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JUL 23 2016

NA PUA MAKANI POWER PARTNERS, LLC
P.O. Box 540
Santa Barbara, CA 93102

June 30, 2016

Scott Glenn, Interim Director
Office of Environmental Quality Control
Department of Health, State of Hawaii
235 S. Beretania Street, Room 702
Honolulu, Hawaii 96813

Russell Tsuji, Administrator
Land Division
Department of Land and Natural Resources, State of Hawaii
1151 Punchbowl Street
Honolulu, Hawaii 96813

RECEIVED '16 JUL 6 A8:59 OFC. OF ENVIRONMENTAL QUALITY CONTROL

Dear Interim Director and Approval Agency Official:

With this letter, Na Pua Makani Power Partners, LLC, hereby transmits the Final Environmental Impact Statement for the Na Pua Makani Wind Project located at Tax Map Keys (1)5-6-005:018 (portion); (1)5-6-006:018, 47, 51, 55; and (1)5-6-008:006 (portion) in the Koolauloa District on the island of Oahu for publication of a notice of availability in the next available edition of *The Environmental Notice* and for evaluation for acceptability under Section 11-200-23, Hawaii Administrative Rules.

Also enclosed is a distribution list for verification from OEQC under Section 11-200-20, Hawaii Administrative Rules. Upon receiving verification from OEQC, we will make the Final Environmental Impact Statement available to those identified on the distribution list.

Finally, enclosed is a completed OEQC Publication Form, one copy of the Final Environmental Impact Statement, an Adobe Acrobat PDF file of the same, and an electronic copy of the publication from in MS Word. Simultaneous with this letter, we have submitted the summary of the action in a text file by electronic mail to the OEQC.

If there are any questions, please contact Brita Woeck of Tetra Tech, Inc. at 425-482-7645.

Sincerely,

Mike Cutbirth
President

cc: Brita Woeck, Tetra Tech, Inc.

RECEIVED '16 JUN 30 A8:55 OFC. OF ENVIRONMENTAL QUALITY CONTROL

Enclosures

17-009

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APPLICANT
PUBLICATION FORM

Project Name:	Na Pua Makani Wind Project
Project Short Name:	Na Pua Makani Wind Project
HRS §343-5 Trigger(s):	Use of state lands (use of Department of Land Natural Resources lands and use of State of Hawaii Department of Transportation's right of way)
Island(s):	Oahu
Judicial District(s):	Koolauloa
TMK(s):	TMK (1)5-6-005:018 (portion); (1)5-6-006:018, 47, 51, 55; and (1)5-6-008:006 (portion)
Permit(s)/Approval(s):	1.National Environmental Policy Act EIS from the U.S. Fish and Wildlife Service 2.Incidental Take Permit from the U.S. Fish and Wildlife Service 3.National Historic Preservation Act Section 106, as necessary 4.U.S. Army Corps of Engineers Clean Water Act 401, 402, 404, as necessary 5.Federal Aviation Administration Clearance 6.Incidental Take License from the State Department of Land and Natural Resources /Division of Forestry and Wildlife 7.Clean Water Act Compliance Section 401, 402, 404 from the State Department of Health, as necessary 8.Stream channel Alternation Permit from the State Department of Health, as necessary 9.National Pollution Discharge Elimination System Construction Permit from State Department of Health 10.Community Noise Permit for Construction Activities from State Department of Health 11.Air Quality Permit from State Department of Health, as necessary 12.Purchase Power Agreement by the Public Utilities Commission 13.Lease for or easement right from State Department of Land and Natural Resources for use of state land 14.Use and Occupany Agreement from the State Department of Transportation, as necessary 15.Conditional Use Permit – Minor from City and County of Honolulu 16.Permit to Move Oversized/Overweight Load from State Department of Transportation and City and County of Honolulu 17.Construction and Building permits from City and County of Honolulu
Approving Agency:	Board of Land and Natural Resources
Contact Name, Email, Telephone, Address	Suzanne Case, Chairperson, Department of Land and Natural Resources Kalanimoku Building,1151 Punchbowl Street, Honolulu, Hawaii 96813 (808) 587-0400 dlnr@hawaii.gov
Applicant:	Champlin Oahu Wind Holdings, LLC
Contact Name, Email, Telephone, Address	Mike Cutbirth 2020 Alameda Padre Serra, Suite 105 Santa Barbara, CA 93103 (805) 568-0300 mcutbirth@champlinwind.com
Consultant:	Tetra Tech, Inc.
Contact Name, Email, Telephone, Address	Brita Woeck 737 Bishop St., Suite 2340 Mauka Tower Honolulu, HI 96813 (808) 441-6600 Brita.woeck@tetratech.com

Status (select one)	Submittal Requirements
____ DEA-AFNSI	Submit 1) the approving agency notice of determination/transmittal letter on agency letterhead, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the DEA, and 4) a searchable PDF of the DEA; a 30-day comment period follows from the date of publication in the Notice.
____ FEA-FONSI	Submit 1) the approving agency notice of determination/transmittal letter on agency letterhead, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the FEA, and 4) a searchable PDF of the FEA; no comment period follows from publication in the Notice.
____ FEA-EISPN	Submit 1) the approving agency notice of determination/transmittal letter on agency letterhead, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the FEA, and 4) a searchable PDF of the FEA; a 30-day comment period follows from the date of publication in the Notice.
____ Act 172-12 EISPN ("Direct to EIS")	Submit 1) the approving agency notice of determination letter on agency letterhead and 2) this completed OEQC publication form as a Word file; no EA is required and a 30-day comment period follows from the date of publication in the Notice.
____ DEIS	Submit 1) a transmittal letter to the OEQC and to the approving agency, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the DEIS, 4) a searchable PDF of the DEIS, and 5) a searchable PDF of the distribution list; a 45-day comment period follows from the date of publication in the Notice.
__X__ FEIS	Submit 1) a transmittal letter to the OEQC and to the approving agency, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the FEIS, 4) a searchable PDF of the FEIS, and 5) a searchable PDF of the distribution list; no comment period follows from publication in the Notice.
____ FEIS Acceptance Determination	The approving agency simultaneously transmits to both the OEQC and the applicant a letter of its determination of acceptance or nonacceptance (pursuant to Section 11-200-23, HAR) of the FEIS; no comment period ensues upon publication in the Notice.
____ FEIS Statutory Acceptance	The approving agency simultaneously transmits to both the OEQC and the applicant a notice that it did not make a timely determination on the acceptance or nonacceptance of the applicant's FEIS under Section 343-5(c), HRS, and therefore the applicant's FEIS is deemed accepted as a matter of law.
____ Supplemental EIS Determination	The approving agency simultaneously transmits its notice to both the applicant and the OEQC that it has reviewed (pursuant to Section 11-200-27, HAR) the previously accepted FEIS and determines that a supplemental EIS is or is not required; no EA is required and no comment period ensues upon publication in the Notice.
____ Withdrawal	Identify the specific document(s) to withdraw and explain in the project summary section.
____ Other	Contact the OEQC if your action is not one of the above items.

Project Summary

Provide a description of the proposed action and purpose and need in 200 words or less.

Na Pua Makani Power Partners, LLC (NPMPP), a wholly owned subsidiary of Champlin Oahu Wind Holdings, LLC, (previously Champlin Hawaii Wind Holdings, LLC) proposes to construct and operate the Na Pua Makani Wind Project (Project) near the town of Kahuku on the island of Oahu, Hawaii. The Project would consist of up to 9 wind turbine generators, with a nameplate generating capacity of up to approximately 25 megawatts (MW). The turbine array could include a combination of models from a single manufacturer ranging in dimensions, based on site-specific conditions and setback requirements. Supporting infrastructure for the proposed Project would include access roads, wind turbine assembly lay down areas, overhead transmission and underground electrical collector lines, an on-site substation and an operations and maintenance building and associated storage yard and parking area. The purpose of the proposed Project is to provide clean, renewable wind energy for the island of Oahu.The energy delivered

by the proposed Project would help HECO meet its Renewable Portfolio Standard (RPS), established in HRS § 269-92 and the state of Hawai'i goal of increasing energy independence through the development of additional sources of renewable energy.

FINAL ENVIRONMENTAL IMPACT STATEMENT

NA PUA MAKANI WIND PROJECT AND HABITAT CONSERVATION PLAN

Lead Agency:

Hawaii Department of Land and
Natural Resources
1151 Punchbowl Street
Honolulu, HI 96813

June 2016

NA PUA MAKANI WIND PROJECT AND HABITAT CONSERVATION PLAN

FINAL ENVIRONMENTAL IMPACT STATEMENT

Prepared by

Tetra Tech, Inc.

On behalf of

NĀ PUA MAKANI

Na Pua Makani Power Partners, LLC

Accepting Authority

Board of Land and Natural Resources

Mike Cutbirth
Na Pua Makani Power Partners, LLC

FINAL ENVIRONMENTAL IMPACT STATEMENT
COVER SHEET

Title of Environmental Review:	Final Environmental Impact Statement Na Pua Makani Wind Project and Habitat Conservation Plan
Activity Considered:	Hawaii DLNR's approval of construction and operation of Na Pua Makani Wind Project on state-owned land
Responsible Agencies and Officials:	Ms. Suzanne Case Chairperson Hawaii Department of Land and Natural Resources 1151 Punchbowl Street (808) 587-0400
Contacts:	Russell Tsuji, Administrator Hawaii Department of Land and Natural Resources – Land Division 1151 Punchbowl Street Honolulu, HI 96813 (808) 587-0419
Legal Mandate:	Hawaii Revised Statutes (HRS) Chapter 343
Location of Proposed Action:	Kahuku; Koolauloa District; Oahu, HI
Land Ownership:	Private (Malaekahana Hui West, LLC) State of Hawaii
Tax Map Keys (TMKs):	(1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55 (portions); and (1)5-6-005:018 (portion)
Project Size:	Wind Farm Site - approximately 707 acres (286 hectares) Project Footprint – approximately 46 ac (19 ha)
Applicant:	Na Pua Makani Power Partners, LLC 2020 Alameda Padre Serra, Suite 105 Santa Barbara, CA 93103
Contact:	Mike Cutbirth (805) 568-0300
Final EIS Preparer:	Tetra Tech Inc. 737 Bishop Street, Suite 2340 Honolulu, Hawaii 96813 Contact: Brita Woeck (808) 441-6600

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Acronyms and Abbreviations

AIS	Archaeological Inventory Survey
ALISH	Agricultural Lands of Importance to the State of Hawaii
amsl	above mean sea level
ANSI	American National Standards Institute
APE	Area of Potential Effect
Army	U.S. Department of the Army (U.S. Army)
AST	aboveground storage tank
BMP	Best Management Practice
BO	Biological Opinion
BYU	Brigham Young University
CAA	Clean Air Act
CCD	Census County Division
CDP	Census Designated Places
CEQ	Council on Environmental Quality
Champlin	Champlin/Oahu Wind Holdings, LLC
CFR	Code of Federal Regulations
CIA	Cultural Impact Assessment
CIAA	cumulative impact analysis area
CO_2	carbon dioxide
CWRM	Commission on Water Resource Management
CZM	Coastal Zone Management
CZMA	Coastal Zone Management Act
dB	decibels
dBA	A-weighted decibels
DEFRA	(United Kingdom) Department of Environment, Food & Rural Affairs
DLNR	Hawaii Department of Land and Natural Resources
DOE	U.S. Department of Energy
DOFAW	Division of Forestry and Wildlife
DPP	Department of Planning and Permitting

EA	Environmental Assessment
EIS	Environmental Impact Statement
EISPN	EIS Preparation Notice
EMF	electric and magnetic fields
EMR	electromagnetic radiation
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ESRC	Endangered Species Recovery Committee
FAA	Federal Aviation Administration
FMP	Fire Management Plan
ft/s	feet per second
GET	general excise tax
GHG	greenhouse gas
HAAQS	Hawaii ambient air quality standards
HAR	Hawaii Administrative Rules
HBWS	Honolulu Board of Water Supply
HCP	Habitat Conservation Plan
HDOT	Hawaii Department of Transportation
HECO	Hawaii Electric Company
HEPA	Hawaii Environmental Policy Act
HAR	Hawaii Administrative Rules
HDOH	Hawaii Department of Health
HMWMP	Hazardous Materials and Wastes Management Plan
HRHP	Hawai'i Register of Historic Places
HRS	Hawaii Revised Statutes
IAL	Important Agricultural Lands
IS	infrasound
ITL	Incidental Take License
ITP	Incidental Take Permit
IUCN	International Union for Conservation of Nature and Natural Resources

JEDI	Jobs and Economic Development Impacts
KLOA	Kawailoa Training Area
KMPW	Koolauloa Mountains Watershed Partnership
kph	kilometers per hour
KTA	Kahuku Training Area
kV	kilovolt
LFN	low frequency noise
LSB	Land Study Bureau
m/s	meters per second
MBTA	Migratory Bird Treaty Act
met	meteorological
mgd	million gallons per day
MOVES	Motor Vehicle Emission Simulator
mph	miles per hour
MW	megawatts
MWh	megawatt hours
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NFWF	National Fish and Wildlife Foundation
NHPA	National Historic Preservation Act
NOI	Notice of Intent
NONROAD	Non-road Engines Equipment and Vehicles
NO_x	nitrogen oxide
NPMPP	Na Pua Makani Power Partners, LLC
NRCS	Natural Resources Conservation Service
NRHP	National Historic Preservation Act
NSA	noise-sensitive area
NWI	National Wetland Inventory
NWR	National Wildlife Refuge
OEQC	Office of Environmental Quality Control

OHWM	ordinary high water mark
O&M	operation and maintenance
ROW	right-of-way
PCMM	post-construction mortality monitoring
PCMP	Post Construction Monitoring Plan
PM_{10}	inhalable particulate matter
$PM_{2.5}$	fine particulate matter
PPA	power purchase agreement
Project	Na Pua Makani Wind Farm Project
PV	photovoltaic
ROD	Record of Decision
RPS	Renewable Portfolio Standard
SBER	Schofield Barracks East Range
SCADA	supervisory control and data acquisition
SHPD	Hawaii State Historic Preservation Division
SHPO	State Historic Preservation Officer
SMA	Special Management Area
SO_2	sulfur dioxide
SPCC	Spill Prevention, Containment, and Countermeasures
SWPPP	Storm Water Pollution Prevention Plan
TESC	Temporary Erosion and Sediment Control
TMK	Tax Map Key
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WoUS	Waters of the United States
WTG	wind turbine generator
WTS	Wind Turbine Syndrome

EXECUTIVE SUMMARY

This Environmental Impact Statement (EIS) for the Na Pua Makani Wind Project (Project) has been prepared pursuant to Hawaii Environmental Policy Act (HEPA) (Chapter 343 of the Hawaii Revised Statutes [HRS]). The Project would be partially located on State of Hawaii lands, triggering environmental review under HEPA. Therefore, the Hawaii Department of Land and Natural Resources (DLNR) serve as the lead agencies for this EIS. A portion of the proposed Project's transmission line would occur within the State of Hawaii Department of Transportation right-of-way, which is also a trigger for environmental review under HEPA and is addressed through this EIS. The purpose of this document is to inform the public and the permitting agencies about the potential adverse and beneficial environmental impacts of the construction and operation of the proposed Project (the Proposed Action), and to recommend mitigation measures that will avoid or reduce significant adverse impacts to the maximum extent possible.

The purpose of the proposed Project is to provide clean, renewable wind energy for the island of Oahu. The proposed Project would provide economic benefits by contributing to the local economy, generating new jobs, and providing a stable, long-term source of tax revenue for the state and county. The power generated by the wind farm would be sold to the Hawaiian Electric Company (HECO) under a long-term, fixed base price contract with fixed annual escalation providing long-term price stability for consumers. The energy delivered by the proposed Project would help HECO meet its Renewable Portfolio Standard (RPS), established in HRS § 269-92, and the State of Hawai'i goal of increasing energy independence through the development of additional sources of renewable energy. To accomplish this purpose, NPMPP proposes to construct and operate a new wind farm on state and private lands near the town of Kahuku, adjacent to the existing Kahuku Wind Farm with a net generating capacity of up to approximately 25 megawatts (MW).

The original Draft EIS considered a Proposed Action of up to 10 wind turbines. In response to public comments on the original Draft EIS, a Modified Proposed Action Option (consisting of only nine turbines with larger generating capacities and dimensions) was added to the Second Draft EIS analysis. The Project would also include an underground electrical collection system, an onsite substation, an operations and maintenance (O&M) facility and related infrastructure, access roads, an approximately 0.8-mile (1.2 kilometer) 34.5-kilovolt HECO-owned transmission line, and a permanent meteorological tower. Because the proposed Project could potentially impact species listed under the Federal ESA, NPMPP is preparing a joint Federal and State Habitat Conservation Plan (HCP) to accompany its application for an Incidental Take Permit (ITP) from the U.S. Fish and Wildlife Service (USFWS), and an Incidental Take License (ITL) from the Hawaii Department of Land and Natural Resources (DLNR) Division of Forestry and Wildlife (DOFAW) under Hawaii Revised Statute (HRS) Section 195D.

The EIS addresses alternatives to the Proposed Action (and Modified Proposed Action Option), including the No Action Alternative and a larger generation facility of up to approximately 42 MW (Alternative 3). Under the No Action Alternative, the Project would not be constructed. Under the No Action Alternative, Project objectives listed in Chapter 1 would not be met. However, this

alternative establishes a baseline against which the action alternatives can be compared. Alternative 3 (larger generation facility) would involve the construction and operation of up to 12 turbines and associated infrastructure, constructed in two phases. Alternatives that were eliminated from further consideration include smaller (less than 25 MW) and larger (more than 42 MW) facilities, alternative locations on Oahu, and other alternative renewable energy sources. These preliminary alternatives were subsequently dismissed if it was determined they did not meet the Project's Purpose and Need or the Project's objectives, described in Chapter 1 of this EIS.

The original Draft EIS was prepared and published as a joint state/federal document meeting HEPA and National Environmental Policy Act (NEPA) requirements. Due to differences in procedural requirements, the HEPA and NEPA processes have diverged and will continue along separate paths, with this EIS fulfilling requirements under HEPA. The NEPA Final EIS has been published under separate cover. Where information supports the analysis or provides additional context, reference to the NEPA process has been retained.

BENEFICIAL AND ADVERSE IMPACTS

NPMPP completed desktop and field-based analyses for biological, cultural, visual, air, noise, traffic, and shadow flicker to assess the potential effects of the Project. Table ES-1 summarizes the types of impacts that could result from the proposed Project (Proposed Action), Modified Proposed Action Option, the No Action Alternative, and Alternative 3 which are discussed in further detail in Chapter 4. Where significant impacts were identified as likely or possible, NPMPP developed appropriate measures to avoid, minimize, and mitigate impacts to the maximum extent practicable. In all resource areas evaluated, neither significant cumulative impacts nor secondary impacts would result from construction or operations of the Project.

PROPOSED AVOIDANCE, MINIMIZATION, AND MITIGATION MEASURES

In this EIS, NPMPP evaluated potential impacts to sensitive environmental resources associated with the Project. In many instances, impacts were deemed less than significant. In all cases where significant adverse impacts were identified, NPMPP developed best management practices (BMPs) and mitigation measures that reduced the potential impact level to less than significant, thereby avoiding significant adverse impacts to sensitive environmental resources.

The means by which NPMPP reduced impacts included Project design features such as BMPs to control stormwater runoff and erosion, fugitive dust, and noxious vegetation; development of a Habitat Conservation Plan for protected wildlife species; and development of specific Project-related plans, such as a Fire Management Plan and a Traffic Control Plan. Proposed mitigation measures are described in detail for each resource listed discussed in Chapters 3 and 4 (existing conditions and impacts, respectively) of this EIS.

CONSISTENCY WITH LAND USE POLICIES AND PLANS

This EIS takes into account the state and local land use policies and plans that apply to the analysis area. The State Land Use Law (HRS § 205-2) allows for wind-generated energy production for

public, private, and commercial use. The Project is on the inland side of Kamehameha Highway and would not include any development within the SMA or in the Shoreline Setback Area.

The City and County of Honolulu General Plan is the guiding document for long-range development of the Island of Oahu. The General Plan, currently being updated, describes general conditions to be sought over the 20-year planning horizon and outlines policies to help direct attainment of the plan's objectives. Themes of the General Plan include supporting programs and projects that contribute to the attainment of energy self-efficiency on Oahu and developing and applying new, locally available energy resources. The Project is consistent with the General Plan goals, policies, and objectives.

The City and County of Honolulu is divided into eight regional areas, each guided by a Sustainable Communities Plan (SCP). The Project is located within the boundaries of the Koolau Loa SCP, which designates the Project Area for agricultural, military, and rural residential use. The Project components are predominantly designated agricultural where wind energy facilities are permitted uses. Chapter 5 of this EIS evaluates the land use policies and plans that would be affected by the Project.

OTHER CHAPTER 343 TOPICS

Wind energy is an abundant, infinitely renewable resource. Generation and integration of wind energy into the electric grid decreases fossil fuel consumption, thereby reducing GHG emissions, particulate-related health effects, and other forms of pollution associated with coal or diesel fuel electric generation. Power generated from the Project would provide greater security in maintaining an energy supply and reduce State expenditures on imported fossil fuels, and provide long-term price stability for HECO consumers. Furthermore, the proposed Project would provide economic benefits by contributing to the local economy, generating new jobs, and providing a stable, long-term source of tax revenue for the state and county.

The Project is compatible with existing agricultural uses, and as such, does not preclude the present and future agricultural productivity of the Wind Farm site or the Kahuku area. At the end of the approximately 20-year life of the Project, the Power Purchase Agreement could be renegotiated or the Project could be decommissioned, returning the land to its original condition to the extent possible.

Construction and operations of the Project would require the use of non-renewable resources for the manufacturing of the Project components, construction materials, and fuel consumed during the construction and operations of the Project. However, to the extent feasible, wastes generated during construction and operation would be recycled.

Relatively minor impacts would occur to non-native vegetation, wildlife habitat, soils, hydrology, agricultural lands, and public services, in association with construction (e.g., ground disturbance) and operation of the project. The Project would not pose a long-term risk to health and safety of workers or residents in the vicinity. Once in operation, the Project would not cause any emissions of air, water, or soil pollutants, and the potential for release of hazardous materials during

construction would be limited by the implementation of appropriate construction best management systems and practices.

There is a potential for adverse impacts to threatened and endangered wildlife species. Approval of the HCP and issuance of the ITP/ITL would authorize incidental take of the Covered Species. Avoidance, minimization, and mitigation measures outlined in the HCP would reduce these biological resources impacts to below a level of significance. However, the incidental take of Covered Species would comprise a small, but irreversible, environmental change associated with implementation of any action alternative.

RATIONALE FOR PROCEEDING

The Project would provide clean, renewable wind energy for the island of Oahu, and would assist HECO in meeting Hawaii's RPS requirements. The Project would diversify Oahu's power supply, and contribute to the State's energy independence and security.

PARTIES CONSULTED

In May 2013, NPMPP began holding community meetings, small focus group meetings with stakeholders, and individual meetings with community leaders and legislators to discuss the proposed Project and engage the public in the Project's planning and design. Stakeholders consulted before and during the development of the environmental impact statement preparation notice (EISPN), Notice of Intent (NOI), and Draft EIS are listed in Chapter 7. The NOI was published in the federal register on November 5, 2013, initiating the federal scoping period (November 5 to December 5, 2013). The EISPN was distributed to federal, state, and local agencies; federal and state legislators; businesses and community organizations; libraries; and other interested parties for review between December 23, 2013, and January 23, 2014, and again between November 8 and December 8, 2014 (republished to reflect the addition of a second access into the Project). A media advisory notice was published in advance of the public meetings held in Kahuku, Hawaii, during the NEPA and HEPA comment periods. A total of 82 comment submissions were received during the comment periods.

The original joint NEPA/HEPA Draft EIS was published in the Office of Environmental Quality Control's (OEQC) *The Environmental Notice* on June 8, 2015, and a Notice of Availability of the Draft EIS was published June 12, 2015, in the Federal Register by USFWS (80 FR 33535-33537) and also on the same date by the USEPA (80 FR 33519). Public comments were accepted during the 45-day and 60-day State and Federal public comment periods, respectively. A public open-house meeting was held during the comment periods on June 23, 2015, in Kahuku, Hawaii. A total of 90 Draft EIS comment letters or emails were received from public agencies, environmental organizations, interested citizens, and others during the public comment periods. Comments received were incorporated into, and resulted in some modifications to this EIS. Responses to substantive comments on the original Draft EIS and Draft HCP can be found in Appendix M of this EIS.

Due to procedural differences between the NEPA and HEPA environmental review processes, a HEPA Second Draft EIS was published in *The Environmental Notice* on April 23, 2016, to provide an additional opportunity for the public to comment on project design changes that were made

subsequent to the publication of the original Draft EIS. Public comments were accepted during another 45-day public comment period. A public open-house meeting was held on May 25, 2016, in Kahuku, Hawaii. A total of 56 comment letters, emails, or public testimonies were received from public agencies, interested citizens, and others during the public comment period on the Second Draft EIS. Responses to substantive comments on the Second Draft EIS can be found in Appendix M of this EIS.

Table ES-1. Summary of Impacts by Alternative

Resource	Alternative 1: No Action	Alternative 2: Proposed Action (8 to 10 Turbine Wind Project)	Alternative 2a: Modified Proposed Action Option (Up to 9 Turbines with Greater Generating Capacity and Larger Dimensions)	Alternative 3: Larger Generation Wind Project (Up to 12 Turbine Wind Project)
Geology and Soils	No effect	ITP/HCP Implementation: Minor short-term soil disturbance during implementation of mitigation measures; minimized through implementation of standard BMPs. Na Pua Makani Wind Project: Minor short-term ground disturbance during construction (89.0 acres [36.0 hectares]), minor long-term ground disturbance during operation (59.9 acres [24.2 hectares]). Up to 26.1 acres (10.6 hectares) Prime Agricultural Lands impacted during construction; 12.6 acres (5.1 hectares) impacted over the long-term (approximately 5 percent of Prime Agricultural Lands in wind farm site). Potential for increased erosion and stormwater runoff/drainage impacts. Impacts minimized through implementation of standard Best Management Practices (BMPs) (Temporary Erosion and Sediment Control (TESC) and Stormwater Pollution Prevention (SWPP) plans), Project site design features, revegetation and regrading of temporarily disturbed areas, and Project facility maintenance.	ITP/HCP Implementation: Same as Alternative 2. Na Pua Makani Wind Project: Minor short-term ground disturbance during construction (84.5 acres [34.2 hectares]), minor long-term ground disturbance during operation (56.7 acres [22.9 hectares]). Up to 21.7 acres (8.8 hectares) Prime Agricultural Lands impacted during construction; 9.4 acres (3.8 hectares) impacted over the long-term (approximately 4 percent of Prime Agricultural Lands in wind farm site). Potential for increased erosion and stormwater runoff/drainage impacts. Measures for avoiding and minimizing impacts same as Alternative 2.	ITP/HCP Implementation: Same as Alternative 2. Na Pua Makani Wind Project: Minor short-term ground disturbance during construction (98.6 acres [39.9 hectares]); minor long-term ground disturbance during operation (69.8 acres [28.2 hectares]). Up to 35.7 acres (14.5 hectares) of Prime Agricultural Lands impacted by construction; 22.4 acres (9.0 hectares) impacted over the long-term (approximately 9 percent of the Prime Agricultural Lands in wind farm site). Potential for increased erosion and stormwater runoff/drainage impacts. Measures for avoiding and minimizing impacts same as Alternative 2.

Table ES-1. Summary of Impacts by Alternative (continued)

Resource	Alternative 1: No Action	Alternative 2: Proposed Action (8 to 10 Turbine Wind Project)	Alternative 2a: Modified Proposed Action (Up to 9 Turbines with Greater Generating Capacity and Larger Dimensions)	Alternative 3: Larger Generation Wind Project (Up to 12 Turbine Wind Project)
Hydrology and Water Resources	No effect.	ITP/HCP Implementation: Negligible impacts to surface and groundwater during implementation of mitigation measures; impacts minimized through implementation of standard BMPs. Na Pua Makani Wind Project: Final Project design will avoid impacts to surface water features to extent possible. Minor, localized, temporary adverse surface water quality impacts due to ground disturbance, use of hazardous materials, and creation of impervious surfaces (approx. 10.1 acres [4.1 hectares]). Net increase in stormwater runoff of approx. 11.9 cubic feet per second (cfs). Impacts minimized through implementation of standard BMPs (TESC, SWPP, and Spill Prevention, Containment, and Countermeasures [SPCC] plans) and Project design. No measurable reduction in quantity or quality of ground water.	ITP/HCP Implementation: Same as Alternative 2 Na Pua Makani Wind Project: Final Project design will avoid impacts to surface water features to extent possible. Minor, localized, temporary adverse surface water quality impacts, similar to Alternative 2. Approximately 9.1 acres (3.7 hectares) of impervious or semi-pervious surfaces created. Estimated net increase in stormwater runoff of 10.9 cfs. No measurable reduction in quantity or quality of ground water. Measures for avoiding and minimizing impacts same as Alternative 2.	ITP/HCP Implementation: Same as Alternative 2 Na Pua Makani Wind Project: Minor, localized, temporary adverse surface water impacts, similar to Alternative 2. Approximately 11.1 acres (4.5 hectares) of impervious or semi-pervious surfaces created. Estimated net increase in stormwater runoff of 13.0 cfs. No measurable reduction in quantity or quality of ground water. Measures for avoiding and minimizing impacts same as Alternative 2.

Table ES-1. Summary of Impacts by Alternative (continued)

Resource	Alternative 1: No Action	Alternative 2: Proposed Action (8 to 10 Turbine Wind Project)	Alternative 2a: Modified Proposed Action (Up to 9 Turbines with Greater Generating Capacity and Larger Dimensions)	Alternative 3: Larger Generation Wind Project (Up to 12 Turbine Wind Project)
Air Quality and Climate	No adverse or beneficial effects.	ITP/HCP Implementation: Negligible impacts to air quality and climate. Na Pua Makani Wind Project: Minor, temporary adverse air quality impacts due to greenhouse gas emissions, air pollutants, and generation of fugitive dust during construction; minimized through standard BMPs; negligible construction-related effects to climate change. Long-term beneficial effect on air quality and climate during operation due to reduction in fossil fuel consumption; reduction of carbon dioxide (CO_2) emissions by 54,780 metric tons a year as compared to oil burning facility of comparable power.	ITP/HCP Implementation: Same as Alternative 2. Na Pua Makani Wind Project: Impacts similar to Alternative 2, with slightly reduced amount of air pollutant emissions and fugitive dust levels associated with construction due to the decrease in the number of turbines. Negligible construction-related effects to climate change. Long-term beneficial effect on air quality and climate during operation due to reduction in fossil fuel consumption. Reduction of 54,780 metric tons of CO_2 emissions per year as compared to oil burning facility of comparable power.	ITP/HCP Implementation: Same as Alternative 2. Na Pua Makani Wind Project: Impacts similar to Alternative 2, with additional minor, temporary adverse air quality impacts due to greenhouse gas emissions, air pollutants, and fugitive dust during construction of additional turbines; negligible construction-related effects to climate change. Long-term beneficial effect on air quality and climate during operation due to reduction in fossil fuel consumption. Reduction of 92,076 metric tons of CO_2 emissions per year as compared to oil burning facility of comparable power.
Noise	No effect.	ITP/HCP Implementation: Negligible noise impacts. Na Pua Makani Wind Project: Minor, localized, temporary noise impacts during construction; Project would comply with Hawaii Department of Health (DOH) permit. Minor, localized, long-term increase in noise during operation; would comply with HAR 11-46 sound level limits. Negligible low frequency noise/infrasound impacts.	ITP/HCP Implementation: Same as Alternative 2. Na Pua Makani Wind Project: Noise similar to Alternative 2. Minor, localized, temporary noise impacts during construction (impacts would occur again during construction of additional turbines). Minor, localized, long-term increase in noise during operation; would comply with HAR 11-46 sound level limits. Negligible low frequency noise/infrasound impacts.	ITP/HCP Implementation: Same as Alternative 2. Na Pua Makani Wind Project: Noise similar to Alternative 2. Minor, localized, temporary noise impacts during construction (impacts would occur again during construction of additional turbines). Minor, localized, long-term increase in noise during operation; would comply with HAR 11-46 sound level limits. Negligible low frequency noise/ infrasound impacts.

Table ES-1. Summary of Impacts by Alternative (continued)

Resource	Alternative 1: No Action	Alternative 2: Proposed Action (8 to 10 Turbine Wind Project)	Alternative 2a: Modified Proposed Action (Up to 9 Turbines with Greater Generating Capacity and Larger Dimensions)	Alternative 3: Larger Generation Wind Project (Up to 12 Turbine Wind Project)
Hazardous and Regulated Materials and Wastes	No effect.	ITP/HCP Implementation: Negligible impacts with implementation of BMPs. Na Pua Makani Wind Project: Minor, localized, temporary risk of impacts from routine transport, use, storage, and disposal of hazardous materials; accidental spills and release of hazardous materials; exposure of workers to chemicals in excess of Occupational Safety and Health Administration (OSHA) limits and disturbance to existing contamination. Impacts minimized through BMPs (SPCC plan, Hazardous Materials and Wastes Management Plan (HMWMP), and Site Safety Handbook). Very low risk of vandalism at site due to site security.	ITP/HCP Implementation: Same as Alternative 2. Na Pua Makani Wind Project: Impacts similar to Alternative 2. Measures to minimize impacts same as under Alternative 2.	ITP/HCP Implementation: Same as Alternative 2. Na Pua Makani Wind Project: Impacts similar to Alternative 2. Additional construction phase would result in potential for additional minor, localized, temporary adverse impacts from transport of hazardous materials, accidental releases or spills, worker exposure, and would increase the amount of solid waste generated. Measures to minimize impacts same as under Alternative 2.
Natural Hazards	No effect.	ITP/HCP Implementation: Negligible impacts due to implementation of project Fire Management Plan. Na Pua Makani Wind Project: Negligible to minor impacts to construction and operation. Impacts from natural hazards minimized through project design features and implementation of FMP and Site Safety Handbook.	ITP/HCP Implementation: Same as Alternative 2. Na Pua Makani Wind Project: Impacts from natural hazards same as described for Alternative 2.	ITP/HCP Implementation: Same as Alternative 2. Na Pua Makani Wind Project: Impacts from natural hazards same as described for Alternative 2.

Table ES-1. Summary of Impacts by Alternative (continued)

Resource	Alternative 1: No Action	Alternative 2: Proposed Action (8 to 10 Turbine Wind Project)	Alternative 2a: Modified Proposed Action (Up to 9 Turbines with Greater Generating Capacity and Larger Dimensions)	Alternative 3: Larger Generation Wind Project (Up to 12 Turbine Wind Project)
Vegetation	No effect.	ITP/HCP Implementation: Negligible impacts to vegetation from implementation of mitigation activities; long-term beneficial effects to vegetation associated with forest restoration. Na Pua Makani Wind Project: Minor, localized, temporary and long-term effects associated with vegetation removal (primarily non-native species). Approximately 89.0 acres (36.0 hectares) affected during construction, of which 59.9 acres (24.2 hectares) affected over the long-term in association with Project facilities. Potential for indirect impacts (fire, invasive plants) minimized through implementation of BMPs (TESC plan, FMP); revegetation of temporarily disturbed areas; and invasive species prevention measures.	ITP/HCP Implementation: Same as Alternative 2. Na Pua Makani Wind Project: Impacts to vegetation similar to Alternative 2. Approximately 84.5 acres (34.2 hectares) of vegetation removal during construction, including 56.7 acres (22.9 hectares) impacted over the long term. Measures to minimize impacts same as under Alternative 2.	ITP/HCP Implementation: Same as Alternative 2. Na Pua Makani Wind Project: Impacts to vegetation similar to Alternative 2. Approximately 98.6 acres (39.9 hectares) of vegetation removal during construction, including 69.6 acres (28.2 hectares) impacted over the long-term. Measures to minimize impacts same as under Alternative 2.

Table ES-1. Summary of Impacts by Alternative (continued)

Resource	Alternative 1: No Action	Alternative 2: Proposed Action (8 to 10 Turbine Wind Project)	Alternative 2a: Modified Proposed Action (Up to 9 Turbines with Greater Generating Capacity and Larger Dimensions)	Alternative 3: Larger Generation Wind Project (Up to 12 Turbine Wind Project)
Wildlife	No beneficial effects from habitat restoration and management efforts in the mitigation areas. No adverse effects associated with the wind farm.	ITP/HCP Implementation: Negligible adverse effects; long-term beneficial effects due to habitat restoration and management activities. Na Pua Makani Wind Project: Minor, localized habitat removal (no high quality or unique habitats); collision potential; and temporary noise and disturbance associated with construction and operation activities. Common, non-native species most likely impacted, although collision potential exists for MBTA-protected and other avian species of concern. Impacts would be avoided or minimized through implementation of the HCP.	ITP/HCP Implementation: Same as Alternative 2. Na Pua Makani Wind Project: Impacts similar to Alternative 2. Measures to minimize impacts same as under Alternative 2.	ITP/HCP Implementation: Same as Alternative 2. Na Pua Makani Wind Project: Impacts similar to Alternative 2, but additional impacts associated with construction and operation of additional turbines. Measures to minimize impacts same as under Alternative 2.

Table ES-1. Summary of Impacts by Alternative (continued)

Resource	Alternative 1: No Action	Alternative 2: Proposed Action (8 to 10 Turbine Wind Project)	Alternative 2a: Modified Proposed Action (Up to 9 Turbines with Greater Generating Capacity and Larger Dimensions)	Alternative 3: Larger Generation Wind Project (Up to 12 Turbine Wind Project)
Threatened and Endangered Species	No adverse effect. No beneficial effect associated with implementation of Project HCP mitigation measures.	ITP/HCP Implementation: Negligible adverse effects associated with HCP implementation. Long-term beneficial effects associated with the protection (fence installation or maintenance) and/or enhancement (invasive plant species control and feral pig removal) of native ecosystems, reduction in predation pressure (predator control), and/or through research and management. Overall net benefit to Covered Species from implementation of the HCP. Na Pua Makani Wind Project: Potential for collision with turbines; impacts considered negligible due to the net benefit of HCP mitigation activities (i.e., no population level effects anticipated). Requested take of Covered Species: Hawaiian hoary bat: Tier 1: 34 bats; Tier 2: 51 bats (tiers not additive; total take requested is 51 bats); mitigation consists of funding of bat research study and habitat restoration at Poamoho Ridge Mitigation Area. Newell's shearwater: 4 adults/fledged young, 2 chicks/eggs: mitigation consists of funding to support research and management of Newell's shearwaters. Hawaiian Goose: 6 adults; mitigation consists of constructing protective fencing at James Campbell NWR. Waterbirds: 4 Hawaiian duck adults, 4 Hawaiian stilt adults, 8 Hawaiian coot adults, 8 Hawaiian moorhen adults; mitigation consists of installation of fence and public information signs and funding of part-time biologist at Hamakua Marsh Mitigation Area. Hawaiian short-eared owl: 4 adults/fledged young, 4 chicks/eggs; mitigation consists of funding to support research and management of Hawaiian short-eared owls.	ITP/HCP Implementation: Same as Alternative 2. Na Pua Makani Wind Project: Impacts are the same under the Proposed Action and Modified Proposed Action Option; the final HCP incorporates a wind project of nine larger turbines with greater generating capacities.	ITP/HCP Implementation: Same as Alternative 2. Na Pua Makani Wind Project: Impacts similar to Alternative 2. Increased risk of injury or mortality from construction and operation of additional turbines and associated facilities. Prior to the construction of the additional turbines proposed under Alternative 3, NPMPP would reopen consultation with the USFWS and DOFAW to assess the potential impacts of the additional turbines to listed species and develop appropriate mitigation measures.

Table ES-1. Summary of Impacts by Alternative (continued)

Resource	Alternative 1: No Action	Alternative 2: Proposed Action (8 to 10 Turbine Wind Project)	Alternative 2a: Modified Proposed Action (Up to 9 Turbines with Greater Generating Capacity and Larger Dimensions)	Alternative 3: Larger Generation Wind Project (Up to 12 Turbine Wind Project)
Socioeconomic Resources	No adverse effects. No beneficial socioeconomic impacts associated with employment or tax revenues that would occur during construction and operation.	ITP/HCP Implementation: Minor beneficial effects associated with short-term and long-term employment associated with implementing mitigation. Na Pua Makani Wind Project: Minor short-term and long-term beneficial socioeconomic impacts through construction expenditures, job creation (approximately 43 short-term construction jobs and 3 to 6 full-time jobs during operation), and tax revenues. Negligible to minor, localized, temporary adverse effects associated demand for housing and community services associated with construction workforce. Adverse effects to property values or ability of homeowners to install rooftop photovoltaic systems on their homes not anticipated. Project would provide source of renewable energy helping Hawaii Electric Company (HECO) meet its Renewable Portfolio Standard (RPS) requirements. Includes long-term Community Benefits Package.	ITP/HCP Implementation: Same as Alternative 2. Na Pua Makani Wind Project: Impacts similar to Alternative 2.	ITP/HCP Implementation: Same as Alternative 2. Na Pua Makani Wind Project: Impacts similar to Alternative 2. Similar, but proportionally smaller beneficial socioeconomic effects from construction of additional turbines. Approximately 34 additional short-term construction jobs and 1 to 2 additional full-time jobs during operation. Additional negligible to minor, localized, temporary adverse effects associated demand for housing and community services associated with construction workforce. Project would provide additional source of renewable energy helping Hawaii Electric Company (HECO) meet its Renewable Portfolio Standard (RPS) requirements.

Table ES-1. Summary of Impacts by Alternative (continued)

Resource	Alternative 1: No Action	Alternative 2: Proposed Action (8 to 10 Turbine Wind Project)	Alternative 2a: Modified Proposed Action (Up to 9 Turbines with Greater Generating Capacity and Larger Dimensions)	Alternative 3: Larger Generation Wind Project (Up to 12 Turbine Wind Project)
Historic, Archaeological, and Cultural Resources	No effect.	ITP/HCP Implementation: Negligible adverse effects; all cultural resources would be avoided. Minor beneficial effect in Hamakua Marsh Mitigation Area due to presence of fence which would reduce trespassing into and littering near archaeological sites. Na Pua Makani Wind Project: Minor, localized, adverse effects to historic and archaeological resources meeting National Historic Preservation Act Criterion D (sites with information potential). Five sites have yielded information (through archaeological survey work) and are no longer eligible for National Register of Historic Places (NRHP) or Hawaii Register of Historic Places (HRHP) listing; no further work recommended for these sites. Three sites recommended as eligible for HRHP listing due to information potential; impacts mitigated through archaeological resources data recovery from these sites. Six sites are recommended for preservation and are potentially eligible for listing on the HRHP or NRHP.. All other archaeological sites within APE will be avoided. Access to the wind farm site would be controlled to avoid any indirect impacts to known archaeological resources associated with vandalism or theft. Negligible effects to traditional cultural uses and practices as none are known in the wind farm site, and there would be no change in mauka/makai (mountain to shoreline) access.	ITP/HCP Implementation: Same as Alternative 2. Na Pua Makani Wind Project: Same as Alternative 2.	ITP/HCP Implementation: Same as Alternative 2. Na Pua Makani Wind Project: Same as Alternative 2.

Table ES-1. Summary of Impacts by Alternative (continued)

Resource	Alternative 1: No Action	Alternative 2: Proposed Action (8 to 10 Turbine Wind Project)	Alternative 2a: Modified Proposed Action (Up to 9 Turbines with Greater Generating Capacity and Larger Dimensions)	Alternative 3: Larger Generation Wind Project (Up to 12 Turbine Wind Project)
Land Use	No effect.	ITP/HCP Implementation: Negligible adverse effects and minor beneficial effects to land use within the mitigation areas. Na Pua Makani Wind Project: Wind energy development is a compatible use on proposed wind farm site lands. Minor, localized short-term and long-term adverse effects to farming activities (approximately 8.2 acres (3.3 hectares) active agriculture affected during construction, of which 4.6 acres (1.8 hectares) would be affected during operation. However, no net loss of active agriculture because NPMPP would work with Malaekahana Hui West, LLC to prepare non-farmed lands within individual farmers lease areas for agricultural production. Minor and intermittent delays of access to nearby land uses may occur due to construction traffic and due to routine maintenance activities during operation. Project in compliance with existing land use plans and policies.	ITP/HCP Implementation: Same as Alternative 2. Na Pua Makani Wind Project: Impacts similar to Alternative 2. Approximately 6.0 acres (2.4 hectares) of active farm land affected during construction, including approximately 2.7 acres (1.1 hectares) affected during operation. However, no net loss of active agriculture because NPMPP and Malaekahana Hui West, LLC would prepare non-farmed lands within individual farmers lease areas for agricultural production.	ITP/HCP Implementation: Same as Alternative 2. Na Pua Makani Wind Project: Impacts similar to Alternative 2. Approximately 13.3 acres (5.4 hectares) of active agriculture affected during construction, including approximately 9.3 acres (3.7 hectares) affected during operation. However, no net loss of active agriculture because NPMPP would work with Malaekahana Hui West, LLC to prepare non-farmed lands within individual farmers lease areas for agricultural production.
Recreation and Tourism	No effect.	ITP/HCP Implementation: Negligible effects to recreation and tourism. Na Pua Makani Wind Project: No loss of recreation opportunities; negligible effects to recreation opportunities associated with Project noise, traffic, and visual effects and changes in recreation and tourism use rates.	ITP/HCP Implementation: Same as Alternative 2. Na Pua Makani Wind Project: Same as Alternative 2.	ITP/HCP Implementation: Same as Alternative 2. Na Pua Makani Wind Project: Similar to Alternative 2. Negligible effects associated with noise and traffic during second construction period.

Table ES-1. Summary of Impacts by Alternative (continued)

Resource	Alternative 1: No Action	Alternative 2: Proposed Action (8 to 10 Turbine Wind Project)	Alternative 2a: Modified Proposed Action (Up to 9 Turbines with Greater Generating Capacity and Larger Dimensions)	Alternative 3: Larger Generation Wind Project (Up to 12 Turbine Wind Project)
Visual Resources	No effect.	ITP/HCP Implementation: Minor, short-term and long-term adverse visual impacts due mitigation activities at Hamakua Marsh and Poamoho Ridge mitigation areas and presence of mitigation fence at Hamakua Marsh, respectively. Na Pua Makani Wind Project: Minor, temporary adverse impacts during construction due to presence of vehicles and equipment and dust. Moderate, long-term adverse impacts due to Project visibility mitigated through design and lighting measures. Project most visible from locations within 1 mile (1.6 kilometers from wind farm site).	ITP/HCP Implementation: Same as Alternative 2. Na Pua Makani Wind Project: Visual impacts similar to Alternative 2; however, Modified Proposed Action Option would include nine larger turbines. Although the larger turbines would create slightly more contrast at each viewpoint, the degree of increased contrast would not be sufficient to result in a change to the contrast rating at any of the viewpoints as compared to Alternative 2. Measures to minimize impacts same as under Alternative 2.	ITP/HCP Implementation: Same as Alternative 2. Na Pua Makani Wind Project: Visual impacts similar to Alternative 2. Two construction periods under Alternative 3, each resulting in similar visual impacts. Measures to minimize impacts same as under Alternative 2.
Transportation	No effect.	ITP/HCP Implementation: Negligible effects to transportation. Na Pua Makani Wind Project: Up to 100 nighttime roundtrips of oversized loads needed during 20 construction days. Average of 144 daytime and 154 nighttime construction-related trips per day. Minor, temporary adverse impact on transportation, minimized through implementation of traffic management plan and permit requirements for oversize and overweight loads. Temporary modifications of overhead utility lines, relocation of traffic lights and guardrails, tree trimming, and asphalt curb removal necessary along construction access routes. Negligible long-term Project-related transportation effects.	ITP/HCP Implementation: Same as Alternative 2 Na Pua Makani Wind Project: Same as Alternative 2.	ITP/HCP Implementation: Same as Alternative 2. Na Pua Makani Wind Project: Impacts similar to Alternative 2. Additional 40 nighttime roundtrips of oversized loads during approximately 8 days of construction for the additional turbines, above roundtrip requirements for first 8 to 10 turbines. Negligible long-term Project-related transportation effects. Measures to minimize impacts same as Alternative 2.

Table ES-1. Summary of Impacts by Alternative (continued)

Resource	Alternative 1: No Action	Alternative 2: Proposed Action (8 to 10 Turbine Wind Project)	Alternative 2a: Modified Proposed Action (Up to 9 Turbines with Greater Generating Capacity and Larger Dimensions)	Alternative 3: Larger Generation Wind Project (Up to 12 Turbine Wind Project)
Public Health and Safety	No effect.	ITP/HCP Implementation: Negligible effects on public health and safety. Na Pua Makani Wind Project: Negligible impacts associated turbine collapse and blade throw, EMF, and stray voltage and minor, long-term impacts associated with fire and fuels; impacts minimized by implementation of mitigation measures, including adherence to industry design standards and implementation of the Site Safety Handbook and other Project plans. Moderate, long-term shadow flicker impacts; 98 percent of receptors predicted to experience below 30 hours of shadow flicker per year (industry standard).	ITP/HCP Implementation: Same as Alternative 2. Na Pua Makani Wind Project: Impacts same as Alternative 2 with the exception of slightly greater shadow flicker at some receptors (97 percent of receptors predicted to experience below 30 hours of shadow per year). Measures to minimize impacts same as Alternative 2.	ITP/HCP Implementation: Same as Alternative 2. Na Pua Makani Wind Project: Impacts similar to Alternative 2. Additional safety issues associated with second construction period under Alternative 3; impacts to public health and safety from additional turbines comparable to Alternative 2. Measures to minimize impacts same as Alternative 2.
Environmental Justice	No effect.	ITP/HCP Implementation: No effect. Na Pua Makani Wind Project: No high and adverse human health or environmental effects anticipated with construction or operation of the Project; all other effects (e.g., visual, noise, public health and safety, socioeconomic) minor to moderate. Because there are no high or adverse effects to any population, there would be no high or adverse effects to any minority or low income population and, therefore, no environmental justice issues resulting from this Project	ITP/HCP Implementation: No effect. Na Pua Makani Wind Project: Same as Alternative 2.	ITP/HCP Implementation: No effect. Na Pua Makani Wind Project: Same as Alternative 2.

Table ES-1. Summary of Impacts by Alternative (continued)

Resource	Alternative 1: No Action	Alternative 2: Proposed Action (8 to 10 Turbine Wind Project)	Alternative 2a: Modified Proposed Action (Up to 9 Turbines with Greater Generating Capacity and Larger Dimensions)	Alternative 3: Larger Generation Wind Project (Up to 12 Turbine Wind Project)
Public Infrastructure and Services	No effect.	ITP/HCP Implementation: No effect. Na Pua Makani Wind Project: Minor short- and long-term adverse effects on public infrastructure and the provision of public services. Minor additional demands for electricity, water, wastewater services, stormwater management, solid waste services, and emergency and health services during construction and operation. Project would provide source of renewable energy helping HECO meet its RPS requirements.	ITP/HCP Implementation: No effect. Na Pua Makani Wind Project: Impacts similar to Alternative 2.	ITP/HCP Implementation: No effect. Na Pua Makani Wind Project: Impacts similar to Alternative 2. Additional, minor demands for electricity, water, wastewater services, stormwater management, solid waste services, and emergency and health services during construction and operation of additional turbines.
Military Interests	No effect.	ITP/HCP Implementation: Negligible impact on military interests. Na Pua Makani Wind Project: No effect from construction. Negligible effects to military interests or the ability of the military to conduct training operations during operation.	ITP/HCP Implementation: Same as Alternative 2. Na Pua Makani Wind Project: Same as Alternative 2.	ITP/HCP Implementation: Same as Alternative 2. Na Pua Makani Wind Project: Same as Alternative 2.

Table ES-1. Summary of Impacts by Alternative (continued)

Resource	Alternative 1: No Action	Alternative 2: Proposed Action (8 to 10 Turbine Wind Project)	Alternative 2a: Modified Proposed Action (Up to 9 Turbines with Greater Generating Capacity and Larger Dimensions)	Alternative 3: Larger Generation Wind Project (Up to 12 Turbine Wind Project)
Agriculture	No effect.	ITP/HCP Implementation: Minor effects on agricultural resources due to post-construction monitoring activities (planting of low growing crops to improve visibility of downed birds and bats). Na Pua Makani Wind Project: Potential for short-term reductions in road access and/or access to irrigation water during construction. Approximately 21.6 acres (8.7 hectares) of land with LSB ratings of A and B (most productive soils); 12.6 acres (5.1 hectares) of Prime Agricultural Land; and 2.9 acres (1.2 hectares) of soils with an NRCS Class II (conducive to agricultural production) rating would be impacted over the long term. No net loss in active agriculture; NPMPP would work with Malaekahana Hui West, LLC to assist farmers in preparing this non-farmed lands for agricultural production	ITP/HCP Implementation: Similar as Alternative 2 with slightly less impacts from post construction monitoring due to fewer wind turbines. Na Pua Makani Wind Project: Impacts similar to Alternative 2. Approximately 18.8 acres (7.6 hectares) of land with LSB ratings of A and B (most productive soils); 9.4 acres (3.4 hectares) of Prime Agricultural Land; and 1.2 acres (0.5 hectares) of soils with an NRCS Class II (conducive to agricultural production) rating would be impacted over the long term. No net loss in active agriculture; mitigation same as Alternative 2.	ITP/HCP Implementation: Same as Alternative 2. Na Pua Makani Wind Project: Impacts similar to Alternative 2. Approximately 30.7 acres (12.4 hectares) of land with LSB ratings of A and B (most productive soils); 22.4 acres (9.0 hectares) of Prime Agricultural Land; and 3.0 acres (1.2 hectares) of soils with an NRCS Class II (conducive to agricultural production) rating would be impacted over the long term. No net loss in active agriculture; mitigation same as Alternative 2.

1.0 PURPOSE AND NEED FOR THE ACTION

1.1 Introduction

This Environmental Impact Statement (EIS) has been prepared pursuant to the Hawaii Environmental Policy Act (HEPA) (Chapter 343 of the Hawaii Revised Statutes [HRS]) and in accordance with Hawaii Administrative Rules (HAR) §11-200. The proposed Na Pua Makani Wind Project (Project) would be partially located on State of Hawaii lands. As such, the construction and operation of the Project constitute an applicant-proposed action requiring review under HEPA. In addition, a portion of the Hawaii Electric Company (HECO)-owned transmission line, which is one component of the proposed Project, will be located within the State of Hawaii Department of Transportation's right of way, which is a second trigger for HEPA environmental review. Therefore, the Hawaii Department of Land and Natural Resources (DLNR) serves as the lead agency for the HEPA environmental review process.

Na Pua Makani Power Partners, LLC (NPMPP), a wholly owned subsidiary of Champlin Oahu Wind Holdings, LLC, proposes to construct and operate the proposed Project near the town of Kahuku on the island of Oahu, Hawaii (Figure 1-1). The proposed Project would consist of wind turbine generators and associated infrastructure, with a nameplate generating capacity of up to approximately 25 megawatts (MW). Because the proposed Project could potentially impact species listed under the Federal ESA, NPMPP is preparing a joint Federal and State Habitat Conservation Plan (HCP) to accompany its application for an Incidental Take Permit (ITP) from the U.S. Fish and Wildlife Service (USFWS), and an Incidental Take License (ITL) from the Hawaii Department of Land and Natural Resources (DLNR) Division of Forestry and Wildlife (DOFAW) under Hawaii Revised Statute (HRS) Section 195D. The purpose of the HCP is to ensure that measures to minimize and mitigate the adverse effects of the applicant's proposed action on the Covered Species are adequate.

The DLNR will use this EIS in consideration of NPMPP's need to obtain a commercial lease from the DLNR Land Division authorizing commercial operation of a wind project on State of Hawaii lands and installing a portion of the HECO-owned transmission lines within the State of Hawaii, Department of Transportation's right-of-way. Because operation of the proposed Project requires an ITP /ITL from USFWS and DOFAW, respectively, this EIS evaluates the potential impacts related to the construction and operation of the proposed Project as well as the potential impacts associated with the issuance of the ITP/ITL and implementation of the associated HCP.

The original Draft EIS, published on June 8, 2015 in *The Environmental Notice*, was prepared as a joint Federal and State document in accordance with HRS Chapter 343 and HAR §11-200-25 and with NEPA implementing regulations, specifying that federal agencies shall cooperate with State and local agencies to the fullest extent possible, including by preparing joint State-Federal EISs, to avoid duplication between NEPA and comparable State requirements (40 Code of Federal

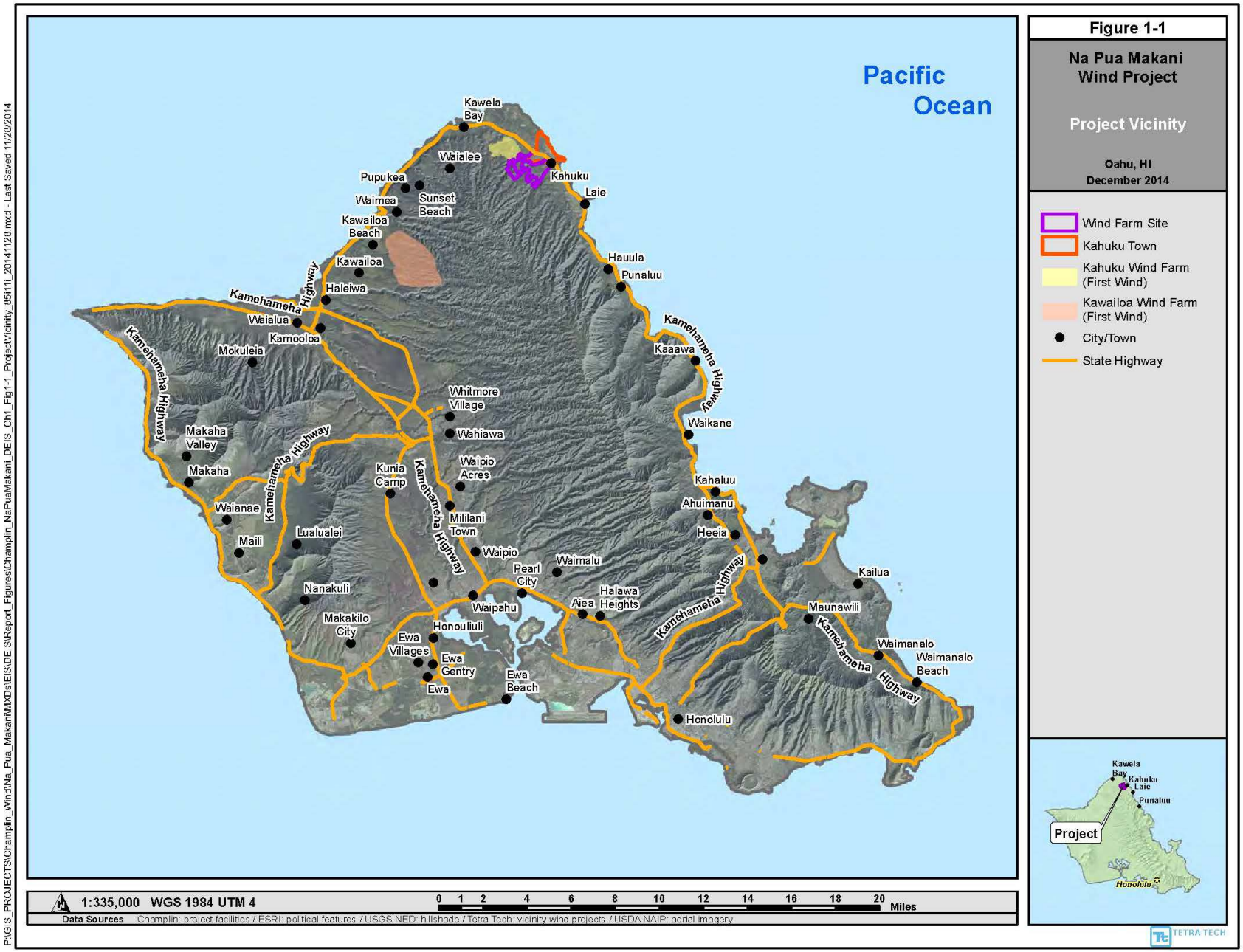
Figure 1-1
Na Pua Makani Wind Project
Project Vicinity
Oahu, HI
December 2014
Wind Farm Site
Kahuku Town
Kahuku Wind Farm (First Wind)
Kawailoa Wind Farm (First Wind)
City/Town
State Highway
Pacific Ocean
Kawela Bay
Waialee
Kahuku
Laie
Pupukea
Waimea
Sunset Beach
Kawailoa Beach
Kawailoa
Haleiwa
Hauula
Punaluu
Kamehameha Highway
Waialua
Kamooloa
Mokuleia
Kaaawa
Whitmore Village
Wahiawa
Waikane
Makaha Valley
Makaha
Waianae
Maili
Lualualei
Kunia Camp
Waipio Acres
Mililani Town
Waipio
Waimalu
Pearl City
Kahaluu
Ahuimanu
Heeia
Kailua
Nanakuli
Makakilo City
Waipahu
Aiea
Halawa Heights
Honouliuli
Ewa Villages
Ewa Gentry
Ewa
Ewa Beach
Maunawili
Waimanalo
Waimanalo Beach
Honolulu
Project
1:335,000 WGS 1984 UTM 4
0 1 2 4 6 8 10 12 14 16 18 20 Miles
Data Sources Champlin: project facilities / ESRI: political features / USGS NED: hillshade / Tetra Tech: vicinity wind projects / USDA NAIP: aerial imagery
P:\GIS_PROJECTS\Champlin_Wind\Na_Pua_Makani\MXDs\EIS\DEIS\Report_Figures\Champlin_NaPuaMakani_DEIS_Ch1_Fig1-1_ProjectVicinity_85i11_20141128.mxd - Last Saved 11/28/2014
TETRA TECH

Regulations [CFR] § 1506.2). The USFWS, as the federal lead agency, is using the environmental review process to evaluate the effects of issuing an ITP pursuant to Section 10(a)(1)(B) of the Endangered Species Act of 1973, as amended (16 U.S.C. §1531 *et sec*, 1539) for activities associated with the proposed Project. Due to differences in procedural requirements, the HEPA and NEPA processes have diverged and will continue along separate paths, with this ~~Second Draft~~ EIS fulfilling procedural requirements under HEPA. A NEPA Final EIS was published under separate cover. Where information supports the analysis or provides additional context, reference to the NEPA process has been retained.

1.2 Project Description and Location

The proposed Project is located in the Koolauloa District, west of the town of Kahuku in the City and County of Honolulu. It includes portions of two parcels (Tax Map Key [TMK] 5-6-008:006 and 5-6-006:018) which would be leased from the DLNR (approximately 234 acres [95 hectares]) and from the Malaekahana Hui West, LLC (approximately 452 acres [183 hectares], of which approximately 10 acres will be leased over the long term by NPMPP), respectively. Additional parcels would be used to access the Project (TMK 5-6-006: 047, 051, 055, and 5-6-005:018) for which NPMPP has a long-term easement from the Department of Agriculture.

The leased area plus the State-owned access is hereafter referred to as the "wind farm site," consisting of approximately 707 acres (286 hectares). Within the wind farm site, all proposed Project activities would occur within a smaller approximately 464-acre (188-hectare) project area, defined for the purposes of archaeological impact assessment (see Section 3.11 of this EIS for further discussion). This area constitutes the maximum footprint of the Project within which all ground-disturbing activities would occur and which would be occupied by permanent Project facilities. The Project is located adjacent to Kamehameha Highway at its closest point, southwest of the Town of Kahuku (Figure 1-2). It is accessible via local roads off of Kamehameha Highway, and is located east of the existing Kahuku Wind Farm.

The proposed Project is located almost entirely within the State agricultural land use district with only a small portion of the wind farm site (2 acres [1 hectare]) near Kamehameha Highway falling within the State urban land use district. All of the proposed Project facilities are located within the State agricultural land use district. The proposed Project is located within Honolulu County agricultural zoning districts: General Agricultural and Restricted Agricultural. Higher elevations of the wind farm site occur on vegetated ridges not actively used for agriculture; lower elevations occur on cultivated lands. The area as a whole is highly fragmented habitat used for agriculture, with a wide array of crops being cultivated by lessees and private landowners. Some of the area is also fallow agricultural lands.

The proposed Project, as considered in the original Draft EIS, would consist of up to 10 turbines, each with a generating capacity of up to 3.3 MW. NPMPP is currently considering newer turbine models from leading turbine manufacturers including Siemens, Vestas, and GE. The turbine array could include a combination of models from a single manufacturer ranging in generating capacity and dimensions. NPMPP would select the most appropriate turbines for the site-specific conditions

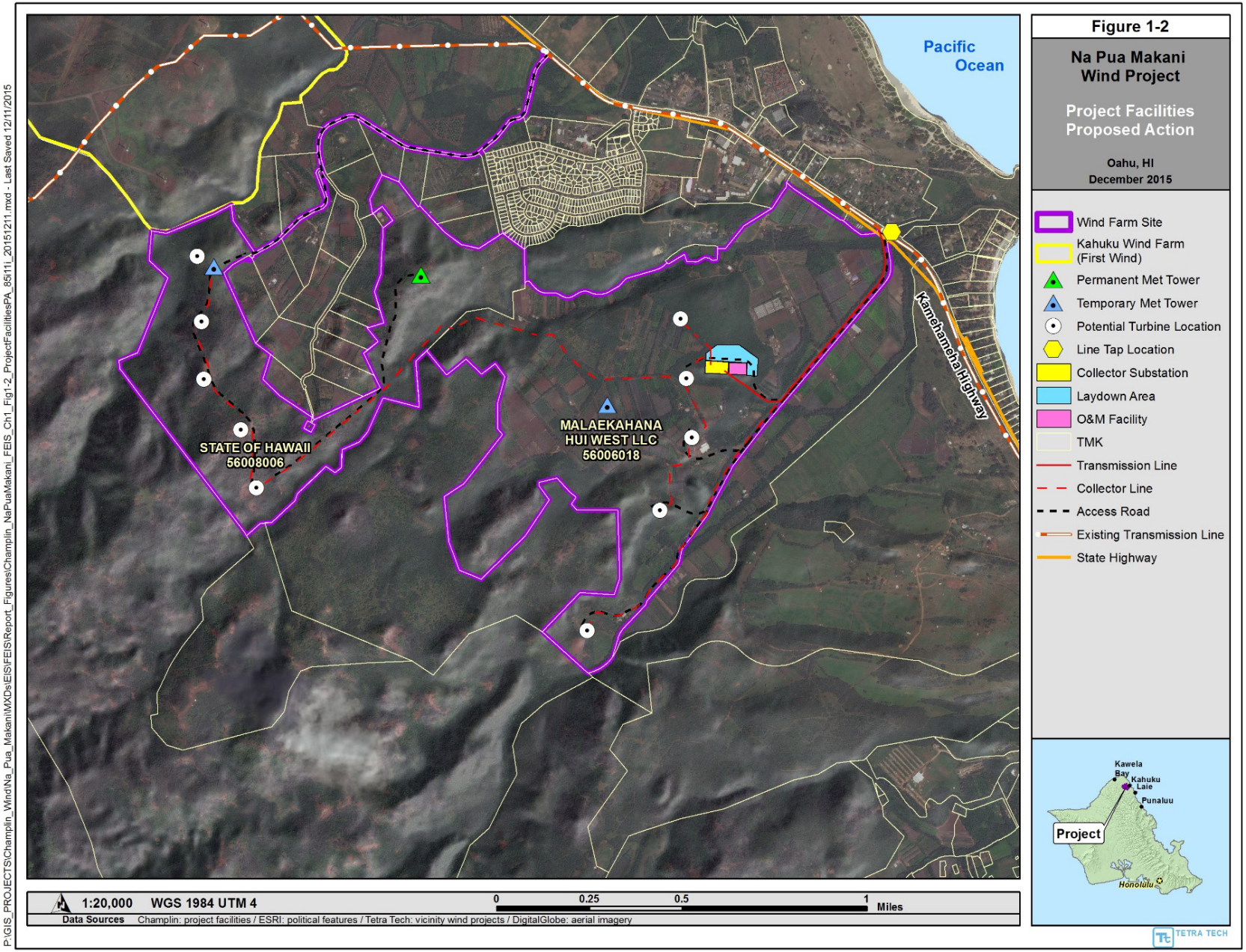
Figure 1-2
Na Pua Makani Wind Project
Project Facilities Proposed Action
Oahu, HI
December 2015
Pacific Ocean
Kamehameha Highway
STATE OF HAWAII 56008006
MALAEKAHANA HUI WEST LLC 56006018
Wind Farm Site
Kahuku Wind Farm (First Wind)
Permanent Met Tower
Temporary Met Tower
Potential Turbine Location
Line Tap Location
Collector Substation
Laydown Area
O&M Facility
TMK
Transmission Line
Collector Line
Access Road
Existing Transmission Line
State Highway
Kawela Bay
Kahuku
Laie
Punaluu
Project
Honolulu
1:20,000 WGS 1984 UTM 4
0 0.25 0.5 1 Miles
Data Sources Champlin: project facilities / ESRI: political features / Tetra Tech: vicinity wind projects / DigitalGlobe: aerial imagery
TETRA TECH
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of the wind farm site prior to construction. The proposed Project would also include permanent facilities including access roads, overhead and underground transmission and collector lines, an onsite substation, and an operation and maintenance (O&M) building and associated storage yard and parking area. Temporary wind turbine assembly lay-down areas would also be used during construction. Chapter 2 provides a more detailed description of the Project components.

The Project is expected to produce, on average, approximately 88,000 megawatt hours (MWh) of electricity generation per year (assuming an installed capacity of up to approximately 25 MW). The energy generated by the Project would connect to an onsite substation and feed into HECO's grid (Figure 1-2).

1.3 Second Draft EIS

In response to public comments on the original Draft EIS related to visual impacts and a request to consider fewer turbines with greater generating capacities, NPMPP reevaluated the proposed turbine locations and turbine models considered under the Proposed Action with the goal of reducing the number of turbines. Through this effort, NPMPP was able to reduce the maximum number of turbines needed to meet the target generating capacity for the Project from 10 turbines to 9 turbines. Depending on the selection of the final turbine model, the number of turbines may be as few as 8. This modification takes advantage of recent technological advancements that have resulted in the availability of uprated versions of turbine models that are larger, more efficient, have increased generating capacity, and are better suited for the moderate to low wind conditions of the wind farm site than previous models. These modifications ~~are evaluated in~~were added to the Second Draft EIS as the Modified Proposed Action Option (Alternative 2a; Figure 1-3). The Project would continue to have a generating capacity of up to approximately 25 MW. At this current time, NPMPP is considering Modified Proposed Action Option (Alternative 2a) to be the preferred alternative.

Although a nine-turbine Project could ultimately be developed under the Proposed Action, the choice to separately evaluate the Modified Proposed Action Option within the Second Draft EIS was made to fully disclose the impact potentially resulting from a project consisting of fewer, larger generating capacity turbines. Thus, ~~this~~ the Second Draft EIS ~~incorporates~~ incorporated refinements in the Project design that were made after the publication of the original Draft EIS (i.e., shifting of individual turbine locations and other proposed Project features; see Chapter 2 for discussion) into both the Proposed Action and Alternative 3, and an analysis of the Modified Proposed Action Option (taking into account the refined Project design and a taller turbine model with larger generating capacity) for comparison. Although these changes in the Project design would not result any significant new impact or a significantly more adverse impacts than disclosed in the original Draft EIS, they ~~are being~~were made available to the public for additional review and comment through ~~this~~ the Second Draft EIS in accordance with HEPA requirements.

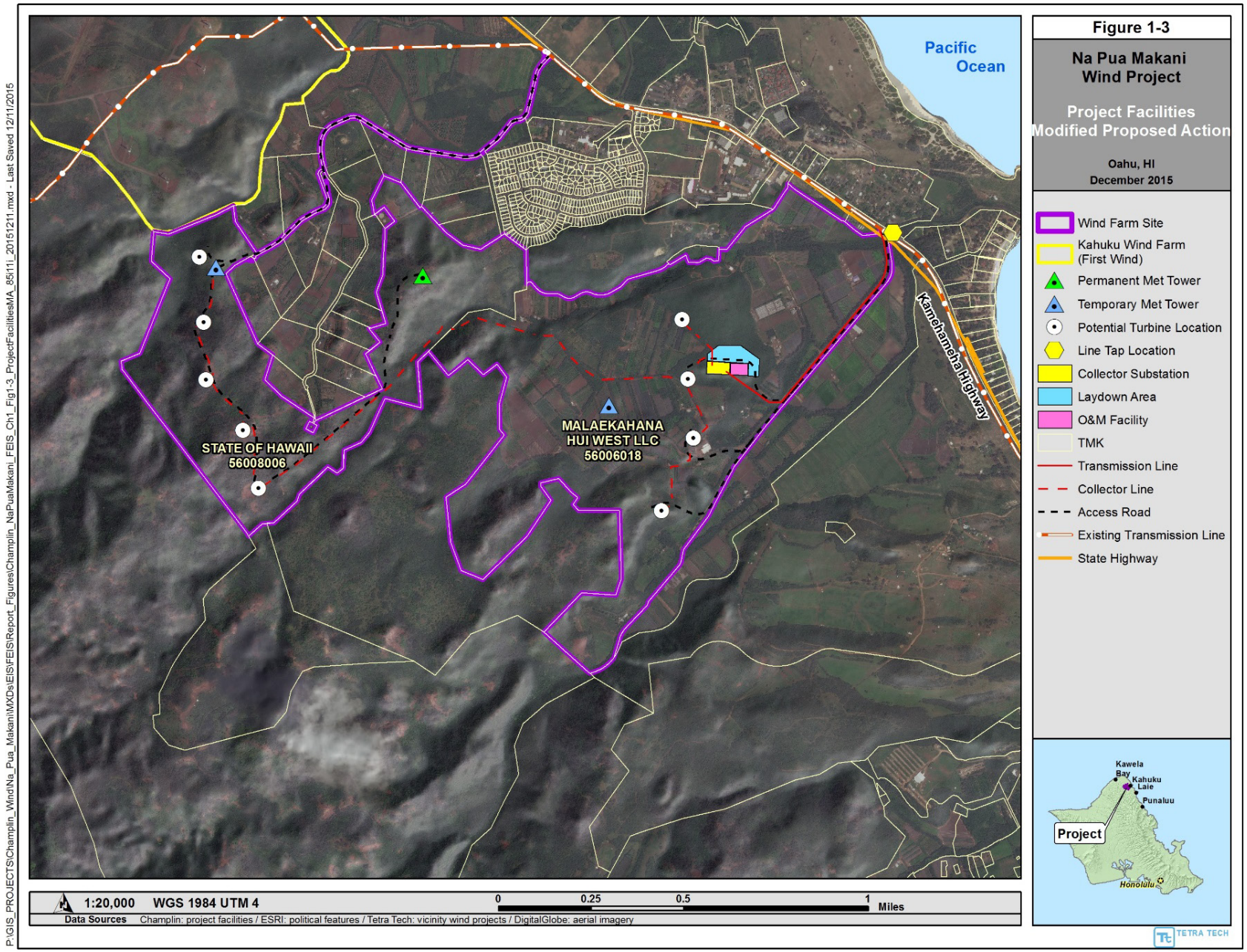
Figure 1-3
Na Pua Makani Wind Project
Project Facilities Modified Proposed Action
Oahu, HI
December 2015
Pacific Ocean
Kamehameha Highway
STATE OF HAWAII 56008006
MALAEKAHANA HUI WEST LLC 56006018
Wind Farm Site
Kahuku Wind Farm (First Wind)
Permanent Met Tower
Temporary Met Tower
Potential Turbine Location
Line Tap Location
Collector Substation
Laydown Area
O&M Facility
TMK
Transmission Line
Collector Line
Access Road
Existing Transmission Line
State Highway
Kawela Bay
Kahuku
Laie
Punaluu
Project
Honolulu
1:20,000
WGS 1984 UTM 4
0
0.25
0.5
1
Miles
Data Sources
Champlin: project facilities / ESRI: political features / Tetra Tech: vicinity wind projects / DigitalGlobe: aerial imagery
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1.4 HCP Mitigation Sites

An ITP is required because construction and operation of the Project have the potential to result in the incidental take of eight species listed under the Federal ESA that may inhabit or may transit through the wind farm site. The HCP provides mitigation for protecting the covered species in the wind farm site in addition to adding protection and habitat for the covered species in offsite areas.

These eight species requiring additional protection include:

- the ‘a’o or Newell’s shearwater (*Puffinus newelli*),
- the koloa maoli or Hawaiian duck (*Anas wyvilliana*),
- the ae’o or Hawaiian black-necked stilt (*Himantopus mexicanus knudseni*),
- the ‘alae ke’oke’o or Hawaiian coot (*Fulica alai*),
- the ‘alae ‘ula or Hawaiian common moorhen (*Gallinula chloropus sandvicensis*),
- the pueo or Hawaiian short-eared owl (*Asio flammeus sandwichensis*),
- the ope‘ape‘a or Hawaiian hoary bat (*Lasiurus cinereus semotus*), and
- the nene or Hawaiian goose (*Branta sandvicensis*)

These species are also listed under the Hawaii Endangered Species Act (HRS Section 195D-1-32), requiring issuance of an ITL from DOFAW. The ITP/ITL would authorize the incidental take of these species (referred to hereafter as the “Covered Species”) as a result of otherwise lawful activities of the Project.

The HCP includes conservation measures intended to avoid, minimize, and mitigate for potential incidental take of the Covered Species. Mitigation measures described in the HCP would be implemented off-site (i.e., outside of the wind farm) and are intended to offset or compensate for the effects of incidental take of the Covered Species through beneficial effects associated with management and monitoring or through enhancement and improvement of their habitats at the mitigation sites. The implementation of the conservation measures described in detail within the HCP will be discussed and analyzed as appropriate in Chapters 3 and 4. The geographic areas that are the focus of the HCP mitigation measures that involve habitat restoration are:

- **Hamakua Marsh,** a DLNR-owned waterbird sanctuary located on the edge of the town of Kailua adjacent to Kawainui Marsh, a DLNR-owned and managed waterbird management area. The combined area forms 714 acres (289 hectares) of State-managed wetlands, with 34 acres (14 hectares) within Hamakua Marsh and 680 acres (275 hectares) within Kawainui Marsh (Figure 1-4).
- **Poamoho Ridge,** a DLNR-owned forested habitat occurring along the leeward summit of the central Koolau Mountains. It is located above Wahiawa in the Ewa Forest Reserve, and is part of the State Natural Area Reserve System (Figure 1-5). It contains suitable, but degraded, bat habitat within two units that are 655 acres (265 hectares) and 618 acres (250 hectares), respectively, which DLNR has already identified for native forest restoration.
- **James Campbell National Wildlife Refuge (James Campbell NWR),** part of the Oahu National Wildlife Refuge complex located approximately 0.75 mile (mi; 1.2 kilometers [km]) to the north of the Project (Figure 1-6). It includes one of the few scattered remnants of

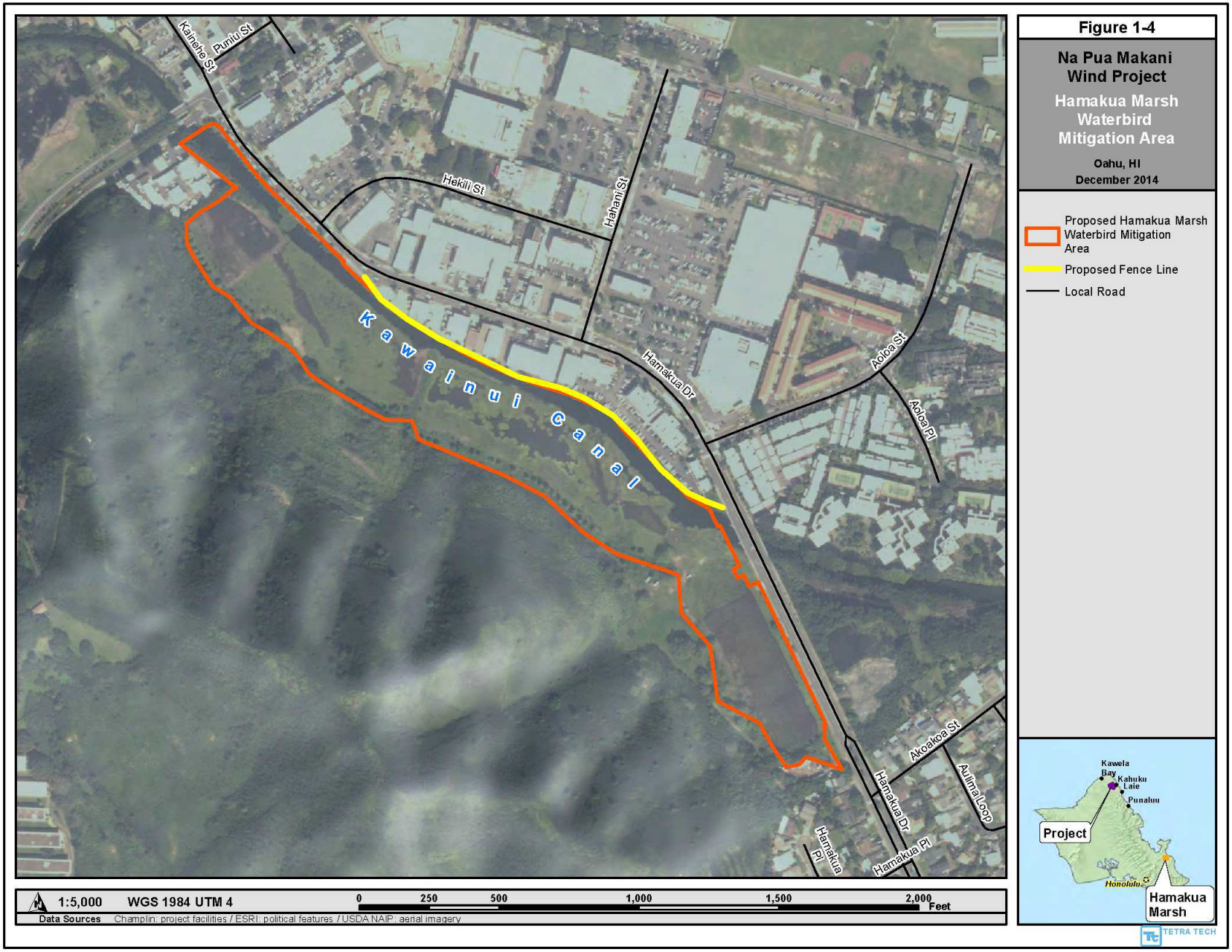
Figure 1-4
Na Pua Makani Wind Project
Hamakua Marsh Waterbird Mitigation Area
Oahu, HI
December 2014
Proposed Hamakua Marsh Waterbird Mitigation Area
Proposed Fence Line
Local Road
Kawainui Canal
Kaiehe St
Puniu St
Hekili St
Hahani St
Hamakua Dr
Aoloa St
Aoloa Pl
Akoakoa St
Aulima Loop
Hamakua Dr
Hamakua Pl
Hamakua Pl
1:5,000
WGS 1984 UTM 4
0 250 500 1,000 1,500 2,000 Feet
Data Sources Champlin: project facilities / ESRI: political features / USDA NAIP: aerial imagery
Kawela Bay
Kahuku
Laie
Punaluu
Project
Honolulu
Hamakua Marsh
TETRA TECH
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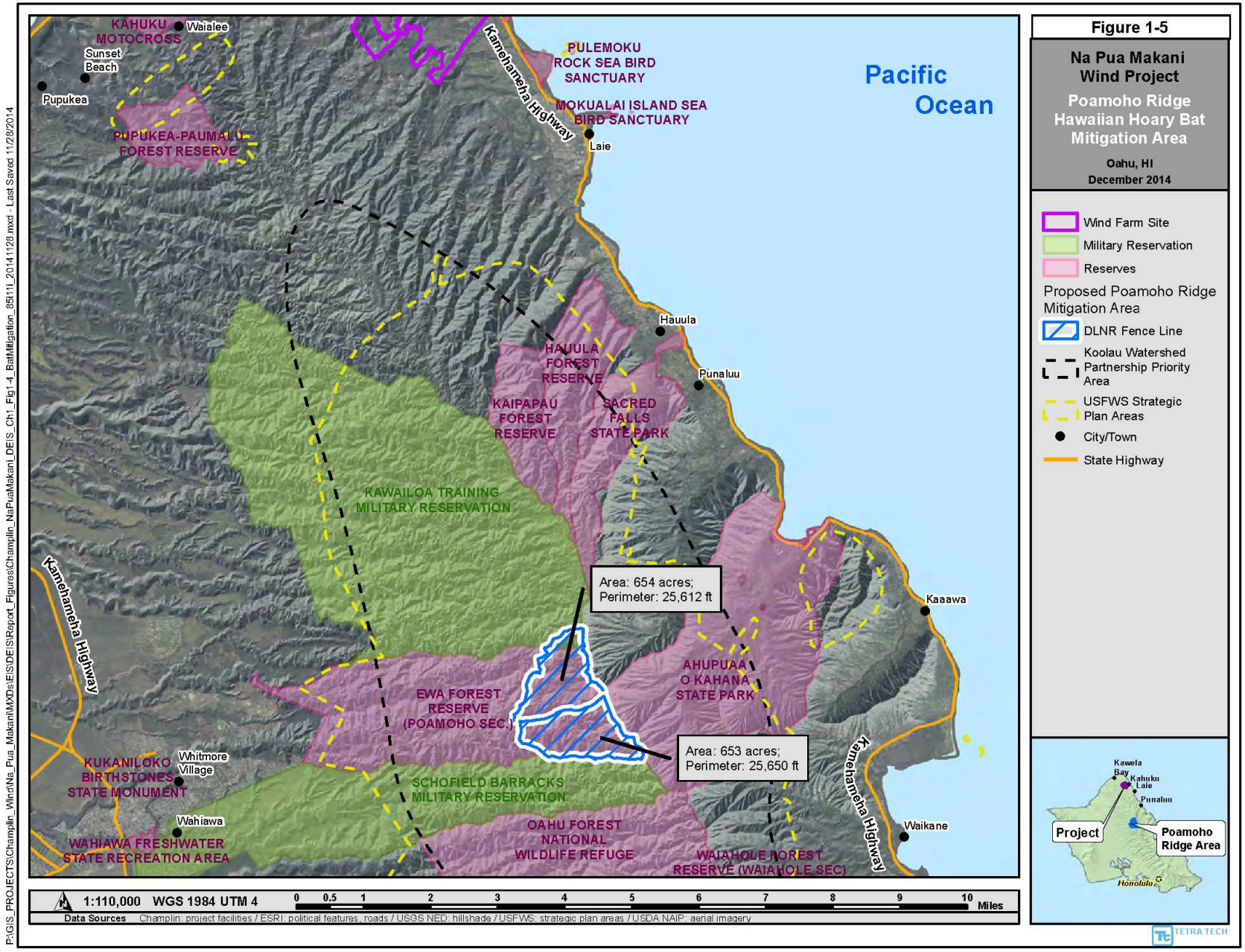
Figure 1-5
Na Pua Makani Wind Project
Poamoho Ridge Hawaiian Hoary Bat Mitigation Area
Oahu, HI
December 2014
Wind Farm Site
Military Reservation
Reserves
Proposed Poamoho Ridge Mitigation Area
DLNR Fence Line
Koolau Watershed Partnership Priority Area
USFWS Strategic Plan Areas
City/Town
State Highway
Pacific Ocean
KAHUKU MOTOCROSS
Waialee
Sunset Beach
Pupukea
PUPUKEA-PAUMALU FOREST RESERVE
PULEMOKU ROCK SEA BIRD SANCTUARY
MOKUALAI ISLAND SEA BIRD SANCTUARY
Laie
Kamehameha Highway
Hauula
Punaluu
HAUULA FOREST RESERVE
KAIPAPAU FOREST RESERVE
SACRED FALLS STATE PARK
KAWAILOA TRAINING MILITARY RESERVATION
Area: 654 acres; Perimeter: 25,612 ft
Kaaawa
AHUPUAA O KAHANA STATE PARK
EWA FOREST RESERVE (POAMOHO SEC.)
Area: 653 acres; Perimeter: 25,650 ft
KUKANILOKO BIRTHSTONES STATE MONUMENT
Whitmore Village
SCHOFIELD BARRACKS MILITARY RESERVATION
Wahiawa
WAHIAWA FRESHWATER STATE RECREATION AREA
OAHU FOREST NATIONAL WILDLIFE REFUGE
WAIAHOLE FOREST RESERVE (WAIAHOLE SEC)
Waikane
Kawela Bay
Kahuku
Laie
Punaluu
Project
Poamoho Ridge Area
Honolulu
1:110,000 WGS 1984 UTM 4
0 0.5 1 2 3 4 5 6 7 8 9 10 Miles
Data Sources Champlin: project facilities / ESRI: political features, roads / USGS NED: hillshade / USFWS: strategic plan areas / USDA NAIP: aerial imagery
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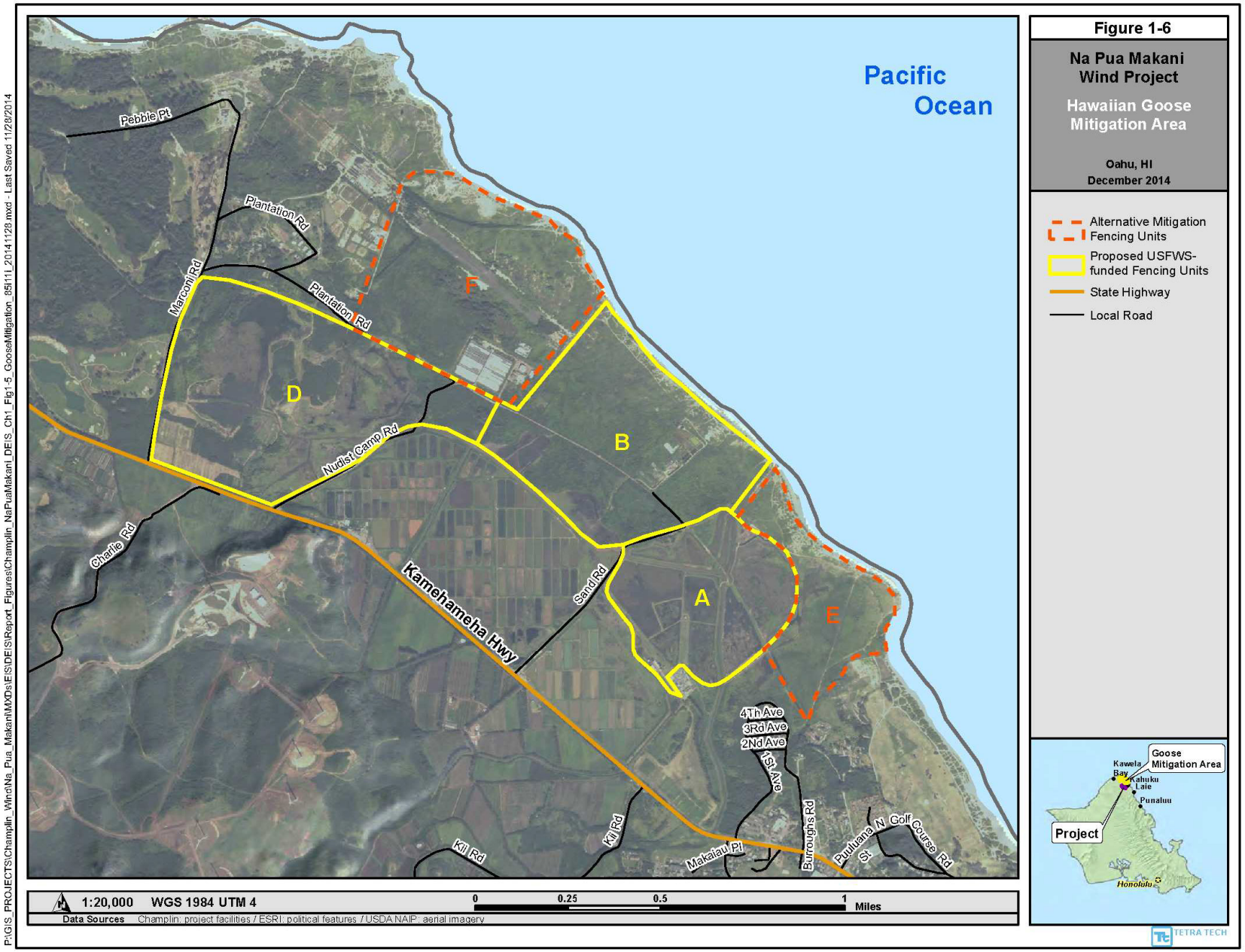
Figure 1-6
Na Pua Makani Wind Project
Hawaiian Goose Mitigation Area
Oahu, HI
December 2014
Alternative Mitigation Fencing Units
Proposed USFWS-funded Fencing Units
State Highway
Local Road
Pacific Ocean
Pebble Pt
Plantation Rd
Marconi Rd
Plantation Rd
F
D
B
Nudist Camp Rd
Charlie Rd
Kamehameha Hwy
Sand Rd
A
E
4Th Ave
3Rd Ave
2Nd Ave
1St Ave
Burroughs Rd
Puuluana St
N Golf Course Rd
Kii Rd
Kii Rd
Makalau Pl
Goose Mitigation Area
Kawela Bay
Kahuku
Laie
Punaluu
Project
Honolulu
1:20,000 WGS 1984 UTM 4
0 0.25 0.5 1 Miles
Data Sources Champlin: project facilities / ESRI: political features / USDA NAIP: aerial imagery
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natural wetlands that still exist on Oahu. The James Campbell NWR Comprehensive Conservation Plan (USFWS 2011a) identifies several management units for which activities such as fencing, predator control, and invasive plant species control are prescribed as measures to protect endangered waterbirds, migratory shorebirds, waterfowl, and seabirds and their habitats.

Other HCP mitigation measures which are not location-specific are described in detail in Chapter 2.

1.5 Purpose and Need

Under HEPA, a statement of purpose and need for the proposed action is required per HAR §11-200-17(D). The purpose and need for the Project from the perspective of NPMPP as the Applicant is provided below.

The proposed Project will require the use of State of Hawaii lands (the western portion of the wind farm site and the HDOT right-of-way; Figure 1-2) which triggers environmental review under HEPA. Because of the Project's need to obtain a commercial lease from the DLNR Land Division authorizing commercial operation of a wind project on State of Hawaii lands and use of State-owned lands, the Board of Land and Natural Resources is the appropriate Accepting Authority for this EIS. Project components that would require the use of these lands include the construction and operation of wind turbines and associated access roads, an underground collection system, and met tower. The Project as proposed from the onset could have a significant impact to the human and natural environment; therefore, an EIS was initiated to fully disclose any potential impacts on the environment and to identify best management practices (BMPs), Project-specific design features, and mitigation measures to reduce potential impacts below significance. The Accepting Authority, the Board of Land and Natural Resources, must determine whether the EIS complies with the requirements of HEPA. It is not a determination on the merits of the Applicant's proposed action, and associated alternatives; instead, a determination that the EIS complies with the content and process requirements of HEPA and HAR Chapter 11-200.

The Federal Production Tax Credit and Investment Tax Credit (PTC) have been a key incentive for wind energy, and has been a primary driver of the industry's research and development. The PTC is a production-based tax credit that was established under the Energy Policy Act of 1992, and has been renewed several times since. The PTC were extended again at the end of 2015 for a period of five years and the Project would be able to qualify for the PTC.

NPMPP's purpose is to provide clean, renewable wind energy for the island of Oahu, and to assist HECO in meeting Hawaii's Renewable Portfolio Standard (RPS) requirements and the State's goal to reduce electricity costs. Hawaii's Clean Energy Initiative sets goals for the state to achieve 100 percent clean energy by 2045 coming from locally generated renewable sources (HCEI 2014). The cost of electricity from renewable energy is currently about one-half the cost of electricity from burning oil and other non-renewable sources (DBEDT 2013). Toward that end, the Project plans to begin operation in 2017. The power generated by the Project would be sold to HECO pursuant to the Purchase Power Agreement under a long-term, fixed-price contract with fixed annual escalation providing long-term price stability for consumers.

NPMPP anticipates that operation of the proposed Project would contribute to the State's diversified portfolio of renewable energy projects, provide environmental and economic benefits to the State, County, and local communities, diversify Oahu's power supply, and contribute to the State's energy independence and security and reduce the import of foreign oil. Production of wind-generated energy would replace a portion of the State's electricity that is currently generated by burning fossil fuels, thus reducing greenhouse gas (GHG) emissions and other forms of pollution that are detrimental to the environment and human health. The energy potentially generated by the proposed Project would eliminate the use of approximately 13.44 barrels of oil for every hour of operation, which in turn would reduce emissions of carbon dioxide (CO_2) and other air pollutants including sulfur dioxide (SO_2), nitrogen oxides (NO_x), and mercury (Hg).

In an attempt to alleviate its dependence on imported fuels, Hawaii established an RPS that requires HECO and its affiliates, Hawaii Electric Light Company and Maui Electric Company, to generate renewable energy equivalent to 15 percent by 2015, 30 percent by 2020, 40 percent by 2030, 75 percent by 2040, and 100 percent by 2045. In addition, the Global Warming Solutions Act of 2007 requires that Hawaii's GHG emissions be reduced to levels at or less than 1990 levels by January 2020. On January 28, 2008, Hawaii also signed a Memorandum of Understanding with the U.S. Department of Energy (DOE) that established the Hawaii Clean Energy Initiative, under which at least 70 percent of Hawaii's energy needs would be supplied by renewable resources by the year 2030.

These laws, regulations, and initiatives reflect Hawaii's commitment to move away from petroleum-based energy generation and to increase its portfolio of renewable energy projects. Collectively, they demonstrate the overwhelming need for the development and implementation of renewable energy projects throughout the state. As proposed, the Project could provide 88,000 MWh per year (MWh/year) of electricity to HECO's grid, enough to provide electricity to approximately 8,000 households based on the average statistics reported by the American Wind Energy Association (AWEA 2014).

NPMPP has identified a number of project objectives, pursuant to HAR §11-200-17(E)(2), that must be met in order to have a technically and economically feasible project, and which allow the Project to meet the purpose and need discussed above. These criteria serve as initial minimum requirements for all action alternatives considered:

- A good and reliable wind resource capable of producing enough power for the Project to be economically viable and generate electricity at a price acceptable to HECO and the State of Hawaii;
- Site conditions which allow for reasonable construction costs compared to potential returns;
- Environmental conditions which allow the Project to comply with applicable environmental regulation at a reasonable cost; and
- Reasonable proximity to an existing HECO transmission line with interconnection costs and requirements that would allow the Project to be economically viable, an interconnection agreement with HECO for an economically viable quantity of additional power, and a power

purchase agreement with HECO for a duration and at a price which permits the Project to be economically viable.

Project designs which do not meet these requirements would not be considered as reasonable alternatives. Alternatives considered but eliminated because they did not meet the Project objectives are further discussed in Chapter 2.

1.6 Scoping

HRS Chapter 343 specifically defines the need for a public scoping process when preparing an EIS. The scoping process is an open public process initiated prior to the preparation of an EIS to define a reasonable scope for the analysis. In particular, the public scoping process should:

- Identify and invite the participation of affected agencies, tribes, and other parties through written comments, public meetings, or other forums;
- Identify the key issues and concerns regarding the Proposed Action;
- Identify only those potentially significant issues relevant to the Proposed Action (while eliminating unimportant issues from further study); and
- Define the form, level of detail, and content of the EIS.

The Federal scoping process begins with publication in the Federal Register of a Notice of Intent (NOI) to prepare an EIS. Formal public scoping for the original Draft EIS was initiated when the NOI was published in the Federal Register on November 5, 2013 (78 FR 66377-66379).

The State scoping or consultation process begins with the publication of an EIS Preparation Notice (EISPN) in the Office of Environmental Quality Control's (OEQC) *The Environmental Notice*. An EISPN notifies the public that an EIS will be prepared. An EISPN for the Project was published by OEQC on December 23, 2013, marking the start of the State scoping process. Subsequently, this EISPN was withdrawn due to the addition of a second access point into the Project which added new TMK parcels that were not included in the original EISPN, as well as other modifications in the proposed Project design. Project design changes were made to incorporate landowner input, with the intent of reducing impacts to active agriculture. A new EISPN was published on November 8, 2014.

Publication of the NOI in the Federal Register initiated a 30-day public scoping period during which agencies and the public could submit comments on the Project. Publication of the EISPN initiated a separate 30-day scoping period during which comments could also be submitted. A second 30-day State scoping period was initiated in association with republication of the EISPN. Public meetings were held during each scoping period. Information on these meetings was announced prior to the meetings through one or several methods including:

- Invitation letters with an enclosed Project fact sheet;
- Flyers (posted at shopping centers and senior housing complex);
- Newspaper advertisements in the *North Shore News* and *Star Advertiser*;
- Legal notice; and
- Press release.

Copies of representative advertisements, public notices, and scoping materials are included in the Scoping Report (Appendix A).

1.6.1 Public Scoping Meetings

Scoping comments were received at each of the three scoping meetings (one held specifically for NEPA hosted by the USFWS and two held for HEPA hosted by the Applicant; Table 1-1), and via phone, voicemail, electronic mail, and hardcopy mail submittals. Comment forms were also available at the meetings so attendees could submit written comments during the meeting or mail them at a later date. A total of 54 people signed the attendance forms, 14 speakers provided verbal comments at the first two scoping meetings, and two written comments were submitted at the January 10, 2014 meeting. There were no attendees at the November 19, 2014 meeting. By the close of the NEPA and HEPA comment periods, a total of 85 EIS scoping letters or emails had been received from public agencies, environmental organizations, interested citizens, and others. Comment submissions identified of a number of issues related to the Project and the associated HCP, and helped to inform the analysis for the EIS.

Table 1-1. Scoping Meeting Dates, Locations, and Attendance

Meeting Location	Date	Location	Estimated Attendance
Kahuku, Oahu (NEPA)	November 13, 2013	Kahuku Community Center	35
Kahuku, Oahu (HEPA)	January 10, 2014	Kahuku Community Center	19
Kahuku Oahu (HEPA)	November 19, 2014	Kahuku Community Center	0

1.6.2 Agency Consultation

Beginning with scoping, and continuing throughout the EIS development, the USFWS and NPMPP consulted with the Hawaii State Historic Preservation Division (SHPD) to fulfill requirements under NEPA, Section 106 of the National Historic Preservation Act (NHPA), and HRS Chapter 6E (see Chapter 5 for a summary of these statutes and their regulations). All individuals and organizations identified as potential consulting parties under these cultural statutes and regulations were contacted by letter, and follow-up phone calls, and emails, and personal meetings were conducted as necessary, to provide information about the proposed Project and to seek additional input regarding the identification and evaluation of archaeological and historic resources. This consultation process is ongoing.

NPMPP is also consulting with the U.S. Army Corps of Engineers, Federal Aviation Administration, U.S. Department of Defense, Hawaii DLNR Land Division and DOFAW, Hawaii Department of Agriculture, Hawaii Department of Business, Economic Development and Tourism, Hawaii Department of Transportation, and Hawaii Department of Health. A full list of consulted parties is included in Chapter 7.

1.6.3 Issues Identified During Scoping

Public comments shape the EIS process by identifying Project-related questions and issues of concern. Typically, questions are in reference to: the Project, existing environment, extent of temporal and spatial impacts, or potential consequences to the human environment from the Proposed Action.

Public scoping comments were received as oral and written testimony at the public scoping meetings, and as written comments received through the mail or via email. Comments were submitted by individual citizens as well as Federal and State agencies, and non-governmental organizations.

There were a total of 85 unique "submissions" received during the three scoping periods. The term submission refers to the entirety of oral testimony at a public meeting, a letter, or an email message. Each submission was read and analyzed for substantive comments. Substantive comments were assigned to an issue category and given an issue code. Each issue code had a summary statement drafted. The public comment submissions generated 522 coded comments, sorted into 21 issue categories and 55 issue codes with accompanying summary statements. The issue categories, issue codes, and summary statements are listed in Table 2 of the Scoping Report contained in Appendix A.

Among the scoping comments received, some issues were raised more frequently than others. A key purpose of scoping is to "determine the scope and the significant issues to be analyzed in depth in the environmental impact statement (40 CFR 1501.7). Significant issues can be raised by just a few comments or by many commenters. It is the significance of the issue and not the frequency of the comment that determines how it should be addressed in the EIS.

The comments received helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process (see Chapter 2 Proposed Action and Alternatives). Available environmental information associated with the identified issue categories, including available scientific research and pertinent studies and surveys, has been reviewed and presented in the Chapter 3 Affected Environment. The issue categories identified during scoping were evaluated in the analysis of potential effects of Proposed Action and alternatives (see Chapter 4 Potential Impacts and Mitigation Measures).

The Scoping Report that includes all the comments received, both in writing and spoken during the public meetings, are provided in Appendix A. As required under HRS Chapter 343, comments received during scoping were responded to and both the comments and their responses are included in the Scoping Report (Appendix A).

1.7 Additional Public Involvement

1.7.1 Public Meetings

The original Draft EIS was published in the OEQC's *The Environmental Notice* on June 8, 2015, and in the Federal Register on June 12, 2015 (80 FR 33535-33537) in accordance with requirements set forth under HEPA (HRS § 343-3) and NEPA (40 CFR 1506.6) implementing regulations. Public

comments were accepted during the 45-day and 60-day State and Federal public comment periods, respectively. A public open-house meeting was held during the comment periods on June 23, 2015 in Kahuku, Hawaii. Forty-four people signed the meeting attendance sheet. A total of 90 Draft EIS comment letters or emails were received from public agencies, environmental organizations, interested citizens, and others during the HEPA and NEPA public comment periods. Comments received were incorporated into and resulted in some modifications to this EIS. Responses to substantive comments on the original Draft EIS and Draft HCP can be found in Appendix M of this EIS.

A Second Draft EIS was published in the OEQC's *The Environmental Notice* on April 23, 2016. Public comments were accepted during another 45-day public comment period. An open house public meeting was held on May 25, 2015, in Kahuku, Hawaii. Thirty-one people signed the meeting attendance sheet. A total of 56 comment letters, emails, and public testimonies on the Second Draft EIS were received from public agencies, interested citizens, and others during the public comment period. Comments received were incorporated into and resulted in some modifications to the Final EIS. Responses to substantive comments on the Second Draft EIS can also be found in Appendix M of this EIS.

1.7.2 Website

A Project website, Napuamakaniwind.com, was launched in 2014. It includes links to current news and the latest information from NPMPP. The website provides an overview of the Project as well as information on public health and safety and other issues of interest to the community, such as setback requirements, agriculture, traffic, weather, visual impacts, property values, and effects to rooftop photovoltaic system installation. The website also includes a Project email address and a contact box for the public to ask questions or express concerns.

1.7.3 Neighborhood Board and Other Community Meetings

Representatives of NPMPP presented Project information at Koolauloa Neighborhood Board meetings on January 9 and February 13, 2014, to present the Project and inform the community about upcoming opportunities for public participation. Project information was also shared with the Kahuku Community Association and Laie Community Association numerous times in 2013, 2014, and 2015 to inform the community about Project design changes, opportunities to participate in the environmental review process, and most recently the consideration of fewer, larger wind turbines. Representatives of the NPMPP have also held numerous meeting with individual community members and small groups since 2013. A list of meetings is included in the project record.

On January 15, 2014, NPMPP hosted a talk story meeting in Kahuku, Hawaii, to provide an opportunity to share information with the community about wind energy health and safety issues. A memo summarizing this meeting is available in the project record. Invited guests included Representative Richard Fale, Mark Glick and Noreen Kam of the State Energy Office, and Dr. Robert McCunney, an internationally recognized expert in wind turbine health issues from the

Massachusetts Institute of Technology. Mr. Glick presented information on the Hawaii Clean Energy Initiative and addressed questions related to the potential for impacts to the ability of community members to install rooftop photovoltaic systems. Dr. McCunney provided a review of the best available scientific information on wind turbines and, including low frequency and infrasound.

1.8 Organization of this EIS

This EIS complies with HEPA requirements under HRS Chapter 343. The EIS is organized as follows:

- Chapter 1 provides descriptions of the purpose of and need for the Proposed Action, agency roles in the EIS process, and a summary of the public scoping process;
- Chapter 2 describes the Proposed Action and alternatives considered for analysis, including the No Action Alternative;
- Chapter 3 describes the affected environment within the analysis area for the Proposed Action;
- Chapter 4 summarizes the direct, indirect, and cumulative effects of the Proposed Action and alternatives; possible mitigation measures to reduce or minimize impacts; and any residual adverse effects following the implementation of mitigation;
- Chapter 5 addresses the regulatory context and consistency with Federal and State plans and policies, and the required permits and authorizations for the Project;
- Chapter 6 addresses additional HRS Chapter 343 requirements including unresolved issues, any irreversible and irretrievable commitment of resources, the relationship between short-term uses and long-term productivity, environmental effects which cannot be avoided, and the rationale for proceeding;
- Chapter 7 contains a list of consulted parties;
- Chapter 8 contains a list of references; and
- Chapter 9 contains a list of preparers.

2.0 PROPOSED ACTION AND ALTERNATIVES

This chapter describes and compares the alternatives considered in detail for the Project and the alternatives considered but dismissed from further analysis; it also discusses how these alternatives respond to the purpose of and need for action and address the significant issues presented in Chapter 1 (and in the Scoping Report in Appendix A). The alternatives considered in detail represent a range of possible actions that respond to the significant issues, purpose and need, and Federal and State laws and regulations. This chapter describes the siting and design criteria considerations for developing alternatives, the Proposed Action project description, and a description of the HCP which will be a part of the Proposed Action.

2.1 Alternative Development and Screening Criteria

The first step in the alternative development process was to develop and assess action alternatives that would meet the Project purpose and needs as described in Chapter 1. HEPA requires the analysis of a No Action alternative, the proposed action, and a reasonable range of alternatives to address the purpose and need for the proposed action.

Through input received from the community and from Federal and State agencies, NPMPP developed screening criteria that were used to help refine the alternative development process. The Project purpose was the basis for the development of the screening criteria, which are listed below.

Wind Resource. For a project site to be viable and economically competitive, it must have a very good wind resource. It is well documented that the North Shore area of Oahu has the best wind resource on the island. Beginning in 2009, temporary met towers were installed within the Na Pua Makani wind farm site to obtain in-depth information about the onsite wind resources. The results of 4 years of data collection indicate that the wind regime (in terms of strength, direction, duration, turbulence, and temporal and spatial variations) throughout the wind farm site is strong due to its location and exposure to the trade winds, which accelerate as they ascend from ocean through the Wind farm site into the mountains. The data determined that there is sufficient wind resource within the wind farm site for a viable project. Ongoing wind monitoring would be used to further microsite turbine locations to maximize energy production.

Utility Interconnection and Transmission Capacity. Additionally, for a project site to be viable it must have access to adequate and available transmission capacity without the requirement for substantial upgrades required on the HECO system and be located in proximity to existing transmission lines. These factors help determine the viability and economic feasibility of a project; projects located in areas where there is no transmission capacity are not viable. Projects in locations that are not adjacent to transmission lines incur greater construction costs due to the need for longer connector lines, and may also result in greater environmental impacts than projects located closer to an existing transmission line. The Na Pua Makani wind farm site is located within approximately 1 mile (1.6 kilometers) of HECO's existing transmission system, which was

determined by HECO to have an adequate capacity to support a wind project of up to approximately 25 MW without substantial transmission upgrades, or wind project of up to 42 MW with substantial transmission upgrades that would be paid for by NPMPP.

Land Availability. Wind projects require available contiguous land that is designated to allow wind energy development. The wind farm site is located on two parcels of land: one that will be leased from DLNR, and the other under private ownership that will be leased from the Malaekahana Hui West, LLC. Both parcels are classified as Agricultural District by the State Land Use District, and AG-1 and AG-2 Agricultural zoned by the City and County of Honolulu. Wind energy facilities are a permitted use on State Agricultural District and Agricultural zoned lands.

Site Conditions. Topography within the wind farm site was assessed to identify areas that would be too steep for construction or that would be inaccessible by construction vehicles. The presence of several steep ridges and deep southwest–northeast trending gullies eliminated some portions of the wind farm site from consideration because construction in these areas would be logistically infeasible and/or terrain ruggedness would inflate construction costs. After portions of the wind farm site were eliminated due to topography, the remaining land area was determined to have a sufficient area for a viable project.

Potential Impacts. The initial Project design was further refined based on input from the surrounding communities regarding visual impacts and concerns about City and County of Honolulu setback distances which are the distance equal to the maximum turbine tip height above ground. The Project design eliminated locations that were the closest and most visible from the Kamehameha highway and from the town of Kahuku. Proposed turbine locations are located at a distance several times the County-required setbacks from key points in the community including the Kahuku Medical Center, Kahuku High School, and Kahuku Elementary School . Additionally, turbine locations have been sited to avoid known biological, cultural, and archaeological resources and areas of active agriculture.

2.2 Alternatives Considered

Three alternatives are considered and analyzed in this EIS. They include:

- Alternative 1 – No Action
- Alternative 2 (Proposed Action) – Wind Project of up to 10 Turbines
- Alternative 2a (Modified Proposed Action Option; the preferred alternative) – Wind Project up to 9 Turbines with larger generating capacity
- Alternative 3 – Larger Generation Wind Project (up to 12 Turbines)

In response to public comments on the original Draft EIS, NPMPP reevaluated the proposed turbine locations and turbine models considered under the Proposed Action. Through this effort, NPMPP was able to reduce the maximum number of turbines needed to meet the target generating capacity for the Project from 10 to 9 using a larger generating capacity turbine model. These modifications are evaluated in ~~the Second Draft~~this EIS as the Modified Proposed Action Option (Alternative 2a),

described below, which as this current time, is NPMPP's preferred alternative. All other components of the Modified Proposed Action Option are the same as the Proposed Action.

2.2.1 Alternative 1 – No Action

The No Action alternative is analyzed as a baseline for comparative purposes with the action alternatives. This alternative would not meet the purpose and need for the Project identified in Chapter 1.

Under Alternative 1, the Project would not be constructed and there would be no need for an HCP or issuance of the ITP/ITL. Alternative 1 would avoid the potential take of Covered Species, but would not provide a clean source of electricity, offset carbon emissions, or contribute to the achievement of the State's renewable energy goals and achievement of the State's RPS law. Under Alternative 1, the HCP would not be implemented and beneficial activities resulting from the HCP would not occur, including protection, restoration, research, and monitoring of Covered Species.

2.2.2 Alternative 2 – Wind Project of Up to 10 Turbines (Proposed Action)

Alternative 2 is an up to approximately 25-MW project consisting of between 8 and 10 wind turbines each with a nameplate generating capacity of up to 3.3 MW (see Figure 1-2 and Section 2.4). The Project would also include permanent facilities including up to 5.0 miles (8.0 kilometers) of internal access roads, overhead and underground transmission and collector lines, an onsite substation, and an O&M building and associated storage yard and parking area. Temporary wind turbine assembly lay down areas would also be used during construction.

A more detailed description of the Project components can be found in Section 2.4. Project components and disturbance acreages for Alternative 2 are listed in Table 2-1. Best Management Practices, design features, and project plans included under the Proposed Action are described in Section 2.4.7. – Construction of this alternative would begin as soon as the second quarter of 2016, with commercial operation planned in 2017.

Alternative 2 includes the approval of the proposed HCP and the issuance of an ITP/ITL to authorize incidental take of the Covered Species (see Section 2.5) in association with construction and operation of the Project. The avoidance, minimization, and mitigation measures that would be implemented for the Covered Species associated with the Project HCP are discussed in detail in Section 2.5.1.

Alternative 2 meets the purpose and need for the Project by providing a clean source of renewable energy to the Island of Oahu, and in doing so, helps to achieve the State's new law requiring 100 percent of electricity from renewables by 2045 and also assists HECO in meeting its RPS requirements. Alternative 2 also meets the Project objectives of being located in an area with compatible land uses, being compatible with HECO's overall system requirements, and maintaining overall environmental quality and contributing to stabilizing future energy prices. It would also meet the objective of increasing the portion of Oahu's energy derived from renewable energy sources and reducing dependencies on fossil fuels.

2.2.3 Alternative 2a – Modified Proposed Action Option (up to 9 turbines with larger generation capacity; Preferred Action)

In response to public comments on the original Draft EIS related to visual impacts and consideration of fewer turbines with larger generating capacities (to reduce the total number of turbines), NPMPP reevaluated the proposed turbine locations and turbine models considered in the original Draft EIS. Through this effort, NPMPP was able to reduce the maximum number of turbines needed to meet the target generating capacity for the Project. This modification takes advantage of recent technological advancements that have resulted in the availability of uprated versions of turbine models that are have increased generating capacity, more efficient, and taller and are better suited for the existing wind conditions of the wind farm site than previous models.

Accordingly, ~~the Second Draft~~this EIS analyzes a Modified Proposed Action Option (Alternative 2a) with a reduced maximum number of turbines (reduced from 10 turbine to 9 turbines) with taller dimensions than were analyzed in the original Draft EIS (Figure 1-3). If the largest generating capacity turbine model under consideration was selected, a total of 8 turbines would be constructed, eliminating one turbine on each Project parcel. All other Project components would be the same as under the Proposed Action. All Best Management Practices, design features, and project plans included under the Proposed Action and described in Section 2.4.7 would also apply to the Modified Proposed Action Option. Likewise, the Modified Proposed Action Option includes the approval of the Project HCP and issuance of an ITP/ITL. Alternative 2a would continue to meet the Project's purpose and need and objectives as described above for the Proposed Action. See Section 2.2.2 for additional discussion.

The Modified Proposed Action Option would result in environmental impacts considered to be within the range of impacts characterized in the original Draft EIS. A supplemental analysis comparing the original Draft EIS Proposed Action (modified to reflect the refined Project design; see Section 2.4 for a description of Project design changes between the original Draft and Second Draft EIS) and the Modified Proposed Action Option is included in Appendix L. This analysis was prepared in accordance with NEPA regulations and steps through each resource evaluated in the EIS and compares the duration, extent, and magnitude of impacts under Alternatives 2 and 2a. It is included with the HEPA ~~Second Draft~~ EIS to support the analysis.

2.2.4 Alternative 3 – Larger Generation Wind Project (up to 12 turbines)

Alternative 3 would involve the construction and operation of a larger generation facility of up to approximately 42 MW. Alternative 3 would consist of up to 12 turbines total (2 to 4 additional turbines compared to the Proposed Action), each with a generating capacity of up to 3.3 MW (see Figure 2-1 and Section 2.4). Alternative 3 would include the construction of approximately 5.9 miles (9.5 kilometers) of associated internal access roads. Other Project components (substation, met towers, transmission line, etc.) would be the same as discussed under Alternative 2. Project components and disturbance acreages for Alternative 3 are listed in Table 2-1. Best Management Practices, design features, and project plans described for Alternative 2 would also apply to

Alternative 3 (Section 2.4.7). As under Alternative 2, construction of the first up to 8 to 10 turbines is proposed to begin as soon as the second quarter of 2016, with commercial operation planned in 2017. Due to HECO transmission line upgrades required for additional turbines and associated generating capacity beyond those identified in Alternative 2, there would be a lag of at least 3 years before the construction of the additional 2 to 4 turbines. At this time, there is no specific engineering information from HECO indicating the extent or specific location of the transmission line upgrade that would be needed.

Similar to Alternative 2, Alternative 3 includes the issuance of an ITP/ITL to authorize incidental take of the Covered Species (see Section 2.5) in association with construction and operation of the up to approximately 25 MW Project and implementation of the Project HCP. Thus, avoidance, minimization, and mitigation measures identified for Covered Species would occur at levels described above for Alternative 2 (see Section 2.6). Due to the uncertainty related to the timing of construction of the addition turbines under this alternative, NPMPP would re-initiate consultation with the USFWS and DOFAW prior to their construction to address potential impacts of the larger generation facility to the Covered Species. The mitigation and monitoring associated with the additional turbines would be covered in an amendment to the HCP, and would be similar in amounts and types as described in Section 2.5 for the Proposed Action.

Alternative 3 would also meet the Project's purpose and need and objectives by providing a clean source of renewable energy, helping to achieve the State's new law requiring 100 percent of electricity from renewables by 2045 and also assisting HECO in meeting its RPS requirements. See Section 2.2.2 for additional discussion.

2.3 Alternatives Considered but Eliminated from Detailed Study

The following sections describe alternatives that were considered but eliminated from detailed study in this EIS. Alternatives discussed in this section were either identified by NPMPP during preparation of this EIS, or derived from comments received during the Federal and State scoping processes. Alternatives were eliminated based primarily on their failure to comply with the criteria listed in Section 2.1 which define the minimum requirements for a feasible project.

2.3.1 Larger Project Size (greater than approximately 42 MW)

The generating capacity of a wind farm is limited by the amount contiguous land at the site as well as the amount of wind-generated energy that the existing high voltage electrical grid can accept. On Oahu, HECO has determined that the grid in the Kahuku area can accept no more than approximately 25 MW of additional energy, as is currently proposed by NPMPP, without significant and costly upgrades to the transmission system. Therefore, an increase in Project generating capacity past that amount is not feasible without major upgrades to the existing transmission system.

Additionally, the number of additional turbines that are feasible to construct is limited by the land area available and topography of the wind farm site and surrounding land ownership and uses. Although the locations identified within the wind farm site are conducive to locating wind turbines,

they also provide some limitation as to where those turbines could be placed due to manufacturer spacing requirements, setback, and other requirements. In general, placement of turbines in gullies would not be viable to effectively make use of the wind resource within the wind farm site and also as a result of cost of trying to construct the turbines in gullies, thereby compromising the economic feasibility of the Project. Moreover, expansion of the Project beyond that proposed under Alternative 3 would require placement of turbines and access roads in areas that are currently being avoided because of the manufacturer and County setback requirements, and the potential for greater impacts to biological, visual, and other resources such as active agriculture. Likewise, the Project is bordered by the existing Kahuku wind farm, the Kamehameha Highway, and private land associated with the town of Kahuku to the north; the U.S. Department of the Army's (Army's) 8,216-acre (3,325-hectare) Kahuku Training Area to the south and west; and privately-owned agricultural lands to the east which precludes expansion of the Project. Thus, this alternative would meet the objective of increasing the portion of Oahu's energy derived from renewable sources, but would not be compatible with HECO's system requirements or existing land uses, and may not maintain overall environmental quality while contributing to stabilization of future energy prices, and therefore was not carried forward for analysis.

2.3.2 Smaller Project Size (less than approximately 25 MW)

A reduction in Project size and generating capacity (i.e., a project smaller than the Proposed Action) would reduce resource impacts and potential incidental take levels of Covered Species, but would not have economies of scale and would not be economically feasible for NPMPP to develop. That is, a smaller wind farm would be unlikely to offset Project infrastructure and development costs. The Project is proposed as a single, integrated power plant, not individual pieces where some turbines may be eliminated and others kept. The Project, through its Power Purchase Agreement, has a defined power output, based on site and design characteristics, market demand, and Applicant objectives. These objectives include providing a minimum level of generation at a competitive price to be attractive to HECO, which is seeking to fulfill their RPS requirements, as well as providing a return on investment to the Applicant. In order to provide this return, NPMPP has determined that the Project must be capable of producing a minimum of approximately 25 MW. The number of wind turbines in the wind farm site has already been minimized to the extent practicable in light of the Project's purpose and need and criteria considerations. Accordingly, if any turbines are removed from the Project design, other locations must be found to replace those turbines to maintain the minimum necessary capacity. Reducing the generating capacity for the Project would also decrease the Project's contribution to HECO's RPS requirements and consequently reduce the benefits to the State. For these reasons, the size and generating capacity of the Project was determined to be appropriate, and a smaller project size was eliminated from further evaluation.

2.3.3 Greater Setback Distances

A number of comments were received during scoping regarding project setbacks. Although the setbacks utilized in the Project design meet the County-required setbacks of one length of the total

turbine height from the parcel boundary, a number of commenters asked that the Project be sited farther from the town of Kahuku due to concerns over potential visual and noise impacts. The wind farm site is bordered by the existing Kahuku wind farm, the Kamehameha Highway, and private land associated with the town of Kahuku to the north; the U.S. Department of Army's 8,216-acre (3,325-hectare) Kahuku Training Area to the south and west; and privately-owned agricultural lands to the east. Lands farther inland were not considered further because they are Federally-owned by the Army and construction and operation of turbines is not a use consistent with the military training these lands are used for. Additionally, much of the Federal land adjacent to the current wind farm site boundary is characterized by steep topography that is not feasible to locate wind turbines on. The original site plan for the Project has gone through a number of revisions since the start of community outreach in the spring of 2013, including the relocation and/or elimination of five turbines to increase the distance between the wind farm site and the community and key points of community interest. Therefore, greater setbacks for the turbines from what are currently proposed under Alternatives 2/2a and 3 are no longer a practicable option, and therefore, such an alternative is not carried forward as a viable alternative for further analysis.

2.3.4 Alternate Project Location on Oahu

As noted in Section 2.1, a suitable site for development of a wind farm on Oahu must have a very good wind resource, must be located near HECO's transmission lines that have transmission capacity available, and must be able to sell electricity at a price that is competitive and attractive to HECO. It must also have land uses that are compatible with wind farm development and must be built in such as way so as to minimize environmental impacts. There may be other areas of Oahu with a wind regime that could support a wind energy project (e.g., some areas along the leeward and windward coasts); however, unless the wind resource was at least as good as the wind farm site, without regards to other factors, the Project could not offer HECO the same price and would therefore not be acceptable to HECO. It has been well documented that the North Shore area of Oahu has the best wind resource on Oahu. Additionally, there is currently no transmission capacity available on other high voltage circuits on the North Shore without costly transmission upgrades.

Prior to NPMPP's acquisition of this Project, other locations on Oahu and the North Shore with sufficient wind and potential for interconnection with the HECO grid were considered but eliminated because:

- there was no available transmission capacity;
- the wind resource was not sufficient to generate electricity at a competitive and attractive rate;
- there was a lack of contiguous suitable land and/or available land was of insufficient size to support a viable wind farm;
- land use restrictions, environmental concerns and potential environmental impacts (e.g., proximity to wildlife refuges or other natural areas) made the location not feasible; and/or
- due to the difficulty and expense of construction due to steep, remote topography.

For these reasons, alternative locations on Oahu and the North Shore were eliminated from further consideration.

2.3.5 Reduced ITP/ITL Permit Term

This alternative would involve an ITP/ITL of shorter duration than the proposed term of 21 years. This alternative was considered because it would reduce the level of incidental take authorized by accounting for fewer years of Project operation. However, in doing so, this alternative would not be consistent with the USFWS 5-Point Policy, which requires that the USFWS consider the expected duration of the covered activities. As described below, the anticipated operating life of the Project is 20 years.

Additionally, a reduced permit term has the potential to create a legal liability for NPMPP associated with non-compliance with the ESA and Chapter 195D if additional incidental take were to occur outside of the permit term during the remaining years of Project operation. Even if the ITP/ITL were to be amended to cover the remaining years of Project operation, there would be financial and potentially operational implications associated with reopening consultation with the USFWS and DOFAW and with the interim period between expiration of the ITP/ITL and when the period of coverage could be extended. For these reasons, this alternative was not carried forward for consideration.

2.3.6 Different Type of Renewable Energy Generation

Some comments received during scoping and during the public comment period for the original Draft EIS felt that other types of renewable energy, rather than wind energy development, should be explored as an option for the Project. Wind power is not the only type of renewable energy which could contribute to meeting the State's RPS goals. However, NPMPP is a wind energy development company and the purpose of this Project is to contribute to the amount of renewable wind energy on Oahu to help achieve the State's goals and State RPS law and HECO requirements under the RPS. There are a number of other renewable energy sources such as geothermal (on islands other than Oahu), tidal, biofuels, or solar which are complementary to wind energy, and the Na Pua Makani Project would not preclude other developers from pursuing these energy sources.

Additionally, comments on the original Draft EIS suggested the use of bladeless wind turbine technologies (e.g., Vortex). Bladeless technologies were not considered for the Project in part because they are still in the research and development stage and are not yet commercially viable or available. The wind turbine models being considered for the Project are those most appropriate for site-specific wind conditions and terrain as well as economic and energy production considerations.

2.4 Project Components

Alternative 2 is the Proposed Action and would include up to 10 turbines (8 to 10 depending on the turbine models selected) and associated foundations and transformers, an underground electrical collection system, up to three met towers, access roads, construction staging areas, an operations

and maintenance building and associated storage yard, a transmission line, and an onsite substation (Figure 1-2). Alternative 2a, the Modified Proposed Action Option, would include up to 9 larger generating capacity turbines (Figure 1-3). Alternative 3 would include up to 12 turbines total (additional 2 to 4 turbines beyond what is described under the Proposed Action) and associated facilities (Figure 2-1). Each of these major Project components are described in detail below and summarized in Table 2-1. Differences between the action alternatives are called out where they exist. The construction access route between Kalaeloa Harbor and the Project is also described below.

The Project design presented in the original Draft EIS represents locations of Project components within the wind farm site based on information available at the time. Subsequent to the publication of the original Draft EIS, additional micrositing was conducted to reflect ongoing site evaluations. This included additional wind monitoring, and input from Malaekahana Hui West, LLC, to ensure that the proposed locations of Project components found the best balance between optimizing the wind resource, topography and other constraints, and ongoing agricultural operations (including farming and operation of an agribusiness zip line facility) and other uses on the property. This resulted in micrositing of some Project components, including:

- Shifting wind turbine locations on both the DLNR and Malaekahana Hui West, LLC properties (the furthest shift occurred to the two northernmost wind turbines on the Malaekahana Hui West, LLC side by up to 300 feet [91 meters] to the northwest).
- Adjusting the electrical collection line alignment to follow a more direct route to the proposed substation and minimizing its crossing of actively farmed land.
- Shifting the laydown area, O&M building, and substation approximately 250 feet (76 meters) to the south.
- Adjusting wind farm access roads to match the refined wind turbine locations.

The refined Project design ~~has been~~was incorporated into the Proposed Action and Alternative 3 in the Second Draft EIS (i.e., all analyses have been updated to reflect the current Project design). These modifications, and the addition of the Modified Proposed Action Option, are considered to fall within the range of environmental effects disclosed in the original Draft EIS. They do not present any significant new impact or a significantly more adverse impact than those disclosed in the original Draft EIS (see the supplemental technical analysis in Appendix L for details).

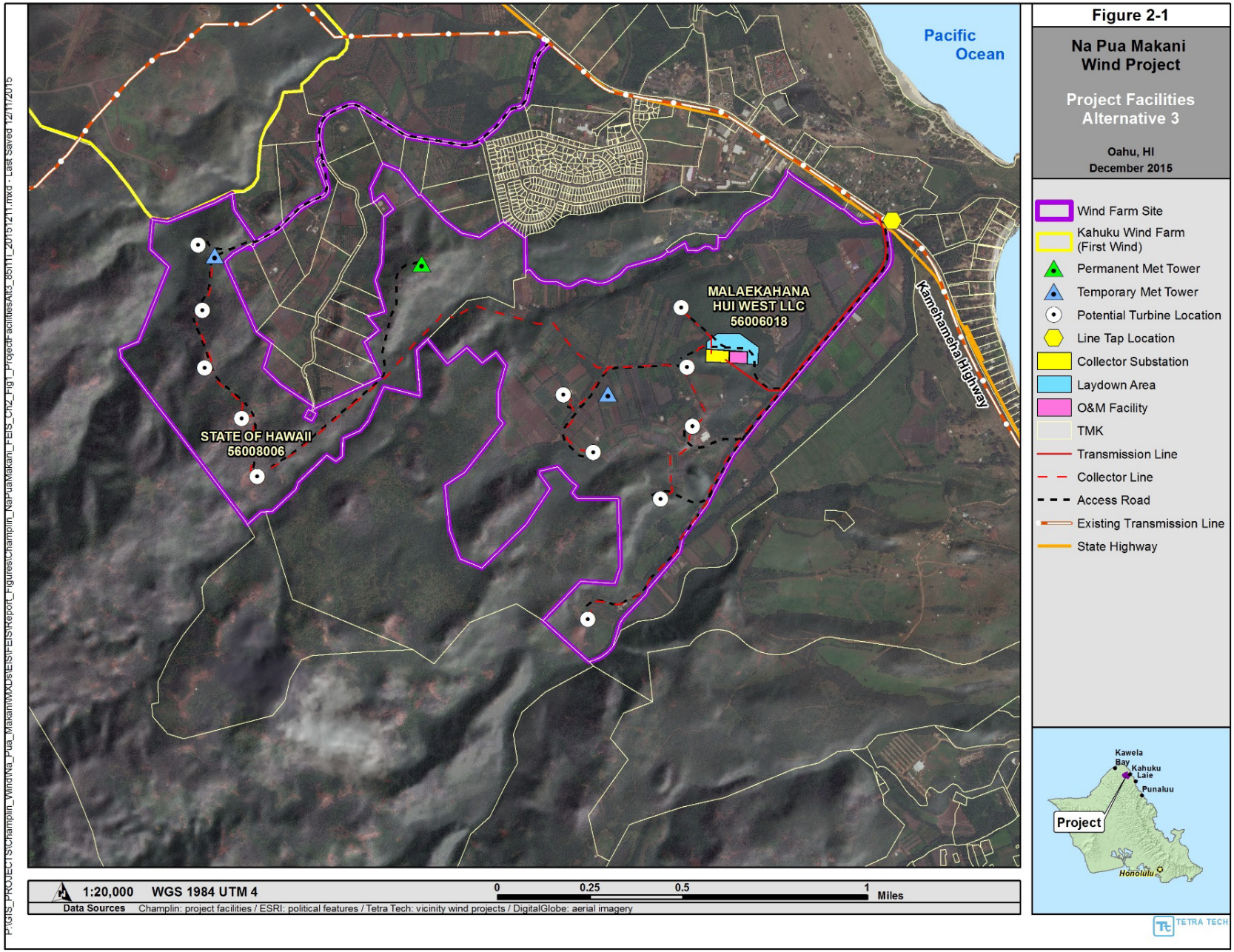


Figure 2-1
Na Pua Makani Wind Project
Project Facilities Alternative 3
Oahu, HI
December 2015
Pacific Ocean
MALAEKAHANA HUI WEST LLC 56006018
STATE OF HAWAII 56008006
Kamehameha Highway
Wind Farm Site
Kahuku Wind Farm (First Wind)
Permanent Met Tower
Temporary Met Tower
Potential Turbine Location
Line Tap Location
Collector Substation
Laydown Area
O&M Facility
TMK
Transmission Line
Collector Line
Access Road
Existing Transmission Line
State Highway
Kawela Bay
Kahuku
Laie
Punaluu
Project
Honolulu
1:20,000 WGS 1984 UTM 4
0 0.25 0.5 1 Miles
Data Sources Champlin: project facilities / ESRI: political features / Tetra Tech: vicinity wind projects / DigitalGlobe: aerial imagery
TETRA TECH

Table 2-1. Comparison of Alternatives: Project Components and Disturbance Areas

Project Component	Area of Soil Disturbance (Total)	Area of Permanent Disturbance (Fill/Structures/Grading)[1/]	Alternative 2 – Proposed Action	Alternative 2a – Modified Proposed Action Option	Alternative 3 – Larger Generation Facility
Wind turbines and pads (incl. construction laydown areas)	4.0 ac (1.6 ha) per turbine	2.0 ac (0.8 ha) per turbine	8 to 10 (up to 10 total)	Up to 9 total	Up to 12 total
Internal Access Roads	50.0 ft (15.2 m) wide per linear foot	16 ft (4.9 m) wide per linear foot	Up to 5.3 mi (8.6 km)	Up to 4.8 mi (7.8 km)	Up to 6.0 mi (9.6 km)
DLNR Access to Project	0.3 ac (0.1 ha)	0.3 ac (0.1 ha)	1	1	1
Met towers[2/]	1.0 ac (0.4 ha) per structure	0.1 ac (0.04 ha)	Up to 3	Up to 3	Up to 3
Underground electrical collection system[3/]	40.0 ft (12.2 m) wide per linear foot	0.0	3.8 mi (6.1 km)	2.9 mi (4.7 km)	4.2 mi (6.7 km)
Construction staging and equipment laydown area, parking and storage, substation, and O&M building	8.9 ac (3.6 ha)	8.3 ac (3.3 ha)	1	1	1
Transmission line (above ground)[4/]	30.0-ft (9.1-m)-wide right-of-way per linear foot	10 x 10 ft (3 x 3 m) space per pole plus pull sites[4]	0. 8 mi (1.2 km)	0.8 mi (1.2 km)	0. 8 mi (1.2 km)
Point of interconnect	0.0	0.0	1	1	1
Disturbance Acreage By Alternative					
	Total/Construction		89.0 ac (36.0 ha)	84.5 ac (34.2 ha)	98.6 ac (39.9 ha)
	Permanent		59.9 ac (24.2 ha)	56.7 ac (22.9 ha)	69.8 ac (28.2 ha)
Acreage by Landownership					
State Land	Total/Construction		47.2 ac (19.1 ha)	47.2 ac (19.1 ha)	47.2 ac (19.1 ha)
	Permanent		34.2 ac (13.8 ha)	34.2 ac (13.8 ha)	34.2 ac (13.8 ha)
Private Land	Total/Construction		41.7 ac (16.9 ha)	37.2 ac (15.1 ha)	51.4 ac (21.8 ha)
	Permanent		25.7 ac (10.4 ha)	22.5 ac (9.1 ha)	35.6 ac (14.4 ha)

1/ Permanent impact acreages are a subset of total impacts.
2/ Note that of the three met tower locations, one will be permanent and two will be temporary.
3/ Portions of the electrical collection system would be within the access road construction buffer; no additional permanent impacts would occur in these areas.
4 /For impact calculations assumed a 7-ft-wide (2-m-wide) corridor centered on the transmission line; actual impacts would be less and limited to pole and pull site locations.

Civil and electrical infrastructure necessary to support the Project includes the underground components of the Project, such as turbine and met tower foundations, the transmission line, and the electrical collection system. Installation of these components would require excavation with standard excavators, bulldozers, and/or hydraulic hammers. Blasting is not anticipated, although if rock is encountered it would either be blasted using drill and shot methods, or removed with the use of hydraulic hammers.

2.4.1 Turbines

NPMPP is currently considering turbine models from leading turbine manufacturers including Siemens, Vestas, and GE, among others. The turbine array could include a combination of models from a single manufacturer ranging in generating capacity and dimensions. Table 2-2 describes the range of turbine dimensions considered for the purposes of impact analysis. NPMPP will select the most appropriate turbines for the site-specific conditions of the wind farm site prior to construction.

Table 2-2. Key Dimensions and Specifications of the Turbines

Description	Measurement	
	Alternatives 2 and 3	Modified Proposed Action Option (Alternative 2a)
Power generation	Up to 3.3 MW[1/]	Up to 3.45 MW[1/]
Tower height	Up to 302 feet (92 meters)	Up to 443 feet (135 meters)[2/]
Rotor type	3-bladed, horizontal axis	3-bladed, horizontal axis
Rotor diameter	Up to 384 feet (117 meters)	Up to 427 feet (130 meters)
Blade length	Up to 187 feet (57 meters)	Up to 208 feet (63 meters)
Number of blades	3	3
Total height above ground	Up to 512 feet (156 meters)	Up to 656 feet (200 meters)
Rotor swept area	Up to 115,723 feet^2 (10,751 meters^2)	Up to 143,160 feet^2 (13,300 meters^2)
Rotor speed	6-16 rotations per minute[3]	6-16 rotations per minute[3]
Cut -in wind speed	10 ft/s (3 m/s)	10 ft/s (3 m/s)
Cut-out wind speed	Up to 82 ft/s (25 m/s)	Up to 82 ft/s (25 m/s)

ft/s = feet per second; m/s = meters per second

[1/] Should the turbine manufacturers make available up-rated versions of existing turbine models prior to construction, they will be considered for use in this project.

[2/] To meet City and County of Honolulu setback requirements (a distance equivalent to the maximum turbine blade tip height), if the largest turbine model under consideration were selected, hub heights of individual turbines would range from 85 to 135 meters (blade lengths would be the same).

[3/] Maximum blade tip speed for the models considered would be approximately 243 miles per hour under Alternatives 2 and 3, and 192 miles per hour under the Modified Proposed Action Option.

Turbine models being considered (all manufacturers) range in hub height from approximately 262 feet (80 meters) to 443 feet (135 meters) with rotor diameters ranging from 328 feet (100 meters) to 427 feet (130 meters), resulting in a maximum height at the top of the blade of up to 656 feet (200 meters) above ground level (Table 2-2). Smaller turbine models (i.e., those with shorter hub heights) would be considered for turbine locations nearest the TMK boundaries to ensure compliance with City and County of Honolulu setback requirements, and larger turbines (i.e., those

with taller hub heights) may be considered for the remaining turbine locations. The combination of turbine models and specific number of turbines under each alternative will be selected to ensure consistency with HECO grid requirements, onsite wind resources, and other Project-specific factors. Since the publication of the original Draft EIS the proposed turbine alignment has been refined as the Project design continues to develop. These updates ~~have been~~were incorporated into the Project's impact calculations and figures in the Second Draft EIS.

A Federal Aviation Administration (FAA)-approved lighting plan will be developed for the Project. This plan will specify the installation of flashing red lights on wind turbines and met towers to improve nighttime visibility for aviation.

2.4.1.1 Construction

Each turbine would be transported from Kalaeloa Harbor via highways (see Construction Access Route below) and assembled on a constructed foundation at the Project site. Each turbine would require multiple deliveries (at least 12 separate loads, including 8 superloads) of equipment and materials to its pad. Towers are generally delivered in three or four sections. Each blade would be delivered separately, as would the nacelles, rotors, and down-tower components (e.g., controllers, ladders and platforms, pad-mount transformers, and pad-mounted transformer vaults). Deliveries would be made using transport vehicles that conform to road weight limits; any variances would be incorporated into permits submitted to the Hawaii Department of Transportation (HDOT). Transportation of turbine components would primarily occur between the hours of 11 p.m. and 6 a.m. A Traffic Assessment Report is included in Appendix B.

A work area would be cleared and graded at each turbine location to provide space for delivery and laydown of turbine components, crane access, and foundations, as well as turbine construction. An area of approximately 4 acres (2 hectares; Table 2-1) would be required at each turbine for the crane pad and construction laydown area.

Foundations would be spread footing or tensionless pier, depending on site-specific soil conditions. Spread footing foundations would be approximately 10 feet (3 meters) deep and up to 60 feet (18 meters) wide. Tensionless foundations would be up to 40 feet (12 meters) deep and up to 15 feet (5 meters) wide. Actual foundation depth would depend upon the results of geotechnical tests conducted at each final tower location and final structural engineering. Each turbine foundation will consist of up to approximately 500 cubic yards (382 cubic meters) of concrete, reinforcing bars, and anchor bolts. Up to approximately 50 trucks of concrete will be required per foundation. NPMPP anticipates that for each turbine pad, concrete deliveries and pouring would occur over a 2-day period.

In total, the Project would require up to approximately 5,170 cubic yards (3,949 cubic meters) of concrete for construction of foundations for the turbines, met towers, the O&M building, onsite substation, and other equipment pads under Alternatives 2 and 2a, or up to approximately 6,670 cubic yards (5,095 cubic meters) under Alternative 3. Concrete typically needs to be poured within 90 minutes of being mixed with water. Concrete will either be supplied from an existing batch plant

on Oahu, or may be mixed at an onsite batch plant which would be located in the construction staging area. Water for a batch plant would be delivered to the site and stored in an onsite water tank, come from existing irrigation lines, or come from a similar source. Aggregate would be sourced from an existing supply or quarry on Oahu.

General fill would be needed for grading of turbine pads (concrete foundations plus surrounding cleared areas), access roads, and laydown areas. Fill material would be utilized from onsite excavations and earthwork. Additional sources of this fill, if needed, include nearby pits or excess material taken from within the property.

Construction would be completed during daylight hours, typically from 7 a.m. to 5 p.m. There may be instances where those hours need to be extended earlier or later and nighttime construction may occur to avoid traffic and to facilitate schedule. All proper communication channels would be followed and compliance with applicable permits will be maintained.

Once the foundations are constructed, the turbines would be assembled and erected using a combination of forklifts, medium-size cranes with a lift capacity of 99 to 143 tons (90 to 130 metric tons), and a main erection crane with a lift capacity of 660 tons (600 metric tons), located on a compacted earthen or gravel crane pad. Construction equipment requiring access to these areas would include both wheeled and tracked vehicles. Cranes used to assemble the turbine components would be delivered to the wind farm site in multiple legal-weight loads.

2.4.1.2 Operation and Maintenance

After construction, a portion of the turbine pad area would be revegetated through replanting with non-aggressive resident species that are compatible with Project operations in order to minimize erosion. Permanent low-growing vegetation or gravel pads up to 2 acres (1 hectare) around each turbine would be maintained to allow for O&M requirements. An additional area up to 4 acres (2 hectares) per pad would be maintained to facilitate post-construction mortality monitoring efforts, as practicable (see Appendix A of the HCP).

During Project operation, technicians would perform routine preventative maintenance on each turbine and troubleshoot problems as needed. Routine maintenance and repairs require service vehicle access. Should there be a need for major component replacement (e.g., blades, generator, supporting tower), heavy equipment similar to that used during construction would be required. In that case, the access road, crane pad, and staging area would be used in a manner similar to their use during the original tower assembly and construction process.

2.4.2 Electrical System (Electrical Collection System, Substation, Transmission Line, and Point of Interconnect)

Power from the turbines would be stepped up to 34.5 kV at pad-mounted transformers and then collected through an electrical collection system, most of which would be installed underground (Figures 1-2 and 2-1). This system would feed into an onsite electrical substation, which would step up the voltage and transmit the power to the point of interconnect with the Oahu's general

transmission system via a new HECO-owned and operated transmission line. Since the publication of the original Draft EIS, the proposed alignment of the electrical collection line was modified on the Malaekahana Hui West, LLC portion of the wind farm site to more directly connect with the proposed substation site at the request of the landowner (Figures 1-2 and 2-1).

2.4.2.1 Construction

The electrical collection system would be installed within the onsite access road bed where possible and would run from turbine to turbine. The electrical collection system would consist of up to two separate 34.5-kV feeder circuits (see Figure 2-1; Table 2-1). To the extent practicable the collection system would be installed underground; however, it may be necessary to install portions of the collection system above ground to respond to construction challenges or to avoid impacts to streams and other resources in the wind farm site. For the underground portions of the collection system, cables would be directly buried in trenches and would terminate at the onsite substation. Depending on the subsurface conditions, blasting is not expected but may be required to install the trenches. Each trench would contain three sets of power cables, plus a ground wire and a fiber optic communication cable for the supervisory control and data acquisition (SCADA) system (to transmit data from the turbine controllers to the onsite substation and O&M building). The cable trench would be backfilled with select fill material to protect the cables from damage or possible contact and to provide appropriate media for heat dissipation from the cables. It is estimated that approximately 3.8 miles (6.1 kilometers) of collection cable would be required under Alternative 2; approximately 2.9 miles [4.7 kilometers] under Alternative 2a; approximately 4.2 miles (6.7 kilometers) would be required under Alternative 3. Trenches would be approximately 24 inches (61 centimeters) wide excavated by rubber tire or tracked equipment and, where the collection system parallels Project access roads, the cable would be buried directly alongside access roads. In these areas, no additional ground disturbance would occur in association with construction of the underground electrical collection system (i.e., disturbance is accounted for in association with the access roads). Above ground portions would have a maximum pole height of 75 feet (23 meters) and wire heights ranging from 35 to 50 feet (11 to 15 meters) above the ground.

The onsite substation would be approximately 400 by 200 feet (122 by 61 meters) within a fenced area of approximately 2 acres (1 hectare) (Figures 1-2 and 2-1; Table 2-1). A portion of the substation would be HECO's switching station that would be a separately fenced area approximately 160 by 130 feet (48 by 40 meters). The substation would include the substation pad and above- and below-grade electrical infrastructure which, subject to the final design, may include:

- A main power transformer;
- Two 34.5 kV breakers;
- A 46-kV breaker;
- A 34.5-kV main bus structure;
- Two 34.5-kV electrical feeder termination structures;
- A 34.5-kV station power transformer;
- A 46-kV metering structure;

- A dead end structure;
- An electrical control enclosure for electrical relays and metering equipment;
- A 200-foot (70-meter)-tall microwave tower; and
- An 85-foot (26-meter)-tall wood pole with yard light pole for shield wire attachment.

During construction, the onsite substation area would be cleared and graded, and the substation pad would be compacted with well-graded material. Foundations would be installed for the components as required.

The new 0.8-mile- (1.2-kilometer)-long HECO-owned transmission line would allow the Project to be interconnected to an existing HECO 46-kV line, extending from the point of interconnect at the onsite substation to the line tap location near Kamehameha Highway (Figures 1-2 and 2-1). The transmission line would consist of a 46-kV power line installed above ground. The transmission line poles would have heights of approximately 75 feet (23 meters) and wire heights would range from approximately 35 to 50 feet (11 to 15 meters) above the ground. All construction activities for the transmission line would occur within an approximately 30-foot-wide (9-meter-wide) temporary right-of-way (ROW). This includes an area of approximately 10 by 10 feet (3 by 3 meters) of ground disturbance for each pole and also includes pull sites (Table 2-1). Permanent disturbance acreages were assumed to occur within a 7-foot-wide (2-meter-wide) corridor centered on the transmission line, although actual impacts would be considerably less, limited to individual pole and pull site locations. Access to the transmission line would be by vehicle or ATV from existing roads. The line tap location may require new or replacement utility poles resulting in minor ground disturbance. (Table 2-1).

Construction of the electrical collection system and transmission line would utilize standard industry procedures including surveying, corridor preparation, materials hauling, pull sites, staging areas, structure assembly and erection, ground wire, conductor stringing, cleanup, and replanting with non-aggressive resident species that are compatible with Project operations.

2.4.2.2 Operation and Maintenance

Qualified personnel would routinely monitor, inspect, and maintain the communication and electrical collector cables and transmission line facilities during Project operation. Typically, small trucks would be used to inspect the system. Heavy equipment would only be necessary if underground cables were determined to have failed or if overhead conductor or supporting structures need to be repaired or replaced.

Qualified personnel would operate and maintain the interconnection substation; maintenance activities would include routine inspections of each component and monitoring of equipment and electronics according to the manufacturer's recommendations and owner's and regulatory requirements. Routine maintenance of the interconnection substation would not typically require heavy construction equipment. However, if a major component (e.g., a main transformer) fails, then appropriate construction equipment would be required to replace the component.

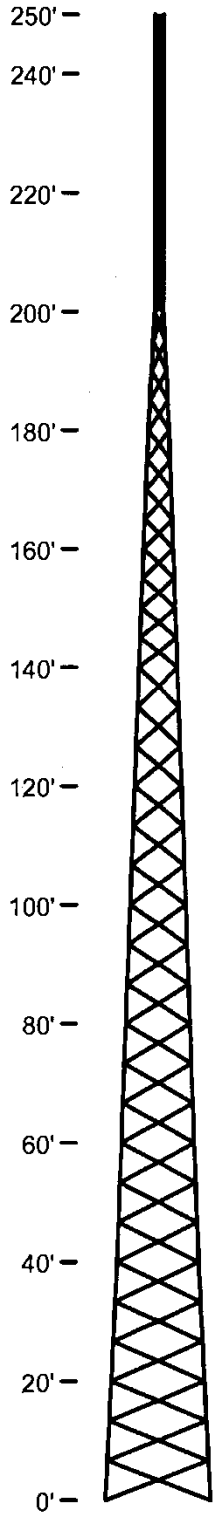


Figure 2-2.
Met Tower Diagram

2.4.3 Met Towers

The Project would include one permanent un-guyed lattice-frame met tower and two temporary guyed towers (Figure 2-2 shows an example of the permanent met tower). These towers would support weather instruments that measure and record weather data to measure performance and guide Project operation. The met towers would be approximately 262 feet (80 meters) tall with base dimensions approximately 22 by 22 feet (7 by 7 meters) and reducing down to approximately 2 by 2 feet (1 by 1 meter) for the top 42 feet (13 meters). The temporary met towers would be removed during Project construction.

2.4.3.1 Construction

Construction of the met towers would require onsite tower assembly on a constructed footing using a large crane approximately 315 feet (96 meters) tall. Approximately 1 acre (0.4 hectare) per met tower would be disturbed during construction (Table 2-1). Following construction, the temporary construction areas would be re-vegetated using non-aggressive resident species that are compatible with Project operations. The central met tower would be accessed from existing State-owned and/or internal access roads. A 40-foot-wide (12-meter-wide) met tower access road may be constructed for the central met tower, extending from the internal access road (Figures 1-2 and 2-1; Table 2-1). The western- and eastern-most met towers are close enough to the access roads that they would not require their own separate roads (Figures 1-2 and 2-1).

2.4.3.2 Operation and Maintenance

The area of permanent impact would consist of an approximately 0.1 acre (0.04 hectare; Table 2-1) gravel pad, which would be maintained around the base of the permanent met tower to allow for O&M requirements. The permanent met tower would require routine monitoring and maintenance during the period of operation. Routine monitoring and maintenance activities would require vehicle access, but met towers do not typically require heavy equipment for servicing.

2.4.4 Access Roads

Roads used for the Project will include portions of an existing road network plus the addition of new roads (Figures 1-2 and 2-1). For the purpose of estimating maximum potential impacts, this discussion assumes the same level of disturbance for all Project access roads.

2.4.4.1 Construction

The extent of new and improved roads to be developed during Project construction is described in Table 2-1. Existing roads would be improved, as needed, and widened to meet construction and maintenance activity requirements. Approximately 5.3 miles (8.6 kilometers) of internal access roads would be required for the Proposed Action (approximately 4.8 miles [7.7 kilometers] of access roads would be required for the Modified Proposed Action Option[Alternative 2a]); for Alternative 3, approximately 6.0 miles (9.6 kilometers) of access road would be required. Existing roads within the wind farm site would be widened to, and new access roads would be constructed to, approximately 16 feet (5 meters; Table 2-1). Disturbance during construction would occur within a larger area of approximately 50 feet (15 meters) wide along the access roads to allow adequate passage for the crawler crane and transport trucks, as well as turn-around locations. The total temporary disturbance required during construction of the roads will depend on the amount of cut-fill in any one area and could expand to 100 feet (30 meters) wide in certain defined areas. All access roads would have a gravel surface, storm water erosion and control features.

2.4.4.2 Operation and Maintenance

Permanent impacts associated with internal access roads are quantified in Table 2-1. During operation, service vehicles and equipment would continue to use these roads for routine maintenance of the turbines and associated Project infrastructure. Permanent roadway surfaces would be maintained in good working order by NPMPP through periodic grading and compacting to minimize naturally occurring erosion.

2.4.5 Construction Staging and Equipment Laydown Area, Operations and Maintenance Building and Associated Storage Yard

The construction staging area and equipment laydown area will serve a variety of storage and support functions over the life of the Project (Figures 1-2 and 2-1). During construction, the area would be used as temporary storage and laydown area, refueling location, and waste collection area. It would also serve to provide temporary parking, office space, and sanitary facilities. Refueling of construction vehicles would be accomplished by a vendor supplied fuel truck making deliveries daily. Crew trucks and water trucks would be fueled at an off-site gas station.

The O&M building, storage, and parking area would be constructed close to the larger construction staging and equipment laydown area and onsite substation. The O&M building, storage, and parking area are permanent facilities that would be used throughout the life of the Project (Figures 1-2 and 2-1).

2.4.5.1 Construction

The construction staging and equipment laydown area would consist of an approximately 8.9-acre (3.6-hectare; Table 2-1) compacted gravel pad on a cleared and graded footprint. During construction, large equipment such as cranes could be stored in the staging area. Following construction, portions of the construction staging and equipment laydown area would be restored

to pre-construction conditions through the removal of gravel and replanted with non-aggressive resident species that are compatible with Project operations.

2.4.5.2 Operation and Maintenance

A permanent 8.3-acre (3.3-hectare) area would be maintained during Project operations which would include the permanent O&M building and vehicle parking for wind farm operations (approximately 1 acre [0.4 hectare]; Figure 2-3), as well as the onsite substation (Figure 2-1). The O&M building and surrounding storage yard and parking areas would undergo routine maintenance and upkeep to minimize erosion, control stormwater runoff and drainage, and maintain the building and its permanent water, septic, electrical, and communications infrastructure. During operations, large equipment required for maintenance could be staged in the O&M storage yard.

2.4.6 Construction Access Route

Construction related traffic for the Project would include the transporting of the major turbine components, hauling in materials for the turbine foundations, other miscellaneous deliveries, and employee-related traffic. The major turbine components would be transported by sea and offloaded at Kalaeloa Harbor located in the west side of Oahu. Due to the size and weight of these turbine components, Hawaii State Department of Transportation and City and County of Honolulu permits to transport these oversized and overweight loads would need to be obtained.

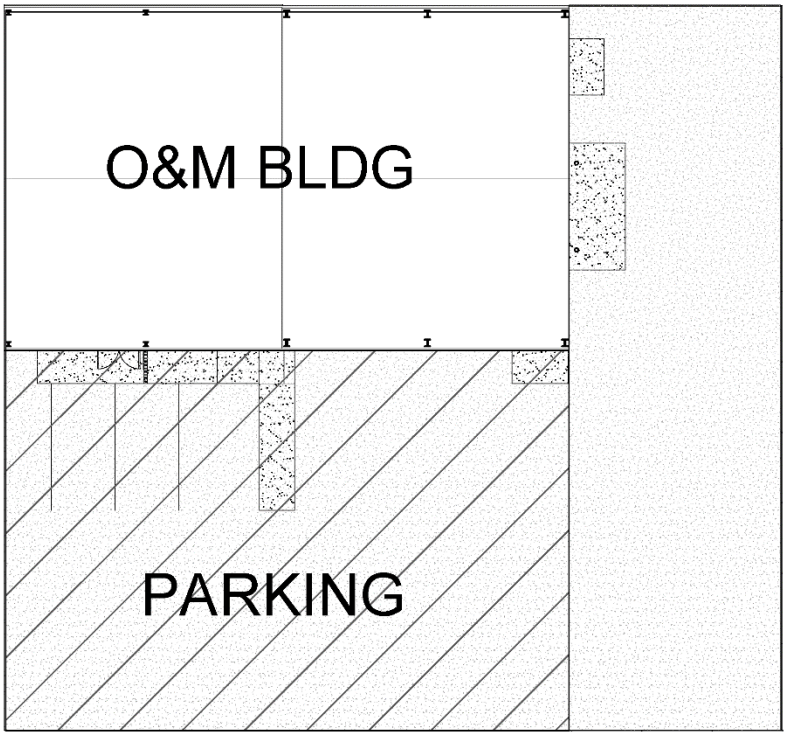


Figure 2-3. O&M Building Plan

The Traffic Assessment Report (Appendix B) identified three proposed routes from Kalaeloa Harbor to the wind farm site to transport the turbine components as follows and seen in Figure 2-4 and Tables 2-3, 2-4, and 2-5.

The transport of the oversized components would require trees along the entire identified routes to be trimmed to a clearance height of 17 feet (5.2 meters), and temporary removal of street signs, poles, utility poles, and traffic signals for clearance of the oversized loads. In addition, the left turn on Wilikina Drive and the right turn from Kamehameha Highway to Ka Uka Boulevard would require police escorts to shut down traffic in order for the trucks to make the turns. Also, minor temporary improvements would need to be implemented such as curb removal or additional of fill in order for the oversize load to safely navigate through curbs.

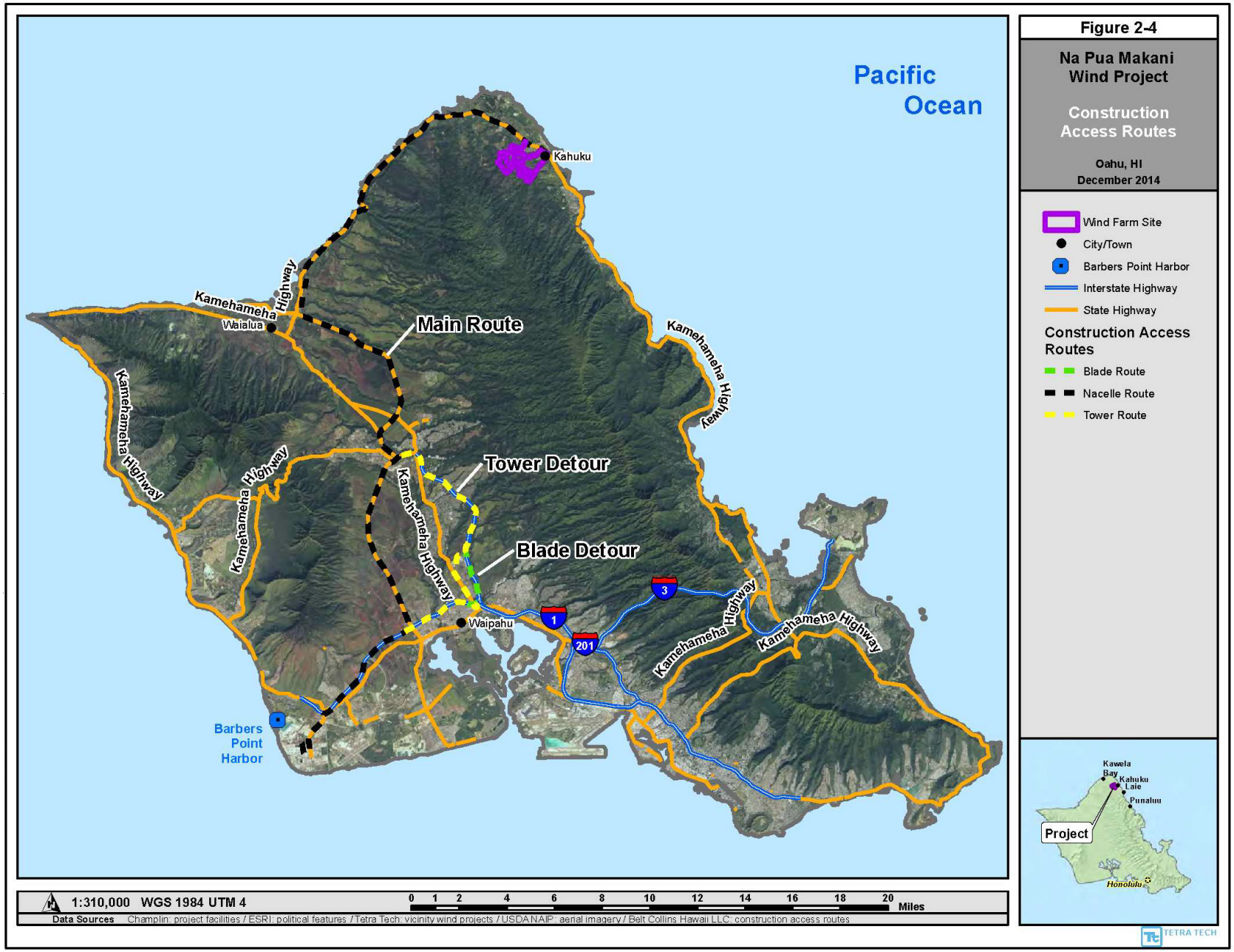


Figure 2-4
Na Pua Makani Wind Project
Construction Access Routes
Oahu, HI
December 2014
Pacific Ocean
Kahuku
Main Route
Tower Detour
Blade Detour
Kamehameha Highway
Waialua
Waipahu
Barbers Point Harbor
Wind Farm Site
City/Town
Barbers Point Harbor
Interstate Highway
State Highway
Construction Access Routes
Blade Route
Nacelle Route
Tower Route
Kawela Bay
Kahuku
Laie
Punaluu
Project
Honolulu
1:310,000 WGS 1984 UTM 4
0 1 2 4 6 8 10 12 14 16 18 20 Miles
Data Sources Champlin: project facilities / ESRI: political features / Tetra Tech: vicinity wind projects / USDA NAIP: aerial imagery / Belt Collins Hawaii LLC: construction access routes
TETRA TECH

Table 2-3. Route 1 for the Longer Nacelle Components

Segment	Description	Length (miles)	Jurisdiction / Ownership
1	Continue straight out of the Grace Pacific gate onto Hanua Street	0.4	City and County
2	Turn left on Kauhi Street toward Kalaeloa Boulevard	0.3	City and County
3	Turn left at Kalaeloa Boulevard	1.8	(multiple) maintained by City and County
4	Merge onto H-1 East	6.5	State
5	Take Exit 5 to Kunia Waipahu / Ewa	0.3	State
6	Turn left onto Kunia Road	--	
7	Continue on Kunia Road to Wilikina Drive	8.1	State
8	Turn left on Wilikina Drive	1.3	State
9	Turn right on Kamananui Road	1.2	State
10	Continue north on Kamehameha Highway	--	
11	Continue on Kamehameha Highway to Joseph P. Leong Highway (Highway 99)	6.6	(multiple) maintained by City and County
12	Continue on Highway 99 to Kamehameha Highway East (Highway 83)	1.9	State
13	Continue on Highway 83 to the access roadway to the Project	14.3	State
	Total	42.7	

Table 2-4. Route 2 for the Taller Tower Sections and Nacelle Components

Segment	Description	Length (miles)	Jurisdiction / Ownership
1	Continue straight out of the Grace Pacific gate onto Hanua Street	0.4	City and County
2	Turn left on Kauhi Street toward Kalaeloa Boulevard	0.3	City and County
3	Turn left on Kalaeloa Boulevard	1.8	State
4	Merge onto H-1 East	--	
5	Continue of H-1 East and stay in the right lane	7.9	State
6	Take Exit 8C for Kamehameha Highway North	2.2	State
7	Turn right on Ka Uka Boulevard	1.1	City and County
8	Turn left onto H-2 North	--	
9	Continue on H-2 North to Wilikina Drive	5.8	State
10	Continue on Wilikina Drive to Kamananui Road	1.8	State
11	Turn right on Kamananui Road	1.2	State
12	Continue north on Kamehameha Highway	--	
13	Continue on Kamehameha Highway to Joseph P. Leong Highway (Highway 99)	6.6	(multiple) maintained by City and County
14	Continue Highway 99 to Kamehameha Highway East (Highway 83)	1.9	State
15	Continue on Highway 83 to the access roadway to the Project	14.3	State
	Total	45.3	

Table 2-5. Route 3 for the Blades

Segment	Description	Length (miles)	Jurisdiction / Ownership
1	Continue straight out of the Grace Pacific gate onto Hanua Street	0.4	City and County
2	Turn left on Kauhi Street toward Kalaeloa Boulevard	0.3	City and County
3	Turn left on Kalaeloa Boulevard	1.8	(multiple) maintained by City and County
4	Merge onto H-1 East	--	
5	Continue on H-1East and stay in the left lane to merge onto the H-2 North	7.8	State
6	Take Exit 8B for H-2 North to Mililani and Wahiawa	0.7	State
7	Continue on H-2 North to Wilikina Drive	7.6	State
8	Continue on Wilikina Drive to Kamananui Road	1.8	State
9	Turn right on Kamananui Road	1.2	State
10	Continue north on Kamehameha Highway	--	
11	Continue north on Kamehameha Highway to Joseph P. Leong Highway (Highway 99)	6.6	(multiple) maintained by City and County
12	Continue on Highway 99 to Kamehameha Highway East (Highway 83)	1.9	State
13	Continue on Highway 83 to the access roadway to the Project	14.3	State
	Total	44.4	

2.4.7 Best Management Practices, Design Features, and Project Plans

Table 2-6 lists industry standard BMPs, Project-specific design features, and Project plans that NPMPP has committed to incorporating into the Project to reduce potential impacts. Additional avoidance and minimization measures specific to each resource area are discussed under their respective subsections below.

Table 2-6. Best Management Practices, Project-specific design features, and Project plans

BMP	Geology and Soils	Hydrology and Water Resources	Air Quality	Noise	Hazardous Materials	Natural Hazards	Vegetation	Wildlife	Threatened and Endangered Species	Socioeconomics	Cultural	Land Use	Recreation and Tourism	Visual	Transportation	Public Health and Safety	Environmental Justice	Public Infrastructure	Military	Agriculture
A Temporary Erosion and Sediment Control (TESC) Plan will be prepared that would be implemented by the construction contractor. The TESC Plan will include standard storm water BMPs such as building during the summer months when rainfall potential is low, using silt fences or hay bales to prevent eroded soil from being transported off-site, and contouring to stop drainage from entering the site and to prevent runoff from entering surface waters.	X	X					X	X	X											
To minimize the potential for erosion and impacts to site drainage patterns, Project access roads will be sited to follow natural contours and minimize side hill cuts to the extent possible.	X	X																		
At the onsite substation, a retention basin will be constructed to avoid erosion and eliminate the possibility of degrading downstream waters.	X	X				X														
Ditches and culverts and other erosion controls will be implemented to capture and convey storm water in areas of temporary disturbance.	X	X																		
If blasting is required it would be conducted such that it would minimize the creation of excessive slopes.	X					X														
During construction, wind erosion will be minimized by using common dust suppression techniques, such as regularly watering exposed soils, stockpiling soils, and stabilizing soils.	X		X																	
With the exception of areas where permanent surface recontouring is required, disturbed areas will be restored to pre-existing grades and revegetated.	X	X				X	X	X	X			X		X						
Permanent storm water control structures will be installed to prevent erosion where access roads, buildings, storage areas, and parking areas are constructed.	X	X				X														
To minimize the introduction and spread of invasive plant species, potential off-site sources of materials (gravel, fill, etc.) will be inspected, and the import of materials from sites that are known or likely to contain seeds or propagules of invasive species will be prohibited.							X													
Vehicle operators transporting materials to the Project site from off-site will be required to follow protocols for removing soils and plant material from vehicles and equipment prior to entry onto the site.							X	X	X			X								
The Hawai‘i Department of Agriculture will be consulted to establish protocols and training orientation methods for screening invasive species introductions during construction.							X	X	X			X								
Noisy construction activities (including blasting, if required) will be conducted between 7a.m. and 5 p.m., unless further restricted by Hawaii Department of Health (HDOH) noise permits, to reduce the potential impact of construction noise during sensitive nighttime hours.				X																
Equipment and vehicles will be maintained in good working order and will employ adequate mufflers and engine enclosures to reduce equipment noise.				X																
Contractors and Project staff will implement proper O&M procedures as recommended by product manufacturers.			X	X								X								

Table 2-6. Best Management Practices, Project-specific design features, and Project plans (continued)

BMP	Geology and Soils	Hydrology and Water Resources	Air Quality	Noise	Hazardous Materials	Natural Hazards	Vegetation	Wildlife	Threatened and Endangered Species	Socioeconomics	Cultural	Land Use	Recreation and Tourism	Visual	Transportation	Public Health and Safety	Environmental Justice	Public Infrastructure	Military	Agriculture
A site-specific Storm Water Pollution Prevention Plan (SWPPP) will be prepared that would be implemented by the construction contractor to reduce impacts to hydrology, drainage, and surface waters. The SWPPP will contain a description of the characteristics of the site such as nearby surface water, topography, and storm water runoff patterns; identification of potential pollutants such as sediment from disturbed areas, and stored wastes or fuels; and identify BMPs that will be used to minimize or eliminate the potential for these pollutants to reach surface waters through storm water runoff.	X	X																		
To reduce the risk of earthquake damage, all structural elements of the Project will meet or exceed current building code requirements for the seismic risk on Oahu. The current design standard is defined by the 2006 Uniform Building Code.						X														
A Traffic Management Plan will be prepared and implemented reduce potential impacts to traffic during construction.															X					
A Hazardous Materials and Wastes Management Plan (HMWMP) will be prepared and implemented that details proper procedures for storing and using hazardous materials and storing and disposing of hazardous waste. The plan will contain sufficient detail to address the purpose of the plan and to readily translate into the actions necessary to comply with relevant regulations. The plan would include information about site activities, site contacts, worker training procedures, and a hazardous materials inventory in accordance with Article 80 of the Uniform Fire Code.					X											X				
A Site Safety Handbook will be prepared for construction and operations and maintenance					X	X						X				X				X

2.4.7.1 Estimated Schedule for the Proposed Action

Alternative 2 is proposed to begin construction as soon as the ~~second~~ fourth quarter of 2016 with commercial operation planned in 2017. Table 2-7 presents the anticipated Project schedule, which is driven by time constraints required by the power purchase agreement (PPA) with HECO.

Table 2-7. Project Schedule

Project Activity	Estimated Start Date	Estimated Completion Date
Permitting Process	Spring 2013	~~Second~~ Fourth quarter 2016
Construction	~~Second~~ Fourth quarter 2016	~~Second~~ Fourth quarter 2017
Commence Commercial Operations	2017	2017

2.4.8 Project Life and Decommissioning

The anticipated life of the Project is 21 years (1 year of construction and 20 years of commercial operation). After that time, NPMPP will evaluate whether to continue operation of the Project or to decommission it. Should the period of Project operation be extended, the facility may also be upgraded and repowered with renegotiated leases (and any necessary extensions of Project permits and approvals, such as the ITP/ ITL, would need to be obtained).

If the Project is decommissioned, the goal of decommissioning would be to remove the power generation equipment and return the site to a condition as close to its pre-construction state as possible within 1 year as contractually required in both the land lease with DLNR and the PPA with HECO. All decommissioning- and restoration-related waste would be properly handled and disposed of or recycled, as appropriate, in accordance with county, state, and Federal laws and permit requirements. Foundations would be removed to a depth below grade, and roads would be left for use. Major activities required for decommissioning would typically occur in reverse order to those of construction and are listed below:

- Turbine components would be disassembled.
- Turbine foundations and the permanent met tower would be removed. Foundations would be removed to a point several feet below grade and the remaining portions buried. Remaining concrete and steel would be hauled offsite. Foundations would be filled with native weed-free aggregate and soils.
- The electrical collection system would be removed for above-ground structures and decommissioned in place for below-ground cables.
- The O&M building would be sold or demolished**.** The onsite septic system would be abandoned consistent with State and local requirements, unless needed for a future use of the site.
- Transmission line would be removed. Foundation holes would be filled with native, weed-free soil.

- Road removal would occur as required by permit and/or site control agreements by landowners. Roads would be re-graded to original contours where feasible. Any roads left in place would become the responsibility of the landowner.
- Grading of disturbed areas would be done to preconstruction contours, where feasible;
- Revegetation would occur with native or pasture grass species to ensure establishment of vegetation. Where applicable, restored areas would be stabilized and returned to preconstruction conditions, to the extent feasible.
- Recycling and disposal of materials, turbine components (i.e., metal parts), and any hazardous and regulated materials and wastes would be conducted per applicable local, State, and Federal regulations.
- Electrical substation would remain in place pending the local utility long-term plans (local utility own and operates portion of onsite substation), otherwise all above and below grade materials would be removed as indicated above.

Decommissioning would restore, to the extent practical, the visual and ecological character of the landscape and also remove effects to other environmental and public resources that may have occurred as a result of Project operations. NPMPP would provide the land owners with security as may be required under the terms of the leases to ensure decommissioning obligations are met.

2.5 Habitat Conservation Plan (HCP)

The HCP and associated ITP/ITL cover activities associated with the proposed Project only (they do not account for take associated with the larger generation project under Alternative 3). The take levels requested are listed in Table 2-8.

Table 2-8. Requested ITP Authorization for ESA-listed Species

Species	Requested Take Over the Permit Term
Hawaiian hoary bat	Tier 1: 34 bats Tier 2 (Authorized Take Level): 51 bats Tier 1 represents estimated take; Tier 2 (authorized take request) equates to 150 percent of estimated take.
Newell's shearwater	4 adults/fledged young; 2 eggs/chicks
Hawaiian stilt	4 adults
Hawaiian coot	8 adults
Hawaiian moorhen	8 adults
Hawaiian duck	4 adults
Hawaiian short-eared owl	4 adults/fledged young; 4 eggs/chicks
Hawaiian goose	6 adults

Subsequent to the publication of the original Draft EIS, the Draft HCP was updated to reflect refinements in the Project design, address public and agency comments, and incorporate new information about the Covered Species (refining assumptions used to estimate Project-related take of the Covered Species). The Final HCP includes incidental take calculations based on the Modified Proposed Action Option, incorporating nine turbines with larger generating capacity and taller

dimensions (see the Project HCP and Sections 2.2.2, and Section 4.11 of this EIS for additional detail). However, Project take estimates under the Proposed Action (i.e., included in the Draft HCP and evaluated in the original Draft EIS) and Modified Proposed Action Option are comparable ~~(the same or less than presented in the original Draft HCP)~~ and do not result in different levels of requested take for any of the covered species. Although the taller turbines have larger rotor swept areas which could influence collision risk, the effect of wind turbine height, rotor swept area, and blade tip speed on bird and bat collision fatalities remains uncertain (Marques et al. 2014). Note that the maximum blade tip speed among the turbine models considered in the original Draft EIS is 243 miles per hour, whereas the maximum blade tip speed of the largest turbines considered under the Modified Proposed Action Option in the Second Draft EIS is 192 miles per hour due to lower wind turbine rotor speed (maximum revolutions per minute). Moreover, collision risk may decrease through the use of larger turbines because fewer are required to produce the same amount of energy (AWWI 2014). Therefore, the take estimates presented in Chapter 4 have additional conservative assumptions to account for the uncertainty associated with changes in the collision risk associated with fewer but larger turbines or differences in the rotor swept area or blade tip speed. Additionally, the Modified Proposed Action Option does not result in changes to HCP avoidance, minimization, and mitigation measures. Therefore, ~~the Second Draft~~ this EIS reflects components of the Final HCP which are described below.

The scope of the HCP covers the area and activities where incidental take authorization would be provided under the ITP and ITL. The covered area includes the portions of the DLNR and Malaekahana Hui West, LLC leased properties which comprise the wind farm site, the construction access route, and the mitigation areas. The covered activities include all Project activities which may occur during construction, operation, and maintenance of the Project that have the potential to result in take of the Covered Species.

NPMPP is requesting a 21-year ITP and ITL term that covers construction and operation of the Project. Before expiration of the ITP and ITL, and to the extent allowed by applicable laws and regulations, NPMPP reserves the right to apply to renew or amend the HCP and its associated permits and authorizations to extend its term of operation.

The Project HCP includes a detailed discussion of incidental take estimation and assumptions about direct and indirect take for each species. Mitigation areas are shown in Figures 1-4, 1-5, and 1-6 of this EIS. The following sections describe the covered activities and the conservation measures incorporated into the HCP.

2.5.1 Avoidance and Minimization Measures

NPMPP has worked collaboratively with USFWS and DOFAW to assess the potential for the Project to cause adverse effects to the Covered Species. The HCP identifies goals and objectives for each Covered Species that establish a framework for developing the HCP conservation strategy, as outlined in the USFWS Five-point Policy guidance for the HCP process (USFWS and NMFS 2000). NPMPP has incorporated measures to avoid and minimize impacts to the Covered Species including impacts related to Project components and siting considerations as well as general project development measures. The

measures described in this section to avoid and minimize impacts to the Covered Species would do the same for other bird species, including those protected under the MBTA, and culturally important birds.

Project Components and Siting Considerations

- The three Project temporary guyed met towers were fitted with bird flight diverters and/or white poly tape (1 inch [2.5 centimeter]) to increase visibility and, as a result, the likelihood of avoidance by Covered Species.
- The Project plans to install an un-guyed, free-standing permanent met tower to maximize the detectability of all features of the structure for birds and bats and minimize the risk of collision. This permanent tower would replace one temporary guyed met tower, and the remaining temporary met towers would be removed before the commercial operation date.
- The majority of the wind farm site is sited in disturbed agricultural habitat, which minimizes impacts to most native species.
- The wind farm site does not have suitable listed waterbird breeding or foraging habitat, thereby minimizing Hawaiian stilt, Hawaiian coot, and Hawaiian moorhen use of the wind farm site and minimizing potential Project impacts to these species.
- To minimize potential impacts to wildlife, onsite lighting at the O&M building and substation will be shielded and/or directed downward, triggered by a motion detector, and fitted with non-white light bulbs. Lighting is only expected to be used when workers are at the site at night. Most O&M activities are expected to occur during daylight hours. Nighttime activities during construction are addressed in the General Project Development Measures below.
- Barbed wire will not be used on perimeter fences required to secure Project infrastructure to avoid the risk of entangling bats.
- Flashing red lights on the nacelle have been shown to not be attractive to birds and will be used in accordance with FAA requirements.
- The collection line will be placed below ground to the maximum extent practicable, thereby reducing the risk of collision of the Covered Species.
- New above-ground portions of the power lines associated with the Project will use line marking devices to improve visibility to birds and follow Avian Protection Plan Guidelines (APLIC 2012).

General Project Development Measures

- Hawaiian hoary bats roost in non-native and native woody vegetation that is 15 feet (4.5 meters) or taller. To minimize potential impacts to the Hawaiian hoary bat, woody plants greater than 15 feet (4.5 meters) tall will not be removed or trimmed between June 1 and September 15 during the installation and ongoing maintenance of the Project structures.
- NPMPP will implement low wind speed curtailment to reduce potential impacts to Hawaiian hoary bats. Proposed implementation will include increasing manufacturer's recommended

cut-in speeds[1] from 10 feet/ per second (ft/s; 3 meters/ per second [m/s]) to 16 ft/s (5 m/s), and feathering turbine blades[2] into the wind below 16 ft/s (5 m/s). Low wind speed curtailment will be instituted March – November between sunset and sunrise. In addition to the intended benefit of reducing bat fatalities, low wind speed curtailment will reduce the risk to Newell's shearwaters, which could transit the wind farm site at night April – November.

- NPMPP will deploy bat acoustic monitors at the Project to document bat acoustic activity for a period during operations. Results from this monitoring may potentially be used to adaptively manage implementation of low wind speed curtailment to reduce observed and unobserved bat fatalities.
- A daytime speed limit of 25 miles per hour (mph; 40 kilometers per hour [kph]) and a nighttime speed limit of 10 mph (16 kph) will be observed on wind farm site roads to minimize the potential for vehicle collisions with Covered Species.
- Should the Hawaiian goose begin to use the wind farm site for foraging or nesting, NPMPP will reduce daytime speed limits to 10 mph (16 kph) to minimize the potential for vehicle collisions.
- Stormwater management on the Project including the turbine pads and roads will be designed to avoid the potential for accumulating standing water, which could serve as an attractant to waterbird species.
- As appropriate to control erosion or other site-specific concerns, disturbed areas will be replanted with non-invasive resident species that are compatible with Project operations, such as being suitable for post-construction mortality monitoring within search areas. To the extent practicable, NPMPP will minimize the creation of suitable Hawaiian goose nesting habitat (shrubs adjacent to low-growing grass) in developing post-construction monitoring search plots.
- Trash will be collected in lidded receptacles and removed from the construction area on a weekly basis to avoid attraction of ants and other animals such as mongooses, cats, and rats that may negatively affect the Covered Species or NPMPP's ability to detect fatalities of the Covered Species.
- NPMPP will maximize the amount of construction activity that can occur in daylight during the seabird breeding season including the peak fledging period (approximately October 15-November 23).
- Should nighttime construction be required, NPMPP will use shielded lights and maximize the use of non-white lights if construction safety is not compromised, to minimize the attractiveness of construction lights to wildlife. NPMPP will also have a biological monitor in the construction area to watch for the presence of Covered Species at all times during nighttime construction. Should a Covered Species be observed, the monitor will stop

[1] Cut-in speed is the speed at which the turbine first starts to rotate and generate power.
[2] Feathering turbine blades refers to increasing the angle of the blade's pitch by turning the blade parallel to the air flow to reduce air resistance or wind drag.

construction activities and shut down construction lighting until the individual(s) move out of the area.

- When not in use, construction cranes will be lowered at night, when practicable, to minimize the risk of bird collisions.
- To address concerns about fire safety, NPMPP will establish fire safety-related construction and O&M requirements (including landscaping considerations), response protocols, and responsibilities. A Fire Management Plan is included in Appendix C of this EIS.
- Chromolaena (*Chromolaena odorata)*, an invasive plant species, occurs on the nearby Kahuku training area. NPMPP will coordinate with the Oahu Invasive Species Committee to identify and implement measures to minimize the risk of introducing chromolaena to the wind farm site. Approaches to minimize risk may include periodic site inspections by qualified personnel to search for the presence of plants and cleaning of equipment used in the wind farm site.

2.5.2 HCP (Off-site) Mitigation Measures

In addition to the need for avoidance and minimization measures, Section 10(a)(2)(A) of the ESA and HRS Chapter 195D require that an HCP describe the specific steps that will be taken to mitigate the effects of the take authorized by the ITP and ITL. The mitigation measures described below, and summarized in Table 2-9, would be implemented at locations outside of the wind farm site and are designed to offset or compensate for the effects of incidental take of the Covered Species which cannot be avoided or minimized through the measures described in the Section 2.5.1. The intent of the measures described here is to benefit the Covered Species through management and monitoring or through enhancement and improvement of their habitats.

Table 2-9. Proposed Mitigation for the Covered Species

Species	Tier 1 or One-time	Tier 2
Hawaiian hoary bat	Provide funding for and report results from a bat research study contributing to the knowledge of Hawaiian hoary bats on Oahu and implement bat habitat restoration measures and associated monitoring at the Poamoho Ridge mitigation area.	Provide funding for and report results from a bat research study contributing to the knowledge of Hawaiian hoary bats on Oahu and implement bat habitat restoration measures and associated monitoring at the Poamoho Ridge mitigation area.
Newell's shearwater	Provide funding to National Fish and Wildlife Foundation research fund to support research and management of Newell's shearwaters.	NA
Hawaiian stilt	Design and install fence and public information signs to reduce fatalities of waterbirds at Hamakua Marsh. Support public education and monitoring through the funding of a part-time biologist.	NA
Hawaiian coot	See Hawaiian stilt, above	NA
Hawaiian moorhen	See Hawaiian stilt, above	NA

Table 2-9. Proposed Mitigation for the Covered Species (continued)

Species	Tier 1 or One-time	Tier 2
Hawaiian duck	See Hawaiian stilt, above	NA
Hawaiian short-eared owl	Provide funding to DOFAW's Endangered Species Trust Fund to support research and management of Hawaiian short-eared owl.	NA
Hawaiian goose	Construct a protective hogwire fence in one of several proposed fenced units at James Campbell NWR.	NA

NPMPP has worked with the USFWS and DOFAW to identify appropriate mitigation measures to compensate for the take of the Covered Species. The mitigation proposed consists of a two-tiered approach for the Hawaiian hoary bat. For this species, initial mitigation efforts (Tier 1) are designed to compensate for estimated take, and a second tier of take (authorized take level) was established for which additional mitigation would be required in the event that take is higher than estimated. One mitigation level is presented for the Hawaiian duck, Hawaiian stilt, Hawaiian moorhen, Hawaiian short-eared owl, and Hawaiian goose due to the low anticipated level of take. The following discussion describes the mitigation proposed for each species or species group including the mitigation approach; mitigation locations; and the mitigation activities for each of the Covered Species, the rationale for their selection, and the details associated with implementing the mitigation specific to each Covered Species to aid in the assessment of their environmental impacts.

2.5.2.1 Mitigation for Potential Impacts to the Hawaiian Hoary Bat

A tiered approach was used for determining the requested authorized take levels for the Hawaiian hoary bat given the uncertainty surrounding the prediction of take and the estimation of actual mortality. Two tiers were created relative to the estimated take under low wind speed curtailment to provide flexibility in case of lower or higher than estimated fatality rates. The first tier was established at the estimated take level, and a second tier of take was established for which additional mitigation would be required. Take levels for this species are not additive among tiers but rather represent the total requested take amount. Mitigation measures described below correspond to the two tiers of take for the Hawaiian hoary bat (Table 2-10).

Table 2-10. Proposed Bat Mitigation.

Tier	Mitigation
Tier 1	Hawaiian hoary bat research funding ($100,000) and 8 years of funding for forest restoration, fence maintenance, and acoustic monitoring at both Poamoho Ridge units (1,307 acres [529 hectares])
Tier 2	Hawaiian hoary bat research funding ($50,000) and 4 years of funding for forest restoration, fence maintenance, and acoustic monitoring at both Poamoho Ridge units (1,307 acres [529 hectares])

The proposed mitigation of research and forest restoration is consistent with Hawaiian Hoary Bat Recovery Plan (USFWS 1998) and priorities and recommendations in the Endangered Species Recovery Committee (ESRC) Bat Guidance (DOFAW 2015), including the recommended mitigation

funding target of $50,000 per bat. The Hawaiian Hoary Bat Recovery Plan (USFWS 1998) describes the first two recovery priorities as: 1) research essential to the conservation of the subspecies and 2) protecting and managing current populations. Therefore, NPMPP has proposed mitigation that includes a combination of Hawaiian hoary bat research and forest restoration in an area used by Hawaiian hoary bats. NPMPP has also included land acquisition as a mitigation alternative. As described above, bat mitigation will be implemented per tier (Table 2-10).

Research Funding

The Hawaiian Hoary Bat Recovery Plan (USFWS 1998) identifies research as one of the primary actions needed to move toward recovery and delisting of the species. Although progress has been made on understanding the ecology of Hawaiian hoary bats, many basic research questions still exist. During April 2015, the ESRC held a Hawaiian hoary bat workshop, during which researchers, agency personnel, and other interested parties developed a list of research priorities, described in the ESRC Hawaiian Hoary Bat Guidance Document (DOFAW 2015), to target the collection of data that would allow for the development of more effective Hawaiian hoary bat mitigation measures. Accordingly, as part of its mitigation, NPMPP would provide funding for a research project or would contribute funding to expand an existing research project targeting one of the research priorities identified in the ESRC Hawaiian Hoary Bat Guidance Document (DOFAW 2015). Table 2-10 identifies the proposed funding amounts to mitigate for potential impacts associated with construction and operation the Project for Tiers 1 and 2.

Forest Restoration, Management, and Monitoring– Poamoho Ridge

The Hawaiian Hoary Bat Recovery Plan and the State of Hawaii's Comprehensive Wildlife Conservation Strategy recommend conservation of known occupied bat habitat (USFWS 1998; Mitchell et al. 2005). Conservation may include restoration of protected land to improve habitat quality, or the acquisition of land to protect it from development. To prevent ongoing habitat degradation of conservation lands, areas targeted for restoration in Hawaii must be fenced and managed to prevent non-native ungulates from destroying native species and introducing and fostering invasive plant species. Additionally, invasive species must be removed and a native-plant dominated community must be fostered. This approach to forest restoration and management reduces the pressures from invasive species and allows natural forest restoration processes to occur.

Based on discussions with the DLNR, Koolau Mountains Watershed Partnership (KMWP), Army Natural Resources, and Kamehameha Schools, NPMPP concluded that it would be most effective to work in collaboration with these existing conservation partnerships to fund long-term forest restoration in an area where fencing efforts are already underway. The DLNR's Poamoho Ridge was identified as the best candidate for Project mitigation efforts because it contains suitable, but degraded, bat habitat and DLNR has already secured funding for fencing around two units that are 654 acres (265 hectares) and 653 acres (264 hectares), respectively (Figure 1-5). Poamoho Ridge consists of native, high-elevation forest along the leeward summit of the central Koolau Mountains (Figure 1-5). It is located above Wahiawa in the Ewa Forest Reserve, and is proposed to be part of the State Natural Area Reserve System. Habitat along Poamoho Ridge is steadily decreasing in

quality due to the presence of invasive plant species are and feral pigs (M. Zoll, DLNR, pers. comm. 2014). Forest restoration and management activities conducted by NPMPP within the fenced units would foster the growth of additional bat roosting and foraging habitat, and would support a forested corridor connected with the Ahupua`a O Kahana State Park and forested habitat managed for conservation in neighboring military reservation areas (Figure 1-5).

Forest restoration, fence maintenance, and acoustic monitoring on both Poamoho fence units are proposed for each mitigation tier with the length of the effort varying by tier. A preliminary draft management plan in Appendix E of the Project HCP describes the initial management approach for addressing mitigation needs and is summarized in the following paragraphs. Upon the initiation of Project construction, funding will be provided to develop a final management plan as part of the mitigation. This plan is subject to review by USFWS and DOFAW and requires the recommendation for approval by the ESRC.

Funding for forest restoration, management, and monitoring of the Poamoho units is proposed for each tier of mitigation. NPMPP would provide annual funds to KMWP or a similar organization for one 8-year period and potentially up to one additional 4-year period. Funding would cover the costs of two full-time employees per year performing forest restoration, management, and monitoring activities including fence maintenance, bat acoustic monitoring, feral pig control and monitoring, and invasive plant removal and monitoring, as well as needed supplies and helicopter time. All of these activities, which are part of DOFAW's ongoing watershed protection efforts, are covered under DLNR's Chapter 343 Declaration of Exemption for the Koolau Forest Watershed Protection Project (DLNR 2012).

Shortly after fence installation, management work would focus on removal of pigs. In later years, the focus would likely shift to invasive plant removal to allow for natural recruitment, and fence maintenance. It is anticipated that work would be conducted by KMWP; if not, an alternate approach would be developed in coordination with the USFWS and DOFAW. For additional information on how the mitigation acreages were derived and the allocation of staff time, please see the Project HCP.

Acoustic monitoring at Poamoho Ridge would document presence and temporal patterns of bats, and would provide valuable information on long-term patterns of bat use at this site. NPMPP initiated short-term bat acoustic monitoring at Poamoho Ridge in April 2014 to provide baseline data and verify bats occur in the area. This effort confirmed the use of the area by bat(s). During commercial operation of the Project, acoustic monitoring will include monitoring at Poamoho Ridge for the duration of mitigation commitment within the respective tiers (Table 2-10).

2.5.2.2 Mitigation for Potential Impacts to the Newell's Shearwater

The USFWS Newell's Shearwater Recovery Plan and the State of Hawaii's Comprehensive Wildlife Conservationist Strategy for Newell's shearwaters recommend efforts to reduce fallout, protect known colonies, and develop efficient predator control methods while expanding knowledge of the species' status and distribution (USFWS 1983, Mitchell et al. 2005). Although providing mitigation for this species on Oahu would be preferred, this approach is not likely the most effective for

Newell's shearwater recovery because no nesting colonies are known from Oahu, and locating any breeding populations, if any exist, would take considerable effort. Combined with additional threats such as fallout potential due to heavy urbanization on Oahu, this makes conservation efforts on Oahu impractical on a scale that is within the scope of the Project. Therefore, with the concurrence of the USFWS, DOFAW, and ESRC, mitigation for the possible take of Newell's shearwater by the Project will be either focused on improving existing management measures or implementing colony-based management at a chosen breeding colony on Maui, Kauai, or elsewhere to provide a net benefit and maximize contributions to the recovery goals of the species. Mitigation actions would address one or more of the major threats to the recovery of Newell's shearwaters: 1) introduced predators, mainly cats, which can prey on adults, eggs, and fledglings; 2) feral ungulates, mainly pigs, which degrade habitat and may trample burrows; and 3) artificial lighting, which may disorient fledglings and increase their risk of collision with artificial structures (Mitchell et al. 2005).

The USFWS has created an account with the National Fish and Wildlife Foundation (NFWF) where funds for Newell's shearwater mitigation can be deposited and then used according to an appropriate Newell's shearwater conservation plan. The overall intent is that pooled resources can be used to fund larger management projects or to resolve larger research questions targeted at the recovery of Newell's shearwater than could have been supported through smaller scale investments. NPMPP will provide designated mitigation funds to the NFWF dedicated account. The USFWS, and potentially other appropriate partner organizations, will collaborate to create a Newell's shearwater conservation plan and implement the planned activities. The Newell's shearwater conservation plan funded in part by NPMPP contributions will be developed in coordination with DOFAW, reviewed by appropriate species experts, and include appropriate biological measures of success which will be determined when the conservation plan is developed.

Based on a review of data from Kauai, USFWS and DOFAW estimated $28,000 would be required to mitigate for one adult Newell's shearwater and $11,000 for one Newell's shearwater chick or egg, plus administration costs of 20 percent (A. Nadig, USFWS, and A. Amlin, DOFAW, pers. comm. 2014). Therefore, to mitigate for potential effects to Newell's shearwaters NPMPP would provide NFWF $160,800 in funding.

2.5.2.3 Mitigation for Potential Impacts to Waterbirds (Hawaiian Stilt, Hawaiian Coot, Hawaiian Moorhen, and Hawaiian Duck)

Mitigation Approach

The Recovery Plan for Hawaiian Waterbirds (USFWS 2011b) identifies habitat loss and degradation and predation by introduced mammals as the primary threats to the Hawaiian stilt, Hawaiian moorhen, and Hawaiian coot. It also identifies these factors as the most important causes of decline of the Hawaiian duck. Appropriate habitat management of USFWS (2011e) core wetlands is the first recovery criterion listed in the USFWS Recovery Plan for Hawaiian Waterbirds for each of the resident waterbird species. Therefore, mitigation proposed by NPMPP includes management

activities at Hamakua Marsh. Hamakua Marsh is a core wetland and therefore the implementation of management at this site is consistent with the USFWS recovery objectives.

Mitigation Location - Hamakua Marsh

Hamakua Marsh is a DLNR-owned waterbird sanctuary located on the edge of the town of Kailua and is adjacent to Kawainui Marsh, the DLNR-owned and managed waterbird management area (Figure 1-4). The Hamakua Marsh Mitigation Area is managed as breeding habitat for Hawaiian stilts, Hawaiian coots, and Hawaiian moorhens and is likely to provide future habitat for the Hawaiian duck, should a population become established on Oahu through planned recovery efforts. The marsh is identified as a core wetland in the USFWS (2011e) Recovery Plan for Hawaiian Waterbirds. DOFAW is responsible for long term management of the area, but DOFAW has also received support for predator control efforts through a mitigation agreement for potential impacts to waterbirds associated with the Kahuku Wind Project HCP (SWCA 2010). Monitoring of the mitigation efforts for the Kahuku Wind Project identified on-going mortality associated with the listed waterbirds being struck by vehicles in a shopping center parking area because they were being fed by the public (L. Salbosa, DOFAW, pers. comm. 2013).

Hamakua Marsh has an unprotected perimeter in an area of high human traffic, which has resulted in a number of negative impacts including the death and disturbance of listed waterbirds and an accumulation of trash at the site. The approximate 1,555-foot (474-meter) length of the north boundary of Hamakua Marsh abuts a shopping center along the Kawainui Canal (Figure 1-4). Local residents, shopping center restaurants employees and visitors, and others frequently use the area in ways that jeopardize resident listed waterbirds. Local residents and nearby restaurants often discard bread or other food in the parking area for the local birds to consume. Attracted by the food, waterbirds leave the marsh and forage for crumbs in the parking area, and these birds are regularly killed by vehicles and occasionally killed by people (L. Salbosa, DOFAW, pers. comm. 2013). Dog owners throw tennis balls into the marsh for their dogs to retrieve, which disturbs nesting birds or can result in direct predation (L. Salbosa, DOFAW, pers. comm. 2013). Finally, open access to the wetland invites trespassing and the illegal disposal of garbage, degrading nesting habitat.

Proposed Mitigation Activities

To address the complex management problems at Hamakua Marsh, NPMPP proposes to fund the design, construction, and limited-term maintenance of a partial fence, as well as fund a part-time staff position that would act as an onsite monitor and public outreach biologist. The proposed fence would create a boundary between the shopping center and the edge of the Hamakua Marsh Mitigation Area, controlling access to limit the illegal dumping of garbage, reducing the movement of waterbirds into the parking lot, and eliminating the use of the marsh by dogs (Figure 1-4). The part-time biologist would serve to educate local shop owners and the public about the harm caused by feeding waterbirds, as well as monitoring the area for waterbird fatalities. Although the fence would impede movement of birds from the marsh to the parking area, USFWS, DOFAW, and NPMPP

agreed that the benefits of the fence would be magnified by an active public outreach program managed by an onsite biologist.

The fence would be approximately 1,555 feet (474 meters) long and 4 feet (1.2 meters) high, and would include up to 20 informational signs, which would serve to educate the public about the resident waterbirds and actions they can take to support them, reinforcing the message from the part-time biologist. Figure 2-5 depicts an example of what the proposed fence may look like that is consistent with design criteria, and NPMPP would work with agencies to ensure fence design and construction will meet mitigation objectives. Funding for the part-time biologist and fence maintenance would be provided for 2 years.

Figure 2-5. Example of Proposed Fence at Hamakua Marsh

2.5.2.4 Mitigation for Potential Impacts to the Hawaiian Short-eared Owl

The State of Hawaii's Comprehensive Wildlife Conservationist Strategy (Mitchell et al. 2005) recommends a combination of conservation actions, monitoring, and research to address threats to the Hawaiian short-eared owl. These recommendations include continuing conservation efforts at refuges and wildlife sanctuaries, expanding survey efforts to monitor population status and trends on Oahu, and conducting research into limiting factors such as "sick owl syndrome" and vehicle collisions. Due to the low level of anticipated impact to Hawaiian short-eared owls and a general desire to maximize the positive effects of investments in mitigation, DOFAW will use the Endangered Species Trust Fund to consolidate contributions for Hawaiian short-eared owl mitigation from approved projects into a general fund. This fund will be used for the expressed purpose of mitigating impacts to Hawaiian short-eared owls. The overall intent is that pooled resources can be used to fund larger management projects or to resolve larger research questions targeted at the recovery of Hawaiian short-eared owls on Oahu than could have been supported through smaller scale investments. In consultation with DOFAW, all parties agreed $25,000 would be required to mitigate for impacts to Hawaiian short-eared owls.

2.5.2.5 Mitigation for Potential Impacts to the Hawaiian Goose

Mitigation Approach

Given the small size of the Hawaiian goose population on Oahu, the USFWS and DOFAW have proposed a mitigation approach consisting of funding for habitat management to reduce potential predation in suitable habitat. Consistent with this recommendation, NPMPP proposes to fund the construction of a hogwire fence in one of several proposed fenced units in the James Campbell NWR being managed as Hawaiian goose habitat (Figure 1-6). Details regarding the appropriate amount of fencing will be determined in consultation with the USFWS and DOFAW.

The proposed fence construction will significantly reduce the predation risk from dogs, which have been identified as a predator of concern for the Hawaiian goose at this site (J. Charrier, USFWS, pers. Comm. 2015), and will increase productivity and survival of the Hawaiian goose should the population grow and use the managed area. The area proposed for management activities contains suitable Hawaiian goose nesting habitat and is in proximity to the area where an adult pair of Hawaiian geese nested in the winter of 2013-2014. This area remains an area of frequent use for the Oahu resident Hawaiian geese (J. Charrier, USFWS, pers. comm. October 2015). Furthermore, the area is expected to be used by Hawaiian geese into the future, and those birds are expected to benefit from these actions because: 1) the species exhibits strong site fidelity and natal philopatry (Banko et al. 1999), 2) the population is assumed to grow over time at least partially due to natural reproduction, and 3) USFWS is committed to providing long term fence maintenance and management of the area. Therefore, this effort is anticipated to reduce threats to the current Oahu resident Hawaiian geese as well as future offspring or arrivals. Specifically, this effort will increase productivity and survival of the Hawaiian goose should the population grow and, as expected, use the managed area.

The James Campbell NWR Comprehensive Conservation Plan and associated NEPA EA address the proposed mitigation activities. Therefore, this EIS tiers to the exiting NEPA EA (USFWS 2011a) and impacts to individual resources are not discussed further here.

2.5.3 Post-construction Monitoring

A Post Construction Monitoring Plan (PCMP) will be implemented as a means to document impacts to the Covered Species as a result of operation of the Project, and to ensure compliance with the authorized provisions and take limitations of the HCP and the associated ITP and ITL (see Appendix A of the Project HCP). The monitoring protocol is consistent with post-construction mortality monitoring being conducted for five other wind projects in Hawaii and elsewhere in the continental U.S. (Arnett 2005, Kerns et al. 2005, Kaheawa Wind Power, LLC 2006, Arnett et al. 2009, SWCA 2011a, SWCA 2011b, Tetra Tech 2012a).

Key components of the PCMP for the Project include:

- Use of NPMPP technical staff and/or contracted biologists with expertise in turbine-bird/bat interaction studies and implementation of wind energy post-construction monitoring protocol;
- Standardized carcass searches conducted under the operating turbines as described in the Post-construction Monitoring Plan. Search intensity or approach may be modified with approval of the USFWS and DOFAW based on the results of standardized monitoring;
- USFWS, DOFAW, and ESRC approval is required to implement interim monitoring as described in the Post-construction Monitoring Plan;
- Carcass removal and searcher efficiency trials during standardized carcass searches to adjust observed fatality numbers for bias associated with the removal of carcasses by scavengers or other means and the ability of searchers to locate carcasses, respectively (see Appendix A of the Project HCP);
- A Wildlife Education and Incidental Reporting Program for reporting incidental observations of Project-related fatalities made by onsite staff;
- A protocol for the recovery, handling, and reporting of downed wildlife (see Appendix A of the Project HCP); and
- NPMPP will evaluate new technologies and/or methods in post-construction mortality monitoring that may become available during the permit term for logistical and economic feasibility as well as their potential to increase monitoring effectiveness.

3.0 AFFECTED ENVIRONMENT

This chapter presents the environmental, cultural, and socioeconomic resources that have the potential to be affected by the Proposed Action as described in Chapter 2. Resource areas include geology and soils; hydrology and water resources; air quality and climate change; noise; hazardous and regulated materials and wastes; natural hazards; vegetation; wildlife; threatened and endangered species; socioeconomic resources; historic, archeological and cultural resources; land use; recreation and tourism; visual resources; transportation; public health and safety; environmental justice; public infrastructure and services; military interests, and agriculture. For most resources, impacts would be limited to the wind farm site (specifically areas coinciding with and immediately adjacent to the Project facilities; Figure 1-2) and HCP mitigation areas. However, for some resources, a wider geographic area is considered to capture all direct and indirect effects of the Project. The analysis area and the existing conditions for each resource are described below.

3.1 Geology and Soils

Geologic resources consist of the earth's surface and subsurface materials, such as soil and bedrock. The analysis area for geology and soils includes all areas that will be disturbed by construction of the Project, as well as areas that would be disturbed by activities implemented in the mitigation areas.

3.1.1 Geology

The island of Oahu is the third largest of the Hawaiian islands and is composed primarily of the remains of two extinct shield volcanoes, Waianae and Koolau (Hunt 1996). Secondary geologic processes, including subsidence, landslides and slumping, weathering, erosion, sedimentation, and rejuvenated volcanism, have resulted in substantial modification of these two shield volcanoes (Hunt 1996). The remnants of these two volcanoes comprise the existing Waianae and Koolau mountain ranges, both of which consist of large valleys, gullies, and gulches separated by steep ridges. The Waianae Range occurs in western Oahu and the Koolau Range occurs in eastern Oahu with the central portion of Oahu, which has been less affected by erosion, forming the saddle between these two ranges (Hunt 1996). The outer edge of Oahu consists of a flat coastal plain, underlain by sedimentary deposits, which varies in width from a narrow strip to an area several miles wide (Hunt 1996). In southern Oahu and other areas where this coastal plain is extensive, the surface of the coastal plain is composed mainly of emerged Pleistocene reefs and associated marine sediments (Hunt 1996). The wind farm site and waterbird, and bat mitigation areas lie within the Koolau Range.

The Koolau Range is comprised primarily of Koolau Basalt. The Honolulu volcanic series, which formed during rejuvenated volcanism, also occur in the southeastern end of the Koolau range (Hunt 1996). The primary constituents of the Koolau Basalt include tholeiitic basalt lavas, feeder dikes of tholeiitic basalt, and lesser amounts of talus breccia, explosion breccia, cinder, and spatter (Hunt 1996). Erosion of the Koolau Volcano exposed rift zones observed due to the presence of dike complexes (Garcia 1979; HBWS 2009). These dike complexes consist of dense, usually vertical,

geological structures created by solidification of molten rock within surrounding porous lava flows (HBWS 2009). Weathering of basaltic rock in the Koolau Range produced erodible, clay-rich soils (Hunt 1996); however, these residual and alluvial soils, have been removed by streams and surface runoff and accumulated in valley floors (HBWS 2009).

3.1.1.1 Wind Farm Site

Located at the base of the northern part of the Koolau Range, just above the coastal plain near the town of Kahuku, the wind farm site ranges in elevation from approximately 3 feet (1 meter) above mean sea level (amsl) on the northern edge to 614 feet (187 meters) amsl on the southern edge. The Project Area consists of steep, dissected ridges surrounding gently sloping valleys (Hobdy 2013a). A detailed geotechnical investigation of the wind farm site will be conducted prior to construction.

3.1.1.2 Hamakua Marsh (waterbird)

The Hamakua Marsh Mitigation Area is located on the edge of the town of Kailua and is adjacent to Kawainui Marsh, the DLNR-owned and managed waterbird management area. Elevations in the Hamakua Marsh Mitigation Area range from approximately 3 feet (1 meter) amsl to approximately 23 feet (7 meters) amsl. Hamakua Marsh is a smaller wetland that was historically connected to and immediately downstream of Kawainui Marsh. Kawainui Marsh is located in the Koolau caldera and historically (around 4000 BC) was a bay connected to the ocean (DLNR 2013). Hamakua Marsh is a remnant floodplain that once linked Kawainui Marsh to Kaelepulu Pond (Ducks Unlimited 1992).

3.1.1.3 Poamoho Ridge (bat)

The Poamoho Ridge Mitigation Area is located in the Ewa Forest Reserve above Wahiawa along the leeward summit of the central Koolau Range. Elevations in the Poamoho Ridge Mitigation Area range from approximately 1,332 feet (406 meters) amsl to approximately 2,648 feet (807 meters) amsl. The mitigation area is located on a steep mountainous land in the Koolau Range. The area is characterized by undulating hills and steep ridges deeply transected by streams (U.S. Army 2010).

3.1.2 Soils

3.1.2.1 Project Area

Under the ALISH classification, the majority of agricultural lands found within the DLNR portion of the wind farm site are not classified, while the majority of agricultural lands within the Malaekahana Hui West portion of the wind farm site are classified as Prime Agricultural Lands (Hawaii State Department of Agriculture 1977). Prime Agricultural Lands are defined as “land best suited for the production of food, feed, forage, and fiber crops” (Hawaii State Department of Agriculture 1977). The majority of the soils found within the DLNR portion of the wind farm site, are classified as Category E (least productive soils) under the University of Hawaii’s Land Study Bureau’s (LSB’s) Detailed Land Classification System, while the majority of the soils found within the Malaekahana Hui West portion are classified as Category B (more productive) (University of

Hawaii Land Study Bureau 1972). Further information on the ALISH and LSB classification systems can be found in Section 3.20 – Agriculture.

Soil types mapped in the wind farm site by the Natural Resources Conservation Service (NRCS) are listed in Table 3.1-1 and displayed in Figure 3.1-1. The dominant soil types in the wind farm site include Paumalu-Badland complex and Lahaina silty clay (3 to 7 and 7 to15 percent slopes) soils. Paumalu-Badland complex soils, which make up approximately 36 percent of the Project Area, are well-drained silty clay Paumulu soils and Badland soils which consist of barren land remaining after Paumulu soils were removed by wind and water erosion (Foote et al. 1972). Lahaina silty clay soils, which make up approximately 31 percent of the wind farm site, consist of very deep, well drained soils that formed in alluvium and residuum weathered from basic igneous rock. Mokuleia clay loam and coral outcrops (found at elevations below 100 feet amsl) make up approximately 7 and 5 percent of the wind farm site, respectively. The only soil type found within the wind farm site that is listed by the NRCS as having a hydric soil component is the Haleiwa silty clay (zero to 2 percent slopes) soil type. This soil type is found along the southeast boundary and makes up approximately 1 percent of the wind farm site (NRCS 2013).

Portions of the wind farm site, particularly the eastern side, have previously or are currently used to support agricultural activities. A discussion of the classification of the soils within the site relative to agricultural productivity is provided as part of Section 3.20 – Agriculture.

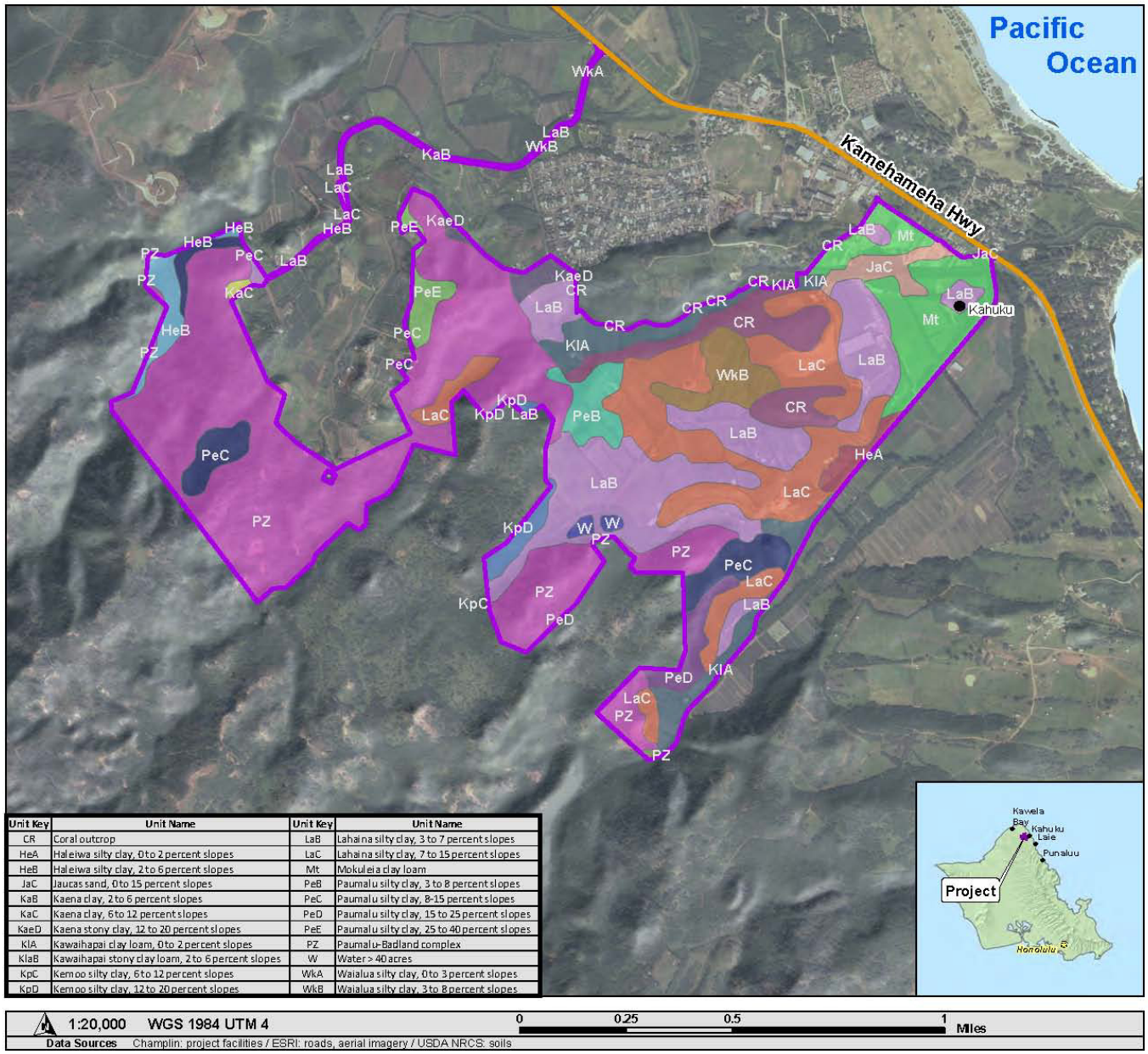
Table 3.1-1. Soil Types in the Wind Farm Site

Soil Name (Map Unit Symbol)	Slope (%)	Description	Permeability	Runoff	Erosion Hazard	Acres within the Wind Farm Site
Coral Outcrop (CR)	N/A	Coral or cemented calcareous sand; found on exposed ocean shore, coastal plains, and foot of the uplands	N/A	N/A	N/A	32.8
Haleiwa silty clay (HeA)	0-2	Deep, well drained soils that formed in alluvium derived from basic igneous material. Found on fans and in drainageways along the coastal plains	Moderate	Slow	Slight	6.4
Haleiwa silty clay (HeB)	2-6	Deep, well drained soils that formed in alluvium derived from basic igneous material. Found on fans and in drainageways along the coastal plains	Moderate	Slow	Slight	10.1
Kaena clay (KaB)	2-6	Deep, poorly drained soils formed on alluvium and colluvium	Slow	Slow	Slight	0.2
Jaucas sand (JaC)	0-15	Excessively drained, calcareous soils that occur as narrow strips on coastal plains adjacent to the ocean	Rapid	Very slow to slow	Slight (water erosion) to severe (wind erosion)	10.4
Kaena clay (KaC)	6-12	Very deep, poorly drained soils on alluvial fans and talus slopes	Slow	Slow to Medium	Slight	1.1

Table 3.1-1. Soil Types in the Project Area (continued)

Soil Name (Map Unit Symbol)	Slope (%)	Description	Permeability	Runoff	Erosion Hazard	Acres within the Wind Farm Site
Kaena stony clay (KaeD)	12-20	Very deep, poorly drained soils on alluvial fans and talus slopes	Slow	Medium	Moderate	6.8
Kawaihapai clay loam (KlA)	0-2	Well-drained soils in drainageways and on alluvial fans on the coastal plains	Moderate	Slow	Slight	32.6
Kawaihapai stony clay loam (KIaB)	2-6	Well-drained soils in drainageways and on alluvial fans on the coastal plains	Moderate	Slow	Slight	0.5
Kemoo silty clay (KpD)	12-20	Well-drained soils on uplands; developed from basic igneous rocks	Moderate to moderately rapid	Medium	Moderate	7.7
Lahaina silty clay (LaB)	3-7	Very deep, well drained soils that formed in alluvium and residuum weathered from basic igneous rock, found on uplands	Moderate	Slow	Slight	118.7
Lahaina silty clay (LaC)	7-15	Very deep, well drained soils that formed in alluvium and residuum weathered from basic igneous rock, found on uplands	Moderate	Medium	Moderate	100.0
Mokuleia clay loam (Mt)	Nearl y level	Well-drained soils along coastal plains; formed in recent alluvium deposited over coral sand	Moderate	Very slow	Slight	46.7
Paumalu silty clay (PeB)	3-8	Well-drained silty clay soils on uplands	Moderately rapid	Slow	Slight	13.0
Paumalu silty clay (PeC)	8-15	Well-drained silty clay soils on uplands	Moderately rapid	Slow to medium	Slight to moderate	27.3
Paumalu silty clay (PeD)	15-25	Well-drained silty clay soils on uplands	Moderately rapid	Medium	Moderate	10.3
Paumalu silty clay (PeE)	25-40	Well-drained silty clay soils on uplands	Moderately rapid	Medium	Moderate to severe	8.6
Paumalu-Badland complex (PZ)	10-70	Well-drained silty clay soils on uplands (Paumulu); barren land remaining after Paumalu soils were removed by wind and water erosion (Badland)	Well-drained silty clay soils on uplands	Medium to rapid (Paumalu); Rapid (Badland)	Moderate to severe (Paumalu); Very severe (Badland)	251.6
Waialua silty clay (WkA)	0-3	Moderately well-drained soils formed in alluvium weathered from basic igneous rock.	Moderate	Slow	Slight	0.8
Waialua silty clay (WkB)	3-8	Well-drained soils on alluvial fans	Moderate	Slow	Slight	18.5
Water (W)	N/A	N/A	N/A	N/A	N/A	2.5
					Total	**706.6**

Source: Foote et al. 1972.;NRCS 2014.



Unit Key	Unit Name	Unit Key	Unit Name
CR	Coral outcrop	LaB	Lahaina silty clay, 3 to 7 percent slopes
HeA	Haleiwa silty clay, 0 to 2 percent slopes	LaC	Lahaina silty clay, 7 to 15 percent slopes
HeB	Haleiwa silty clay, 2 to 6 percent slopes	Mt	Mokuleia clay loam
JaC	Jaucas sand, 0 to 15 percent slopes	PeB	Paumalu silty clay, 3 to 8 percent slopes
KaB	Kaena clay, 2 to 6 percent slopes	PeC	Paumalu silty clay, 8-15 percent slopes
KaC	Kaena clay, 6 to 12 percent slopes	PeD	Paumalu silty clay, 15 to 25 percent slopes
KaeD	Kaena stony clay, 12 to 20 percent slopes	PeE	Paumalu silty clay, 25 to 40 percent slopes
KIA	Kawaihapai clay loam, 0 to 2 percent slopes	PZ	Paumalu-Badland complex
KIaB	Kawaihapai stony clay loam, 2 to 6 percent slopes	W	Water > 40 acres
KpC	Kemoo silty clay, 6 to 12 percent slopes	WkA	Waialua silty clay, 0 to 3 percent slopes
KpD	Kemoo silty clay, 12 to 20 percent slopes	WkB	Waialua silty clay, 3 to 8 percent slopes

Figure 3.1-1

Na Pua Makani Wind Project

Soils Within the Wind Farm Site

Oahu, HI
December 2014

Wind Farm Site
City/Town
State Highway

Soil Unit
CR
HeA
HeB
JaC
KaB
KaC
KaeD
KIA
KIaB
KpC
KpD
LaB
LaC
Mt
PZ
PeB
PeC
PeD
PeE
W
WkA
WkB

TETRA TECH

3.1.2.2 Hamakua Marsh (waterbird)

Soil types in the Hamakua Marsh Mitigation Area are listed in Table 3.1-2. Soils in this area are mapped almost exclusively as Marsh (16.4 acres [6.6 hectare]), with small amounts of Pappaa clay (1.8 acres [0.7 hectare]), water (4.4 acres [1.8 hectares]), and Jaucas sand (0.1 acre [<0.1 hectare]) also occurring in the mitigation area.

Table 3.1-2. Soil Types in the Hamakua Marsh Mitigation Area

Soil Name (Map Unit Symbol)	Slope (%)	Description	Permeability	Runoff	Erosion Hazard	Acres within the Mitigation Area
Marsh (MZ)	N/A	Wet, periodically flooded areas covered dominantly with grasses and bulrushes or other herbaceous plants; hydric soils	N/A	N/A	N/A	16.4
Jaucas sand (JaC)	0-15	Excessively drained, calcareous soils that occur as narrow strips on coastal plains, adjacent to the ocean.	Rapid	Very slow to slow	Water erosion slight; wind erosion severe where vegetation has been removed	0.1
Papaa clay (PYE)	20-35	Well-drained soils on uplands; formed in colluvium and residuum derived from basalt	Slow	Medium	Moderate to severe	1.8
Water (W)	N/A	N/A	N/A	N/A	N/A	4.4
					Total	**22.7**
Source: Foote et al. 1972. Soil descriptions from NRCS 2014 and Foote et al. 1972.						

3.1.2.3 Poamoho Ridge (bat)

Soil types found in the Poamoho Ridge Mitigation Area are listed in Table 3.1-3. The primary soil type found in the Poamoho Ridge mitigation area is Rough Mountainous Land. This soil type is characterized as very steep land, which is typically not stony, broken by numerous intermittent drainage channels (Foote et al. 1972).

Table 3.1-3. Soil Types in the Poamoho Ridge Mitigation Area

Soil Name (Map Unit Symbol)	Slope (%)	Description	Permeability	Runoff	Erosion Hazard	Acres within the Mitigation Area
Poamoho Ridge Mitigation Area						
Rock land (rRk)	level to very steep	Areas where exposed rock covers 25 to 90 percent of the surface	--	--	--	1.4
Rough mountainous land (rRT)	--	Very steep land broken by numerous intermittent drainage channels; typically not stony	--	--	--	1,271.8
					Total	**1,273.2**
Source: Foote et al. 1972. Soil descriptions from NRCS 2014.						

3.2 Hydrology and Water Resources

Hydrology and water resources include groundwater, surface water features, and other resources such as watersheds and floodplains. Surface water features include lakes, rivers, streams, and wetlands. Groundwater refers to the subsurface hydrologic resources, often described in terms of depth to the aquifer or water table, water quality, and surrounding geologic composition. Surface waters, including wetlands and other Waters of the United States (WoUS), within the wind farm site and mitigation areas are subject to jurisdiction under Section 404 of the CWA and Section 10 of the Rivers and Harbor Act. Additional regulations related to hydrology and water resources are outlined in Chapter 5. The analysis area for direct and indirect impacts to hydrology and water resources includes the wind farm site and mitigation areas.

Stream flow and other hydrologic processes in Hawaii are influenced by the climatic and geological features of the area, including topography, rainfall, fog drip, and wind patterns (HBWS 2009). Hawaii streams typically have steep profiles, due to the steep terrain and numerous waterfalls, and are characteristically flashy, due to localized, heavy storms (DAR 2013). The upper reaches of many Hawaii streams are within or near areas where volcanic dikes have impounded ground water to a high level; streams that intersect dike-impounded groundwater are often perennial due to continual recharge from this groundwater source (CWRM 2008). The majority of the perennial streams on Oahu are located within the Koolau Range watersheds. Many streams in the Koolau Range, as well as most on the leeward side of the island, are perennial in their headwaters but intermittent in the lower reaches (HBWS 2009).

Groundwater in Hawaii provides about 99 percent of the domestic water and 50 percent of freshwater used in the State (Oki et al. 1999). The State Water Code (HRS §174C) defines groundwater as "any water found beneath the surface of the earth, whether in perched supply, dike-confined, flowing, or percolating in underground channels or streams, under artesian pressure or not, or otherwise." Groundwater occurs within aquifers, underground beds or layers of permeable rock, sediment, or soil through which water can easily move. Volcanic-rock aquifers are found throughout the Hawaii islands and are locally overlain by sedimentary deposits (Oki et al. 1999).

The State Commission on Water Resource Management (CWRM) has assigned hydrologic units or aquifer sector areas across the Hawaii islands, generally based on regional geology which describes how water is held and its natural movement (CWRM 2008). These aquifer sector areas also serve as management boundaries for the regulation and allocation of groundwater resources (HBWS 2009). The CWRM administers water use regulation programs with the objective of protecting in-stream flows and maintaining sustainable yields of groundwater in the state (CWRM 2008). The CWRM defines sustainable yield as "the maximum rate at which water may be withdrawn from a water source without impairing the utility or quality of the water source as determined by the commission" (CWRM 2008).

3.2.1 Surface Water

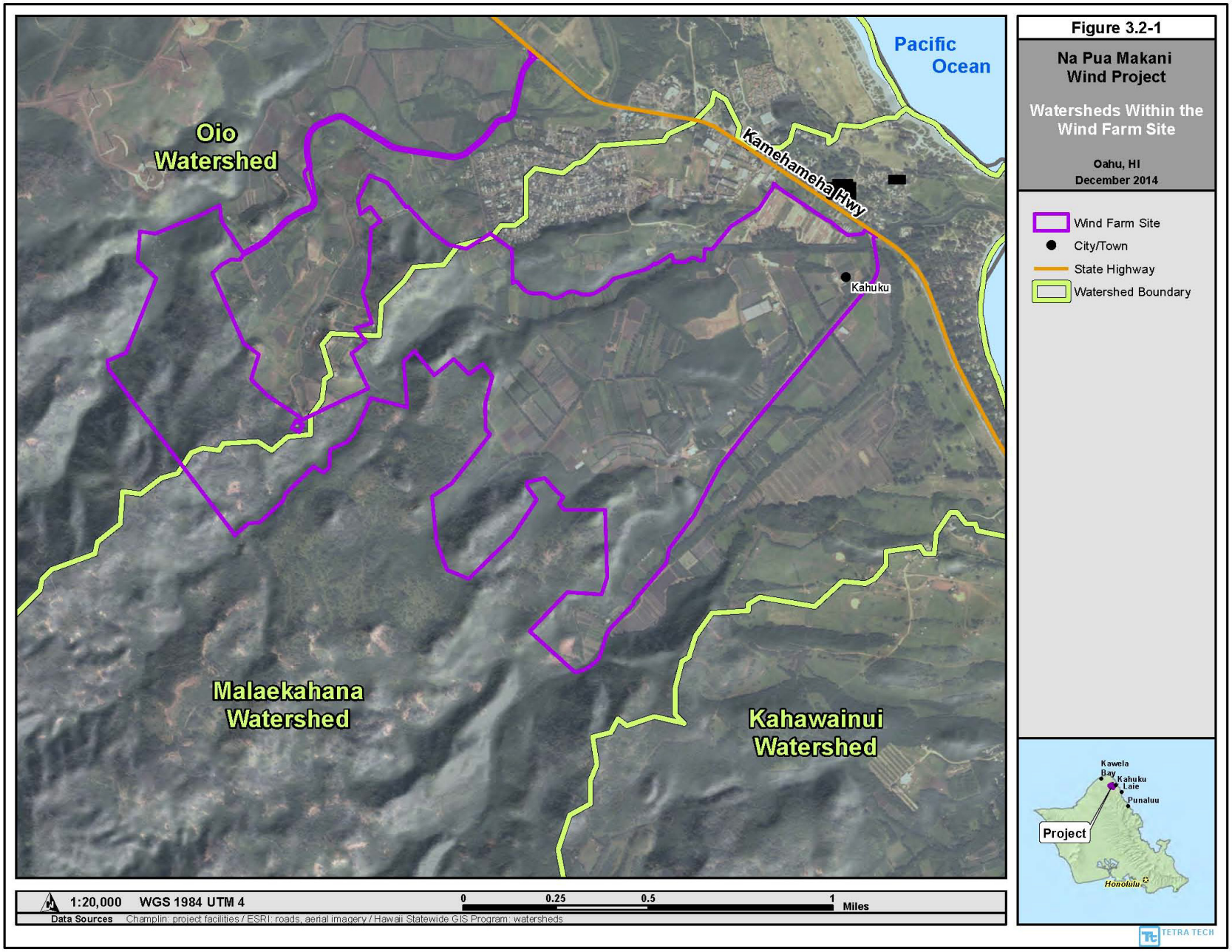
3.2.1.1 Wind Farm Site

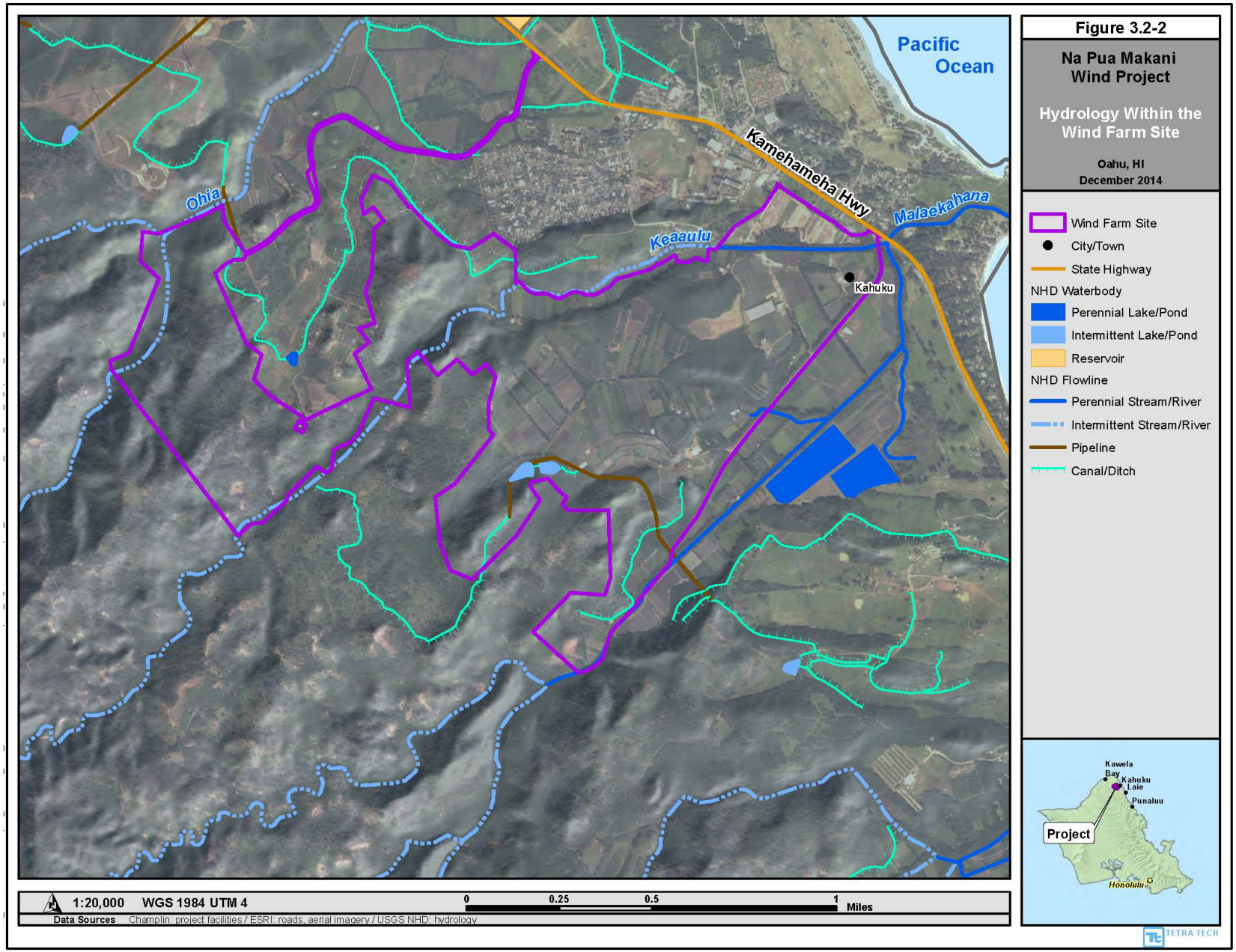
The wind farm site lies within the Oio and Malaekahana watersheds of the Koolau Loa District of Oahu (Figure 3.2-1). The Oio Watershed is approximately 6,704 acres (2,713 hectares) with a maximum elevation of 1,850 feet (564 meters; Hawaii Statewide GIS Program 2013). The Malaekahana Watershed is approximately 4,450 acres (1,800 hectares) with a maximum elevation of 2,123 feet (647 meters; Hawaii Statewide GIS Program 2013). Average annual rainfall in the wind farm site ranges from approximately 60 inches (152 centimeters) in the upper elevations to 45 inches (114 centimeters) in the lower elevations near Kahuku (Giambelluca et al. 2013).

The National Hydrography Dataset identified three streams within the wind farm site (Figure 3.2-2). These streams include: Ohia Stream on the northwestern border of the wind farm site, Keaaulu Stream which runs through the middle of the wind farm site, and Malaekahana Stream on the southern border of the wind farm site (Figure 3.2-2). Field surveys conducted in 2013, 2014, and 2015 identified Malaekahana Stream as a perennial stream throughout the wind farm site (Hobdy 2013b, SWCA 2015). The other two streams, Ohia and Keaaulu, are considered intermittent non-Relatively Permanent Waters as they only flow for 1 to 5 days, one to three times a year, following larger rains storms (Hobdy 2013b). Keaaulu Stream is a tributary of Malaekahana Stream and joins Malaekahana Stream at the eastern edge of the wind farm site (Hobdy 2013b). Additionally, the National Hydrography Dataset identified one ditch/canal as being located in the southern portion of the wind farm site. During non-wetland water delineation surveys conducted by SWCA (2015; Appendix I), this ditch/canal appeared to have been filled in and was no longer active. SWCA determined that this ditch was likely excavated in uplands and was not observed to contribute flow to another potentially jurisdictional water (SWCA 2015).

Malaekahana Stream is approximately 6 miles (10 kilometers) long flowing from an elevation of approximately 2,000 feet (610 meters) along the summit ridge of the Koolau Mountains to near Makahoa Point, at the southern edge of Kahuku, where it enters the ocean (Hobdy 2013b). The average width of Malaekahana Stream within the wind farm site is 6 to 10 feet (2 to 3 meters) with an ordinary high water mark (OHWM) of approximately 3 feet (1 meter; Hobdy 2013b).

Keaaulu Stream is approximately 4.8 miles long (7.7 kilometers long) from its headwaters, at an elevation of approximately 1,400 feet (427 meters), to its confluence with Malaekahana Stream at Kamehameha Highway (Hobdy 2013b). This stream's watershed is approximately 1,100 acres (445 hectares) and annual rainfall averages approximately 110 inches (279 centimeters) at its headwaters to approximately 45 inches (114 centimeters) at its junction with Malaekahana Stream (Hobdy 2013b). During these intermittent flow events, the stream flow attains a noticeable but somewhat indistinct OHWM of approximately 2 feet (0.6 meter; Hobdy 2013b). During surveys by SWCA (2015) it was noted that the majority of the upper (mauka) portion of Keaaulu Stream within the wind farm site appeared ephemeral due to weak or absent indicators of flow and/or an ordinary high water mark (SWCA 2015). The average width of Keaaulu Stream within the wind farm site is 2 to 6 feet (0.2 to 1.8 meters).

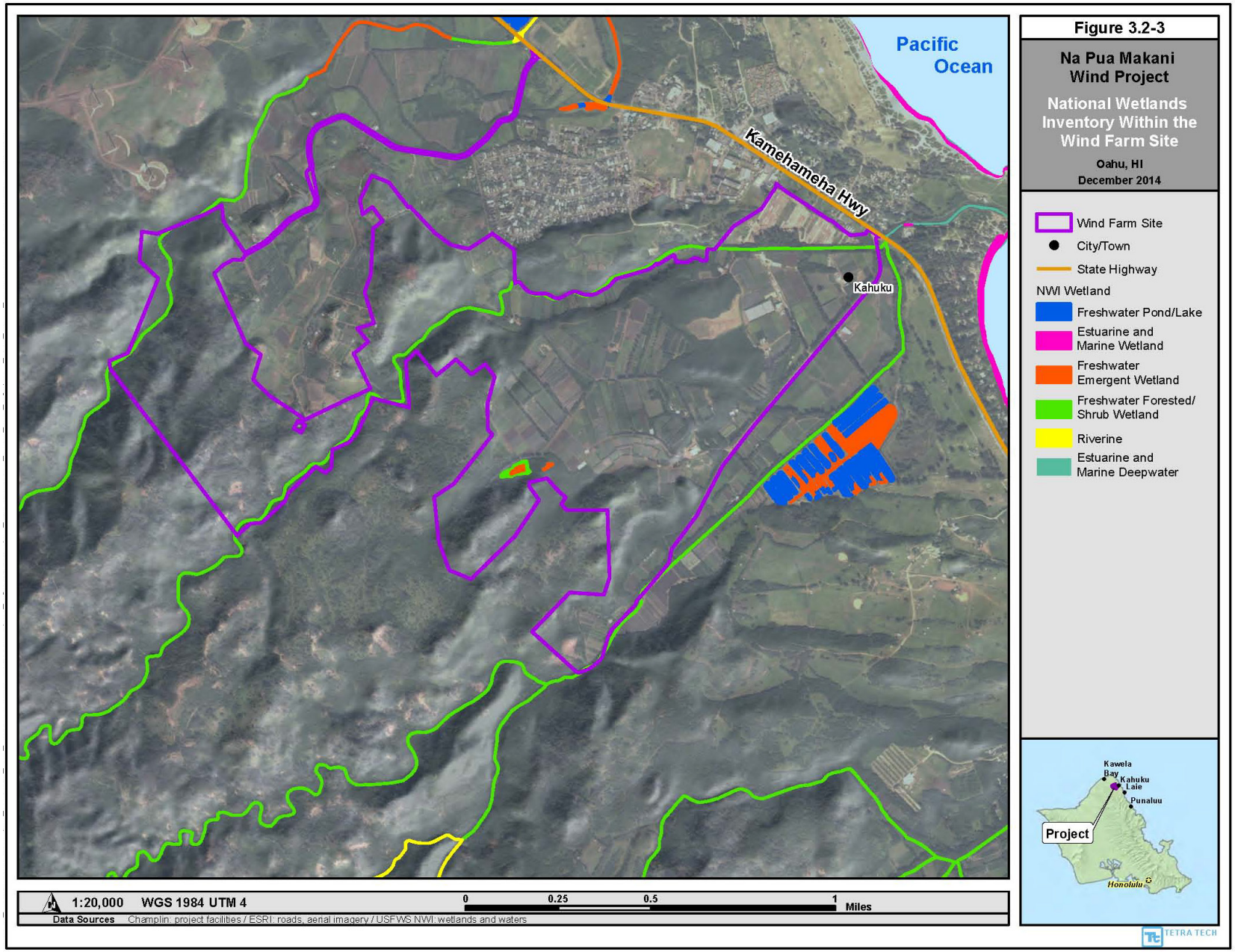

Pacific Ocean
Oio Watershed
Kamehameha Hwy
Kahuku
Malaekahana Watershed
Kahawainui Watershed
1:20,000 WGS 1984 UTM 4
0 0.25 0.5 1 Miles
Data Sources Champlin: project facilities / ESRI: roads, aerial imagery / Hawaii Statewide GIS Program: watersheds
Figure 3.2-1
Na Pua Makani Wind Project
Watersheds Within the Wind Farm Site
Oahu, HI
December 2014
Wind Farm Site
City/Town
State Highway
Watershed Boundary
Kawela Bay
Kahuku
Laie
Punaluu
Project
Honolulu
TETRA TECH


Pacific Ocean
Kamehameha Hwy
Malaekahana
Keaaulu
Ohia
Kahuku
Figure 3.2-2
Na Pua Makani Wind Project
Hydrology Within the Wind Farm Site
Oahu, HI
December 2014
Wind Farm Site
City/Town
State Highway
NHD Waterbody
Perennial Lake/Pond
Intermittent Lake/Pond
Reservoir
NHD Flowline
Perennial Stream/River
Intermittent Stream/River
Pipeline
Canal/Ditch
Kawela Bay
Kahuku
Laie
Punaluu
Project
Honolulu
1:20,000
WGS 1984 UTM 4
0
0.25
0.5
1
Miles
Data Sources
Champlin: project facilities / ESRI: roads, aerial imagery / USGS NHD: hydrology
TETRA TECH

Ohia Stream is approximately 5.0 miles (8.0 kilometers) long and flows from an elevation of 1,700 feet (518 meters) at the summit of the Koolau Range to Kii Wetlands in the James Campbell National Wildlife Refuge (NWR) north of Kahuku where it enters the ocean (Hobdy 2013b). Average annual rainfall ranges from approximately 125 inches (318 centimeters) at its headwaters to approximately 45 inches (114 centimeters) at the coast. Similar to Keaaulu Stream, a noticeable, although somewhat indistinct, OHWM of approximately 2 feet (0.6 meter) in height is evident during intermittent flow events along Ohia Stream (Hobdy 2013b). The average width of Ohia Stream within the wind farm site is 3 to 6 feet (1 to 2 meters).

A preliminary jurisdictional determination was issued by the U.S. Army Corps of Engineers (USACE) on April 6, 2015 (USACE 2015) concluding that Keaaulu, Ohia, and Malaekahana streams may be WoUS requiring a Department of Army permit for any activity resulting in the discharge and/or placement of dredged or fill materials into these waters. USACE also confirmed that the ditch/canal located in the southern portion of the wind farm site was determined to not be a WoUS. In addition to Ohia and Keaaulu streams, Lamaloa Gulch, located to the south of the wind farm site also routes and discharges runoff generated in the wind farm site into Malaekahana Stream (Belt Collins Hawaii LLC 2016a).

The National Wetland Inventory (NWI) identified three wetland features within the wind farm site (Figure 3.2-3) (USFWS 2013a). These features were mapped by the NWI as freshwater emergent and freshwater forested/shrub wetlands. However, wetland surveys conducted in 2013 determined that these areas did not qualify as wetlands. These features were assessed following USACE Guidelines in the summer of 2013 and were identified as two small former plantation ponds and an associated ditch system (Hobdy 2013b). Neither of the man-made ponds had positive indicators of wetland hydrology and hydric soils, and they were no longer functioning as wetlands, having reverted to upland sites (Hobdy 2013b). The ditch and former ponds, originally excavated out of a sloping upland site, have not been functional for more than 30 years and are currently overgrown with predominantly upland grasses and trees. If additional wetlands are identified as the Project progresses, a formal wetland delineation would occur.


Pacific Ocean
Kamehameha Hwy
Kahuku
Figure 3.2-3
Na Pua Makani Wind Project
National Wetlands Inventory Within the Wind Farm Site
Oahu, HI
December 2014
Wind Farm Site
City/Town
State Highway
NWI Wetland
Freshwater Pond/Lake
Estuarine and Marine Wetland
Freshwater Emergent Wetland
Freshwater Forested/ Shrub Wetland
Riverine
Estuarine and Marine Deepwater
Kawela Bay
Kahuku
Laie
Punaluu
Project
Honolulu
1:20,000 WGS 1984 UTM 4
0 0.25 0.5 1 Miles
Data Sources Champlin: project facilities / ESRI: roads, aerial imagery / USFWS NWI: wetlands and waters
TETRA TECH

3.2.1.2 Hamakua Marsh (waterbird)

Hamakua Marsh, the 34-acre (14-hectare) proposed waterbird mitigation area, lies within the Kaelepulu Watershed of the Koolau Poko District (Figure 3.2-4). This watershed is approximately 3,466 acres (1,403 hectares) with a maximum elevation of 1,621 feet (494 meters; HBWS 2012; DAR and Bishop Museum 2008). Average annual rainfall in the mitigation area is approximately 40 inches (Giambelluca et al. 2013).

The Hamakua Marsh Mitigation Area is located adjacent to Kawainui Marsh, the largest remaining wetland in Hawaii. Both Hamakua and Kawainui Marshes were designated as Ramsar Wetlands of International importance in 2005 for their biological, historical, and cultural significance (USACE 2008). The majority of the Hamakua Marsh Mitigation Area consists of freshwater emergent wetland (Figure 3.2-5) (USFWS 2013a). Hamakua Marsh used to be fed by Kawainui Stream which flowed from Kawainui Marsh. Currently, the northeastern edge of the mitigation area is bordered by Hamakua Canal, a manmade canal (Figure 3.2-4). In 1952 Kawainui Stream was deepened to create Hamakua Canal to help flood control (DLNR 2013). The flood control canal restricted flow to Hamakua Marsh, altering hydrology of the marsh.

3.2.1.3 Poamoho Ridge (bat)

The 1,273-acre (501-hectare) Poamoho Ridge Mitigation Area lies primarily within the Kaukonahua Watershed, although the northern parcel also lies within the Poamoho and Helemano watersheds (Figure 3.2-6). The Kaukonahua Watershed stretches across the Schofield plateau, from the ridgeline of the Koolau Range to the ridgeline of the Waianae Range. Average annual rainfall at Poamoho Ridge averages approximately 195 inches (495 centimeters; Giambelluca et al. 2013). Five perennial and one intermittent stream have been mapped by the NHD within the Poamoho Ridge Mitigation Area (Figure 3.2-6). The NWI mapped all of these stream segments as containing riverine wetlands (Figure 3.2-7) (USFWS 2013a). The five perennial streams include Poamoho Stream, three tributaries of the North Fork Kaukonahua Stream and Helemano Stream. Wetland and other waters of the U.S. surveys have not been conducted within the Poamoho Ridge Mitigation Area in association with the Project.

3.2.2 Groundwater

3.2.2.1 Wind Farm Site

The wind farm site is located in the Koolau Loa Aquifer system (aquifer code 30601) of the Windward Aquifer sector (aquifer code 306) (DLNR 2008). This aquifer system has sustainable yields of 36 to 41 million gallons per day (mgd) (136 to 155 million liters per day; CWRM 2008).

The upper aquifer in the wind farm site consists of a basal, unconfined aquifer and the lower aquifer consists primarily of a basal, confined flank aquifer with the eastern portion of the wind farm site consists of a basal confined dike aquifer (HDOH 1992). The majority of the aquifer in the wind farm site is currently used for drinking water and the remainder is a potential source of drinking water and the entire area has a high vulnerability to contamination (HDOH 1992).

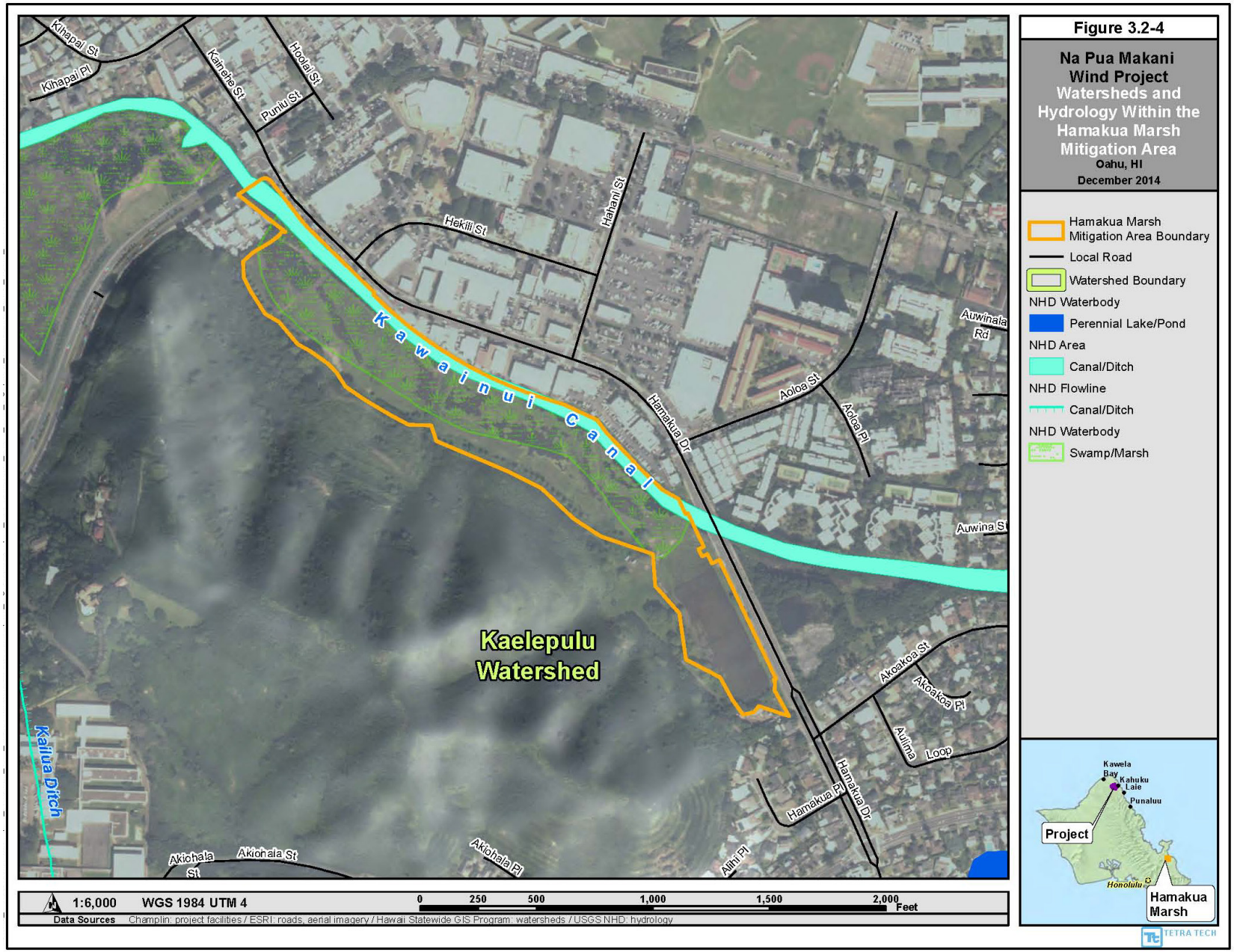


Figure 3.2-4
Na Pua Makani Wind Project
Watersheds and Hydrology Within the Hamakua Marsh Mitigation Area
Oahu, HI
December 2014
Hamakua Marsh Mitigation Area Boundary
Local Road
Watershed Boundary
NHD Waterbody
Perennial Lake/Pond
NHD Area
Canal/Ditch
NHD Flowline
Canal/Ditch
NHD Waterbody
Swamp/Marsh
Kawainui Canal
Kaelepulu Watershed
Kailua Ditch
Kihapai St
Kihapai Pl
Kainehe St
Hoolai St
Puniu St
Hekili St
Hahani St
Hamakua Dr
Aoloa St
Aoloa Pl
Auwinala Rd
Auwina St
Akoakoa St
Akoakoa Pl
Aulima Loop
Hamakua Pl
Akiohala St
Akiohala Pl
Alini Pl
1:6,000
WGS 1984 UTM 4
0 250 500 1,000 1,500 2,000 Feet
Data Sources
Champlin: project facilities / ESRI: roads, aerial imagery / Hawaii Statewide GIS Program: watersheds / USGS NHD: hydrology
Kawela Bay
Kahuku Laie
Punaluu
Project
Honolulu
Hamakua Marsh
TETRA TECH

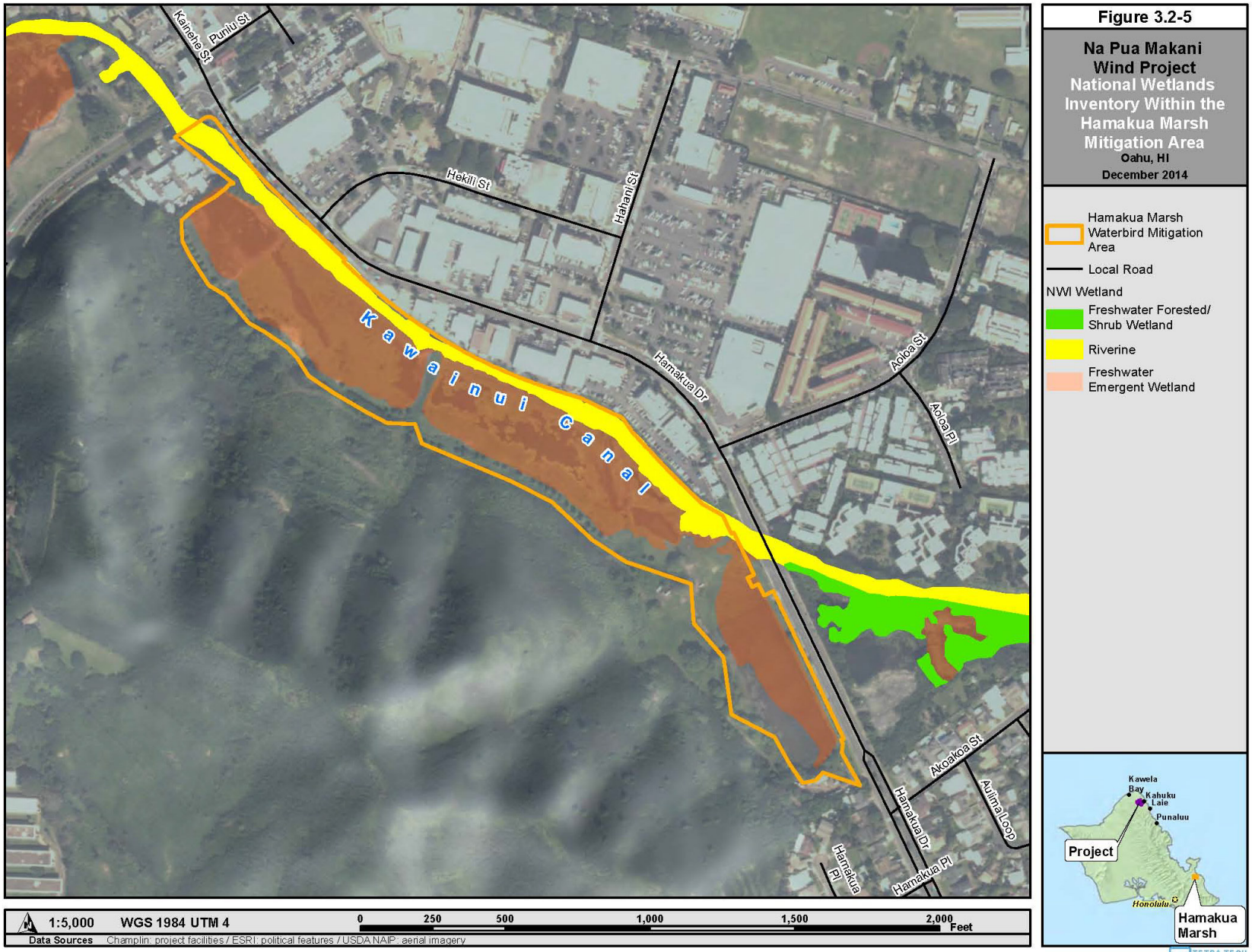


Figure 3.2-5

Na Pua Makani Wind Project
National Wetlands Inventory Within the Hamakua Marsh Mitigation Area
Oahu, HI
December 2014

Hamakua Marsh Waterbird Mitigation Area
Local Road
NWI Wetland
Freshwater Forested/ Shrub Wetland
Riverine
Freshwater Emergent Wetland

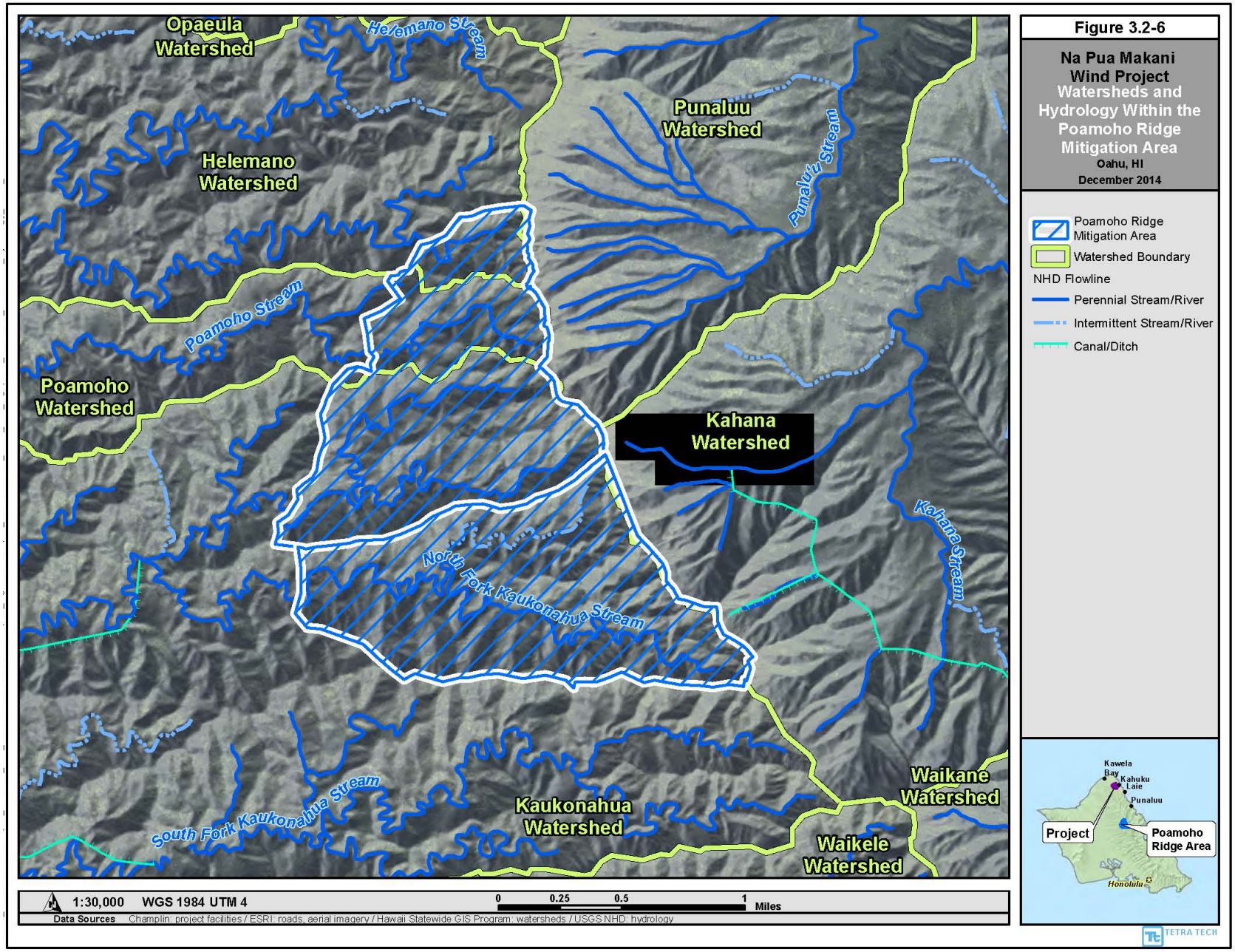


Figure 3.2-6
Na Pua Makani Wind Project
Watersheds and Hydrology Within the Poamoho Ridge Mitigation Area
Oahu, HI
December 2014
Poamoho Ridge Mitigation Area
Watershed Boundary
NHD Flowline
Perennial Stream/River
Intermittent Stream/River
Canal/Ditch
Opaeula Watershed
Helemano Stream
Helemano Watershed
Punaluu Watershed
Punalu'u Stream
Poamoho Stream
Poamoho Watershed
Kahana Watershed
Kahana Stream
North Fork Kaukonahua Stream
South Fork Kaukonahua Stream
Kaukonahua Watershed
Waikane Watershed
Waikele Watershed
Kawela Bay
Kahuku
Laie
Punaluu
Project
Poamoho Ridge Area
Honolulu
1:30,000 WGS 1984 UTM 4
0 0.25 0.5 1 Miles
Data Sources Champlin: project facilities / ESRI: roads, aerial imagery / Hawaii Statewide GIS Program: watersheds / USGS NHD: hydrology
TETRA TECH

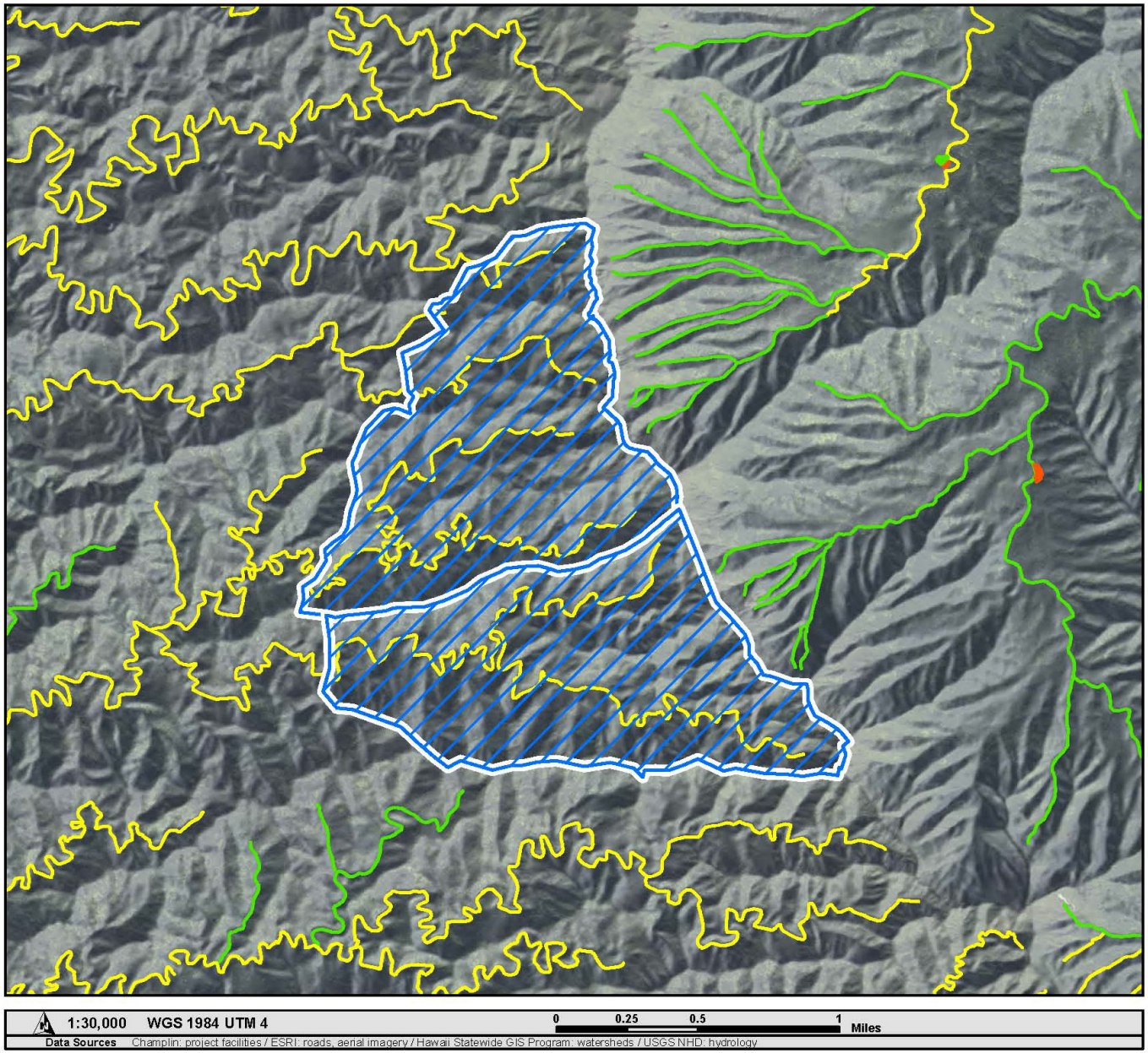


Figure 3.2-7

Na Pua Makani Wind Project
National Wetlands Inventory Within the Poamoho Ridge Mitigation Area
Oahu, HI
December 2014

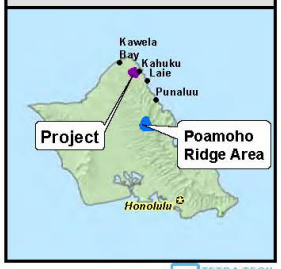
Poamoho Ridge Mitigation Area

NWI Wetland

Freshwater Emergent Wetland

Freshwater Forested/ Shrub Wetland

Riverine



TETRA TECH

According to records from the CWRM, four wells serve the wind farm site within the Malaekahana Hui West, LLC-owned lands. Well No. 4057-06 is permitted to withdraw 0.670 mgd for irrigation to a turf farm. Well No. 4057-07 is permitted to withdraw 0.300 mgd for irrigation of diversified agriculture. Well Nos. 3957-01 and 3759-03 are permitted to withdraw 1.244 mgd for truck farms, taro, and domestic purposes.

Soils in the wind farm site primarily consist of well-drained silty clay soils. These soils, as well as the limited amount of existing impervious structures or surfaces (e.g., buildings, roads), allow for precipitation to infiltrate into the groundwater system in the wind farm site. A runoff coefficient (C value) can be assigned to a particular area or land use (e.g., industrial, agricultural land) to estimate the amount of runoff to the amount of precipitation received. The existing C Value assigned to agriculture areas within the Project Area is 0.3, whereas impervious surfaces such as buildings and yards are assigned a C Value of 0.9 (Belt Collins Hawaii LLC 2016a).

3.2.2.2 Hamakua Marsh (waterbird)

The Hamakua Marsh Mitigation Area is located in the DLNR Waimanalo Aquifer system (aquifer code 30604) of the Windward Aquifer sector (aquifer code 306) and has sustainable yields of 10 to 13 mgd (38 to 49 million liters per day; CWRM 2008).

The Hamakua Marsh Mitigation Area consists of an upper aquifer defined as basal, unconfined sedimentary; and a lower aquifer defined as lower basal, confined, dike (HDOH 1992). The lower, freshwater (less than 250 mg/l of chloride) aquifer is currently used for drinking water. The upper aquifer is slightly saline (250-1,000 mg/l of chloride).

3.2.2.3 Poamoho Ridge (bat)

The Poamoho Ridge Mitigation Area is located in the Wahiawa Aquifer system (aquifer code 30501) of the Central Aquifer sector (aquifer code 305) and has sustainable yields of 104 to 141 mgd (394 to 534 million liters per day; CWRM 2008). The Poamoho Ridge Mitigation Area aquifer is a high-level, unconfined dike aquifer consisting of freshwater that is currently used as a source of drinking water (HDOH 1992). This aquifer has a high vulnerability to contamination.

3.3 Air Quality and Climate Change

3.3.1 Air Quality

Under the authority of the Clean Air Act (CAA), the Environmental Protection Agency (EPA) has established nationwide air quality standards to protect public health and welfare. These Federal standards, known as National Ambient Air Quality Standards (NAAQS), represent the maximum allowable atmospheric concentrations for six criteria pollutants: ozone, nitrogen dioxide, carbon monoxide, sulfur dioxide, lead, and particulate matter (i.e., inhalable particulate matter [PM_{10}][1] and

[1] PM_{10} is defined as particulate matter that is 10 microns or less in aerodynamic diameter. These particles are typically considered "coarse" particles.

fine particulate matter [$PM_{2.5}$] [2]). The Clean Air Branch of the Hawaii Department of Health (HDOH) is responsible for implementing air pollution control in the state and has established Hawaii ambient air quality standards (HAAQS). Table 3.3-1 lists the State and Federal ambient air quality standards.

Table 3.3-1. State and Federal Ambient Air Quality Standards

Air Pollutant	Averaging Time	Standards		
		Hawaii State Standard	Federal Primary Standard[1/]	Federal Secondary Standard[2/]
Carbon Monoxide (CO)	1-hour 8-hour	9 ppm 4.4 ppm	35 ppm 9 ppm	None
Nitrogen Dioxide (NO_2)	1-hour eff. 1/22/2010 Annual	--- 0.04 ppm	0.100 ppm 0.053 ppm	--- 0.053 ppm
PM_{10}	24-hour Annual[3/]	150 µg/m³ 50 µg/m³	150 µg/m³ ---	150 µg/m³ ---
$PM_{2.5}$	24-hour Annual	--- ---	35 µg/m³ 15 µg/m³	35 µg/m³ 15 µg/m³
Ozone (O_3)	8-hour	0.08 ppm	0.075 ppm	0.075 ppm
Sulfur Dioxide (SO_2)	1-hour eff. 6/2/2010 3-hour 24-hour Annual	--- 0.5 ppm 0.14 ppm 0.03 ppm	0.075 ppm --- 0.14 ppm 0.03 ppm	0.5 ppm
Lead (Pb)	Calendar Quarter	1.5 µg/m³	0.15 µg/m³	0.15 µg/m³
Hydrogen Sulfide	1-hour	0.025 ppm	None	None

Source: State standards HAR § 11-59; Federal standards 40 CFR Part 50
1/ ***Primary Standards*** set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children and the elderly.
2/ ***Secondary Standards*** set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.
3/ Due to a lack of evidence linking health problems to long-term exposure to coarse particle pollution, EPA revoked the annual PM_{10} standard effective December 17, 2006. However, the State still has an annual standard.

Based on measurements of ambient criteria pollutant data, EPA designates areas of the United States as having air quality equal to or better than NAAQS (i.e., attainment) or worse than NAAQS (i.e., non-attainment). The CAA general conformity rule requires that projects occurring in nonattainment and maintenance areas be consistent with the applicable State Implementation Plan. Maintenance areas are areas that previously violated Federal ambient air quality standards, but which have now come into attainment of those standards. Because Hawaii is, and always has been, in attainment for all pollutants, a general conformity analysis is not required for the Project.

Issues related to air quality that have been raised during the public scoping process for this Project include 1) the effects the Project could have on ambient air quality, 2) whether the Project would be in compliance with Federal and State air quality standards, and 3) the levels of air emissions that would be generated by the Project. These issues are addressed in this section as well as the air quality portion of Chapter 4.

[2] $PM_{2.5}$ is defined as particulate matter that is 2.5 microns or less in aerodynamic diameter. These particles are typically considered "fine" particles.

The analysis area for the air quality analysis includes the full extent of the island of Oahu. This analysis area includes the entire Project footprint, the extent of proposed mitigation areas (see Chapter 2 for more details), as well as the full extent of potential project related impacts to air quality.

3.3.1.1 Existing Conditions

In general, air quality in the state of Hawaii is among the best in the nation, primarily because of consistent trade-winds and limited emission sources. The HDOH and EPA maintain a network of air quality monitoring stations throughout the islands. Data collected from these monitoring stations indicate that criteria pollutant levels consistently remain well below State and Federal ambient air quality standards (HDOH 2012).

The most recent publicly available information for Hawaii regarding air quality are from 2012 (HDOH 2012). Excluding the exceedances that were due to the Kilauea Volcano located on the island of Hawaii, the State of Hawaii was in attainment of all NAAQS and HAAQS in 2012 (HDOH 2012). The EPA considers volcanos to be natural uncontrollable events and the State of Hawaii requests exclusion of any volcano-related exceedances on an annual basis.

The closest air quality monitoring station to the Project is the Pearl City Station, which is located approximately 18 miles to the south of the Project on the leeward side of the island. The station is located on the roof of the Leeward Health Center within an area that contains commercial, residential, and light industrial developments. Other air quality monitoring stations on the island of Oahu include the Honolulu, Sand Island, Kapolei, and Kapolei NCore stations (HDOH 2012).

The highest 24-hour PM_{10} reading recorded at the Pearl City Station in 2012 was 37 micrograms per cubic meter, while the highest 24-hour $PM_{2.5}$ reading was 20.1 micrograms per cubic meter (HDOH 2012). The annual mean 24-hour PM_{10} readings recorded at the Pearl City Station in 2012 was 17.9 micrograms per cubic meter, while the annual mean 24-hour $PM_{2.5}$ readings was 6.3 (HDOH 2012). These measurements are all below the Federal and State standards (HDOH 2012). No data is available from the Pearl City Station regarding other air pollutants such as CO, NO_2, O_3, SO_2, lead, or hydrogen sulfide; however, readings recorded at other air quality monitoring stations on the island of Oahu are all below the Federal and State standards (HDOH 2012).

The sources of air pollutants located near the Project include windblown dust originating from overgrazed areas, vehicular emissions on the Kamehameha Highway, fires, agricultural emissions, and natural volcanic emissions from the volcano on the island of Hawaii. However, pollution from these sources likely move rapidly through the area as a result of the northeast trade winds that are present for much of the year. In summary, the analysis area is currently in attainment of all criteria pollutant levels established by the EPA and the State of Hawaii.

3.3.2 Climate Change

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, elevation, and proximity to the ocean. Climatic regions are typically characterized by temperature, humidity, wind patterns, and rainfall. Greenhouse gases

(e.g., CO, methane, and nitrous oxide) are chemical compounds found in the earth's atmosphere that can trap heat.

Issues related to climate change that have been raised during the public scoping process for this Project include 1) the levels of greenhouse gases that would be generated by this Project, 2) the effect this Project would have on local weather and climate conditions, and 3) the effect climate change could have on this Project and the local area. These issues are addressed in this section as well as the climate change portion of Chapter 4 (Section 4.5).

The analysis area for purposes of this climate change analysis is the island of Oahu because climate acts on a regional scale. Data used in this analysis comes from historic records regarding Oahu's climate conditions, as well as current research on possible changes that could occur to Oahu's climate.

3.3.2.1 Existing Conditions

Hawaii's climate is characterized by two seasons: summer (May through September) and winter (October through April). In general, the Hawaiian Islands have relatively mild temperatures and moderate humidity throughout the year (except at high elevations), with persistent northeasterly trade winds and infrequent severe storms (NOAA 2007). 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 Hawaii. During the winter months, the high pressure systems are located farther to the south, thereby decreasing the prevalence of the trade winds to about 50 to 80 percent of the time (WRCC 2013).

Despite the strong marine influence resulting from Hawaii's insularity, some mountainous areas exhibit semi-continental conditions. Combined with the rugged and irregular topography, the result is a diverse climatic condition across the various regions of the state, including significant geographic differences in rainfall amounts, which range from 20 inches to 300 inches (51 to 762 centimeters; WRCC 2013).

EPA's 2012 report on global climate change found that "[t]he Earth's climate is changing," and that "[s]cientists are confident that many of the observed changes in the climate can be linked to the increase in greenhouse gases in the atmosphere, caused largely by people burning fossil fuels to generate electricity, heat and cool buildings, and power vehicles" (EPA 2012). Like other small islands, Hawaii is considered vulnerable to global climate change because extreme events (such as rising sea levels, changes in the frequency of extreme weather, coral-reef bleaching, and ocean acidification) can have major impacts to islands (Kwong, 2009). Over the past century, the average temperature in the Pacific Islands region has increased by 0.4 degrees Fahrenheit (°F) (-17.6 degrees Celsius [°C]), and global sea levels have risen by 4 to 8 inches (10 to 20 centimeters; CIER 2007). The State of Hawaii recognizes the potential effects that global climate change can have on the state, and have established a State policy framework to address Hawaii's greenhouse gas emissions in order to minimize these risks (via Act 234, Session Laws of Hawaii 2007).

The wind farm site and mitigation areas are located in the lowland and mountainous areas on the windward side of Oahu, respectively. The Western Regional Climate Center describes this region as moderately rainy, having frequent trade-wind showers; partly cloudy to cloudy days are common in this region and temperatures are more uniform and mild than other parts of the Hawaiian Islands (WRCC 2013). The annual temperatures in this region range from approximately 63 to 88°F (17 to 31°C, and monthly precipitation ranges between 3.4 and 0.2 inches (8.6 to 0.5 centimeters; WC 2013).

3.4 Noise

Noise would potentially affect the local environment during both construction and operation of the Project. Sounds originate with a source whether it is a human voice, motor vehicles on a roadway, or a wind turbine generator (WTG). Sound levels are presented on a logarithmic scale to account for the large range of acoustic pressures that the human ear is exposed to and is expressed in units of decibels (dB). For the purposes of the Project acoustic analysis, sound levels are expressed in A-weighted decibels (dBA), which compensates for the frequency response of the human auditory system. At any location, both the magnitude and frequency of environmental noise may vary considerably over the course of the day and week. For construction activities, this variation in noise levels would be caused primarily by changes in equipment operations and activity locations. For operational noise conditions, this variation would result primarily from operational conditions such as higher wind speeds and other changing weather conditions. Two measures commonly used by Federal, State, and local governments to relate the time-varying quality of environmental noise to its known effect on people are the equivalent sound level (L_{eq}) and the day-night sound level (L_{dn}). The L_{eq} is the level of steady sound with the same total (equivalent) energy as the time-varying sound of interest, averaged over a given time period, often daytime (7 a.m. to 10 p.m.) and nighttime (10 p.m. to 7 a.m.) periods. The L_{dn} is the 24-hour L_{eq} with 10 dBA added to the nighttime sound levels between the hours of 10 p.m. and 7 a.m. to account for the greater sensitivity of people to sound during the nighttime hours.

Estimates of noise sources and outdoor acoustic environments, and the comparison of relative loudness, are presented in Table 3.4-1. Appendix D is the Noise Technical Report for the Project and provides greater detail on the technical aspects and background of acoustical analysis conducted to support the Project.

Table 3.4-1. Sound Pressure Levels (L_P) and Relative Loudness of Typical Noise Sources and Acoustic Environments

Noise Source or Activity	Sound Level (dBA)	Subjective Impression	Relative Loudness (perception of different sound levels)
Jet aircraft takeoff from carrier (50 ft)	140	Threshold of pain	64 times as loud
50-hp siren (100 ft)	130		32 times as loud
Loud rock concert near stage Jet takeoff (200 ft)	120	Uncomfortably loud	16 times as loud
Float plane takeoff (100 ft)	110		8 times as loud
Jet takeoff (2,000 ft)	100	Very loud	4 times as loud
Heavy truck or motorcycle (25 ft)	90		2 times as loud

Table 3.4-1. Sound Pressure Levels (L_P) and Relative Loudness of Typical Noise Sources and Acoustic Environments (continued)

Noise Source or Activity	Sound Level (dBA)	Subjective Impression	Relative Loudness (perception of different sound levels)
Garbage disposal Food blender (2 ft) Pneumatic drill (50 ft)	80	Loud	Reference loudness
Vacuum cleaner (10 ft)	70	Moderate	1/2 as loud
Passenger car at 65 mph (25 ft)	65		
Large store air-conditioning unit (20 ft)	60		1/4 as loud
Light auto traffic (100 ft)	50	Quiet	1/8 as loud
Quiet rural residential area with no activity	45		
Bedroom or quiet living room Bird calls	40	Faint	1/16 as loud
Typical wilderness area	35		
Quiet library, soft whisper (15 ft)	30	Very quiet	1/32 as loud
Wilderness with no wind or animal activity	25	Extremely quiet	
High-quality recording studio	20		1/64 as loud
Acoustic test chamber	10	Just audible	
	0	Threshold of hearing	
Adapted from: Beranek 1988; EPA 1971			

3.4.1 Regulatory Framework

A review of noise regulations and guideline criteria applicable to the Project was completed at the Federal, State, and county level. Details on Federal guidelines and requirements are included in the Project Noise Impact Assessment (see Appendix D). The Noise Control Act of 1972 (EPA 1972), along with its subsequent amendments (Quiet Communities Act of 1978 [42 USC 4901-4918]) (EPA 1978), delegates the authority to regulate environmental noise to each state.

3.4.1.1 State of Hawaii Community Noise Regulations

The State of Hawaii regulates noise through the Hawaii Administrative Rule (HAR), Title 11, Chapter 46, "Community Noise Control", promulgated on September 11, 1996, and limits sound generated by new or expanded developments (HDOH 1996). The Hawaii Community Noise Regulations (HAR 11-46) provide for the prevention, control, and abatement of noise pollution in the State. The purpose of these rules is to "provide for the prevention, control, and abatement of noise pollution in the State from the following noise sources: stationary noise sources; and equipment related to agricultural, construction, and industrial activities" (HAR 11-46). Sound from routine ongoing maintenance activities is considered part of routine operation and the combined total of the ongoing maintenance and routine operation are subject to the sound level limits. However, the Community Noise Control Regulation is not applicable to most moving sources, i.e., transportation and vehicular movements. Sound from Project construction and the occasional, major equipment overhauls is regulated as construction activity.

The State of Hawaii's limits on noise produced by stationary sources are identified by three receiving zoning class districts and time periods and are enforceable at the facility property boundaries. For mixed zoning districts, the primary land use designation is used to determine the

applicable zoning district class and maximum permissible sound level. For the purposes of identifying impact conditions, Class A use on Class C Land has been defined at the residential structure, i.e., agricultural portions of the surrounding properties were considered Class C receivers and the residences considered Class A receivers. This is considered a conservative regulatory assessment approach.

As wind energy generation projects may operate at any time during the day or night, the more stringent nighttime permissible sound level will become the controlling limit. The daytime and nighttime maximum permissible noise limits are provided in dBA according to zoning districts in Table 3.4-2. The State of Hawaii's limits on noise are assumed to be absolute and independent of the existing acoustic environment; therefore, no baseline sound survey is required to assess conformity.

Table 3.4-2. Hawaii Maximum Permissible Sound Levels by Zoning District

Receiving Zoning Class District	Maximum Permissible Sound Level	
	Daytime (7:00am – 10:00pm)	Nighttime (10:00pm – 7:00am)
Class A Zoning districts include all areas equivalent to land zoned residential, conservation, preservation, public space, or similar type.	55	45
Class B Zoning districts include all areas equivalent to lands zoned for multi-family dwellings, apartment, business, commercial, hotel, resort, or similar type.	60	50
Class C Zoning districts include all areas equivalent to lands zoned agriculture, county, industrial, or similar type.	70	70
Source: Hawaii Administrative Rules §11-46, "Community Noise Control"		

The maximum permissible sound levels are assessed and at any point at or beyond the property line of the facility. Noise levels may exceed the prescribed limits up to 10 percent of the time within any 20-minute period. Sound level for impulsive noise, as measured with a fast meter response, is 10 dBA above the maximum permissible sound levels for the given receiving zoning class district. Pursuant to HAR 11-46-7 and HAR 11-48-8, a permit may be obtained for operation of an excessive noise source beyond the maximum permissible sound levels. Factors that are considered in granting of such permits include whether the activity is in the public interest and whether the best available noise control technology is being employed. The standard provides further exemptions to these limits and further guidance on application, compliance procedures, and penalties. The State Department of Health is responsible for the implementation, administration, and enforcement of the statutes.

3.4.2 Existing Acoustic Environment

The noise analysis area for the Project includes Tax Map Keys (TMKs), or parcels, located within 1.2 miles (2 kilometers) (Figure 3.4-1) of the Project and the mitigation areas where noise-producing activities may occur. The HCP mitigation areas are not included in the detailed noise analysis because Project operational noise would not occur in these locations; therefore, providing ambient sound levels in these areas is not necessary. Project components, such as wind turbines and the

substation, would be located on agriculturally zoned TMKs or HAR 11-46 Class C districts. The remaining TMKs within the noise analysis area are mostly agriculturally zoned; however, north and west of Project there are Class A (mostly residential) and Class B (mostly commercial) TMKs. The most restrictive land use from a noise perspective are the Class A TMKs located approximately 1,575 feet (480 meters) from the nearest proposed wind turbine.

Existing ambient sound levels were monitored in April 2014 at locations dispersed through the acoustic analysis area (Figure 3.4-1). Baseline sound levels provide the basis for establishing what the expected change in sound levels would be at noise-sensitive areas (NSAs) in the analysis area, such as residences and schools. They also provide information on how sound levels vary both spatially and temporally depending on proximity to area sound sources. Diurnal effects result in sound levels that are typically quieter during the night than during the daytime, except during periods when evening and nighttime insect noise may dominate the soundscape. Sources of sound include passing vehicles on nearby roads, agricultural activities (e.g., off-road vehicles), leaf or grass rustle during elevated wind conditions, wildlife, and insect noise. Closer to the coastline, breaking waves also contribute to the overall existing soundscape.

Baseline sound levels were collected at integer wind speeds where the Project would operate ranging from cut-in to cut-out wind speed conditions, or approximately 10 to 39 feet per second (ft/s; 3 to 12 meters per second [m/s]). New sound sources would be at least partially obscured through a mechanism referred to as acoustic masking. Other factors such as insect noise, agricultural activities, as well as wind-generated sound contributing to ambient levels as airflow interact with foliage and grasslands, increase masking effects. Wind farms, in comparison to conventional energy projects, are somewhat unique in that the sound generated by each individual wind turbine will increase as the wind speed across the site increases, up to a certain maximum sound level. The baseline sound survey confirmed that as wind speeds increase the background ambient sound levels also increase resulting in greater masking effects. The lowest background sound levels typically occur on windless nights when the Project would not be operating. Thus, it is important that baseline sound level monitoring document the existing sound levels, day and night, for wind speeds in the range between the wind turbine cut-in and the maximum rated power.

Using mapping and aerial photography of the wind farm site, Tetra Tech selected three long-term MP locations along the Project's site limit to be representative of NSAs nearest to the Project. Tetra Tech attempted to locate monitoring equipment at the structures of the nearest NSA; however, when Champlin requested access from property owners or leases for deployment of monitoring equipment, none were agreeable. As a result, Tetra Tech was restricted to placing long-term monitoring equipment at the Project site limit. To supplement and confirm the applicability of the long-term data collection, short-term measurements were made from public rights-of-way adjacent to NSAs, such as sidewalks that did not require land owner access permission. Table 3.4-3 provides the locations of the long-term (LT-#) and short-term (ST-#) monitoring equipment.

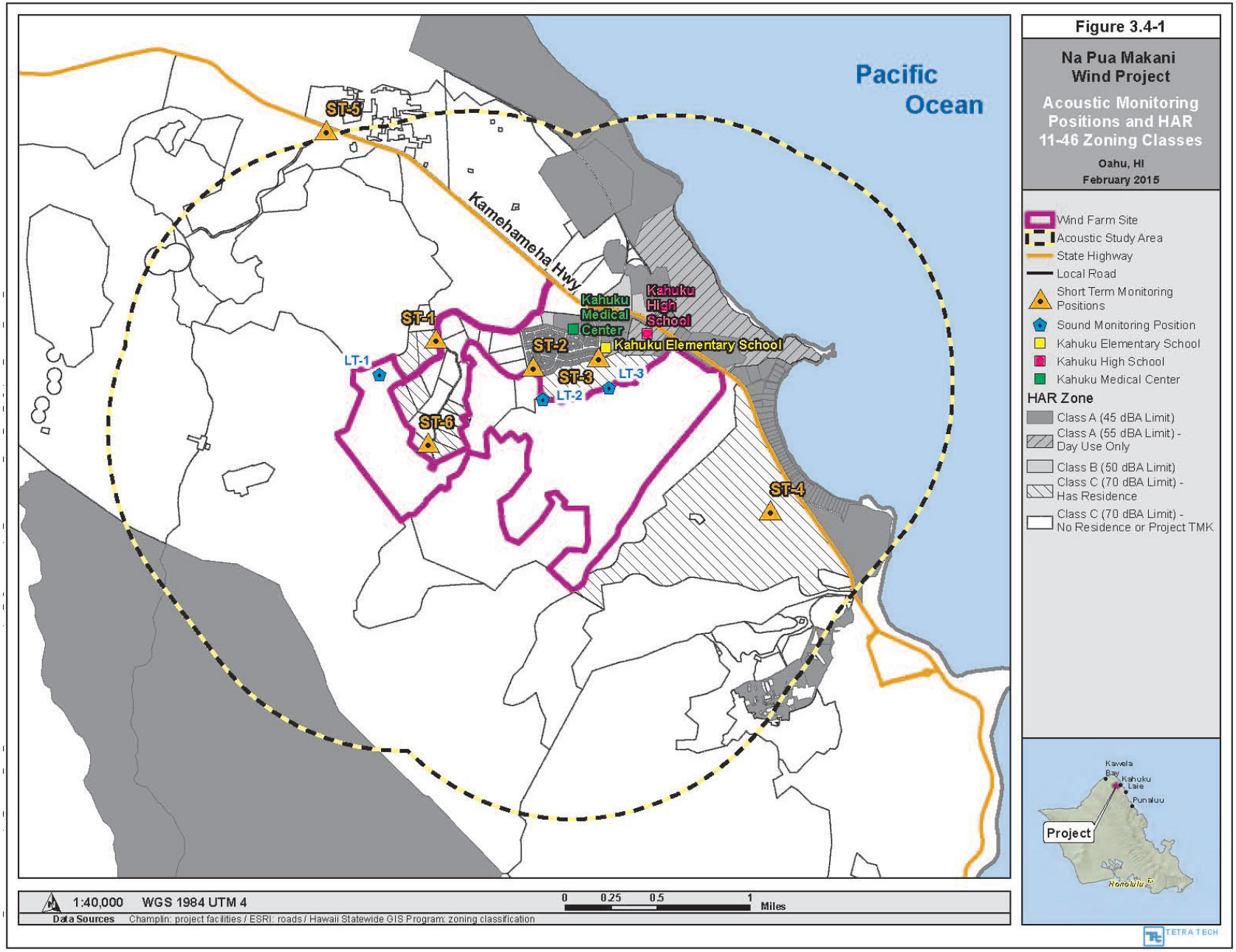


Figure 3.4-1
Na Pua Makani Wind Project
Acoustic Monitoring Positions and HAR 11-46 Zoning Classes
Oahu, HI
February 2015
Pacific Ocean
Kamehameha Hwy
ST-1
ST-2
ST-3
ST-4
ST-5
ST-6
LT-1
LT-2
LT-3
Kahuku Medical Center
Kahuku High School
Kahuku Elementary School
Wind Farm Site
Acoustic Study Area
State Highway
Local Road
Short Term Monitoring Positions
Sound Monitoring Position
Kahuku Elementary School
Kahuku High School
Kahuku Medical Center
HAR Zone
Class A (45 dBA Limit)
Class A (55 dBA Limit) - Day Use Only
Class B (50 dBA Limit)
Class C (70 dBA Limit) - Has Residence
Class C (70 dBA Limit) - No Residence or Project TMK
Kawela Bay
Kahuku
Laie
Punaluu
Project
Honolulu
1:40,000 WGS 1984 UTM 4
0 0.25 0.5 1 Miles
Data Sources Champlin: project facilities / ESRI: roads / Hawaii Statewide GIS Program: zoning classification
TETRA TECH

Table 3.4-3. Long-Term Monitoring Position Location Summary

Monitoring Position	UTM Coordinates (NAD83 UTM Zone 14 N)		Distance to Nearest Project WTG (m)	Distance to Nearest Existing Kahuku WTG (m)	SLM Serial Number
	Easting (m)	Northing (m)			
LT-1	606,540.04	2,396,927.75	68.1	326.7	1350 & 14027964
LT-2	607,962.82	2,396,713.27	495.8	1,674.2	3140
LT-3	608,537.47	2,396,811.61	220.6	2,197.0	1403045
ST-1	607,030.73	2,397,241.57	640.6	670.6	1403045
ST-2	607,875.34	2,396,999.59	783.1	1,517.3	1403045
ST-3	608,444.81	2,397,077.41	496.2	2,017.1	1403045
ST-4	609,940.67	2,395,748.07	1,270.4	3,863.1	1403045
ST-5	606,075.81	2,399,058.66	2,235.9	474.6	14027964 & 1403045
ST-6	606,962.96	2,396,334.02	349.2	1,055.4	14027964
1 meter = 3.3 feet					

The short-term measurements demonstrated that the long-term measurements are sufficiently conservative for estimating baseline conditions in the acoustical study area and are not discussed further. Additional information on the short-term measurement and more in-depth documentation of the baseline sound survey is provided in Appendix D. For example, long-term monitoring results show lower sound levels at the Project site limit than those experienced in the more densely populated areas where the NSAs are located. As a result, the long-term baseline sound levels may underestimate the actual sound levels in these areas. Table 3.4-4 provides the monitored sound levels under hub-height wind speed conditions at each long-term measurement position.

The wind turbines under consideration for the Project reach their highest operational sound power levels at approximately 23 ft/s (7 m/s). During this wind speed condition, existing sound levels for the acoustic analysis area range from 45 dBA L_{eq} to 49 dBA L_{eq} during the day and 43 dBA L_{eq} to 48 dBA L_{eq} at night. Impact conditions will be assessed against the monitored baseline sound levels during 23 ft/s (7 m/s) wind speeds to ascertain the Project contribution at NSAs.

Table 3.4-4. Baseline Monitoring Results at Integer Wind Speeds

Monitoring Position	Time of Day	dBA Leq by Wind Speed (m/s)								
		Calm	3	4	5	6	7	8	9	10+
LT-1	7AM-10PM	40	45	47	50	50	49	51	52	55
	10PM-7AM	N/A[1/]	43	43	44	47	48	49	50	52
LT-2	7AM-10PM	46	41	45	50	47	46	47	46	48
	10PM-7AM	47	51	42	46	48	46	44	47	45
LT-3	7AM-10PM	42	45	45	44	46	45	45	45	49
	10PM-7AM	44	44	43	40	42	43	43	45	45

1/ There were no periods of calm wind conditions during the nighttime monitoring period.
1 meter = 3.3 feet

3.4.2.1 Hamakua Marsh (waterbirds)

At the Hamakua Marsh Mitigation Area existing ambient sound levels are expected to be low. However, they may be sporadically elevated due to roadway noise or periods of human activity adjacent to the marsh.

3.4.2.2 Poamoho Ridge (bats)

At the Poamoho Ridge Mitigation Area noise levels are low and primarily consist of existing sources (e.g., wind). Sources of sound include ongoing DLNR restoration activities (e.g., off-road vehicles, helicopters), leaf or grass rustle during elevated wind conditions, wildlife and insect noise.

3.5 Hazardous and Regulated Materials and Wastes

The Institute of Hazardous Materials Management (IHMM 2014) defines a hazardous material as any item or agent (biological, chemical, or physical) that has the potential to cause harm to humans, animals, or the environment, either by itself or through interaction with other factors.

The term may also have specific definitions for certain purposes, such as the definitions used by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Resource Conservation and Recovery Act (RCRA).

Hazardous materials and wastes are subject to many regulations at the Federal, State, and local levels. The primary Federal agencies responsible for regulating hazardous materials and wastes are EPA, the Occupational Safety and Health Administration (OSHA), and the U.S. Department of Transportation.

Petroleum products and solid waste are included in this section. Common petroleum products include gasoline and diesel fuel. Solid waste is generally defined as discarded material. EPA defines solid waste as ”any garbage or refuse, sludge from a wastewater treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, including solid, liquid, semi-solid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities” (EPA 2013).

The analysis area for hazardous and regulated materials and wastes includes all areas that could be affected by conditions at the wind farm site, the routes of travel to and from the Project, as well as the mitigation areas.

3.5.1 Wind Farm Site

A Phase I Environmental Site Assessment (Tetra Tech 2014a) of the wind farm site was performed in 2014 to assess the potential presence of hazardous materials on the site. The Phase I was conducted in accordance with ASTM International Standard E1527-13, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process, and included a visual site inspection, interviews with persons familiar with the property, and a review of current and historical property records.

The Phase I assessment did not find evidence that hazardous materials, solid waste, or petroleum products have been released to the environment in or around the wind farm site. There was no evidence of the presence of storage of hazardous materials; improper disposal of hazardous wastes, dumping, or landfilling; or wastewater such as pits, ponds, or lagoons. There were no solid waste dumpsters or waste staging areas at the wind farm site.

No evidence of the presence of underground storage tanks was observed. Four 500-gallon (1,893-liter) aboveground storage tanks (ASTs) labeled "United States Army JP-8" (jet fuel) were observed in grassy areas located on the northeastern portion of the wind farm site. The ASTs were observed to be intact and empty. No areas of ground staining or evidence of a release were observed adjacent to or in proximity to the ASTs. Based on an interview with the Site Manager, the four ASTs have never been used and will reportedly be used to hold water for an aquaponic system. In addition, an approximately 1,000-gallon (3,785-liter) water AST was observed adjacent to a water pump house.

An empty metal 55-gallon (208-liter) drum with a hand pump was observed in a vegetated area on the northern portion of the wind farm site. The drum was labeled as "fuel", and no areas of ground staining or evidence of a release were observed adjacent to the 55-gallon (208-liter) metal drum. The drum was observed to be dented and rusted, however there were no visible perforations.

Heavy construction equipment, which may contain hydraulic components, was observed in a construction area along a dirt road on the eastern portion of the wind farm site. There was no evidence or leaks or spills observed in association with the heavy construction equipment.

Four pole-mounted transformers were observed on the northeastern portion of the wind farm site. In addition, one pole-mounted transformer was observed adjacent to the northern corner and one pole-mounted transformer was observed along the eastern boundary of the wind farm site. The transformers are owned and maintained by the Hawaiian Electric Company, Inc., and were not labeled with respect to polychlorinated biphenyls (PCBs) content. No evidence of leaks or spills was observed in association with the transformers.

Portions of the wind farm site are being used and/or have been used for agricultural purposes. Signage was observed across the wind farm site indicating the historical application of pesticides. No pesticides, herbicides, or landscaping chemicals were observed to be stored at the wind farm site; however, the interiors of buildings (warehouse building and sheds) were not inspected and the individual or contractor responsible for pesticide application was not interviewed. No evidence of herbicide or pesticide misuse was observed on the wind farm site during the site visit. No indications of the presence of onsite agricultural chemical mixing areas (current or past), chemical dumping or improper storage were observed.

A 4,510-square foot (419-square meter) warehouse building located on the eastern portion of the wind farm site was constructed in 1975. Based on the date of construction of the warehouse building, asbestos containing materials and lead based paint may potentially be present.

3.5.2 Hamakua Marsh (waterbird)

Hamakua Marsh lies in the eastern portion of Kawainui Marsh. Document review of available resources did not find evidence that hazardous materials, solid waste or petroleum products have been released to the environment at Hamakua Marsh.

Kapaa Landfill, Kapaa Industrial Park, Kapaa Refuse Transfer Station and the former Kalaheo Sanitary Landfill are located west of Kawainui Marsh, but no evidence has been found that the proximity of these properties introduced hazardous materials to Hamakua Marsh. Some sections of Kapaa Quarry Road, which runs along the western border of Kawainui Marsh, have a history of illegal dumping, particulary rubbish and bulky items (DLNR 2011).

During vegetation management and removal at Hamakua Marsh, herbicides are being used in accordance with applicable Best Management Practices (BMPs). The use of herbicides is limited to all applicable State and Federal regulations, and the herbicides must be used according to EPA restrictions and labeling (USACE Undated).

3.5.3 Poamoho Ridge (bat)

The Poamoho Biological Surveys Report (DLNR Undated) states that chemical weed control treatment is used at Poamoho Ridge to target weeds. Neither the amount nor the type of chemical used is described in the report. Site access is limited, making dumping of hazardous materials, solid waste or petroleum products unlikely. No additional information was found about any evidence that hazardous materials, solid waste or petroleum products have been released to the environment at Poamoho Ridge.

3.6 Natural Hazards

A natural hazard is a naturally occurring event that could negatively affect people, infrastructure, and/or the environment. Many natural hazards can be triggered by another event, though they may occur in different geographical locations, for example, an earthquake can trigger a tsunami in an entirely different geographic area. Natural hazards that can affect the Hawaiian Islands and Oahu include hurricanes and tropical storms, tsunamis, earthquakes, flooding, and wildfire. Because natural hazards occur on a regional scale, the analysis area for impacts associated with natural hazards includes the island of Oahu.

3.6.1 Hurricanes and Tropical Storms

Hurricanes develop over warm tropical oceans, and have sustained winds that exceed 74 mph (119 kph). Based on the Saffir-Simpson Hurricane Wind Scale (NOAA 2013a) there are five categories of hurricanes:

- Category 1 has sustained winds between 74 and 95 mph (119 and 153 kph);
- Category 2 has sustained winds between 96 and 110 mph (154 and 177 kph);
- Category 3 has sustained winds between 111 and 129 mph (179 and 208 kph);
- Category 4 has sustained winds between 130 and 156 mph (209 and 251 kph; and

- Category 5 is sustained winds greater than 157 mph (253 kph).

The Central Pacific Hurricane season runs from June 1 to November 30. Hurricanes are relatively rare in Hawaii; only five hurricanes have caused serious damage to the islands since 1950 (Businger 1998). No recorded hurricane has made landfall on the island of Oahu, although a few of these hurricanes have affected Oahu through high winds and flooding.

Tropical storms are similar to hurricanes, except that the sustained winds are below 74 mph (119 kph). These events can also produce torrential rains. Tropical storms occur more frequently in than hurricanes and typically pass sufficiently close to Hawaii every 1 to 2 years to affect the weather in some part of the Islands (WRCC 2013).

The topography of the Hawaiian Islands can funnel and amplify winds across ridges and through island channels. Additionally, the mountainous topography focuses rains on mountain slopes, in some cases resulting in destructive flash floods and landslides in the valleys below (Businger 1998). As a result, even a relatively weak tropical storm can potentially result in considerable damage (Businger 1998).

3.6.2 Tsunamis

Tsunamis are large, rapidly moving ocean waves triggered both by disturbances around the Pacific Rim (i.e., teletsunamis) and by earthquakes and landslides near Hawaii (i.e., local tsunamis) (USGS 2013). Tsunami waves travel at speeds of 300 to 600 mph, and the first wave may not be the largest one (Pacific Disaster Center 2013). Tsunami hazards include not only the powerful waves, but also large debris within the waves and flooding of low-lying areas (Pacific Disaster Center 2013). Tsunamis have resulted in more lost lives in Hawaii than all other natural disasters combined (Pacific Tsunami Museum 2013). Approximately 221 people in Hawaii were killed by tsunamis in the 20th century (USGS 2013). Twenty-six tsunamis with flood elevations greater than 3.3 feet (1 meter) have made landfall in the Hawaiian Islands during recorded history, and 10 of these had significant damaging effects on Oahu (Fletcher et. al. 2002). This translates to a recurrence interval of one large tsunami making landfall on the Hawaiian Islands once every 7 years and a damaging tsunami reaching Oahu every 19 years (Fletcher et. al. 2002). However, since 1976, there have been no large tsunamis recorded in all of Hawaii (Fletcher et. al. 2002).

A small portion of the northeastern edge of the wind farm site, near Kamehameha Highway, is within the Civil Defense Tsunami Evacuation Zone (NOAA 2013b). No portions of the Poamoho Ridge and Hamakua Marsh mitigation areas are within Civil Defense Tsunami Evacuation Zone.

3.6.3 Earthquakes and Seismicity

Earthquakes in Hawaii are often linked with volcanic activity, and are an important part of the island-building process (USGS 2001). On the island of Hawaii, numerous small volcanic earthquakes are triggered by eruptions and magma movement within the presently active volcanoes of Kilauea, Mauna Loa, and Lo`ihi. Tectonic earthquakes tend to produce larger earthquakes and occur in areas of structural weakness at the base of these active volcanoes or deep within the Earth's crust beneath the Island of Hawaii (USGS 2001). Occasionally, these larger tectonic earthquakes may be

felt in Oahu, including the Honomu Earthquake of 1973 which occurred beneath the Hamakua Coast of the island of Hawaii.

The Uniform Building Code (UBC) was developed to regulate building codes in specific areas to account for seismic hazards. The UBC's seismic hazard classification system is based on expected ground shaking strength and probability of shaking occurring within a specified time (USGS 2001). Hawaii has four UBC seismic hazard zones. According to the U.S. Geological Survey (USGS), Zone 0 means that there is "no chance of severe ground shaking" and a seismic hazard rating of 4 means that there is a "10 percent chance of severe shaking in a 50-year interval" (USGS 2001). The entire island of Oahu has a UBC seismic risk zone ranking of 2A (USGS 2001), which indicates a low level of seismic risk.

3.6.4 Flooding

Potential flood hazards are identified by the Federal Emergency Management Agency (FEMA) National Flood Insurance Program and are mapped on the Flood Insurance Rate Maps. The maps classify land into zones depending on the potential for flood inundation.

3.6.4.1 Wind Farm Site

The wind farm site lies within several flood zones. Designations for these flood zones include (FEMA 2013a; 2013b):

- Zone A – areas mapped as being within the 100-year (1-percent-annual-chance) floodplain; however, hydraulic analysis has not been conducted in these areas and base flood elevations are not listed.
- Zone AE – area mapped as being within the 100-year (1-percent-annual-chance) floodplain and base flood elevations have been derived from detailed hydraulic analyses for these areas.
- Zone AEF – areas that lie within the floodway of a stream. The floodway is the channel of the stream plus any adjacent areas that must be kept free of encroachment so that the 1-percent-annual chance flood can be carried without substantial increases in flood heights.
- Zone D – areas where analysis of flood hazards has not been conducted and flood hazards are undetermined.
- Zone X – areas determined to be outside the 0.2-percent-annual-chance (or 500-year) floodplain.
- Zone XS – areas between the limits of the 100-year (1-percent-annual-chance) and 500-year (0.2-percent-annual-chance) floodplains, including areas inundated by 100-year flooding with average depths of less than 1 foot.

According to the Flood Insurance Rate Maps, the wind farm site is located predominantly within Flood Zones D and X (Figure 3.6-1). Small portions of the wind farm site are located in Flood Zones A, AE, AEF, and XS. The portions of the wind farm site mapped as Zone AEF include areas adjacent to Malaekahana and Keaaulu streams. Improvements within the floodway are limited to surface pavements and power transmission lines which are not expected to change the conveyance

capacity of the floodway (Belt Collins Hawaii LLC 2016a). All the proposed wind turbines would be located within areas classified as Zone X or Zone D.

3.6.4.2 Hamakua Marsh (waterbird)

The Hamakua Marsh mitigation area lies within areas designated by FEMA as Flood Zones AE, AEF, and X (Figure 3.6-2). The classifications for flood zones AE and X are as defined above under wind farm site. Much of the northern portion of the mitigation area is mapped as being within a Zone AEF (Figure 3.6-2). Zone AEF is defined as the areas that lie within the floodway of a stream. The floodway is the channel of a stream plus any adjacent areas that must be kept free of encroachment so that the 1-percent-annual-chance flood can be carried without substantial increases in flood heights (FEMA 2013a).

3.6.4.3 Poamoho Ridge (bat)

The Poamoho Ridge Mitigation Area lies within areas designated by FEMA as Flood Zone D, where analysis of flood hazards has not been conducted and flood hazards are undetermined.

3.6.5 Wildfire

Fire is believed to have been infrequent in the lowlands of the Hawaiian Islands prior to human settlement. Wildfires have increased in frequency with Polynesian and European colonization, the introduction and spread of invasive species, and the cessation of feral and domestic ungulate grazing (LaRosa et al. 2008). Fires of volcanic origin occurred in Hawaii prior to human colonization and continue today; however, these fires are intermittent and geographically localized (LaRosa et al. 2008). Currently, wildfires in the Hawaiian Islands occur most commonly in lowland communities, with human activity as the primary cause. From the early- to mid-20th century, the number of fires throughout Hawaii has increased six-fold and the average acres burned has increased five-fold (Cuddihy and Stone 1990).

Wildfires have resulted in extensive damage to life and property and pose an ecological threat to endemic flora and fauna in the Hawaiian Islands (Chu et al. 2002). Hawaii's native ecosystems are not adapted to wildfire; therefore, wildfire can result in impacts to native species and can facilitate the proliferation of non-native invasive species (LaRosa et al. 2008). Other effects of wildfire include increased soil erosion and runoff and decreased water quality.

Since 2000, 114 wildfires have occurred in the vicinity of the wind farm site, including 10 in the adjacent Kahuku Training Area that were ignited due to military training activities (The Center for Environmental Management of Military Lands 2014). All these fires have been small in size (less than 2.5 acres [1 hectare] on average), with the largest fire covering 10.1 acres.

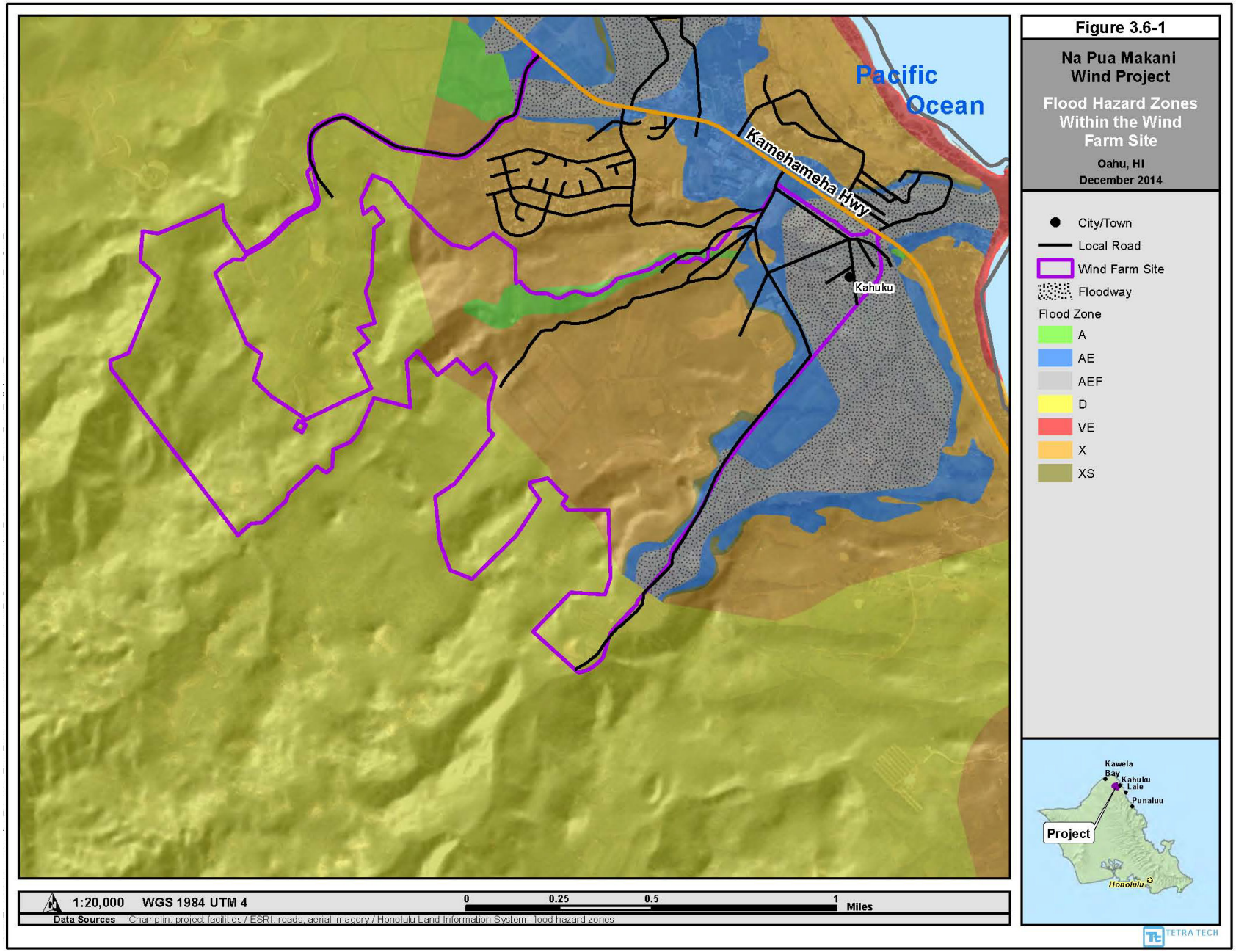


Figure 3.6-1
Na Pua Makani Wind Project
Flood Hazard Zones Within the Wind Farm Site
Oahu, HI
December 2014
Pacific Ocean
Kamehameha Hwy
Kahuku
City/Town
Local Road
Wind Farm Site
Floodway
Flood Zone
A
AE
AEF
D
VE
X
XS
Kawela Bay
Kahuku
Laie
Punaluu
Project
Honolulu
1:20,000
WGS 1984 UTM 4
0
0.25
0.5
1
Miles
Data Sources
Champlin: project facilities / ESRI: roads, aerial imagery / Honolulu Land Information System: flood hazard zones
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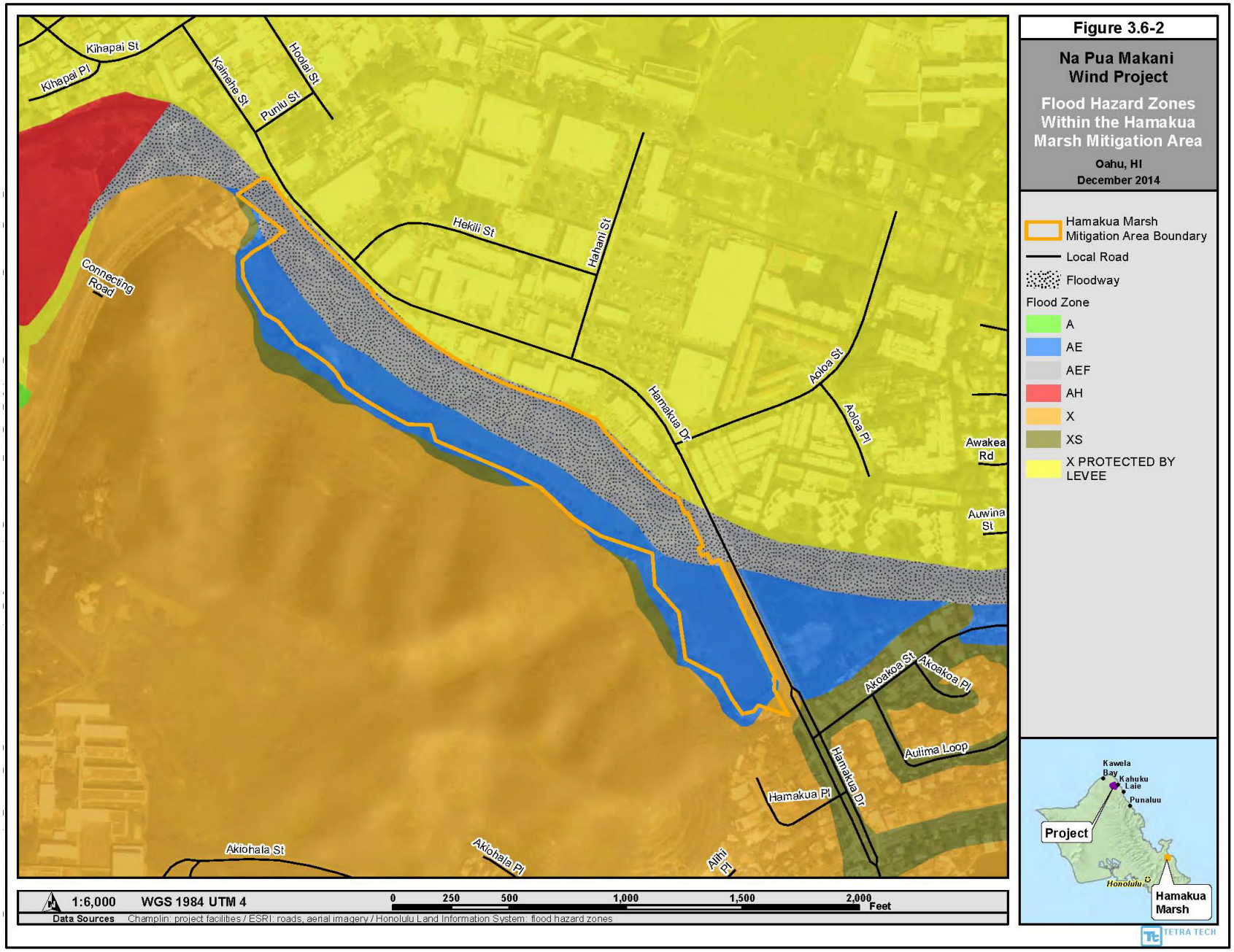


Figure 3.6-2
Na Pua Makani Wind Project
Flood Hazard Zones Within the Hamakua Marsh Mitigation Area
Oahu, HI
December 2014
Hamakua Marsh Mitigation Area Boundary
Local Road
Floodway
Flood Zone
A
AE
AEF
AH
X
XS
X PROTECTED BY LEVEE
Kihapai St
Kihapai Pl
Kainehe St
Hoolai St
Punilu St
Hekili St
Hahani St
Connecting Road
Hamakua Dr
Aoloa St
Aoloa Pl
Awakea Rd
Auwina St
Akoakoa St
Akoakoa Pl
Aulima Loop
Hamakua Pl
Hamakua Dr
Akiohala St
Akiohala Pl
Alihi Pl
1:6,000
WGS 1984 UTM 4
0 250 500 1,000 1,500 2,000 Feet
Data Sources
Champlin: project facilities / ESRI: roads, aerial imagery / Honolulu Land Information System: flood hazard zones
Kawela Bay
Kahuku Laie
Punaluu
Project
Honolulu
Hamakua Marsh
TETRA TECH

eFuels within the wind farm site include a variety of grass, grass and shrub, and shrub communities, as well as small patches of timber. Additionally, much of the wind farm site is located in existing agricultural fields which are generally unburnable as currently utilized (Beavers 2014). Grasses comprise a substantial portion of the surface fuels in the wind farm site, including in the timber and shrub communities. Dominant grasses in these communities include highly flammable guinea grass (*Urochloa maxima*) and California grass (*Urochloa* [*Brachiaria*] *mutica*). Additionally, there are patches of common ironwood (*Casuarina equisetifolia*) and eucalyptus (*Eucalyptus* spp.) trees in the wind farm site, both of which can contribute to fire control problems under dry conditions (Beavers 2014).

Climatic conditions in the vicinity of the wind farm site include high relative humidity, with monthly average humidity never dropping below 65 percent, and high precipitation, with average monthly rainfall never dropping below 1.5 inches (3.8 centimeters). These conditions tend to prohibit the production of fires (Beavers 2014). Live herbaceous moisture in the wind farm site is high (exceeding 120 percent) indicating that fire behavior will generally be dampened by the presence of live fuels (Beavers 2014). Additionally, an analysis of potential fire behavior in the wind farm site under the 50th, 80th, and 97th percentile weather conditions, using weather data from the Kahuku Remote Automated Weather Station (RAWS), determined that even under extreme weather conditions (97th percentile), probability of ignition was extremely low (43 percent probability) (Beavers 2014). Weather at these extreme conditions normally produces ignition probabilities in excess of 90 percent (Beavers 2014).

3.7 Vegetation

General vegetation communities and plant species found within the wind farm site and mitigation areas are briefly described below. Federal or State threatened, endangered, or candidate plant species are discussed in Section 3.9 – Threatened and Endangered Species. The analysis area for vegetation includes the Project construction footprint, as well as areas that would be disturbed by activities implemented in the mitigation areas plus a 0.25-mile (0.4-kilometer) buffer around these areas. This area encompasses the areas where potential direct effects to vegetation could occur as well as areas where indirect effects to vegetation, such as invasive plant species introduction and spread or increased fire risk could occur. Existing vegetation conditions in the wind farm site are based on botanical surveys conducted in the wind farm site in 2013 (Hobdy 2013a). Existing vegetation conditions in the mitigation areas were derived from various management plans, cited below as appropriate.

3.7.1 Wind Farm Site

Botanical surveys of the wind farm site were conducted in June 2013 (Hobdy 2013a; Appendix E). The objectives of these surveys were to characterize vegetation communities within the wind farm site and to determine the presence of Federal or State threatened, endangered, or candidate, plant species. As stated above, Federal and State threatened, endangered, and candidate plant species are discussed in Section 3.9 – Threatened and Endangered Species.

The wind farm site is surrounded by agricultural farm lands to the north and east and by undeveloped forested lands to the west and south (Hobdy 2013a). Vegetation in the wind farm site consists mostly of low, windblown shrubs and trees on the ridge tops with larger trees and brush on slopes and in gullies.

Prior to European colonization, the lower, more gently sloping lands in the wind farm site and vicinity would have been extensively farmed by the large Hawaiian population that lived in the lower valleys and along the seashore (Hobdy 2013a). The ridges would have been covered by native shrubs such as ulei (*Osteomeles anthyllidifolia*), akia (*Wikstroemia oahuensis*), iliahi aloe (*Santalum ellipticum*), and uhaloa (*Waltheria indica*) (Hobdy 2013a). Much of the area was converted for sugar cane (*Saccharum officinarum*) production in the late 1800s. The lowlands were cleared, plowed, burned, and harvested, while the steeper land was used to pasture plantation horses and mules (Hobdy 2013a). Sugar cane production was discontinued in the 1980s and the land was put into crop agriculture or left idle (Hobdy 2013a).

Currently, the vegetation within the wind farm site is predominantly non-native shrubland and forest dominated by a mixture of aggressive non-native weedy species that took over following the abandonment of agricultural production of sugar cane. Only a few persistent native plants have been able to compete and survive (Hobdy 2013a). Common ironwood, a non-native tree, was the most abundant species observed in the wind farm site during field surveys in 2013. Other common non-native species observed were koa haole (*Leucaena leucocephala*), octopus tree (*Schefflera actinophylla*), parasol leaf tree (*Macaranga tanarius*), Java plum (*Syzygium cumini*), Formosa koa (*Acacia confusa*), strawberry guava (*Psidium cattleianum*), Koster's curse (*Clidemia hirta*), beggarstick (*Bidens alba*), Guinea grass, pitted beardgrass (*Bothriochloa pertusa*), spanish clover (*Desmodium incanum*), huehue haole (*Passiflora suberosa*), and Jamaica vervain (*Stachytarpheta jamaicensis*).

A total of 134 plant species were identified during botanical surveys, only 19 of which were native species, including 5 endemic species. Native species present were largely intermixed with non-native species with the exception of a few ridge tops where a number of native shrub species also occur. The native shrub ulei was also seen forming large monotypic patches on ridge tops. Other common native species observed in the wind farm site include uhaloa, huehue (*Cocculus orbiculatus*), and akia. Each of the native species present in the wind farm site is known from multiple islands, and none are rare. No Federal or State threatened, endangered, or candidate plant species were detected. Additionally, no plant species proposed for listing or special status plant species were detected. No portion of the wind farm site has been designated as critical habitat for any listed plant species. Table 3.7-1 lists the native plant species recorded in the wind farm site by Hobdy (2013a). A complete list of plant species observed during botanical surveys of the wind farm site is provided in Appendix E.

Table 3.7-1. Native Hawaiian Plants Observed in the Wind Farm Site

Scientific Name	Common Name	Status[1/]	Abundance[2/]
FERNS			
Dicranopteris linearis	uluhe, staghorn fern	indigenous	rare
Nephrolepis exaltata	nianiau, sword fern	indigenous	uncommon
Psilotum nudum	moa; whisk fern	indigenous	rare
Pteridium aquilinum var. *decompositum*	kilau, bracken fern	endemic	rare
Sphenomeris chinensis	palaa	indigenous	rare
MONOCOTS			
Carex wahuensis	Oahu sedge	endemic	rare
Chrysopogon aciculatus	piipii, golden beardgrass	indigenous	uncommon
Dianella sandwicensis	ukiuki	indigenous	uncommon
Heteropogon contortus	pili grass	indigenous	rare
DICOTS			
Cassytha filiformis	kaunaoa pehu	indigenous	rare
Cocculus orbiculatus	Huehue	indigenous	common
Styphelia (*Leptecophylla*) *tameiameiae*	Pukiawe	indigenous	rare
Osteomeles anthyllidifolia	ulei	indigenous	common
Peperomia latifolia	alaala wai nui	endemic	rare
Psydrax odorata	alahee	indigenous	rare
Santalum ellipticum	iliahi aloe, coast sandalwood	endemic	uncommon
Scaevola (*taccada*) *sericea*	naupaka kahakai	indigenous	rare
Waltheria indica	uhaloa	indigenous	common
Wikstroemia oahuensis	akia	endemic	common

1/ endemic = native only to Hawaii; indigenous = native to Hawaii and elsewhere
2/ Abundance within wind farm site: common = widely scattered or locally abundant; uncommon = sparsely scattered or in a few small patches; rare = few isolated individuals

3.7.2 Hamakua Marsh (waterbird)

The Hamakua Marsh Mitigation Area is located on the edge of the town of Kailua and is adjacent to Kawainui Marsh, the largest remaining wetland in Hawaii (USACE 2008). Hamakua Marsh is a smaller wetland that was historically connected to and immediately downstream of Kawainui Marsh. Both Hamakua and Kawainui Marshes were designated as Ramsar Wetlands of International importance in 2005 for their biological, historical, and cultural significance (USACE 2008). Hamakua Marsh used to be fed by Kawainui Stream which flowed from Kawainui Marsh. Currently, the northeastern edge of the mitigation area is bordered by the manmade Hamakua Canal. Currently, Hamakua Marsh is designated as a Hawaii State Wildlife Sanctuary and is managed by the Division of Forestry and Wildlife (DOFAW).

Vegetation communities within the mitigation area consists of a mix of upland tree, shrub, and groundcover species along the Hamakua Canal and emergent and aquatic wetland vegetation adjacent to and within the marsh. Vegetation surveys of the marsh conducted in 1992, as part of the environmental assessment for the Hamakua Wetland Protection and Enhancement Project, found that the vegetation along Hamakua Canal was dominated by non-native tree and shrub species including red mangrove (*Rhizophora mangle*), kiawe (*Prosopis pallida*), Christmas berry (*Schinus terebinthifolius*), fiddlewood (*Citharexylum spinosum*), koa haole, Chinese banyan (*Ficus microcarpa*) (Ducks Unlimited, Inc. 1992). Ground cover along the canal was dominated by non-native invasive grasses. The non-native shrub, Indian fleabane (*Pluchea indica*), and non-native groundcover, pickleweed (*Batis maritima*), occurred in the transition zone between the canal and

the wetland areas (Ducks Unlimited, Inc. 1992). Seashore paspalum (*Paspalum vaginatum*), a non-native grass species, was the dominant emergent species within the marsh. Common native emergent species observed within the marsh include bulrush (*Schoenoplectus* [*Bolboschoenus*] *maritimus*), water hyssop (*Bacopa monnieri*), and ditchgrass (*Ruppia maritima*) (Ducks Unlimited, Inc. 1992).

3.7.3 Poamoho Ridge (bat)

Consisting of native, high-elevation forest, the Poamoho Ridge Mitigation Area is located almost entirely in the Ewa Forest Reserve above Wahiawa along the leeward summit of the central Koolau Range. Vegetation communities in the mitigation area include ohia (*Metrosideros* spp.)/olapa (*Cheirodendron* spp.) native wet forest, ohia/koa (*Acacia koa*) native wet forest, and mixed windswept native shrubland along summit areas (U.S. Army 2008). Native wet forest vegetation includes *Metrosideros* spp., *Cheirodendron* spp., *Cibotium* spp, *Ilex anomala, Pritchardia martii, Myrsine sandwicensis,* and *Perrottetia sandwicensis.* Native understory vegetation includes fern and moss species (OANRP 2012). Habitat along Poamoho Ridge is steadily decreasing in quality due to the presence of invasive plant species are and feral pigs (M. Zoll, DLNR, pers. comm. 2013). Additional, threats to native vegetation include slugs, ants, rats, and potentially fire. The DLNR has secured funding and is in the process of installing fencing around the mitigation area parcels to deter feral pig use. However, funding for long-term forest restoration and management of this area including fence maintenance, pig removal, and invasive species removal has not been secured.

3.8 Wildlife

This section describes the non-listed wildlife in the vicinity of the Project including common wildlife species, migratory and endemic bird species that are protected under the Migratory Bird Treaty Act (MBTA), and other indigenous avian species of concern. Threatened and endangered species are addressed in detail in Section 3.9. The analysis area for impacts to wildlife includes the wind farm site and the mitigation areas. This encompasses all potential effects to wildlife and wildlife habitats including habitat loss and alteration and direct mortality within the footprint of the Project (area of disturbance associated with Project structures), as well as areas extending beyond where wildlife could be exposed to disturbance. This area also includes potential beneficial effects of HCP mitigation activities.

3.8.1 Surveys Completed

Field surveys to document wildlife within the wind farm site included walk-through general biological surveys (Hobdy 2013a), avian count surveys (Tetra Tech 2014b), and radar and audiovisual surveys for bats and seabirds (Sanzenbacher and Cooper 2013). General wildlife surveys were conducted in June 2013 (see Appendix E). Avian point count surveys were conducted monthly from October 2012 to October 2013 at two locations within and representative of the wind farm site and two points near wetland habitat in the vicinity of the wind farm site. The radar and audiovisual surveys for endangered seabirds and acoustic monitoring for bats are discussed in Section 3.9 – Threatened and Endangered Species.

3.8.2 Wind Farm Site

Wildlife habitat in the wind farm site consists of agricultural lands, grassland, shrub-scrub, and dryland forest. The existing vegetation includes many introduced species and there are no contiguous patches of native vegetation present. Vegetation communities are described in detail in Section 3.7.1. The wind farm site provides habitat for a variety of birds, most of which are non-native, as well as for several non-native mammal species and numerous invertebrates. There are no wetlands or waterbodies within the wind farm site and there are no areas where congregations of birds occur.

3.8.2.1 Non-listed Wildlife

Twenty-six avian species were observed during field surveys or incidentally within the wind farm site in 2012 and 2013. Songbirds and waterbirds (primarily cattle egrets) were the most common. Most are widespread and common introduced species associated with low elevation habitats throughout Oahu, or indigenous species that occur in lowland habitats throughout the Hawaiian Islands as residents or migrants, and may use the wind farm site for foraging or nesting (Table 3.8-1).

Table 3.8-1. Bird Species Observed in the Wind Farm Site

Common Name	Scientific Name	Status[1/]	Protected Status[2/]
Barn owl	*Tyto alba*	non-native; resident	MBTA
Black-crowned night heron	*Nycticorax nycticorax*	indigenous; resident	MBTA
Bristle-thighed curlew	*Numenius tahitiensis*	indigenous; migrant	MBTA
Cattle egret	*Bubulcus ibis*	non-native; resident	MBTA
Common myna	*Acridotheres tristis*	non-native; resident	none
Common peafowl	*Pavo cristatus*	non-native; resident	none
Common waxbill	*Estrilda astrild*	non-native; resident	none
Great frigatebird	*Fregata minor*	indigenous; resident	MBTA
House finch	*Carpodacus mexicanus*	non-native; resident	MBTA
Japanese bush-warbler	*Cettia diphone*	non-native; resident	none
Japanese white-eye	*Zosterops japonicas*	non-native; resident	none
Laysan albatross	*Phoebastria immutabilis*	indigenous; breeder	MBTA
Northern cardinal	*Cardinalis cardinalis*	non-native; resident	MBTA
Nutmeg mannikin	*Lonchura punctulata*	non-native; resident	none
Pacific golden-plover	*Pluvialis fulva*	indigenous; migrant	MBTA
Red avadavat	*Amandava amandava*	non-native; resident	none
Red junglefowl	*Gallus gallus*	non-native; resident	none
Red-billed leiothrix	*Leiothrix lutea*	non-native; resident	none
Red-crested cardinal	*Paroaria coronate*	non-native; resident	none
Red-vented bulbul	*Pynonotus cafer*	non-native; resident	none
Red-whiskered bulbul	*Pycnonotus jocosus*	non-native; resident	none
Rock pigeon	*Columba livia*	non-native; resident	none
Spotted dove	*Streptopelia chinensis*	non-native; resident	none
White-rumped shama	*Copsychus malabaricus*	non-native; resident	none
White-tailed tropicbird	*Phaethon lepturus*	indigenous; migrant	MBTA
Zebra dove	*Geopelia striata*	non-native; resident	none

1/ indigenous = native to Hawaii and elsewhere
2/ MBTA = Migratory Bird Treaty Act

Aside from the Hawaiian hoary bat (*Lasiurus cinereus semotus*) (addressed in detail in Section 3.9), all land mammals in Hawaii are introduced. Four mammalian species were observed during biological surveys. In addition to the Hawaiian hoary bat, three species of introduced mammals were also observed during general biological surveys including: small Indian mongoose (*Herpestes auropunctatus*), domestic cat (*Felis catus*), and domestic dog (*Canis lupis familiaris*). All of these species are widespread in the Hawaiian Islands and on Oahu. See the Biological Survey Report (Hobdy 2013a) in Appendix E for additional discussion of invasive species.

Twenty species of invertebrates were also identified during the general biological surveys (Hobdy 2013a). This includes 18 species of insects and two species of mollusk (Appendix E). With the exception of the globe skimmer (*Pantala flavescens*), an indigenous dragonfly, all invertebrates are widespread introduced species. The globe skimmer is widespread in Hawaii and across the planet (Howarth and Mull 1992).

Development activities have the potential to affect wildlife through direct mortality (during construction or through collision with turbines), habitat alteration or removal, or though noise and disturbance associated with increased human activity in the wind farm site. Indirectly, construction activities can also result in the introduction and spread of non-native species.

3.8.2.2 MBTA-protected Species and Other Avian Species of Concern

This section describes the MBTA-protected species that occur in the vicinity of the wind farm site. Hawaii has 317 documented bird species, which include introduced, indigenous, and endemic residents, as well as wintering and breeding migrants and birds that only pass through Hawaiian waters in migration (Pyle and Pyle 2009). Hawaii and, consequently, the wind farm site are situated within the West Pacific Flyway, one of the world's main bird migratory routes. Birds that move along the West Pacific Flyway consist primarily of shorebirds, waterfowl, and seabirds. Some of these species hold cultural significance in Hawaii. While many species of migrant or wintering seabirds pass near the Hawaiian Islands, they rarely approach land and are at very low risk of being affected by land-based wind energy development.

Migratory birds, as well as some non-migratory birds that are native to the Hawaiian Islands, are afforded protection under the MBTA. Additionally, numerous species introduced to the Hawaiian Islands are protected under the MBTA, even though they are non-native. The following describes each of these groups in detail.

Shorebirds (curlews, plovers, sanderlings, tattlers, and turnstones)

Shorebirds are a group of birds that live along coastlines and are associated with a variety of freshwater and marine wetland habitats. Shorebirds that occur in the Hawaiian Islands are primarily migratory, traveling for thousands of miles across the ocean between breeding grounds in Alaska and Siberia to wintering grounds in Hawaii and farther south. They are typically present in Hawaii from August through April, with peaks in diversity and number during the middle of fall migration (October-November; Engilis and Naughton 2004).

The U.S. Pacific Islands Regional Shorebird Conservation Strategy (Engilis and Naughton 2004) identifies four shorebirds of primary conservation importance in the Hawaiian Islands including the Hawaiian stilt, bristle-thighed curlew, Pacific golden-plover, and wandering tattler. The Hawaiian stilt (an ESA-listed species covered under the Project HCP and addressed in detail in Section 3.9) is endemic to the main Hawaiian Islands and is the only resident, breeding shorebird in the region. The Hawaiian Islands provide essential habitat for the other three species as a majority their global populations overwinter there.

The Pacific golden-plover is indigenous to the Hawaiian Islands and is one of the most ubiquitous wintering birds. This species is ranked by the U.S. Shorebird Conservation Strategy as a species of high concern (Engilis and Naughton 2004). This species winters across the tropical Pacific from Hawaii to Japan, and use the widest range of habitats among shorebird species from sea level to 13,000 feet (3,960 meters) elevation (Mitchell et al. 2005). They are most common in uplands, parks, pastures, and open wetlands. Pacific golden-plovers exhibit high sight fidelity (returning year after year) to their wintering grounds. Population trends for this species are largely unknown, although it is common in the Hawaiian Islands and an average of 14.1 Pacific golden-plovers per party-hour has been recorded during Honolulu Christmas Bird Counts since 1990 (National Audubon Society 2014).

The Bristle-thighed curlew is indigenous to the Hawaiian Islands and has an International Union for Conservation of Nature and Natural Resources (IUCN) red-list ranking of vulnerable. It is ranked by the U.S. Shorebird Conservation Strategy as a species of high concern (Engilis and Naughton 2004). Winter range for this species includes islands throughout the Pacific. Within the Hawaiian Islands, the largest concentrations of this species overwinter in the Northwest Hawaiian Islands; smaller concentrations overwinter in the main Hawaiian Islands, particularly Oahu and Hawaii (Mitchell et al. 2005). This species prefers undisturbed, predator-free habitats, and most bristle-thighed curlews on Oahu overwinter on grassy areas, wetlands, and vegetated dunes. Population trends for this species are largely unknown and an average of 0.05 bristle-thighed curlews per party-hour has been recorded during Honolulu Christmas Bird Count since 1990 (National Audubon Society 2014).

Wandering tattler is indigenous to the Hawaiian Islands and is ranked by the U.S. Shorebird Conservation Strategy as a species of moderate concern (Engilis and Naughton 2004). This species winters in the Pacific Ocean from the Hawaiian Islands through the archipelagos to the south (Mitchell et al. 2005). In Hawaii, this species forages in intertidal habitats as well as human-modified areas such as grassy areas around airports and golf courses. Population trends for this species are largely unknown, although wandering tattlers are not common in the Hawaiian Islands and an average of 0.39 wandering tattlers per party-hour has been recorded during Honolulu Christmas Bird Count since 1990 (National Audubon Society 2014).

Other common winter visitors include the ruddy turnstone and sanderling. Winter visitors that occur annually, but in small numbers, include the black-bellied plover, lesser yellowlegs, least sandpiper, pectoral sandpiper, sharp-tailed sandpiper, dunlin, and long-billed dowitcher. Other shorebird species occur as irregular or accidental migrants in Hawaii.

Threats to shorebirds in the Hawaiian Islands include habitat loss associated with land development; introduction of invasive, non-native plants (degradation of habitat) and non-native animals (predation, disease, competition); human disturbance; and contaminants (sewage discharge, oil spills, radioactive wastes, pesticides; Engilis and Naughton 2004). The Pacific golden-plover has been documented as a fatality at operational wind facilities in Hawaii.

Table 3.8-2 provides a list of the MBTA-protected shorebird species documented in the vicinity of the wind farm site. Shorebird habitat on Oahu is diverse and includes tidal flats, estuaries, playas, ephemeral and permanent marshes, managed wetlands, and urban grasslands. The James Campbell NWR, located approximately 0.75 mile (1.2 kilometers) to the north the wind farm site, is an important wintering area for shorebirds. Shorebirds can also be seen near the wind farm site at the Kahuku aquaculture facilities and the Kahuku golf course. There is no suitable habitat for shorebirds within the wind farm site; therefore, these species are only likely to pass through when flying between wetland habitats outside of the wind farm site.

Waterfowl (Ducks and Geese)

Close to 30 species of migratory waterfowl winter in the Hawaiian Islands, including species of diving ducks, dabbling ducks, sea ducks, and geese. These species are typically present from September through May, and are associated with wetland habitats (USFWS 2011a). There are also several resident waterfowl species that are afforded protection under the MBTA including the mallard, Hawaiian duck, Hawaiian coot, and Hawaiian goose. The Hawaiian duck, Hawaiian coot, and Hawaiian goose are ESA-listed species covered under the Project HCP and are addressed in detail in Section 3.9.

Table 3.8-2 provides a list of the MBTA-protected waterfowl species documented in the vicinity of the wind farm site. There is no suitable habitat for migratory waterfowl within the wind farm site; however species that frequent the wetlands around the wind farm site, including northern shovelers, northern pintail, wigeons, and teal (USFWS, pers. comm. 2014). These species are only likely to pass through when flying between wetland habitats outside of the wind farm site.

Table 3.8-2. Species Protected by the Migratory Bird Treaty Act in the Vicinity of the Wind Farm Site

Species	Occurrence[1/]	Documented During Project Surveys?[2/]
Seabirds		
Wedge-tailed shearwater (*Puffinus pacificus*)	Br	Yes
Laysan albatross (Phoebastria immutabilis)	Br	Yes
Black-footed albatross (*Phoebastria nigripes*)	Br	
Red-tailed tropic bird (*Phaethon rubricauda*)	Br	Yes
Red-footed booby (*Sula sula rubripes*)	Res	
Arctic tern (Sterna paradisaea)	Mig	
Bonaparte's gull (Chroicocephalus Philadelphia)	Mig*	
Brown booby (Sula leucogaster)	Res	
Brown noddy (*Anous stolidus*)	Mig*	
Caspian tern (Hydroprogne caspia)	Mig*	
Common tern (*Sterna hirundo*)	Mig*	Yes
Franklin's gull (*Laris pipixcan*)	MIg	

Table 3.8-2. Species Protected by the Migratory Bird Treaty Act in the Vicinity of the Wind Farm Site (continued)

Species	Occurrence[1/]	Documented During Project Surveys?[2/]
Glaucous-winged gull (*Larus glaucescens*)	Mig*	
Great frigatebird (*Fregata minor*)	Res	Yes
Gull-billed tern (Gelochelidon nilotica)	Mig*	
Herring gull (Larus argentatus)	Mig	
Laughing gull (Leucophaeus atricilla)	Mig	
Least tern (Sternula antillarum)	Mig	
Masked booby (Sula dactylatra)	Res	
Ring-billed gull (*Larus delawarensis*)	Mig	
Sandwich tern (Thalasseus sandvicensis)	Mig*	
Thayer's gull (*Larus thayeri*)	Mig*	
Western gull (Larus occidentalis)	Mig*	
White tern (*Gygis alba*)	Mig*	
White-tailed tropic bird (*Phaethon lepturus dorotheae*)	Res	Yes
Shorebirds		
Bar-tailed godwit (*Limosa lapponica*)	Mig*	
Black-bellied plover (*Pluvialis squatarola*)	Mig/Win	
Bristle-thighed curlew (*Numenius tahitiensis*)	Mig/Win	Yes
Common snipe (Gallinago gallinago)	Mig*	
Curlew sandpiper (*Calidris ferruginea*)	Mig*	
Dunlin (Calidris aplina)	Mig/Win	
Gray-tailed tattler (*Tringa brevipes*)	Mig*	
Greater yellow-legs (*Tringa melanoleuca*)	Mig*	
Hawaiian stilt (Himantopus mexicanus knudseni)	Res	Yes
Killdeer (Charadrius vociferous)	Mig*	
Least sandpiper (*Calidris minutilla*)	Mig/Win	
Lesser yellowlegs (*Tringa flavipes*)	Mig/Win	
Long-billed dowitcher (*Limnodromus scolopaceus*)	Mig/Win	
Marbled godwit (*Limosa fedoa*)	Mig*	
Marsh sandpiper (*Tringa stagnatilis*)	Mig*	
Pacific golden-plover (*Pluvialis fulva*)	Mig/Win	Yes
Pectoral sandpiper (*Calidris melanotos*)	Mig	
Red knot (Calidris canutus)	Mig*	
Ruddy turnstone (*Arenaria interpres*)	Mig/Win	Yes
Ruff (Philomachus pugnax)	Mig*	
Sanderling (*Calidris alba*)	Mig/Win	Yes
Semipalmated plover (Charadrius semipalmatus)	Mig*	
Sharp-tailed sandpiper (*Calidris acuminate*)	Mig	
Short-billed dowitcher (*Limnodromus griseus)*	Mig*	
Semipalmated sandpiper (*Calidris pusilla*)	Mig*	
Solitary sandpiper (*Tringa solitaria*)	Mig*	
Spotted sandpiper (*Actitis maclaria*)	Mig*	
Stilt sandpiper (Calidris himantopus)	Mig*	
Terek sandpiper (*Xenus cinereus*)	Mig*	
Wandering tattler (*Heteorscelus incanus*)	Mig/Win	
Western sandpiper (*Calidris mauri*)	Mig*	
Whimbrel (Numenius phaeopus)	Mig*	
White-rumped sandpiper (*Calidris fuscicollis*)	Mig*	
Wilson's phalarope (*Phalaropus tricolor*)	Mig*	
Wilson's snipe (Gallinago delicate)	Mig*	
Waterfowl		
American widgeon (*Anas americana*)	Mig	
Black brant (Branta bernicla)	MIg	

Table 3.8-2. Species Protected by the Migratory Bird Treaty Act in the Vicinity of the Wind Farm Site (continued)

Species	Occurrence[1/]	Documented During Project Surveys?[2/]
Blue-winged teal (*Anas discors*)	Mig	
Bufflehead (Bucephala albeola)	Mig	
Canvasback (Aythya valisineria)	Mig*	
Cinnamon teal (*Anas cyanoptera*)	Mig*	
Common merganser (*Mergus merganser*)	Mig*	
Eurasian widgeon (*Anas Penelope*)	Mig	
Cackling goose (*Branta hutchinsii*)	Mig*	
Canada goose (Branta Canadensis)	Mig	
Fulvous whistling duck (*Dendrocygna bicolor*)	Res	
Gadwall (Anas strepera)	Mig*	
Garganey (Anas querquedula)	Mig*	
Green-winged teal (*Anas carolinensis*)	Mig	
Greater scaup (*Aythya marila*)	Mig	
Greater white-fronted goose (*Anser albifrons*)	Mig*	
Hooded merganser (Lophodytes cucullatus)	Mig*	
Lesser scaup (*Aythya affinis*)	MIg	
Mallard (Anas platyrhynchos)	Mig/Res	
Northern pintail (*Anas acuta*)	Mig	
Northern shoveler (*Anas clypeata*)	MIg	
Redhead (Aythya Americana)	Mig*	
Ring-necked duck (*Aythya collaris*)	Mig	
Tufted duck (Aythya fuligula)	Mig*	
Hawaiian duck (*Anas wyvilliana*)	Res	Yes
Hawaiian coot (*Fulica alai*)	Res	Yes
Hawaiian goose (Branta sandvicensis)	Res	
Wading Birds		
Black-crowned night heron (*Nycticorax nycticorax*)	Res	
Cattle egret (*Bubulcus ibis*)	Res	
Great blue heron (*Ardea Herodias*)	Mig*	
Snowy egret (*Egretta thula*)	Mig*	
White-faced ibis (*Plegadis chihi*)	Mig*	
Landbirds		
Mourning dove (*Zenaida macroura*)	Res	
Barn owl (*Tyto alba*)	Res	
Northern cardinal (Cardinalis cardinalis)	Res	Yes
House finch (Carpodacus mexicanus)	Res	Yes

Sources: USFWS (2005), Mitchell et al. (2005), Engilis and Naughton (2004)
1/Occurrence: Br = breeding season; Win = winter; Res = resident (present year round); Mig = migration; Mig* = irregular or accidental migrant
2/ Includes surveys conducted in wetlands adjacent to the wind farm site.

Threats to waterfowl include loss and degradation of wetland habitats and the introduction of non-native plants (habitat degradation) and non-native animals (predation, competition). To date, no waterfowl species have been documented as fatalities at operational wind facilities in Hawaii.

Seabirds (Albatrosses, Terns, Boobies, Frigatebirds, Shearwaters, Petrels, and Gulls)

Seabirds spend a substantial portion of their lives in the marine environment, many only returning to land to breed. More than 98 percent of all seabirds nest in colonies (USFWS 2005). During the nesting season, adult seabirds make frequent trips between nesting colonies and the ocean to

forage. Seabirds that breed in the Hawaiian Islands typically disperse after the breeding season to waters elsewhere in the Pacific, typically hundreds of miles away from the Hawaiian Islands (USFWS 2005). A smaller number of species are resident, occurring throughout the year. Most species only occur in the Hawaiian Islands during migration. Seabirds that breed in or migrate through the Hawaiian Islands are typically present from approximately mid-March through mid-December (USFWS 2005).

Table 3.8-2 provides a list of MBTA-protected seabirds documented in the vicinity of the wind farm site. The wind farm site does not provide suitable breeding or foraging habitat for any seabird species; therefore, seabirds are most likely to pass through during migration or in transit between inland breeding habitat and the ocean.

Threats to seabirds include invasive (non-native) species, interactions with fisheries when at sea, pollution, habitat loss and degradation disturbance and climate change. Human development has resulted in the potential for new conflicts associated with nighttime lighting and collisions with structures such as transmission lines, communications towers, and wind energy facilities (USFWS 2005). Increases in nighttime lighting have been associated with the attraction, disorientation, and grounding (fall out) of fledgling seabirds on their first nocturnal flight to the ocean (USFWS 1983, 2011c). Disorientation exposes birds to increased risk of collision with power lines or structures, or increased risk of injury or death from impacts by vehicles or predation by non-native mammals if they become grounded. More recently, widespread use of shielded lights has reduced but not eliminated this threat (USFWS 2011c).

Wedge-tailed shearwaters, Laysan albatross, great frigatebirds, and white-tailed tropic birds have observed in the vicinity of the Project and/or been documented as fatalities at operational wind facilities in Hawaii. These species are addressed in detail below. A Cook's petrel (*Pterodroma cookii*), a very infrequent, vagrant species in Hawaii was also documented as a fatality. The Hawaiian petrel and Newell's shearwater are both ESA-listed seabird species covered by the Project HCP and are addressed in detail in Section 3.9.

The wedge-tailed shearwater is indigenous to the Hawaiian Islands and is an abundant seabird occurring throughout the tropical and subtropical Indian and Pacific Oceans. Its population appears stable and is ranked by the North American Waterbird Conservation Plan as a species of low concern (Mitchell et al. 2005). Wedge-tailed shearwaters breed throughout the northwest Hawaiian Islands and offshore islets of most of the main Hawaiian Islands including Oahu (Mitchell et al. 2005). A small number of wedge-tailed shearwaters have nested along the coast at the James Campbell NWR; however, nesting been generally unsuccessful due to the uncontrolled presence of nonnative predator (USFWS 2011a). Attraction to nighttime lighting on Oahu is a management concern for this species.

The Laysan albatross is indigenous to the Hawaiian Islands and has an IUCN red-list ranking of vulnerable. Approximately 95 percent of the global population breeding population of this species occurs in the Hawaiian Islands (approximately 590,000 pairs) with the largest colonies occurring on Midway Atoll and Laysan; less than 100 pairs breed on the main Hawaiian Islands (Mitchell et al.

2005). A small breeding colony is located at Kaena Point on Oahu (Mitchell et al. 2005). Population trends for this species are unknown.

The great frigatebird is indigenous to the Hawaiian Islands and is ranked by the North American Waterbird Conservation Plan as a species of moderate concern (Mitchell et al. 2005). There are five subspecies of which one breeds on isolated islands in the western and central Pacific (USFWS 2005). Great frigatebirds do not breed on the main Hawaiian Islands, although large numbers roost on offshore islets of the main Hawaiian Islands including Oahu (Mitchell et al. 2005). Population trends for this species appear stable to cyclic (Pyle and Pyle 2009).

The white-tailed tropic bird is indigenous to the Hawaiian Islands and is ranked under the North America Waterbird Conservation Plan as a species of high concern (Mitchell et al. 2005). This species breeds year round on oceanic islands and offshore islets, typically choosing inaccessible spots on cliffs to nest. There are five subspecies of white-tailed tropic bird, one of which breeds in the western and central Pacific. On Oahu, a few pairs nest on the southeastern portion of the island (Mitchell et al. 2005). Population trends are unknown for this species.

Wading Birds (Herons, Egrets)

There are five species of MBTA-protected wading birds that have been documented in the vicinity of the wind farm site including the black-crowned night heron, cattle egret, great blue heron, snowy egret, and white-faced ibis. All were documented at the James Campbell NWR; the cattle egret was documented during Project-specific avian point count surveys. The great blue heron, snowy egret, and white-faced ibis occur in Hawaii as irregular or accidental migrants and are unlikely to occur in the wind farm site.

The black-crowned night heron is an indigenous species, resident in the Hawaiian Islands. Black-crowned night herons are associated with all types of wetland habitats including fresh, brackish, and saltwater swamps, rivers, streams, impoundments, salt marshes, ditches, ponds, and reservoirs. Nesting occurs in colonies from December to February in Hawaii. During the nesting season, black-crowned night herons are susceptible to human disturbance (Mitchell et al. 2005). This species is also a predator of waterbird chicks. A small concentration of this species occurs within the James Campbell NWR, where it is known to forage and breed, and within nearby aquaculture farms (Mitchell at el. 2005; USFWS 2011a). An average of 0.81 black-crowned night herons per party-hour has been recorded during the Honolulu Christmas Bird Count since 1990 (National Audubon Society 2014). There is no habitat for this species within the wind farm site; therefore, it is only likely to pass through when in transit between wetland habitats. This species has not been documented as a fatality at operational wind facilities in Hawaii.

The cattle egret is a widespread, resident, introduced species in the Hawaiian Islands. One of the largest and oldest known rookeries on Oahu is located near Kahuku and this species was observed during Project-specific avian point count surveys. Fatalities of this species have occurred at operational wind facilities in Hawaii, and fatalities of cattle egrets could occur at the Project. The cattle egret has had stable populations with an average 3.24 birds per party-hour recorded during Honolulu Christmas Bird Counts since 1990 (National Audubon Society 2014).

Other Landbirds

There are a number of passerines (perching birds) that are protected by the MBTA, but not native to Hawaii, that occur in the vicinity of the wind farm site. These include the mourning dove, barn owl, northern cardinal, and house finch. These species are common and widespread in Hawaii. The northern cardinal and house finch were observed during Project surveys.

3.8.3 Mitigation Areas

This section describes wildlife resources in the Hamakua Marsh and Poamoho Ridge mitigation areas. Information on wildlife was derived from existing management plans, including Wetland Restoration and Habitat Enhancement Plan for the Kawainui Marsh (Helber Hastert & Fee 2011) and the USAG-HI Integrated Natural Resource Management Plan (Poamoho Ridge; U.S. Army 2010).

3.8.3.1 Hamakua Marsh (waterbird)

The Hamakua Marsh Mitigation Area is located within the Hamakua Marsh Waterbird Sanctuary, managed by DOFAW. It is managed as breeding habitat for Hawaiian stilts, Hawaiian coots, and Hawaiian moorhens (addressed in detail in Section 3.9 – Threatened and Endangered Species) and also provides potential habitat for many species of migrant waterfowl and shorebirds. The marsh is identified as a core wetland in the USFWS (2011e) Recovery Plan for Hawaiian waterbirds. Indigenous species commonly seen at Hamakua Marsh include the black-crowned night heron, Pacific golden-plover, ruddy turnstone, wandering tattler (DOFAW 2013a). Mallard/Hawaiian duck (*Anas platyrhynchos/Anas wyvilliana*) hybrids are also seen at the marsh (DOFAW 2013a).

Non-native and invasive predators pose a significant threat to waterbird populations at Hamakua Mash. Rats (*Rattus* spp.), house mice (*Mus musculus*), Indian mongoose (*Herpestes javanicus*), feral cats, dogs, feral pigs (*Sus scrofa*), cattle egrets, and bullfrogs (*Rana catesbeiana*) may all prey upon waterbird eggs and chicks, as well as contribute to the degradation of wetland habitat (DOFAW 2013a; Helber Hastert & Fee 2011). Mortality associated with vehicle collisions in the adjacent shopping-center parking area and dumping of trash in the marsh are additional threats to these species. Since July 2011, the DOFAW has been actively managing Hamakua Marsh through predator control and vegetation maintenance.

3.8.3.2 Poamoho Ridge (bat)

Poamoho Ridge Mitigation Area is located above Wahiawa within the Ewa Forest Reserve in the south east portion of the U.S. Army Garrison-Hawai'i (USAG-HI) Kawailoa Training Area within the Maimano Management Unit. Poamoho Ridge is State-owned (DLNR) forested habitat occurring along the leeward summit of the central Koolau Mountains and is part of the State Natural Area Reserve System. Wildlife habitat in the Poamoho Ridge consists of native wet forest, characterized by scattered shrubby Ohia and other native trees such as lapa lapa with dense uluhe fern understory. This habitat supports numerous rare and endangered plants (discussed in Section 3.7 – Vegetation) and wildlife, including damselflies, tree snails, forest birds, and fish (U.S. Army 2010). The Poamoho Ridge Mitigation Area also supports breeding, roosting, and foraging habitat for the

Hawaiian hoary bat (addressed in detail in Section 3.9 – Threatened and Endangered Species). Twenty-seven introduced species have also been observed within the Kawailoa Training Area, including invertebrates, fish, amphibians, reptiles, and mammals (U.S. Army 2010).

Native wildlife species in the Poamoho Ridge Mitigation Area are currently being threatened by non-native ungulate activity in the area (i.e., feral pigs). Non-native ungulates modify native forest habitat through physical destruction of vegetation and the introduction of non-native plant species. Without management intervention, habitat in the area will continue to degrade.

3.9 Threatened and Endangered Species

This section describes the threatened and endangered species potentially occurring in the vicinity of the Project. The analysis area for threatened and endangered species includes the wind farm site and the mitigation areas. Eight State and/or Federally threatened and endangered species are known to occur, or have the potential to occur, in the vicinity of the wind farm site including the Hawaiian hoary bat (*Lasiurus cinereus semotus*), Newell's shearwater (*Puffinus newelli*), Hawaiian goose (*Branta sandvicensis*), Hawaiian stilt (*Himantopus mexicanus knudseni*), Hawaiian coot (*Fulica alai*), Hawaiian moorhen (*Gallinula chloropus sandvicensis*), Hawaiian duck (*Anas wyvilliana*), and Hawaiian short-eared owl (*Asio flammeus sandwichensis*) (Table 3.9-1). These species are covered under the Project HCP. No portion of the wind farm site has been designated as critical habitat for any listed wildlife species.

Table 3.9-1. Listed Species with the Potential to Occur in the Wind Farm Site

Common Name	Scientific name	Status[1/]	Year Federally -listed	Status in Wind Farm Site
Hawaiian hoary bat	*Lasiurus cinereus semotus*	FE, SE	1970	Potential detection during biological survey (Hobdy 2013a) although not detected during July – October 15, 2013 bat acoustic surveys (Tetra Tech 2013b). Assumed present based on presence at Kahuku Wind Project
Newell's shearwater	*Puffinus newelli*	FT, ST	1975	None known; potential to occur in transit
Hawaiian goose	*Branta sandvicensis*	FE, SE	1967	None known; lack of suitable habitat; one detection adjacent to wind farm site during radar surveys (Sanzenbacher and Cooper 2013); present at James Campbell NWR; potential in transit or may be attracted to maintained vegetated areas in search plots for post-construction monitoring
Hawaiian stilt	*Himantopus mexicanus knudseni*	FE, SE	1970	None known; potential to occur in transit
Hawaiian coot	*Fulica alai*	FE, SE	1970	None known; potential to occur in transit
Hawaiian moorhen	*Gallinula chloropus sandvicensis*	FE, SE	1967	None known; potential to occur in transit
Hawaiian duck	*Anas wyvilliana*	FE, SE	1967	None known; potential in transit should an intensive and successful Hawaiian duck reintroduction and feral mallard management effort be conducted by USFWS and/or DOFAW
Hawaiian short-eared owl	*Asio flammeus sandwichensis*	SE (Oahu only)	NA	None known; suspected based on presence at Kahuku Wind Project and James Campbell NWR
[1/] State Endangered =SE, Federal Threatened =FT, Federal Endangered =FE				

The bird and bat species covered under the Project HCP, as well as some others addressed in Section 3.10 – Wildlife, are culturally important species under native Hawaiian belief systems. These culturally important species hold a significant place in the traditional cultural landscape of Kahuku for many Hawaiian and Polynesian descents, and are recognized in the Kumulipo, or Hawaiian Creation Chant, as ancestors, protectors, creators, and/or elders of the Hawaiian people (see Section 3.11 – Historic, Archeological, and Cultural Resources for additional discussion).

Four additional listed wildlife species were considered but excluded from further analysis because they are unlikely to occur in the vicinity of the Na Pua Makani wind farm and thus would not be impacted by the Project. These include the Hawaiian petrel (*Pterodroma sandwichensis*), blackline Hawaiian damselfly (*Megalagrion nigrohamatum nigrolineatum*), oceanic Hawaiian damselfly (*M. oceanicum*), and crimson Hawaiian damselfly (*M. leptodemas*). The Hawaiian petrel is not known or expected to breed on Oahu. As the species is highly pelagic, except when breeding, it is very unlikely that individuals would transit the wind farm site. Additionally, there is no suitable habitat present for the Hawaiian damselfly species which require habitat where the Koolau core-dike complex geological formation is exposed and rainfall exceeds 75 inches per year (Polhemus 2007, USFWS 2012b). As a result, these species are not covered under the Project HCP, and are not discussed further here. See the Project HCP for more detail on these species (Tetra Tech 2014c).

No Federal or State threatened, endangered, or candidate plant species were detected within the wind farm site during surveys. Additionally, no plant species proposed for listing or special status plant species were detected. No portion of the wind farm site has been designated as critical habitat for any listed plant species. Therefore, no listed plant species are discussed in detail here.

Sources of information on the presence of threatened and endangered species in the wind farm site include:

- A walk-through general biological survey of the wind farm site conducted in June 2013 (Hobdy 2013a),
- Avian point count surveys conducted between October 2012 to October 2013 within, and in the vicinity of, the wind farm site (Tetra Tech, Inc. 2014c),
- Radar and audiovisual surveys and associated risk-of-collision analysis for threatened and endangered seabirds and bats conducted in the fall (October-November) of 2012 and spring (April) and summer (June) of 2013 (Sanzenbacher and Cooper 2013),
- Ongoing AnaBat® SD2 (Anabat) acoustic monitoring for bats (ground-based and installed on met towers) within the wind farm site (Tetra Tech 2013b), and
- Recovery plans for the Newell's shearwater (USFWS 1983), Hawaiian hoary bat (USFWS 1998), Hawaiian goose (USFWS 2004), and Hawaiian waterbirds (USFWS 2011e).

Details of the radar/audiovisual surveys and acoustic bat surveys are provided in the Project HCP. Results are described below where appropriate. The following subsections summarize the status and ecology; distribution, abundance and population trends; threats; and presence on Oahu and potential for occurrence in the analysis area for the wildlife species covered under the Project HCP. Further details on each of these species can be found in the Project HCP.

3.9.1 Hawaiian Hoary Bat

3.9.1.1 Status and Ecology

The Hawaiian hoary bat is the only fully terrestrial native mammal in the Hawaiian Islands. Hawaiian hoary bats are found in both wet and dry areas from sea level to 13,000 feet (2,962 meters) above mean sea level (amsl), with most observations occurring below 7,500 feet (2,286 meters) amsl (USFWS 2012a) and have been observed in a variety of habitats including open pastures and more heavily forested areas in both native and non-native habitats (Mitchell et al. 2005, Gorressen et al. 2013). Typically, this species feeds over streams, bays, along the coast, over lava flows, or at forest edges. The Hawaiian hoary bat is an insectivore, and prey items include a variety of native and non-native night-flying insects, including moths, beetles, crickets, mosquitoes, and termites (Whitaker and Tomich 1983). Hawaiian hoary bats are known to roost solitarily in tree foliage and have only rarely been seen exiting lava tubes, leaving cracks in rock walls, or hanging from human-made structures. Foliage roosting has been documented in native and non-native vegetation including hala (*Pandanus tectorius*), coconut palms (*Cocos nucifera*), kukui (*Aleurites moluccana*), pukiawe (*Styphelia* [*Leptecophylla*] *tameiameiae*), Java plum (*Syzygium cumini*), kiawe, avocado (*Persea americana*), pink shower trees (*Cassia javanica*), `ohi`a trees (*Metrosideros polymorpha*), fern clumps, and mature eucalyptus plantations; they are also suspected to roost in Sugi pine (*Cryptomeria japonica*) stands (USFWS 1998, Mitchell et al. 2005, Gorressen et al 2013).

Although the Hawaiian hoary bat may migrate between islands and within topographical gradients on the islands, long-distance migration like that of the mainland hoary bat is not known (USFWS 1998, Gorressen et al. 2013). Seasonal and altitudinal differences in bat activity have been suggested (Menard 2001, Gorressen et al. 2013).

Breeding activity takes place between April and August with pregnancy and birth of approximately two young occurring from April to June (mean young per year = 1.83 young per year based on mainland hoary bat; Bogan 1972, Koehler and Barclay 2000, USFWS 1998). Lactating females have been documented from June to August and post-lactating females have been documented from September to December (Menard 2001). Until weaning, young are completely dependent on the female for survival.

3.9.1.2 Distribution, Abundance, and Population Trends

Confirmed reports of the Hawaiian hoary bat are known from all the main islands except Niihau and Kahoolawe (HBMP 2007), although this species is most often seen on Hawaii, Maui, and Kauai (Kepler and Scott 1990). Today, the largest known breeding populations are thought to occur on Kauai and Hawaii. Recent studies on Oahu and Molokai, suggest that populations persist on those two islands (Day and Cooper 2002, 2008; SWCA 2011b), and breeding was recently documented on Oahu (A. Nadig, USFWS, pers. comm. August 2013). Relatively little research has been conducted on the Hawaiian hoary bat and data regarding its habitat and population status are very limited. Population estimates for this species range from hundreds to a few thousand; however, these

estimates are based on limited and incomplete data due to the difficulty in estimating populations of patchily distributed bats (USFWS 2012a).

3.9.1.3 Threats

The main threats to the Hawaiian hoary bat, as identified in the recovery plan (USFWS 1998), are reduction in tree cover, habitat loss, increases in pesticide use, reduction in prey availability due to the introduction of non-native insects, and predation. It is unknown what effect these threats have on local population dynamics. Observation and specimen records do suggest that this species is now absent from historically occupied areas; however, the magnitude of any population decline is unknown.

The hoary bat is one of the bat species most frequently killed by turbines in the continental United States, primarily during fall migration (Kunz et al. 2007). Hawaiian hoary bats have been killed at several wind farms in the Hawaiian Islands, with documented fatalities as shown in Table 3.9-2, and collision with wind turbines is considered as a potential emerging threat to the species (USFWS 2011d). As mentioned above, Hawaiian hoary bats have seasonal elevation movements (Gorressen et al. 2013), but are not known to have large migration movements similar to mainland hoary bats.

Table 3.9-2. Hawaiian Hoary Bat Fatalities Observed at Existing Wind Farms

Project	Island	Operation Commencement	Number of Turbines	Number of bat fatalities observed
Kaheawa Wind Power I	Maui	June 2006	20	8
Kaheawa Wind Power II	Maui	July 2012	14	3
Auwahi	Maui	December 2012	8	5
Kawailoa	Oahu	November 2012	30	25
Kahuku	Oahu	March 2011 (Idled August 2012 – August 2013)	12	4
Pakini Nui	Hawaii	April 2007	14	1
Source: L. Gibson, USFWS, July 2015 pers. comm..				

3.9.1.4 Presence on Oahu and Potential Occurrence within the Wind Farm Site and Mitigation Areas

Historically, Hawaiian hoary bats have been observed on Oahu (Baldwin 1950, Tomich 1986). However, populations on Oahu have been characterized as extremely low, and it was suggested that detections on Oahu could represent migrant or vagrant individuals (Kepler and Scott 1990). Recent studies document the persistence of the species on the island and in the vicinity of the Project (Day and Cooper 2008, SWCA 2011b). A bat was potentially detected in the wind farm site in 2013 during a night survey using a handheld detector (Hobdy 2013a). Hawaiian hoary bats were not observed during radar surveys at the Project site in October – November 2012 and April – June 2013 (Sanzenbacher and Cooper 2013). Two Anabat detectors were installed in summer 2013, and between July 2013 and February 6, 2015, an average of 0.30 bat passes per detector night were recorded. Because of detector malfunctions, the Anabat detectors were replaced with Wildlife Acoustics detectors on February 6, 2015. Between February 6, 2015 and July 31, 2015, an average of 0.27 bat passes per detector night were recorded. To provide consistent baseline information, the Wildlife Acoustics detectors were deployed for one year, February 2015 to February 2016.

Bat activity is anticipated to be low at the wind farm site due to the low level of activity detected at the adjacent Kahuku Wind Project (0.01 bat passes/detector/night; SWCA 2010). This level of bat activity is low in comparison to similar studies on both the mainland and Hawaii (F. Bonaccorso, USGS-BRD, pers. comm. 2013; Kepler and Scott 1990; Menard 2001).

Hawaiian hoary bats are also known to occur in the vicinity of the Poamoho Ridge Mitigation Area and have been documented within the Poamoho Ridge Mitigation Area, The Poamoho Ridge Mitigation Area is located in the Ewa Forest Reserve (Figure 1-4), and is part of the State Natural Area Reserve System. The Oahu Army Natural Resources Program (OANRP) has deployed acoustic bat detectors on this property and bats were detected in low numbers (OANRP 2012). Bats have also been documented within the Poamoho Ridge parcel via acoustic monitoring efforts initiated by the Project in coordination with the Koolau Mountains Watershed Partners and DLNR in April 2014, and nearby monitoring studies have documented bats in similar habitats (F. Bonaccorso, USGS-BRD, pers. comm., 2014).

3.9.2 Newell's Shearwater

3.9.2.1 Status and Ecology

The Newell's shearwater is a migratory, highly pelagic seabird endemic to the Hawaiian Islands. Like other procellariids (shearwaters, petrals, fulmars, and prions), the Newell's shearwater spends up to 80 percent of its life at sea, only returning to land to breed.

The Newell's shearwater is a colonial, burrow- and crevice-nesting species whose breeding colonies are typically located at middle to high elevations (range 525 to 3,937 feet [160 to 1,200 meters] amsl), often in isolated locations (Ainley et al. 1997). Most Newell's shearwaters excavate burrows on densely-vegetated mountain slopes of 65 percent or greater. Vegetation typically consists of open native forest dominated by ohia with a dense understory of uluhe fern (*Dicranopteris linearis*). On East Maui, nests have been documented in areas dominated by cover of `ama`u (*Sadleria cyatheoides*), a native fern species (Wood and Bily 2008). However, breeding has also been documented on sparsely-vegetated slopes along the Na Pali coast on Kauai and on Lehua Islet (VanderWerf et al. 2004, Mitchell et al. 2005).

The breeding season for the Newell's shearwater begins in April when adults arrive at the nesting colony, and egg-laying begins in early June. Pairs produce one egg, and both parents incubate the egg and brood and feed the chick. Parents forage offshore, returning to the colony at night to feed the chick. Young leave the nesting colony in October and November, with a few birds still fledging into December. Adults do not care for young after they fledge (Ainley et al. 1997). Newell's shearwaters exhibit strong philopatry, returning to their natal colony to breed and returning to the same nesting site over many years (USFWS 2005, Griesemer and Holmes 2011).

3.9.2.2 Distribution, Abundance, and Population Trends

The Newell's shearwater only breeds in Hawaii and was once abundant on all the main Hawaiian islands. Currently, 75 to 90 percent of the breeding population occurs on Kauai, with smaller

colonies on the islands of Hawaii, Maui, and Molokai, and possibly on Oahu, and there is an isolated record of breeding from Lehua Islet near Niihau (Ainley et al. 1997, Reynolds and Ritchotte 1997, Day and Cooper 2002, Day et al. 2003, VanderWerf et al. 2004, VanderWerf et al. 2007, Day and Cooper 2008, Wood and Bily 2008, USFWS 2011c).

The only available population estimate for Newell's shearwaters is approximately 84,000 individuals, based on at-sea data collected between 1984 and 1993 (Spear et al. 1995 as cited in Griesemer and Holmes 2011). Trends in ornithological radar data (detections of shearwater-like targets) and reporting of seabird fallout (the number of downed fledglings collected after attraction to artificial light), suggest that the population of Newell's shearwaters has declined (between 50 and 75 percent) over the last two decades (Day et al. 2003, Holmes et al. 2009). Additionally, three colonies known to be active between 1980 and 1994 were documented as inactive in 2006 to 2007, suggesting a narrowing of the breeding range (Holmes et al. 2009).

3.9.2.3 Threats

Important factors in the decline of the Newell's shearwater include loss of breeding habitat, predation by introduced mammalian predators, and historical hunting by humans (USFWS 1983). Other threats include collisions with power lines and other human-made structures, disorientation and fall out associated with light attraction, impacts to habitat associated with climate change, and decline in food resources due to overfishing (USFWS 2005).

Historically, breeding habitat has been lost due to periodic volcanic activity and other natural disasters, and the conversion of lowlands for agriculture and urban development. As breeding colonies are now mostly isolated from humans and at high elevations, the current threats to habitat are degradation by non-native ungulates such as feral pigs and goats (*Capra hirca*). These animals crush burrows, compact the soil, and facilitate the invasion of aggressive non-native plants such as strawberry guava and rose myrtle (*Rhodomyrtus tomentosa*) which displace native vegetation and significantly alter vegetation structure and substrate, reducing the suitability of breeding habitat (Troy and Holmes 2008, Holmes et al. 2009).

The 5-year review (USFWS 2011c) characterizes predation as a severe threat. Dog and cat depredation is particularly problematic in coastal areas when birds become grounded due to the effects of light attraction.

Urbanization and the resulting increase in night-time lighting have been associated with the attraction, disorientation, and grounding (fall out) of fledgling Newell's shearwaters on their first nocturnal flight to the ocean (USFWS 1983, 2011b). Disorientation exposes birds to increased risk of collision with power lines or structures, or increased risk of injury or death from impacts by vehicles or predation by non-native mammals, if they become grounded. More recently, widespread use of shielded lights has reduced but not eliminated this threat (USFWS 2011c). Adult Newell's shearwaters are not attracted to lights to the same degree as fledglings, but adults do collide with power lines (Ainley et al. 2001, Griesemer and Holmes 2011). The USFWS five-year status review for the Newell's shearwater also identifies wind farms as a new potential threat to this species

(USFWS 2011c); however, there have been no reported Newell's shearwater fatalities due to collision with turbines (D. Bruns, USFWS, pers. comm. 2013).

3.9.2.4 Presence on Oahu and Potential Occurrence within the Wind Farm Site and Mitigation Areas

No Newell's shearwater breeding colonies have been identified on Oahu, although suitable breeding habitat is present in the steep, uluhe fern-covered slopes of the Koolau and Waianae mountain ranges. Figure 3.9-1 displays potential suitable Newell's shearwater breeding habitat on Oahu based on topography, forest type, and elevation identified as important nesting colony parameters (Ainley et al. 1997)[3]. The recovery of downed Newell's shearwaters at interior locations on Oahu since the 1950s suggests the potential presence of a colony on the leeward slopes of the Koolau Range above Honolulu (Figure 3.9-1; Tetra Tech 2014c, Pyle and Pyle 2009).

The wind farm site itself, consisting of low elevation habitat dominated by aggressive non-native species, is not appropriate Newell's shearwater nesting habitat. However, Newell's shearwaters could fly through the wind farm site when moving between potential unknown nesting colonies in the Koolau or Waianae mountain ranges and the ocean.

Radar surveys conducted in 2012 and 2013 documented a low level of use by shearwater-like targets, although none of these targets were confirmed to be Newell's shearwaters (Sanzenbacher and Cooper 2013). Surveyors observed one unidentified petrel or shearwater during surveys in June 2013. Surveyors were only able to confirm that this unidentified bird was not a wedge-tailed shearwater (*Puffinus pacificus*), which is a non-listed species. The observed low passage rates are consistent with results of radar surveys conducted at the two operational Oahu wind farms (Kahuku and Kawailoa), which also did not confirm the presence of any Newell's shearwaters (Table 3.9-3; Day and Cooper 2008, Cooper et al. 2009).

Newell's shearwater habitat is potentially present at the Poamoho mitigation area based on topography, forest type, and elevation. Figure 3.9-1 displays potential breeding habitat on Oahu (Ainley et al. 1997).

[3] A 500 foot elevation contour identifies the lower expected limit of potential nesting colonies (Ainley et al. 1997). Based on habitat description from Ainley et al. (1997), suitable habitat includes slopes greater than or equal to 65 percent in native shrubland/sparse ohia, native wet cliff vegetation, open koa-ohia forest, open ohia forest, ohia forest, uncharacterized forest, uncharacterized shrubland (USGS 2011).

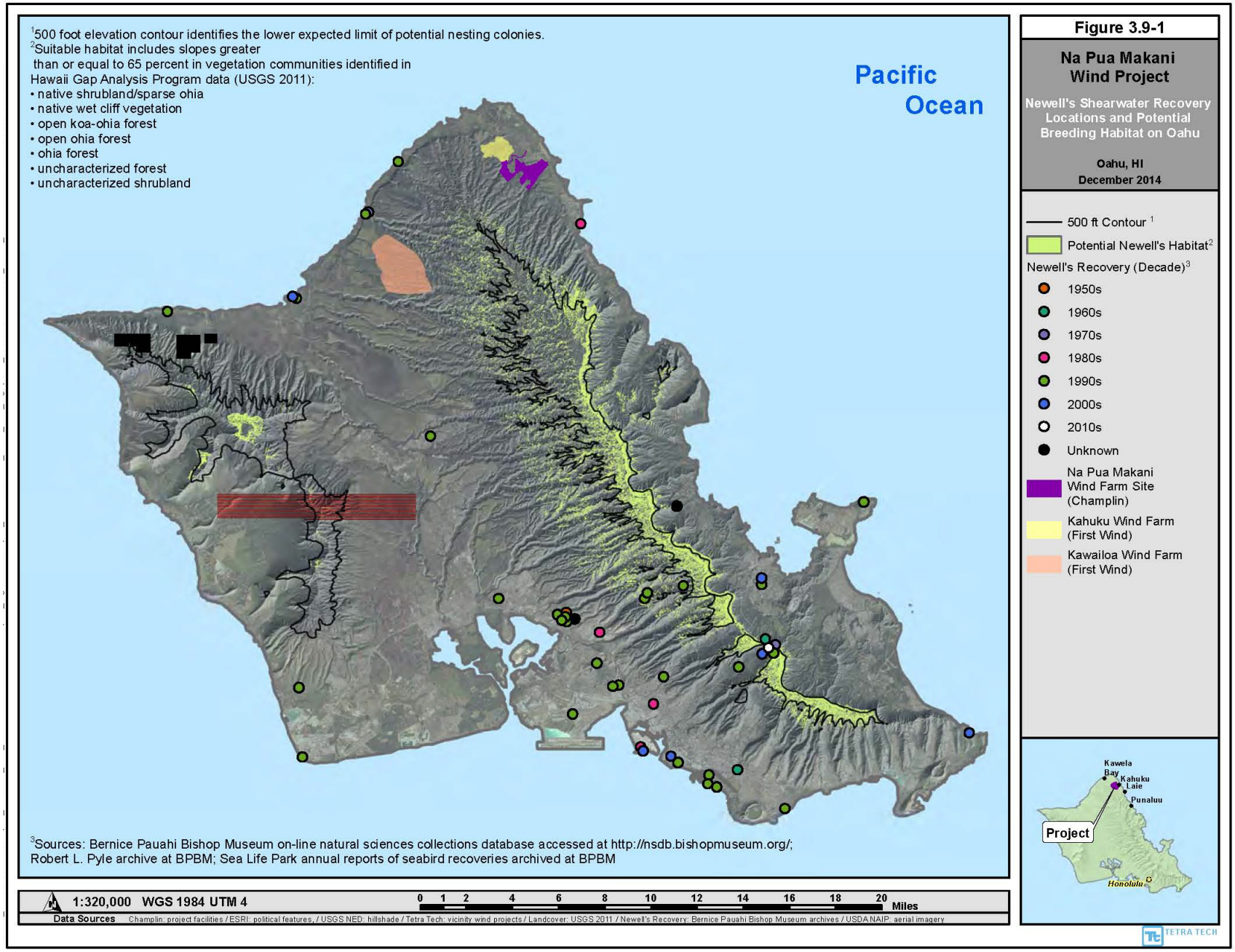

[1]500 foot elevation contour identifies the lower expected limit of potential nesting colonies.
[2]Suitable habitat includes slopes greater than or equal to 65 percent in vegetation communities identified in Hawaii Gap Analysis Program data (USGS 2011):
• native shrubland/sparse ohia
• native wet cliff vegetation
• open koa-ohia forest
• open ohia forest
• ohia forest
• uncharacterized forest
• uncharacterized shrubland
Pacific Ocean
[3]Sources: Bernice Pauahi Bishop Museum on-line natural sciences collections database accessed at http://nsdb.bishopmuseum.org/; Robert L. Pyle archive at BPBM; Sea Life Park annual reports of seabird recoveries archived at BPBM
Figure 3.9-1
Na Pua Makani Wind Project
Newell's Shearwater Recovery Locations and Potential Breeding Habitat on Oahu
Oahu, HI
December 2014
500 ft Contour [1]
Potential Newell's Habitat[2]
Newell's Recovery (Decade)[3]
1950s
1960s
1970s
1980s
1990s
2000s
2010s
Unknown
Na Pua Makani Wind Farm Site (Champlin)
Kahuku Wind Farm (First Wind)
Kawailoa Wind Farm (First Wind)
Kawela Bay
Kahuku
Laie
Punaluu
Project
Honolulu
1:320,000 WGS 1984 UTM 4
0 1 2 4 6 8 10 12 14 16 18 20 Miles
Data Sources Champlin: project facilities / ESRI: political features, / USGS NED: hillshade / Tetra Tech: vicinity wind projects / Landcover: USGS 2011 / Newell's Recovery: Bernice Pauahi Bishop Museum archives / USDA NAIP: aerial imagery
TETRA TECH

Table 3.9-3. Newell's Shearwater-Like Targets Flight Characteristics from Oahu Wind Energy Facilities[1]

Project	Season	Passage Rate (shearwater-like targets per hour)[1/]	Flight Height (mean ± SE agl)	Percent Below Maximum Blade Tip Height/Percent Below Met Tower Height[2/]
Kahuku	Summer (2008)	0.2 ± 0.1	None measured	NA
	Fall (2007)	0.3 ± 0.2	None measured	NA
Kawailoa	Summer (2009)	0.60 ± 0.07	Not reported	NA
	Fall (2009)	1.41 ± 0.15	Not reported	NA
Na Pua Makani	Spring (2013)	0.52 ± 0.09	482 ± 108 ft (147 ± 33 m)	71% / 29%
	Summer (2013)	0.34 ± 0.09	430 ± 66 ft (131 ± 20 m)	86% / 14%
	Fall (2012)	0.43 ± 0.09	600 ± 98 ft (183 ± 30 m)	80% / 10%
	Mean	Not calculated	499 ± 56 ft (152 ± 17 m)	79% / 17%

Sources: Sanzenbacher and Cooper 2013, Day and Cooper 2008, Cooper et al. 2009.
1/ Shearwater-like targets are birds that: fly >30 mph (48 kph), have directional flight toward potential breeding habitat, are not confirmed visually or aurally to be another species.
2/ Assumes maximum turbine tip height is 656 ft (200 m); met tower height 262 ft (80 m).
agl = above ground level

3.9.3 Hawaiian Goose

3.9.3.1 Status and Ecology

The Hawaiian goose is the only surviving endemic goose in the Hawaiian Islands. The Hawaiian goose, a year-round resident, typically resides on a single island and makes movements of up to 6 miles (10 kilometers). The Hawaiian goose, a sedentary and largely terrestrial species, nests from sea level to high elevations in a variety of habitats including beach strand, shrubland, grassland, and on old lava flows. At higher elevations, the species typically nests under native vegetation. At lower elevation sites, non-native plants often provide protective cover (Banko et al. 1999, Mitchell et al. 2005).

The Hawaiian goose typically nests between October and March. Clutch size is typically three to five eggs and the young are able to fly at approximately 10 to 12 weeks (USFWS 2004). Pair formation typically occurs in the second year of life and approximately 80 percent of all birds are paired in any given year, and 40 to 60 percent of these pairs will attempt to nest (Banko 1988, Banko et al 1999). Low elevation nests face high predation pressure, particularly where mongoose are present (Black and Banko 1994, USFWS 2004).

Studies show differences in survival and mortality of the Hawaiian goose based on sex, but factors associated with the release and subsequent management of captive-raised geese into the wild under differing conditions complicate interpretation of the results (Black et al. 1997). On the island of Hawaii, Hu (1998) found that annual mortality of wild females at least 4 years old was 13.2 percent, while annual mortality for wild males at least 3 years old was 11.3 percent. The differential survival of males versus females appears to be true in released birds, as well, resulting in males

outnumbering females among birds older than 1 year old in populations on Hawaii, Maui, and Kauai (Banko et al. 1999).

3.9.3.2 Distribution, Abundance, and Population Trends

Fossil evidence suggests that the endemic Hawaiian goose occurred on all of the main Hawaiian Islands, but populations on all but the island of Hawaii were extirpated by the early 1900s. As a result of recovery and management efforts initiated beginning in the 1950s, populations have recovered from a low of 30 birds on the island of Hawaii to a statewide population of approximately 2,000 birds (Banko et al. 1999, USFWS 2004). Populations are increasing on Kauai and Molokai, while the populations on Hawaii and Maui populations are stable (HNP 2009, Pyle and Pyle 2009, USFWS 2011b). Birds typically remain on the islands on which they were hatched, but birds may range over larger areas following the fledging of young. A recent effort to translocate young Hawaiian geese from Kauai to Hawaii has resulted in the occurrence of birds in unexpected locations, including on Oahu. Distributions of the birds are strongly influenced by the locations of release sites of captive-bred birds (Banko et al. 1999).

Management actions have established populations on Kauai, Maui, and Molokai and expanded the range of the population on Hawaii, but the distribution of the birds is strongly influenced by the locations of release sites of captive-bred birds (Banko et al. 1999). Birds typically remain on the islands on which they were hatched, but birds may range over larger areas following the fledging of young. A recent effort to translocate Hawaiian geese from Kauai to Hawaii and Maui, however, has resulted in the unexpected occurrence of birds on Oahu, where it is suspected the species was once resident, but for which there is no historical record (USFWS 2004).

3.9.3.3 Threats

The 2004 draft recovery plan for Hawaiian goose (USFWS 2004) lists predation by non-native mammals as the greatest factor limiting Hawaiian goose populations. Feral cats, dogs, rats, and mongoose are each likely to be main predators on Oahu, where the few birds present are close to human populations. Other threats to the species include lack of access to seasonally important lowland habitats, insufficient nutritional resources for breeding females and for goslings, human-caused disturbance and mortality (e.g., road mortality), behavioral problems related to captive propagation, and inbreeding depression (USFWS 2011b).

3.9.3.4 Presence on Oahu and Potential Occurrence within the Wind Farm Site and Mitigation Areas

The Hawaiian goose is a recent arrival on Oahu, with a pair arriving during the winter of 2014 after dispersing from their translocation site on Hawaii. This pair bred and produced three goslings in 2014 (A. Nadig, USFWS, pers. comm. March 2014). As translocation efforts are expected to continue until 2016, the Hawaiian goose population on Oahu may grow as a result of additional translocated birds arriving as well as on-island reproduction. Habitats on Oahu that are most likely to support the Hawaiian goose are lowland areas managed as golf courses, habitat for Hawaiian waterbirds, and grazed agricultural areas. In addition, areas where vegetation is mowed can be attractive to the

Hawaiian goose, and these areas include resorts, playing fields, housing developments, and could include areas maintained beneath operational wind turbines.

Thus, given the proximity of the wind farm site to recently occupied habitat, it is possible that the Hawaiian goose will use the wind farm site to forage and possibly to nest during the ITL and ITP permit term. In addition to the potential use of the wind farm site, the Hawaiian goose has the potential to fly through the wind farm site in transit between foraging areas. The Hawaiian goose arrived on Oahu after the completion of avian point count surveys, so none were detected during Project surveys. However, given the potential growth of the population during the Project permit term, it is possible that in the future, flocks of Hawaiian geese will occasionally fly through the wind farm site and may forage within maintained areas under the wind turbines.

3.9.4 Waterbirds

Four State- and Federally-listed threatened and endangered waterbirds, the Hawaiian stilt, the Hawaiian coot, the Hawaiian moorhen, and the Hawaiian duck have the potential to occur in the wind farm site. All four of these waterbirds, with the exception of the threat of hybridization with feral mallards (*Anas platyrhynchos*) for the Hawaiian duck, face the same suite of threats; thus, to avoid repetition, threats to these three species are discussed together.

3.9.4.1 Hawaiian Duck

Status and Ecology

The Hawaiian duck is a small dabbling duck endemic to the Hawaiian Islands. The Hawaiian duck is similar in appearance to the much more common and widespread mallard but is genetically distinct and differs in size, plumage, and behavior. The Hawaiian duck is about 20 to 30 percent smaller than the mallard, has a deeper, brown plumage and dark tail, and is more shy and secretive.

Hawaiian ducks are found from sea level to 9,843 feet (3,000 meters) in elevation and utilize a variety of wetland habitats, including freshwater marshes, flooded grasslands, coastal ponds, streams, montane pools, forest swamplands, agricultural and artificial wetlands, and irrigation ditches (USFWS 2011e). Ephemeral wetlands are important habitat for Hawaiian duck foraging (Engilis et al. 2002). Hawaiian ducks are opportunistic feeders, eating snails, insect larvae, earthworms, tadpoles, crayfish, mosquito larvae, mosquito fish (*Gambusia affinis*), aquatic invertebrates, grass seeds, rice, green algae, and seeds and leaf parts of wetland plants (Swedberg 1967, USFWS 2011e).

Hawaiian ducks breed year-round, although the majority of nesting records are from March through June (Giffin 1983). Nesting occurs on the ground near water, but little else is known of specific Hawaiian duck nesting habits (USFWS 2011e). Clutch size ranges from 2 to 10 eggs and incubation lasts approximately 28 days, with most chicks hatching in April through June (Swedberg 1967). Only females incubate eggs, and they abandon nests quickly if disturbed (Giffin 1983). Young leave the nest as soon as the entire clutch has hatched; however, young remain with the female after leaving the nest and have been observed with the female parent after developing flight at

approximately 65 days old (Engilis et al. 2002). The species breeds each year and is capable of double-clutching, at least in captivity (DOFAW unpublished data as cited in Engilis et al. 2002).

Hawaiian ducks are non-migratory but exhibit some seasonal, altitudinal, and inter-island movements; however, these movements are not well understood (Engilis et al. 2002). The species may use different habitats for nesting, feeding, and resting, and may move seasonally among areas (Engilis and Pratt 1993, Gee 2007). These movements between the islands may be driven by food resources and rainfall. There is no information on the lifespan and survivorship from wild or captive flocks of Hawaiian ducks (Engilis et al. 2002).

Distribution, Abundance, and Population Trends

Hawaiian ducks historically occurred on all the main Hawaiian Islands except Lanai and Kahoolawe (USFWS 2011e). By the 1960s, Hawaiian ducks were found in small numbers only on Kauai and probably on Niihau (USFWS 2011e). From the late 1950s through the early 1990s, Hawaiian ducks were reintroduced to Oahu, Maui, and Hawaii (Paton 1981, Bostwick 1982, Engilis et al. 2002) through captive propagation and release. Populations of Hawaiian ducks still exist on Kauai, Niihau, Maui, and Hawaii, but the species is strongly affected by hybridization with feral mallards on Oahu and Maui. Very few pure Hawaiian ducks persist on Maui (USFWS 2011e), and genetic studies show that the Oahu Hawaiian duck population is heavily compromised through hybridization with feral mallards, and few ducks with predominantly Hawaiian duck characteristics remain (Browne et al. 1993, Fowler et al. 2009, USFWS 2011d; A. Amlin, DOFAW, pers. comm. 2014).

Winter biannual waterbird surveys estimated the Hawaiian duck population at 2,200 birds, including 2,000 on Kauai and 200 on Hawaii as well as approximately 350 and 50 Hawaiian duck-like birds (presumed hybrids) on Oahu and Maui, respectively (Engilis et al. 2002). Based on the biannual waterbird counts, the Hawaiian duck population appears to be increasing overall, due to increases in the population on Kauai; pure Hawaiian duck populations are declining on other islands (USFWS 2011e). However, population trends may be inaccurate due to incomplete survey coverage and difficulty in distinguishing Hawaiian ducks from hybrids.

Presence on Oahu and Potential for Occurrence in the Wind Farm Site and Mitigation Areas

Hawaiian ducks are believed to have been extirpated on Oahu by the 1960s and the population of Hawaiian duck-like birds on Oahu is comprised of mallard-Hawaiian duck hybrids (USFWS 2011e). Although pure Hawaiian ducks were released on Oahu between 1968 and 1982 (Engilis and Pratt 1993), feral mallards were not removed from the reintroduction sites prior to the releases, resulting in extensive hybridization and genetic introgression of mallards into the reestablished Hawaiian duck population on Oahu (USFWS 2011e).

The Recovery Plan for Hawaiian Waterbirds identifies the removal of feral mallards on all islands as a critical element in the recovery of the species (USFWS 2011e). In addition to feral mallard management, reintroduction is critical for development of a population of pure Hawaiian ducks on Oahu. The Recovery Plan for Hawaiian Waterbirds (USFWS 2011e) prioritizes the establishment of self-sustaining populations of Hawaiian ducks on Maui and/or Molokai; however, DOFAW has also

initiated planning of Hawaiian duck recovery efforts that includes populations on Oahu (A. Amlin, DOFAW, pers. comm. 2014). Therefore, Hawaiian ducks may occur in the Project vicinity during the ITL and ITP permit term and are likely to occupy habitats currently used by hybrid individuals.

During biannual winter counts from 1999 – 2003, Hawaiian duck-like birds (presumed hybrids) were reported in low numbers (less than 15) at the following wetlands within 5 miles (8 kilometers) of the Project: James Campbell NWR (core wetland), Kahuku aquaculture ponds (supporting wetland), Laie wetlands (supporting wetland), the Kuilima Wastewater Treatment Plant at Turtle Bay (supporting wetland), and the Turtle Bay Golf Course Ponds (USFWS 2011e). These areas represent potential areas of future Hawaiian duck occupancy.

Assuming reintroduction is successful, suitable habitat for Hawaiian ducks in the wind farm site is very limited. A small stretch of the Malaekahana Stream along the southern border of the Project Area could be suitable habitat for Hawaiian ducks; however, the abundance of high quality habitat at managed wetland areas outside of the wind farm site would minimize the importance of this area. Therefore, if Hawaiian ducks were to occur in the wind farm site, their occurrence would be primarily limited to their transit of the area when flying between wetland habitats outside of the wind farm site.

No Hawaiian duck-like birds were observed within the wind farm site during 20 avian point count surveys conducted over a 1-year period (Tetra Tech 2014b). Surveyors recorded 61 Hawaiian duck-mallard hybrid detections in wetland areas adjacent to the Project during these surveys. While these hybrids are not listed by the State or Federal government, their presence indicates the suitability of habitat in the vicinity of the Project and the potential future use of wetland areas in the vicinity of the Project by Hawaiian ducks, should they be successfully reintroduced to Oahu.

3.9.4.2 Hawaiian Stilt

Status and Ecology

The Hawaiian stilt is an endemic subspecies of the black-necked stilt, a moderately sized wading bird. Hawaiian stilts are associated with a variety of aquatic habitats, primarily within the lower elevation coastal plains of Hawaii, but are limited to habitats with a water depth of less than 9 inches (24 centimeters), and sparse low-growing vegetation or exposed tidal mudflats (Robinson et al. 1999, USFWS 2011e). Nesting generally occurs from mid-February through August on freshly exposed mudflats interspersed with low-growing vegetation (USFWS 2011e). Nesting season varies among years, possibly depending on water levels. Hawaiian stilts generally lay 3 to 4 eggs in a simple scrape on the ground adjacent to freshwater or brackish ponds (USFWS 2011e, Shallenberger 1977). Eggs are incubated for approximately 24 days (Coleman 1981 as cited in USFWS 2011e, Chang 1990). Chicks leave the nest within 24 hours of hatching, but remain with both parents for several months after hatching (Coleman 1981 as cited in USFWS 2011e).

Hawaiian stilts are opportunistic feeders, eating a wide variety of invertebrates and other aquatic organisms that occur in shallow water and mudflats, including water boatmen, beetles, polychaete worms, small crabs, fish, and possibly brine fly larvae (Shallenberger 1977, Robinson et al. 1999,

USFWS 2011e). Hawaiian stilts typically feed in shallow flooded wetlands that are ephemeral in nature and have been documented moving within and between islands in order to exploit these seasonal food resources (Ueoka 1979 as cited in USFWS 2011e; Engilis and Pratt 1993; Reed et al. 1994, 1998b).

Little information on Hawaiian stilt life span is reported in recent accounts of life history information (Reed et al. 1998a, Robinson et al. 1999, USFWS 2011e), but Hawaiian stilts have been documented to survive at least 15 years in the wild and captivity.

Distribution, Abundance, and Population Trends

The Hawaiian stilt is found on all of the main Hawaiian Islands except Kahoolawe and is non-migratory except for seasonal movements between adjacent islands (Reed et al. 1994, 1998b; USFWS 2011e). Long-term census data show year-to-year variability in the number of Hawaiian stilts observed but indicate statewide populations have been relatively stable or slightly increasing through the late 1980s (Engilis and Pratt 1993, Reed and Oring 1993). Bi-annual Hawaiian waterbird surveys from 1998 through 2007 documented an average Hawaiian stilt population of 1,484 birds, ranging from approximately 1,100 to 2,100 birds (DOFAW 1976 – 2008 as cited in USFWS 2011e). The annual variability is at least partially a result of rainfall patterns and reproductive success (Engilis and Pratt 1993). Available habitat is thought to limit the carrying capacity for Hawaiian stilts.

Presence on Oahu and Potential Occurrence within the Wind Farm Site and Mitigation Areas

Oahu, with approximately 450 to 700 birds counted on the island per year between 1976 and 2008, supports the largest number of Hawaiian stilts in the Hawaiian Islands accounting for 35 to 50 percent of the state's population (DOFAW 1976 – 2008 as cited in USFWS 2011e). On Oahu, Hawaiian stilts can be found in large concentrations at James Campbell NWR, the Kahuku aquaculture ponds, and the Pearl Harbor National Wildlife Refuge (USFWS 2011e). Both the James Campbell NWR and Kahuku aquaculture ponds are within 5 miles (8 kilometers) of the wind farm site, and are core and supporting wetlands for Hawaiian waterbirds, respectively. Core wetlands are "areas that provide habitat essential for survival and recovery, supporting large populations of Hawaiian waterbirds," and supporting wetlands are "areas that provide habitat important for survival and recovery, but may support only smaller waterbird populations or may be occupied only seasonally" (USFWS 2011e). Based on winter counts of adults from 1999 – 2003, other wetlands within 5 miles (8 kilometers) of the Project where stilts have been observed include the Kahuku airstrip ponds, Coconut Grove Marsh, the Turtle Bay Golf Course Ponds, and the Kuilima Wastewater Treatment Plant at Turtle Bay (USFWS 2011e).

There is no suitable habitat for Hawaiian stilts in the wind farm site. Stilts require wetlands, marshes, or ponds, which are not present in the wind farm site. Extreme rain events could result in flooding in low-lying areas, which would offer temporary habitat for Hawaiian stilts, but such events would create an abundance of available habitat throughout the vicinity of the Project; so stilts would still not likely use the wind farm site. Therefore, if Hawaiian stilts occur in the wind

farm site, this occurrence would be primarily limited to their transit of the area when flying between wetland habitats outside of the wind farm site.

No Hawaiian stilts were observed within the wind farm site during avian point count surveys conducted in the wind farm site (Tetra Tech 2014b). Surveyors recorded forty Hawaiian stilt detections in wetland areas adjacent to the Project during avian point count surveys (Tetra Tech 2014b). Reed et al. (1998b) studied movement patterns of Hawaiian stilts at the James Campbell NWR and noted that few individuals moved from the James Campbell NWR to wetlands outside of the refuge and the adjacent shrimp ponds. Based on the known biology of the species and results of avian point counts, the frequency of Hawaiian stilts transiting the wind farm site is likely to be low.

Hawaiian stilts require habitats with wetlands and marshes. In addition to the James Campbell NWR Mitigation Area, the Hamakua Marsh Mitigation Area is managed as breeding habitat for Hawaiian stilts, Hawaiian coots, and Hawaiian moorhens and may also provide potential habitat for migrant waterfowl and shorebirds.

3.9.4.3 Hawaiian Coot

Status and Ecology

The Hawaiian coot is a non-migratory species endemic to the Hawaiian Islands. Previously considered a subspecies of the American coot (*Fulica americana*), and originally listed under the ESA as such, the Hawaiian coot is now regarded as a distinct species (AOU 1998; USFWS 2011e).

Hawaiian coots are associated with lowland wetland habitats that have emergent vegetation interspersed with open water, which typically occur along the coastal plains, from sea level up to 850 feet (260 meters; Pratt and Brisbin 2002; USFWS 2011e). Hawaiian coots are generalist feeders, consuming seeds and leaves of aquatic plants, snails, crustaceans, and aquatic or terrestrial insects, tadpoles, and small fish (Schwartz and Schwartz 1949 as cited in USFWS 2011e). They forage in mud, sand, or near the surface of the water, and they can dive up to 48 inches (120 centimeters) below the water surface (USFWS 2011e).

Hawaiian coots nest on open freshwater and brackish ponds, flooded taro fields, shallow reservoirs, and irrigation ditches (Shallenberger 1977; Pratt and Brisbin 2002). They construct floating or semi-floating nests of aquatic vegetation in open water or at the outer margins of emergent vegetation around relatively deep bodies of water, respectively (Byrd et al. 1985 as cited in USFWS 2011e; Pratt and Brisbin 2002). Although previously thought to breed from early spring through fall, Hawaiian coots are now thought to breed opportunistically in response to rainfall, as active nests have been found year-round, but peak breeding occurs March – September (Shallenberger 1977; Byrd et al. 1985 as cited in USFWS 2011e; Pratt and Brisbin 2002). Clutch size averages five eggs and chicks are able to swim as soon as their down has dried but are attended by parents for up to several months after hatching (Shallenberger 1977, Byrd et al. 1985 as cited in USFWS 2011e, Pratt and Brisbin 2002). There is limited information on Hawaiian coot life history parameters and survivorship. Chang (1990) calculated a 28 percent fledging success rate for Hawaiian coots.

Hawaiian coots are non-migratory, but they exhibit pronounced irregular movements based on rainfall (Pratt and Brisbin 2002). Movements are associated with a reduction in water levels and food availability (USFWS 2011e). Hawaiian coots commonly wander and larger water bodies of water may have large concentrations of birds during the non-breeding season (Pratt and Brisbin 2002). As movements are associated with fall and winter rain events, which occur after the peak breeding season, movements between wetlands are most likely to occur after independence of young.

Distribution, Abundance, and Population Trends

Hawaiian coots historically occurred on all the main Hawaiian Islands except Lanai and Kahoolawe, as these islands lacked suitable wetland habitat (USFWS 2011e). Hawaiian coots are now also present on Lanai due to the creation of artificial wetlands or wetland-like features such as water treatment sites. Hawaiian coots occur in the greatest numbers on Oahu, Maui, and Kauai (Shallenberger 1977) and were likely once fairly common in large natural marshes and ponds on these islands.

Engilis and Pratt (1993) estimated a statewide Hawaiian coot population of 2,000 to 4,000 birds. Winter biannual waterbird surveys from 1997 through 2006 indicated average Hawaiian coot populations of approximately 2,000 birds (DOFAW 1976 – 2008 as cited in USFWS 2011e). These biannual counts indicate short-term population fluctuations and a slight long-term increase in population between 1976 and 2008 (DOFAW 1976 – 2008 as cited in USFWS 2011e). As Hawaiian coots disperse readily and exploit seasonally flooded wetlands, their populations naturally fluctuate according to climatic and hydrologic conditions (USFWS 2011e).

Presence on Oahu and Potential Occurrence within the Wind Farm Site and Mitigation Areas

During 1995 – 2007, the Hawaiian coot population on Oahu has fluctuated between approximately 500 and 1,000 birds (DOFAW 1976 – 2008 as cited in USFWS 2011e). Large concentrations of Hawaiian coots have been observed at the James Campbell NWR (core wetland), the Kahuku aquaculture ponds (supporting wetland), the Kuilima wastewater treatment plant (supporting wetland), the Ka`elepulu Pond in Kailua, the Pearl Harbor National Wildlife Refuge, and the Hawaii Prince Golf Course (USFWS 2011e). James Campbell NWR, Kahuku aquaculture ponds, and Kuilima wastewater treatment plant are within 5 miles (8 kilometers) of the wind farm site. Based on winter counts of adults from 1999 – 2003, other wetlands within 5 miles (8 kilometers) of the wind farm site where Hawaiian coots have been observed in smaller numbers include Coconut Grove Marsh, Laie wetlands (supporting wetland), and the Turtle Bay golf course ponds.

There is no suitable habitat for Hawaiian coots in the wind farm site. Extreme rain events could result in flooding of low-lying areas in the wind farm site, which would offer temporary habitat for Hawaiian coots ; however, such events would create an abundance of available habitat throughout the general Project vicinity; thus, Hawaiian coots would still not likely use the wind farm site specifically. Therefore, occurrence of Hawaiian coots in the wind farm site would primarily be limited to their transit of the area when flying between wetland habitats outside of the wind farm site.

No Hawaiian coots were observed within the wind farm site during Project avian point count surveys (Tetra Tech 2014b). Surveyors recorded 14 Hawaiian coot detections during avian point count surveys in wetland areas adjacent to the Project (Tetra Tech 2014b). Based on the known biology of the species and the results of avian point counts, the frequency of Hawaiian coots transiting the wind farm site is likely to be low.

Hawaiian coots inhabit habitats with wetlands and marshes. In addition to the James Campbell NWR Mitigation Area, the Hamakua Marsh Mitigation Area is managed as breeding habitat for Hawaiian stilts, Hawaiian coots, and Hawaiian moorhens and may also provide potential habitat for migrant waterfowl and shorebirds.

3.9.4.4 Hawaiian Moorhen

Status and Ecology

The Hawaiian moorhen is a non-migratory subspecies endemic to the Hawaiian Islands. The Hawaiian moorhen is predominantly associated with lowland wetland habitats that have emergent vegetation interspersed with open water including: natural ponds, marshes, streams, springs or seeps, lagoons, grazed wet meadows, taro and lotus fields, shrimp aquaculture ponds, reservoirs, sedimentation basins, sewage ponds, and drainage ditches (Shallenberger 1977, Nagata 1983, Banko 1987, Bannor and Kiviat 2002). They appear to have a preference for freshwater habitat over brackish water (Engilis and Pratt 1993, USFWS 2011e). The Hawaiian moorhen requires "relatively dense marginal vegetation" near open water (Berger 1981), floating or barely emergent mats of vegetation, and water depth less than 3 feet (1 meter).

Little specific information on the diet of the Hawaiian moorhen is available; however, they are apparently opportunistic feeders, and their diet likely varies by habitat (Shallenberger 1977). This diet includes algae, aquatic insects, mollusks, snails, seeds, other plant parts (Schwartz and Schwartz 1949 as cited in USFWS 2011e, Telfer [unpubl. data] as cited in USFWS 2011e). Although the Hawaiian moorhen typically forages in and along areas of dense vegetation, they also forage on open ground (Bannor and Kiviat 2002, USFWS 2011e).

Hawaiian moorhens typically nest over shallow water (less than 24 inches [60 centimeters] deep) along emergent vegetation edges and also in wet meadows or on solid ground in the presence of tall vegetative cover (USFWS 2011e). Hawaiian moorhens nest year round, but breeding activity is concentrated between March and August and is influenced by both vegetation height and water levels (Shallenberger 1977, Byrd and Zeillemaker 1981 as cited in USFWS 2011e, Chang 1990). Clutch size ranged from 4.9 to 5.6 eggs in two studies (Chang 1990, Byrd and Zeillemaker 1981 as cited in USFWS 2011e) and average brood size observed during a study on Oahu was 4.4 chicks per brood (Smith and Polhemus 2003 as cited in USFWS 2011e).

Hawaiian moorhens are non-migratory and generally sedentary; however, they readily disperse in spring, presumably to breed (Nagata 1983). As with other Hawaiian waterbirds, dispersal may be related to the timing of wet and dry periods (Engilis and Pratt 1993) with dispersal occurring with the creation of new seasonal habitat during periods of flooding. Inter-island movement has not

been documented in the Hawaiian moorhen (USFWS 2011e). Given the short duration of dependence, sedentary nature of the species, and timing of dispersal events, Hawaiian moorhens are unlikely to move between wetland areas when caring for dependent young. There is no information on the lifespan and annual survival of the Hawaiian moorhen (Bannor and Kiviat 2002, USFWS 2011e).

Distribution, Abundance, and Population Trends

The Hawaiian moorhen historically occurred on all of the main Hawaiian Islands except Lanai (likely due to a lack of wetland habitat) and probably Niihau (Munro 1960, Banko 1987). From the late 19th to the mid-20th centuries, moorhen populations on all but Kauai and Oahu were extirpated. Reintroduction efforts on the islands of Maui, Molokai, and Hawaii all failed, although there are unsubstantiated reports of moorhens from the islands of Hawaii and Maui from the late 20th century (USFWS 2011e).

Given the species' preference for densely-vegetated wetlands, DOFAW biannual waterbird surveys provide only a rough measurement of recent population trends (DOFAW 1976 – 2008 as cited in USFWS 2011e). While other approaches have been explored to develop more accurate estimates, none have been implemented (USFWS 2011e). Statewide population count estimates have been stable during the last decade (1998 – 2007) with an average count of 287 birds (DOFAW 1976 – 2008 as cited in USFWS 2011e).

Presence on Oahu and Potential Occurrence within the Wind Farm Site and Mitigation Areas

Based on results of biannual waterbird surveys, approximately half of the Hawaiian moorhen population resides on Oahu (USFWS 2011e). Although widely distributed on Oahu, the species is most common on the northern and eastern coasts. Areas supporting the largest populations include: Dillingham Ranch large pond; Amorient Aquafarm (part of Kahuku Aquaculture Farms); James Campbell NWR, Ki`i Unit (core wetland); and Waimea Valley. Amorient Aquafarm and James Campbell NWR are within 5 miles (8 kilometers) of the Project. Based on winter counts of adults from 1999 – 2003, other wetlands within 5 miles (8 kilometers) of the wind farm site where Hawaiian moorhens have been observed in smaller numbers include Coconut Grove Marsh, Laie wetlands (supporting wetland), Kahuku Prawn Farm (part of Kahuku Aquaculture Farms; supporting wetland), Punahoolapa Marsh, and the Turtle Bay golf course ponds.

There is no suitable habitat for Hawaiian moorhens in the wind farm site. Extreme rain events could result in flooding in low-lying portions of the wind farm site, which would offer temporary habitat for Hawaiian moorhens. However, such events would create an abundance of available habitat throughout the general Project vicinity and; thus, Hawaiian moorhens would still not likely use the wind farm site specifically. Therefore, occurrence of Hawaiian moorhens in the wind farm site would primarily be limited to their transit of the area when flying between wetland habitats outside of the wind farm site.

No Hawaiian moorhens were observed within the wind farm site during avian point count surveys (Tetra Tech 2014b). Surveyors recorded 16 Hawaiian moorhen detections during avian point count

surveys in wetland areas adjacent to the Project (Tetra Tech 2014b). Based on the known biology of the species and the results of avian point counts, the frequency of Hawaiian moorhens transiting the wind farm site is likely to be low.

Hawaiian moorhens utilize habitats with wetlands and marshes. In addition to the James Campbell NWR Mitigation Area, the Hamakua Marsh Mitigation Area is managed as breeding habitat for Hawaiian stilts, Hawaiian coots, and Hawaiian moorhens and may also provide potential habitat for migrant waterfowl and shorebirds.

3.9.4.5 Threats to Waterbirds

Historically, the greatest limiting factors for Hawaiian waterbirds have included predation by non-native introduced animals and loss and degradation of wetland habitats (USFWS 2011e). Other threats to Hawaiian waterbirds have included hunting pressure, disease, and environmental contamination. Currently, predation by introduced animals and avian botulism may be the greatest threats to the Hawaiian stilt, Hawaiian coot, and Hawaiian moorhen (USFWS 2011e).

Predation is a major cause of waterbird mortality and nest failure (USFWS 2011e). Adult waterbirds are occasionally taken, but most depredation is of eggs and young (USFWS 2011e). Introduced mammals such as mongooses, cats, dogs, and rats are the primary predators, but depredation by both native and introduced birds (e.g., black-crowned night-heron, cattle egrets [*Bubulcus ibis*] and barn owls), introduced fish, and American bullfrogs (*Rana catesbeiana*) has also been documented (Shallenberger 1977, Berger 1981, Robinson et al. 1999, Brisbin et al. 2002).

Significant loss of wetland habitat, resulting from the conversion of land to agriculture and urbanization of lowland coastal areas, has contributed to the decline of all four waterbird species (USFWS 2011e). Additionally, waterbird habitat has been degraded through modification of hydrologic regimes, alteration of habitat structure and vegetation composition by invasive non-native plants, loss of riparian vegetation, and reductions in water quality due to grazing (USFWS 2011e). Currently, less than 70 percent of the coastal plain wetlands historically present in Hawaii remains (Dahl 1990 as cited in USFWS 2011e).

Although collision is not listed as a current threat (USFWS 2011e), waterbirds have been identified as a wildlife group at risk from collisions or other interactions with wind turbines (Erickson et al. 2001; Drewitt and Langston 2008; Arnett et al. 2007, 2008). Waterbird fatalities, however, are not typically documented in high numbers at operational wind energy facilities despite high mean use in some locations (Erickson et al. 2002, Jain 2005, Johnson and Erickson 2011). Additionally, waterbirds, shorebirds, and seabirds have shown strong avoidance of turbines at coastal wind energy facilities (Larsen and Guillemette 2007; Day et al. 2005; Desholm and Kahlert 2005; Kingsley and Whittam 2001, 2005).

3.9.5 Hawaiian Short-eared Owl

3.9.5.1 Status and Ecology

The Hawaiian short-eared owl is an endemic subspecies of the short-eared owl. It likely colonized the islands following the arrival of Polynesians due to the concurrent introduction of the Polynesian rat (*Rattus exulans*), common prey for the Hawaiian short-eared owl (USFWS 2010).

Hawaiian short-eared owls are most common in open habitats including grasslands, shrublands, and montane parklands; however, they use a broad spectrum of other habitats including wetlands, wet and dry forests, and urban areas (Mitchell et al. 2005). The Hawaiian short-eared owl has been found from sea level to 8,000 feet amsl (2,450 meters). Unlike its mainland counterpart, the Hawaiian subspecies is largely diurnal (Mitchell et al. 2005).

Little is known about the breeding biology of the subspecies, but nests have been found year round (USFWS 2010). Young remain dependent on their parents for approximately 2 months. Fledging success rates are unknown in Hawaiian short-eared owl and variable in other populations. Age at first breeding is unknown in the Hawaiian short-eared owl, but based on anecdotal information the widespread species appears to nest beginning at 1 year of age (Wiggins et al. 2006). Life span and annual survival rates of the Hawaiian short-eared owl is not known.

Hawaiian short-eared owls primarily consume small mammals, but their diet includes a variety of bird species, and insects (Snetsinger et al. 1994, Mostello 1996, USFWS 2010). Hawaiian short-eared owls forage in a variety of habitats, and their prey likely varies with the habitat.

3.9.5.2 Distribution, Abundance, and Population Trends

Hawaiian short-eared owls historically occurred on all of the southeastern Hawaiian Islands including adjacent islets (Pyle and Pyle 2009). They are considered sacred by native Hawaiians, but early Caucasian settlers killed them, and populations showed declined by the late 1800s (Perkins 1895). Klavitter (2009), in a summary of their natural history, noted substantial population size decreases on all occupied islands, especially Oahu. However, Pyle and Pyle (2009) suggest all populations have stabilized in the 2000s, although the populations show episodic peaks and "die-offs."

3.9.5.3 Threats

Hawaiian short-eared owls are susceptible to many of the same factors that threaten other native Hawaiian birds, including: loss and degradation of habitat, predation by introduced mammals, and disease, as well as pesticide poisoning, food shortages, and vehicle collisions (Mitchell et al. 2005). Hawaiian short-eared owls persist in modified landscapes and at elevations where extensive exposure to avian malaria (*Plasmodium relictum*) and avian pox (*Poxvirus avium*) is certain. This suggests an ability to overcome some of these threats. When foraging, short-eared owls typically fly low over open areas, often at dusk or dawn. When these areas are traversed by roads, the species may be pre-disposed to collisions with vehicles.

3.9.5.4 Presence on Oahu and Potential Occurrence within the Wind Farm Site and Mitigation Areas

Hawaiian short-eared owls are rare on Oahu (Pyle and Pyle 2009, Klavitter 2009). While none were detected during biological surveys for the Project (Hobdy 2013a, Sanzenbacher and Cooper 2013, Tetra Tech 2014b), the species was detected once during pre-construction avian point count surveys and once during pre-construction radar surveys for the neighboring Kahuku Wind Project (Day and Cooper 2008, SWCA 2010). Habitat within the wind farm site is similar to that at the Kahuku Wind Project and is consistent with the habitat used by Hawaiian short-eared owls throughout the Hawaiian Islands. However, given the diurnal and crepuscular activity pattern exhibited by this species and the few records of use in the vicinity, the likelihood of the species breeding in the area is low, and for this reason in combination with the lack of detection during Project biological surveys, the species is assumed to occur as an irregular visitor to the wind farm site.

Hawaiian short-eared owls are known to use a broad spectrum of habitats, including wetlands, wet and dry forests and urban areas, although most commonly found in open habitats. The Poamoho Mitigation area is predominantly forested, while the Hamakua Marsh is a wetland. The likelihood of the species breeding at the Hamakua Marsh mitigation areas is low based on the same reasoning as noted above for the wind farm site.

3.10 Socioeconomic Resources

The primary analysis area for the socioeconomic analysis is the Koolau Loa District with emphasis on the individual communities in the Project vicinity. Koolau Loa is the northeastern district of Oahu, extending from Waimea Bay on the north shore to Kaaawa on the east coast. One of the mitigation areas (Nene Mitigation Area) is also located in the Koolau Loa District. The other two mitigation areas, the Poamoho Ridge and Hamakua Marsh mitigation areas, are located in the Wahiawa District and the Koolaupoko District, respectively. These two districts form a secondary area of analysis for the socioeconomics assessment.

Data are presented for the Census County Divisions (CCDs) and Census Designated Places (CDPs) in the primary and secondary analysis areas. CCDs are county subdivisions that are delineated by the U.S. Census Bureau, in cooperation with State and local officials, for the purposes of presenting statistical data. CDPs are the statistical counterparts of incorporated places delineated for settled concentrations of population that are identifiable by name but are not legally incorporated under the laws of the state in which they are located. There are seven districts on the island of Oahu, including the Koolau Loa District. These districts are identified as CCDs by the U.S. Census. The U.S. Census identifies seven communities (CDPs) in the Koolau Loa District: Hauula, Kaaawa, Kahuku, Kawela Bay, Laie, Punaluu, and Pupukea. The community of Kahuku is nearest to the proposed Na Pua Makani Wind Project. Data for the City and County of Honolulu and the State of Hawaii are also provided for comparison, where appropriate. The City and County of Honolulu (referred to as Honolulu County below) includes the city of Honolulu and the rest of the island of Oahu.

3.10.1 Population

An estimated total of 20,111 people lived in the Koolau Loa District in 2012 (Table 3.10-1). The majority of the resident population in Honolulu County lives in the District of Honolulu. The Koolau Loa District is relatively sparsely populated accounting for just 1.5 percent of the total population in Honolulu County. Population increased in the district from 2000 to 2012, but at a slower rate than the State and Honolulu County averages, 6 percent versus 12 percent and 9 percent, respectively (Table 3.10-1).

The majority (95 percent) of the population in the Koolau Loa District was concentrated in the seven communities in 2012, with community populations ranging from 279 (Kawela Bay) to 4,823 (Pupukea). Kahuku had an estimated 2012 population of 2,626. The estimated population in Laie was 5,560 (Table 3.10-1). Estimated population change in these communities from 2000 to 2012 ranged from a decrease of 32 percent (Kawela Bay) to an increase of 33 percent (Punaluu). The population in Kahuku experienced a relatively large increase over this period, with a net gain of 529 residents or 25 percent. The population in Laie also experienced a relatively large increase, with a net gain of 975 residents or 21 percent (Table 3.10-1).

Table 3.10-1. Population, 2000 and 2012

Area	2000	2012	2000 to 2012	
			Absolute Change	Percent Change
State of Hawaii	1,211,537	1,362,730	151,193	12
Honolulu County	876,156	955,215	79,059	9
Koolau Loa District	18,899	20,111	1,212	6
Hauula	3,651	3,521	-130	-4
Kaaawa	1,324	1,086	-238	-18
Kahuku	2,097	2,626	529	25
Kawela Bay	410	279	-131	-32
Laie	4,585	5,560	975	21
Punaluu	881	1,173	292	33
Pupukea	4,250	4,823	573	13
Source: U.S. Census Bureau 2000, 2012				

Population data are summarized for the two other districts that contain mitigation areas in Table 3.10-2. The Koolaupoko District contains the large communities of Kailua and Kaneohe, as well as the Marine Core Base Hawaii, and accounted for about 12 percent of the total population in Honolulu County in 2012. The Wahiawa District contains a major portion of the military area in the center of the island. Population in these districts grew at much slower rates between 2000 and 2012 than the State and Honolulu County averages, with the Koolaupoko District experiencing a net decrease in population over this period (Table 3.10-2).

Table 3.10-2. Population for Mitigation Areas, 2000 and 2012

District	Mitigation Area	2000	2012	Absolute Change	Percent Change
Koolaupoko	Hamakua Marsh (waterbird)	117,994	115,897	-2,097	-2
Wahiawa	Poamoho Ridge (bat)	38,370	40,021	1,651	4
Source: U.S. Census Bureau 2000, 2012					

3.10.2 Economic Conditions

The education and health care sector was the largest employer in the Koolau Loa District in 2012, accounting for 30 percent of total employment compared to 20 percent and 22 percent statewide and in Honolulu County, respectively (Table 3.10-3). The relatively high concentration of employment in this sector reflects the presence of the Brigham Young University (BYU) Hawaii campus. The campus has a full-time enrollment of nearly 3,000 students and is located southeast of the proposed Project in Laie. Tourism is the second largest sector by employment in the Koolau Loa District, accounting for 19 percent of total District employment in 2012.

The education and health care and tourism sectors are also the largest sectors in Kahuku, each accounting for about one-quarter of total employment in 2012. The education and health care sector accounted for 42 percent of employment in Laie, with tourism accounting for an additional 25 percent (Table 3.10-3).

Table 3.10-3. Employment, 2012

Economic Sector	State of Hawaii	Honolulu County	Koolau Loa District	Kahuku CDP	Laie CDP	Kawela Bay CDP
Employed Civilian Population	642,284	447,382	9,124	1279	2,437	136
Armed Services	39,220	38,528	161	14	10	5
Percent of Employed Civilian Population[1/]						
Agriculture/Resource Extraction	2	1	1	0.2	1	2
Construction	8	7	11	13	7	7
Manufacturing	3	4	2	4	0.4	0
Wholesale & Retail Trade	14	14	11	14	7	12
Transportation & Utilities	6	6	3	3	2	2
Information	2	2	2	1	2	2
Finance & Real Estate	7	7	4	3	4	7
Professional, Scientific & Management	10	10	6	3	5	18
Education & Health Care	20	22	30	25	42	18
Tourism (Arts & Services)	16	14	19	26	25	16
Public Administration	8	10	5	6	3	11
Other	5	4	5	3	3	4

Note:
1/ Percentages may not sum exactly due to rounding.
Source: U.S. Census Bureau 2012

Following a county-wide trend, employment in the construction industry increased in the Koolau Loa District between 2000 and 2012, nearly doubling in Kahuku and Laie over the same period (U.S. Census Bureau 2000, 2012).

Education and health care was the largest sector in the Koolaupoko District, accounting for 24 percent of total employment. Armed services is the largest sector in the Wahiawa District, accounting for about 37 percent of total employment in 2012, compared to 6 percent and 8 percent Statewide and in Honolulu County, respectively.

The annual average unemployment rate in the Koolau Loa District was approximately twice the state and Honolulu County averages in 2012, 8 percent versus 4.2 percent and 3.6 percent, respectively (U.S. Census Bureau 2012). Unemployment rates among the communities within the

Koolau Loa District ranged from 2.5 percent in Laie to 8.8 percent in Punaluu. The average annual unemployment rate in Kahuku was 5.9 percent in 2012.

3.10.3 Housing

The Koolau Loa District had an estimated 6,434 housing units in 2012, with 19 percent (1,251 units) of this total identified as vacant. Almost two-thirds (65 percent) of the vacant total – 13 percent of the total housing stock – were identified for seasonal, recreational, or occasional use. Housing for seasonal, recreational, or occasional use represented 6 percent and 3 percent of the total housing stock in Hawaii and Honolulu County, respectively. The high relative share of this type of housing in the Koolau Loa District reflects the importance of tourism to the local economy. A total of 811 units were identified for seasonal, recreational, or occasional use, with an estimated 85 housing units available for rent (Table 3.10-4).

There were an estimated 612 housing units in Kahuku in 2012, almost all (97 percent) of which were occupied. A total of 12 of the 19 vacant units were identified as for seasonal, recreational, or occasional use, with no units identified as available for rent. In Kawela Bay, almost 70 percent of the 419 housing units were identified as vacant, with the majority (80 percent, 230 units) used for seasonal, recreational, or occasional use, with just 13 units available for rent. In Laie, 19 percent or 215 of the 1,110 housing units were identified as vacant, with slightly more than half this total (52 percent) used for seasonal, recreational, or occasional use, and just 17 units available for rent (Table 3.10-4).

Table 3.10-4. Housing, 2012

Geographic Area	Hawaii	Honolulu County	Koolau Loa CCD	Kahuku CDP	Kawela Bay CDP	Laie CDP
Total housing units	519,811	337,389	6,434	612	419	1,110
Occupied housing units	447,453	308,490	5,183	593	131	895
Vacant housing units	72,358	28,899	1,251	19	288	215
Type of Vacant Housing Units (Number)						
For rent	19,326	6,666	85	0	13	17
Rented or sold, not occupied	3,885	2,152	14	0	8	0
For sale only	4,982	2,442	17	0	2	0
For seasonal, recreational, or occasional use	30,624	10,503	811	12	230	112
Other vacant	13,541	7,136	324	7	35	86
Total	**72,358**	**28,899**	**1,251**	**19**	**288**	**215**
Source: U.S. Census Bureau 2012						

Other forms of temporary housing located within the analysis area, include hotel and motel rooms and resort facilities. Island-wide, a total of 35,126 temporary housing units were identified in 2012, including hotel rooms, condominium hotel units, and individual vacation units, with an overall annual occupancy rate of 85 percent (HTA 2012). These data were not disaggregated by District. However, review of the Hawaiian Tourism Authority (HTA 2014b) website suggests that very little temporary housing is available in the vicinity of the Project site, save for the luxury-scale hotels and resorts in Kawela Bay. More temporary accommodations are located in Haleiwa and outside the Koolau Loa District, to the west and southeast, respectively, but these resorts are also geared to the

tourist experience. Most affordable temporary lodging would likely be found in the greater Honolulu urbanized area, an approximately 1-hour drive away from the Project Area.

3.10.4 Property Values

The Project site is located on agricultural land next to a residential neighborhood to the east, and to the west, rugged open space managed by the Army for training purposes (City and County of Honolulu, Department of Planning and Permitting [DPP] 1999). Towards the community of Kahuku, further to the east, lies a small rural commercial cluster of restaurants, medical facilities and a church, along Kamehameha Highway (State Highway 83). Kahuku High and Intermediate School is also less than 1 mile from the Project Area. The community vision for the Koolau Loa District, as described in the Koolau Loa Sustainable Communities Plan, includes the preservation and enhancement of the rural character of the area, especially that of "Old Hawaii", but acknowledges the possible expansion of wind energy in the Kahuku area (City and County of Honolulu, DPP 1999).

Median owner-occupied property values in the Koolau Loa District were approximately 124 percent of the Honolulu County median in 2012 (Table 3.10-5). Median values in the communities near the Project site ranged from just 78 percent (Kawela Bay) to 122 percent (Laie) of the County median. The median property value in Kahuku in 2012 was $488,500, equivalent to 88 percent of the County median in 2012 (Table 3.10-5).

Table 3.10-5. Median Property Values, 2012

Geographic Area	Median Property Value	Percent of County Median
Honolulu County	$557,800	100%
Koolau Loa District	$693,333	124%
Kahuku CDP	$488,500	88%
Laie CDP	$682,900	122%
Kawela Bay CDP	$433,300	78%
Koolaupoko District	$671,800	120%
Wahiawa District	$482,100	86%
Source: U.S. Census Bureau 2012		

3.10.5 Public Services

The Honolulu Police and Fire Departments have jurisdiction over the entire island. The nearest community to the Project site, Kahuku, offers law enforcement, fire protection, and medical services. The Kahuku Police Substation and Kahuku Fire Station (Station 13) are both located near the Project site and share a facility on the Kamehameha Highway.

The nearest emergency medical facility to the Project Site is Kahuku Medical Center located on Pualalea Street in Kahuku. There are also two offices of the Koolau Loa Community Health and Wellness Center, one in Kahuku on Pualalea Street, and the other along the Kamehameha Highway in Hauula.

The Project site would be serviced by the Hawaiian Electric Company, Hawaii Gas, and the Board of Water Supply, all of which serve the entire island of Oahu.

3.10.6 Tax Revenues

The State of Hawaii charges a four percent general excise tax (GET) and Use tax on nearly all monetary transactions (DOTAX 2014a). In addition, starting in 2007, Honolulu County implemented an additional 0.5 percent tax to fund a mass transit project on Oahu (DOTAX 2014b).

Total revenues for Honolulu County in 2013 were $2,093 million (Table 3.10-6). The GET and Use tax accounted for approximately eight percent of total revenue in Honolulu County in 2013.

Table 3.10-6. Honolulu County Revenues for 2013.

Revenue Type	Total ($ million)
Program revenues	
Charges for services	829.0
Operating grants and contributions	143.7
Capital grants and contributions	81.1
General revenues	
Property taxes	825.5
Other taxes	163.8
Other	50.3
Total revenues	**2,093.4**
Source: City and County of Honolulu, DBFS 2013.	

3.11 Historic, Archaeological and Cultural Resources

The heritage of the wind farm site is reflected in its cultural resources. Defined here, cultural resources are prehistoric or historic archaeological districts, landscapes, sites, or objects, traditional cultural properties, human remains, and/or historic built environment resources that include, districts, buildings, structures, landscapes, sites, and objects or places of importance to a culture or community for scientific, traditional, religious, or other reasons. Archaeological resources can include visible surface features and/or buried deposits without surface features. The information presented here summarizes the archaeological and cultural assessment work conducted for the Project described in detail in Pacific Legacy's *Archaeological Inventory Survey for the Na Pua Makani Wind Project, Kahuku, Keana, and Malaekahana Ahupuaa, Koolauloa District, Island of Oahu, Hawaii* (AIS; Appendix F) and *Cultural Impact Assessment for the Na Pua Makani Wind Project, Kahuku, Keana, and Malaekahana Ahupuaa, Koolauloa District, Island of Oahu* (CIA; Appendix G).

The assessment of potential impacts to historic, archaeological, and cultural resources within the analysis area begins with the identification and evaluation of the significance of resources as they relate to the requirements of Section 106 of the of the National Historic Preservation Act (NRHP; discussed below) and eligibility for inclusion for listing in the National Register of Historic Places (discussed below). The analysis area for cultural resources begins with defining the Area of Potential Effect (APE) or the "the geographic area or areas within which an undertaking my directly or indirectly cause alterations in the character or use of historic properties" (26 CRF 800.16(d)). For the analysis of effects to cultural and archaeological resources, the analysis area is the APE, described in more detail below.

In consultation with the State Historic Preservation Officer (SHPO), an historic, archaeological, traditional cultural properties, and architectural APE was delineated for the Project and is as follows:

- The APE is based on the Project layout as proposed at the time of this document submittal and consists of an approximately 464-acre (188-hectare) area within which the current AIS was focused. This area constitutes the maximum footprint of the Project within which all ground disturbing activities would occur and which would be occupied by permanent Project facilities (see figures included in Appendix F).
- The OEQC guidelines require evaluation of a broader geographic area surrounding the Project; therefore, the assessment of impacts to historic, archaeological, and cultural resources for this Project includes the wind farm site plus adjacent areas.

This section describes the applicable Federal and State laws and regulations; the pre-contact and historical context of the APE; historical and archaeological accounts within the APE; a description of the survey methods used to identify existing historical and/or archaeological resources within the APE and associated results; and traditional cultural uses and practices.

3.11.1 Regulatory Context

3.11.1.1 Federal

There are numerous Federal regulations, executive orders, and policies that mandate the treatment of cultural resources on Federal lands, and projects that fall under the jurisdiction of Federal agencies. The following is a discussion of the most pertinent laws that would apply to the Project described in this EIS.

National Historic Preservation Act, Section 106

The principal Federal law addressing cultural resources is the National Historic Preservation Act (NHPA) of 1966, as amended (54 United States Code, Section 300101 et seq.), and its implementing regulations (36 CFR, Part 800), which address compliance with Section 106 of the NHPA. The regulations describe the process for identifying and evaluating historic properties, for assessing the effects of Federal actions on historic properties, and for consulting with interested parties, including the SHPO, to develop measures that would avoid, reduce, or minimize adverse effects. The term "historic properties" refers to cultural resources that are listed on, or meet specific criteria of eligibility for listing on the NRHP.

In order to be eligible for the NRHP, cultural resources must be at least 50 years old (generally), meet most of the seven aspects of integrity, and meet at least one of the four criteria listed below. Integrity is the property's ability to convey its demonstrated historical significance through location, design, setting, materials, workmanship, feeling, and association. There are also

considerations for resources that may have achieved national significance but are fewer than 50 years old. Criteria for listing on the NRHP (36 CFR, 60.4) are as follows:

A. Association with events that have made a significant contribution to the broad patterns of our history;
B. Association with the lives of persons significant to our past;
C. Resources that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
D. Resources that have yielded or may be likely to yield information important in prehistory or history.

Section 106 of the NHPA describes the procedures for identifying and evaluating eligible properties, for assessing the effects of Federal actions on eligible properties, and for consulting to avoid, reduce, or minimize adverse effects. Eligible properties need not be formally listed on the NRHP. As part of the Section 106 process, agencies are required to consult with the SHPO. Section 106 does not require the preservation of historic properties, but it ensures that the decisions of Federal agencies concerning the treatment of these places result from meaningful considerations of cultural and historic values and of the options available to protect the properties. If a project is an undertaking, as defined by 36 CFR 800.3, it is subject to Section 106 and consideration under other Federal requirements. Section 106 regulations of the NHPA also include provision for Native Hawaiian consultation regarding cultural significance of potential religious and sacred artifacts (16 USC 470a [a][6][A] and [B]).

3.11.1.2 State

State Regulatory Setting

HRS Chapter 6E, Historic Preservation, requires the identification, evaluation, and assessment of adverse effects of State and local undertakings on cultural resources. Implementation of these requirements is accomplished by HAR § 13-198, the Hawai'i Register of Historic Places (HRHP) and NRHP programs, and HAR § 13-276, Rules Governing Standards for Archaeological Inventory Surveys and Reports. The conduct of this Project has followed these procedures.

Criteria Considerations

Identified archaeological and cultural resources are evaluated for eligibility for inclusion on the HRHP with reference to the evaluation criteria enumerated in HAR § 13-198-8, as follows:

> *In deciding whether a property should be entered and ordered into the HRHP, the review board shall evaluate whether the property meets or possesses, individually or in combination, the following criteria or characteristics:*
>
> *(1) The quality of significance in Hawaiian history, architecture, archaeology, and culture, which is present in districts, sites, buildings, structures, and objects of State and local*

importance that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:

a. That are associated with events that have made a significant contribution to broad patterns of our American or Hawaiian history;
b. That are associated with the lives of persons significant in our past;
c. That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic value, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
d. That have yielded, or may be likely to yield, information important in prehistory or history;

The State of Hawai'i recognizes the above criteria under HAR §13-275-6 and has also added a fifth HRHP significance criterion to the evaluation process:

e. That have an important value to the Native Hawaiian people or to another ethnic group of the State due to associations with cultural practices once carried out or still carried out, at the property or due to associations with traditional beliefs, events or oral accounts – these associations being important to the group's history and cultural identity.

(2) Environmental impact, i.e., whether the preservation of the building, site, structure, district, or object significantly enhances the environmental quality of the State;
(3) The social, cultural, educational, and recreational value of the building, site, structure, district, or object, when preserved, presented, or interpreted, contributes significantly to the understanding and enjoyment of the history and culture of Hawaii, the pacific area, or the nation.

HAR §§ 13-276-7 and -8 require that significance evaluations be included in all survey reports as well as recommendations such as mitigation commitments. It is required that the significance evaluations and mitigation recommendations are presented in a summary table listing all sites in order to carry out the mandates of HRS § 6E.

3.11.2 Existing Conditions

The following section provides the environmental and cultural setting of the Project as presented in Pacific Legacy's AIS (Pacific Legacy 2015a; Appendix F) and CIA (Pacific Legacy 2015b; Appendix G). The cultural setting of the Hamakua Marsh and Poamoho Ridge mitigation areas was derived from existing sources cited as appropriate below.

3.11.2.1 Wind Farm Site

Pre-contact and Historical Context

The wind farm site encompasses the three ahupuaa (the main units of traditional Hawaiian land division, typically extending from the coast to the nearest mountain top or ridge and indicative of the exchange of resources between the land and sea [mauka to makai]) of Kahuku, Keana, and Malaekahana

within the moku or district of Koolauloa (Figure 1 in Appendix F). These ahupuaa have traditional information extending from the pre-Contact era to the historic era which describe what kinds of natural resources were found, what stories and mythological figures are associated with the area, as well as the chronicles and conflicts may have occurred there. These facets of the cultural landscape help to provide a connection for modern day cultural practitioners to the land and their ancestors who dwelt in these ahupuaa and are integral to understanding the cultural, historic, and spiritual significance of these lands. Of the three wind farm site ahupuaa, Kahuku, which literally translates as "the projection," has the most information and is described in detail below.

Traditional accounts of the natural resources and existing conditions of the Kahuku ahupuaa indicate that during Hawaiian settlement prior to the arrival of Europeans, many parts of the landscape were used for traditional agriculture, habitation, and ceremony, varying from moderate to intense. At the time of the initial Contact period, a good portion of the land lay fallow due to severe population decline and was overgrown in some areas with exotic plant species. Thus, there are several conflicting accounts of what the landscape was like and how it was used prior to European contact (see below).

Several themes are tied to Kahuku's landscape during the pre-Contact period. One is the abundance of the hala tree, or Pandanus, and its importance to ancient Kahuku's cultural identity. The wearing of hala, in the form of plaited lau (leaves) hala or lei made of the hala fruit/seed was a way in which the people of Kahuku represented their homeland. Fresh water springs were mentioned in several traditional accounts of the Kahuku area, including tales of the adventurer Makanikeoe who is said to have discovered Punahoolapa and Punamano springs; Rock Spring and Kaainapele Spring were also said to be located in the Kahuku area. Agricultural terraces, made possible by the presence of the natural springs, were said to existing in northern Kahuku, although there is some debate as to whether these features originated in the pre-contact era or post European contact (Handy and Handy 1991). Finally, the presence of fish and fishing practices of pre-contact Kahuku is also recalled in legends. The story of Punamano spring alludes to locals net fishing at the beach at night, indicating the traditional fishing methods in Kahuku.

The Kahuku area is also known for landmarks including Kahuku Point, or Kalaeokahipa, and the great cave of Pohukaina. Kalaeokahipa Ridge, located approximately 2 miles north of the wind farm site, is believed to have been an area where the deities Kanaloa and Kane once lived. The cave, thought to be located a considerable distance inland from the Turtle Bay Resort area, had an entrance in Kahuku and was said to be a refuge and storage place of "much wealth" for Oahu chiefs.

The Kahuku area is associated with a number of supernatural beings or demigods. These include Mano-niho-kahi, a man-eating shark associated with an underground canal in Kahuku; Ku-ilio-loa the "great dog" or dog-man with a human body and supernatural powers; and Kamapuaa, a supernatural being and deity attributed to agriculture, rain, and fertility.

Much less pre-contact information is known about the Keana and Malaekahana ahupuaas. The former derives its name from a cave on the inland side of Kahuku school. Traditional sites associated with legendary stories of Keana include two large stones in the Keana Cave or Rock Shelter that are said to be the remains of two boys who failed to follow their mother's orders to stay

silent during a thunderstorm in accordance with the kapu (law) of the god of thunder Kane-hekili and a pool of water called Polou said to be the place where the "floating island" of Kahuku attached to the Island of Oahu. Malaekahana is derived from the name of the mother of the Hawaiian goddess Laie-i-ka-wai and her twin sister Laie-lohelohe and is also the name of a large bay and stream within the land division. Several legendary stories reference Malaekahana as a locality. Agricultural terraces were associated with Kaukanalaau Stream in the Malaekahana area.

Historical and Archaeological Accounts

At the time of European contact, the Kahuku area was a rich cultivated landscape. Lieutenant James King remarked: "nothing can exceed the verdure of the hills, the variety of wood and lawn, and the rich cultivated valleys which the whole face of the country displayed" (Cook and King 1784:115, as cited in Handy and Handy 1991:462). This comment indicates the wealth of the Kahuku region. However, a short time later, the explorer George Vancouver paints a picture of an area in great decline:

> Our examination confirmed the remark of Capt. King excepting that in point of cultivation or fertility, the country did not appear in so flourishing a state, nor to be so numerously inhabited, as he represented at that time, occasioned most probably by the constant hostilities that existed since that period (Vancouver 1798 vol. 3:71, as cited in Handy and Handy 1991:462).

Handy and Handy write of the abandoned terraces which once dotted the Kahuku landscape and the population decline:

> In 1833 Hall (1839) observed at Kahuku that "much taro land now lies waste because the diminished population of the district does not require its cultivation (Handy and Handy 1991:462)

Based upon these descriptions, it is evident that the Kahuku area was once fairly densely inhabited and that agricultural activities flourished. However, after European contact it appears that there was a marked population decline with an associated decrease in agricultural activity.

Ranching in the Kahuku area began in the 1850s when the Kahuku Ranch was established on land purchased from Kamehameha III (Korn 1958). The ranch grew and soon the once rich vegetation of Kahuku began to disappear, as the result of free-range overgrazing (Stride et al. 2003:16). This took a toll on the natural resources, the small unprotected family gardens, and the native population -- "At the same time the hala forests began to disappear, the Hawaiian population also began to disappear" (Stride et al. 2003). Presumably the population continued to decline between the 1830s and the 1850s.

By the 1890s, James Campbell had control of a large portion of the Kahuku tract which laid the groundwork for the creation of the Kahuku Plantation (Stride et al. 2003). This was the start of large-scale commercial agriculture that altered the landscape of Kahuku with agriculture and a railroad segment that changed the landscape and redefined the region.

> Much of the uplands above Kahuku Village were once planted in sugar cane and pineapple. These fields were established wherever possible except on steep hillsides and on the crests of ridges and knolls (Stride et al. 2003).

The plantation continued to expand into the 1930s when Japanese, Filipino, and Portuguese worked the fields (Stride et al. 2003). The plantation was responsible for shaping the town of Kahuku and the life of its workers by introducing "concrete stoves for laborer's cottages and sanitation drains that were used as models for other plantations…Kahuku…introduced the first plantation day nursery and high school…baseball diamond, the first golf course …" (Stride et al. 2003:22). The growth quickly slowed when in 1955 the last of locomotives hauling sugar cane stopped. In 1971, the Kahuku Plantation closed (Stride et al. 2003).

Archaeological Investigations

Thirty-nine archaeological studies have been conducted in various locations within a 1.6-mile (2.5-kilometer) radius around the proposed Project. A summary of the findings of these reports is provided in the AIS in Appendix F.

Two previous archaeological studies have been conducted in portions of the wind farm site. These were conducted by Cultural Surveys Hawaii (Stride et al. 2003) and International Archaeological Research Institute (Morrison 2009) and are described in more detail below.

In 1992, Cultural Survey Hawaii (CSH) conducted a literature review and field investigation of approximately 785 acres of land encompassing the western portion of the wind farm site (Stride et. al 2003). The CSH survey identified seven sites composed of 16 features: overhang shelters (N=8) (one of which contained human remains), walls (N=3), terraces (N=3) an enclosure (N=1), and a U-shaped temporary shelter (N=1). These sites are located outside of the Project APE. The results of the CSH survey indicate that although the current Project Area and vicinity was severely impacted by large-scale commercial agriculture, the area still has the potential to contain significant cultural resources.

In 2009, International Archaeological Research Institute, Inc. (IARII) conducted archival research for the western portion of the wind farm site for West Wind Works, LLC (Morrison 2009). This research included review of early historic documents, historic maps, and previous archaeological investigations in the area. IARII's research indicated that at the time of first European contact (in 1779) the general Kahuku area was densely settled and intensively cultivated. However, drastic population decline and education in agricultural practices were evident within 20 years (by 1794). In the mid-1800s, cattle and sheep ranching was being practiced in Kahuku, which led to dramatic vegetation change in the area. Sugar and pineapple cultivation began in the late 1800s resulting in extensive land modifications of the area. IARII's research indicates that the wind farm site was extensively modified by these commercial agricultural activities (McIntosh and Cleghorn 2013). IARII concluded that it is unlikely that any cultural remains would be found within the western portion of the wind farm site and that no further archaeological work was needed.

During the initial consultations with the SHPD, the adequacy of the previous archaeological field work in the project area was discussed thoroughly. The previous field work was conducted over two decades ago, in 1992. Perspectives on what types of remains constitute archaeological sites have changed considerably

over the last few decades. Previously, remains associated with early historic agricultural systems were not thought of as being important, because at that time active large scale sugar and pineapple plantations were still dominating the landscapes in the Hawaiian Islands. Military remains were also not considered important to our history. Because of changing viewpoints, SHPD recommended that the APE should be completely covered by a pedestrian survey.

In 2014, Pacific Legacy conducted a pedestrian survey of close to 100 percent of the APE (excluding only areas that were too steep to traverse) to identify archaeological sites. Information presented here ~~has been updated for the Second Draft EIS to~~ reflects input from SHPD, which recommended that many of sites identified in the Draft AIS that were given a distinct site number be combined resulting in fewer site numbers but still consisting of the same amount of total features. The survey identified 28 new (not identified during previous archaeological investigations) archaeological sites consisting of 113 distinct features. A majority of these features (72) were within a single site that is associated with agricultural development and intensive use for the cultivation of sugar cane by the former Kahuku Sugar Plantation. Of the remaining sites, 22 were traditional Hawaiian pre-Contact activities, 3 were historic, and 2 were related to World War II military activities in the area.

Survey data were used by Project engineers to refine the location of proposed facilities to avoid archaeological features. This resulted in a revision of the APE. Fourteen of the documented sites and three features of the Kahuku Sugar Plantation site, are now located outside of the APE and would not be affected by the Project. Of these, all but the three features of the plantation site are traditional pre-Contact sites and relate to habitation, agricultural, and burial practices. The remaining 14 sites (and 88 features) within the APE are described below.

Sixty-nine features composing 39 components of the site associated with historic sugar plantation activities were documented within the APE, most of which were associated with water control or transport. Features included ditches, concrete culverts, concrete foundations, retaining walls, walls, valves, wells, iron pipes and pipelines, pump houses, a concrete footing, tanks, and an aqueduct. Eight pre-Contact Native Hawaiian sites were documented within the APE including a stone mound determined to be a marker (see discussion of hand excavation below), a platform used for habitation, agricultural terraces (four sites), a modified outcrop, and a cave that functioned as a habitation site. The two historic sites associated with World War II activities included a bivouac site (an alignment and hearth) and site containing two bunkers. Three non-sugar plantation historic era sites associated with agriculture (terraces and terraced soil furrows) or other functions (artifact scatter) were also documented within the APE.

Subsurface backhoe testing was also conducted at select locations within the APE to determine if subsurface cultural deposits were present. Test trenches were located where cultural deposits were likely to be present, focusing on areas where ground disturbing activities are proposed. No subsurface cultural resources were identified in any of the trenches. Hand-excavated test units were placed at two sites to collect cultural material (a stone mound thought to be a potential burial and a cave with a marine shell midden; see the AIS in Appendix F for further information). No human remains or other cultural material were identified in the stone mound. The test unit in the cave identified marine shell midden, non-human bone, crab claws, and basalt flakes. Charcoal

samples from this test unit were submitted for identification and radiocarbon dating. Preliminary significance assessments of the archaeological and cultural resources recorded in the APE were made and are presented in the AIS (Appendix F). The AIS was accepted by SHPD (December 18, 2015) with approval of the stated mitigation recommendations for the 14 sites.

Traditional Cultural Uses and Practices

In accordance with HRS Chapter 343, Act 50, and the OEQC "Guidelines for Assessing Cultural Impact" a CIA was conducted by Pacific Legacy. The objective of a CIA is to promote and protect cultural beliefs, practices, and resources of Native Hawaiians and other ethnic groups as well as other collective groups associated with the subject area and surrounding areas (OEQC 2011). The general purpose of a CIA is to protect and preserve all cultural practices and resources that may be impacted by the proposed Project. Types of cultural practices and beliefs may include those relating to subsistence, commercial, residential, agricultural, access-related, as well as religion and spirituality as well as "traditional cultural properties or other types of historic sites, both manmade and natural, including submerged cultural resources, which support such cultural practices and beliefs" (OEQC 2011).

To gather information about the cultural resources within the wind farm site and surrounding area oral history interviews were conducted with five people knowledgeable about the area, including two noted kupuna and two cultural practitioners familiar with the area (Mooney et al. 2015b, Appendix G). The continued use of the general area for agriculture, including various food crops and small-scale animal husbandry, following the closure of the Kahuku Plantation was indicated by two interviewees. Traditional Hawaiian practices in and around the wind farm site include pig hunting and plant gathering, according to the testimony of two interviewees; however, neither informant expressed that the area in which these cultural practices were occurring were exceptional, legal, or even ideal as the lands are private and/or reserved for military use. Further, the locations in which the activities occur do not appear to be within the APE. Two of the informants also indicated that the area in general has a mystical past and retains some supernatural qualities, which is reportedly a common belief in the area. One of the informants, a professor from BYU, provided information on the cultural significance of wildlife species including threatened and endangered species covered by the HCP, described in detail below. Transcripts of each interview are included in the CIA in Appendix G.

Culturally Important Species

Based on testimony from Dr. Ka'ili, ancestral deities may take the form of birds and bats (collectively, manu) that occur in the vicinity of the wind farm site. These deities include ancestral guardians ('Aumakua), parental/caretaker birds (Makua), guardian/protector birds (Kia'i), offspring of parental/caretaker birds (Keiki), and manifestations/vessels of ancestors and gods (Kinolau). Listed species that are identified in the Hawaiian Creation Chant (Kumulipo) as manu include Hawaiian hoary bat, Newell's shearwater, Hawaiian goose, Hawaiian stilt, Hawaiian coot, Hawaiian moorhen, and Hawaiian short-eared owl. Hawaiian ducks also are recognized in traditional Hawaiian folklore as guardians of a legendary blind king. Harming of these birds therefore may be interpreted as causing harm to ancestral spirits. The traditional name of the

dominant wind at Kahuku is Ahamanu, which translates as "gathering of birds" (manu) and further indicates the significance of these species to local traditional culture.

3.11.2.2 Hamakua Marsh

Hamakua Marsh is part of the larger Kawainui Marsh located west of the town of Kailua, Oahu. The Kawainui-Hamakua Marsh complex is the largest remaining lowland emergent wetland in the state of Hawaii. In 1966, USACE constructed a levee along the northern edge of the marsh to enhance its flood storage capacity and protect the community of Kailua from flooding. This levee was later modified in 1997.

The Hamakua Marsh Mitigation Area is within the Kailua ahupuaa of the Koolaupoko district. In 1979, the Kawainui Marsh was deemed eligible for listing on the National Register of Historic Places as a significant cultural and archaeological resource. The Kawainui-Hamakua Marsh cultural complex includes several prehistoric and historic archaeological sites dating back to early Polynesia migration, pre-contact Hawaii (approximately 1,500 years ago) to historic times. Recorded cultural resources within the complex consist of three Hawaiian heiau (Ulupo Heiau, Pahukini Heiau, and Holomakani Heiau), prehistoric occupation and habitation sites, and series of dry farming agricultural terraces, extensive wetland agricultural system-aquaculture, retaining walls, and remnants of historic house foundations.

3.11.2.3 Poamoho Ridge

The Poamoho Ridge area is characterized as undeveloped, steep mountainous terrain, zigzagging ridges, and deep gulches with shallow drainages and dense vegetation. The Poamoho Ridge Mitigation Ara is located in the ahupuaa of Paalaya and Kamananui within the Waialua district (Hawaiian Studies Institute 1987). Prior to European contact, Kamananui was the ritual and political center of Waialua with a dense population and taro fields in the lowlands that were irrigated by a 2-mile-long ditch (Kirch and Sahlins 1994). Rainfall agricultural was practiced within along slopes and upland plains. Kamananui ahupuaa also includes two heiau.

3.12 Land Use

Comprehensive plans, land use policies, and zoning regulations determine the type and extent of land uses allowable in specific areas and often protect environmentally sensitive land uses. Land use impacts typically result from actions that negatively affect or displace an existing use or affect the suitability of an area for its current, designated, or formally planned use. For purposes of the land use evaluation, the analysis area includes the wind farm site and HCP mitigation areas. The mitigation areas include the Hamakua Marsh for water birds, Poamoho Ridge for the Hawaiian hoary bat, and the James Campbell National Wildlife Refuge for the Hawaiian goose.

Public comments on the original Draft EIS requested an expanded discussion of existing agricultural uses and activities within the wind farm site. Therefore, the discussion of agriculture has been moved to a new section, Section 3.20 – Agriculture.

3.12.1 Existing Conditions

3.12.1.1 Wind Farm Site

The wind farm site is located in Kahuku town. The western portion of the wind farm site is located on land owned by the State and administered by the DLNR (TMK (1) 5-6-008:006). The eastern portion of the wind farm site is located on land owned by Malaekahana Hui West, LLC (TMK (1) 5-6-006:018) (Figure 1-2).

Existing land use within the wind farm site is influenced by elevation and terrain. Lower-elevation portions of the wind farm site are cultivated for agriculture. Higher-elevation lands are dominated by a mixture of non-native weedy vegetation and common native vegetation, and are not actively used for agriculture.

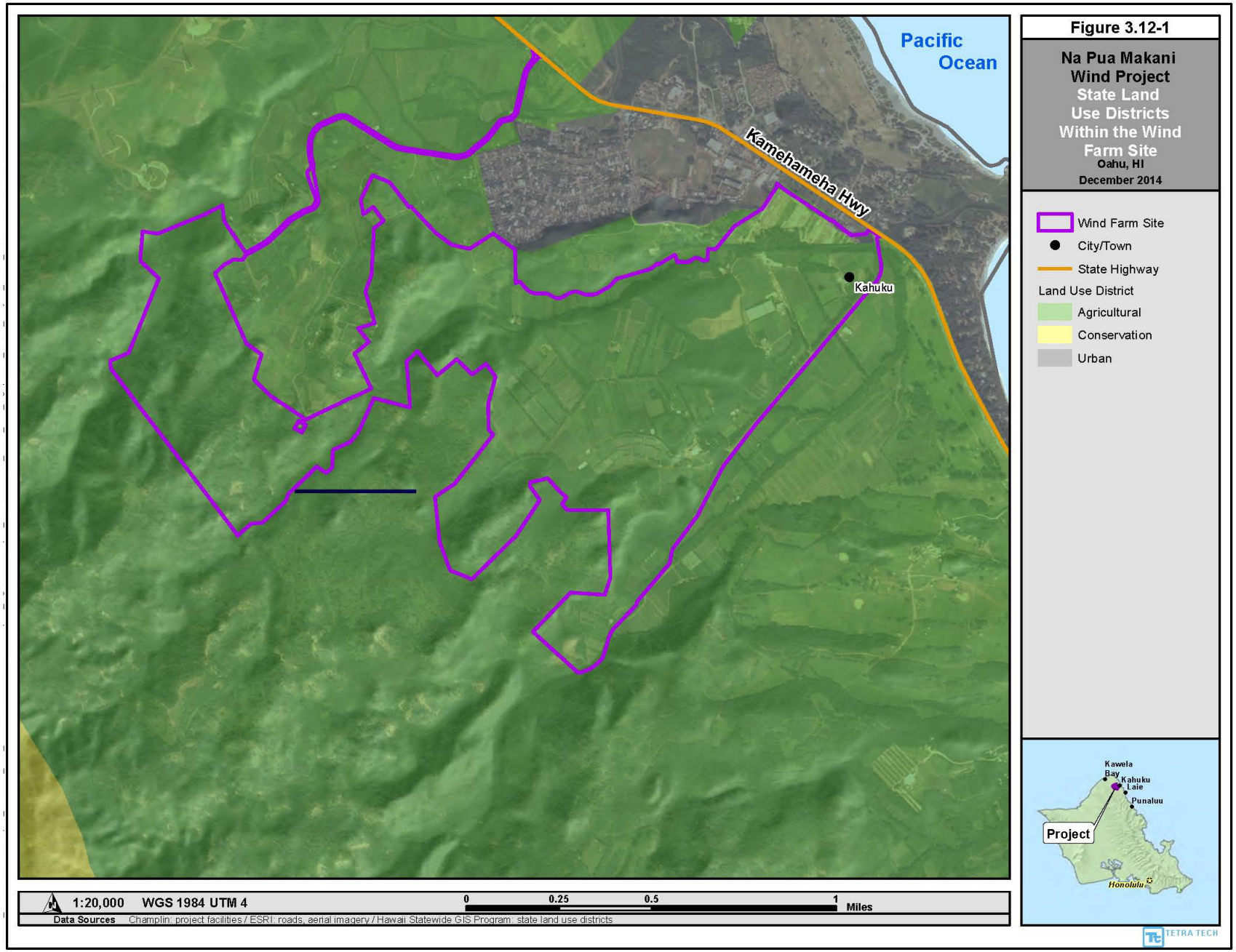
Research completed to prepare the archaeological assessment indicates much of the DLNR lands were once farmed in pineapple, while the Malaekahana Hui West portion of the wind farm site was farmed in sugar cane until the 1970s. Plantation cultivation occurred from the late 1800s to the 1970s, when the Kahuku Plantation closed (Continental Pacific 2013). After sugar cane production ceased, cultivation of truck crops began and continues today on the Malaekahana Hui West lands. Malaekahana Hui West currently leases approximately 245 acres (99.0 hectares) of the wind farm site's farm lands to individual farmers. The DLNR portion of the Project site (234 acres; 95 hectares) is currently vacant lands with the exception of approximately 11 acres of actively farmed land.

The immediately adjacent lands surrounding the wind farm site are vacant and agricultural lands, both active and fallow. West of the Project boundary are active military training lands known as the Kahuku Training Area (KTA). North of the Project is the adjacent Kahuku Wind Farm, with 12 wind turbines and a nameplate generating capacity of 30 MW, and the residential community known as Kahuku Mauka Village. East of the Project boundary is Kamehameha Highway near the core of Kahuku town that includes Kahuku Intermediate and Kahuku High School (Figure 1-2).

The wind farm site is located almost entirely within the state agricultural land use district, with only a small portion of wind farm site (2.1 acres [0.8 hectare]) near Kamehameha Highway falling within the State urban land use district. All of the Project facilities are located within the State agricultural land use district (Figure 3.12-1).

The wind farm site is located within the boundaries of the Koolau Loa planning region of Oahu. The comprehensive plan applicable to this area is the Koolau Loa Sustainable Communities Plan, which designates the wind farm site for agricultural, military, and rural residential use (see Figure 3.12-2) (City and County of Honolulu, DPP 2012).

The wind farm site is located within the City and County of Honolulu agricultural zoning districts: AG-2 General Agricultural and AG-1 Restricted Agricultural (Figure 3.12-3). For further discussion on the consistency with Federal, State, and county regulations and policies and county plans, refer to Chapter 5.0.


Pacific Ocean
Kamehameha Hwy
Kahuku
Figure 3.12-1
Na Pua Makani Wind Project State Land Use Districts Within the Wind Farm Site
Oahu, HI
December 2014
Wind Farm Site
City/Town
State Highway
Land Use District
Agricultural
Conservation
Urban
Kawela Bay
Kahuku
Laie
Punaluu
Project
Honolulu
1:20,000 WGS 1984 UTM 4
0 0.25 0.5 1 Miles
Data Sources Champlin: project facilities / ESRI: roads, aerial imagery / Hawaii Statewide GIS Program: state land use districts
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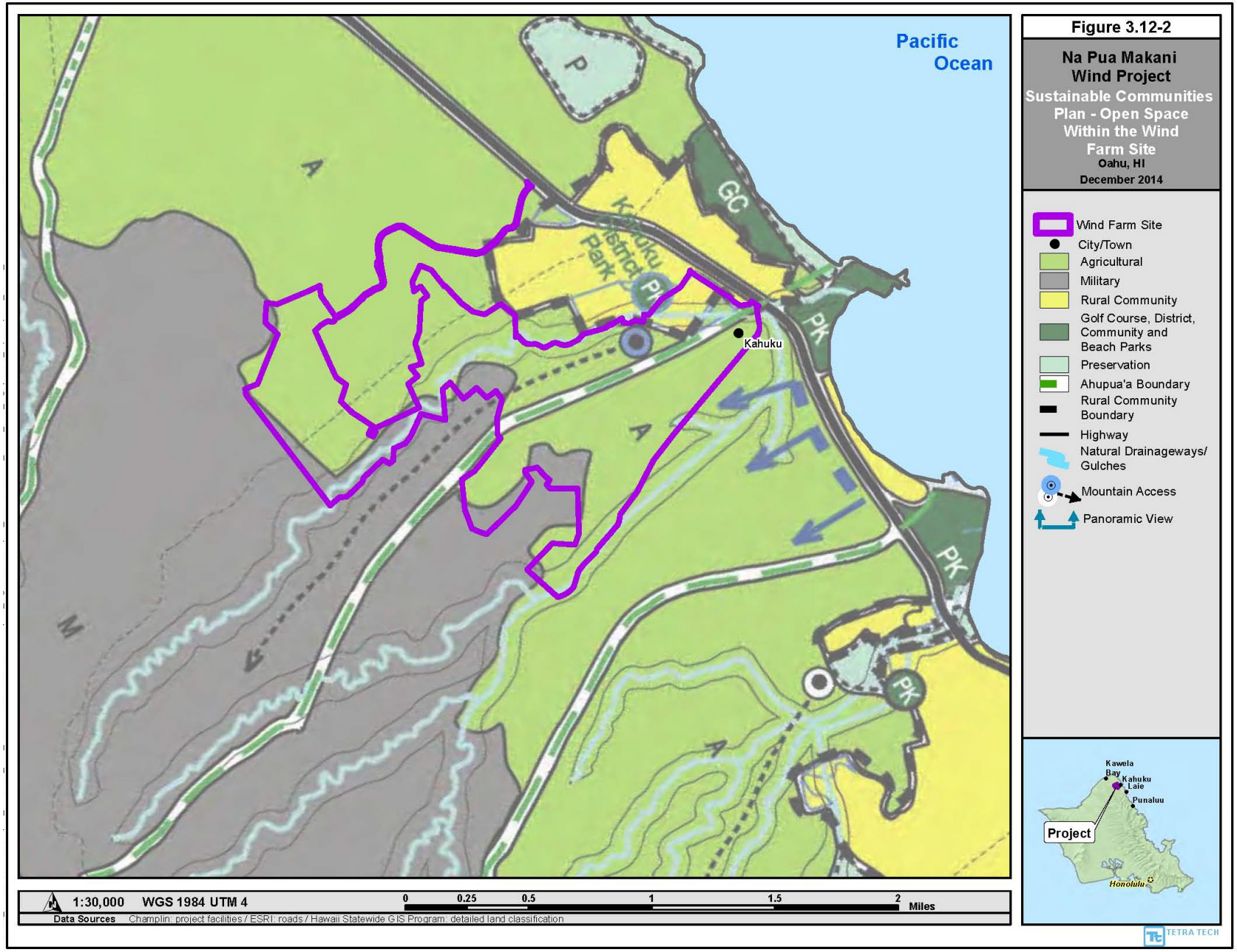
Figure 3.12-2
Na Pua Makani Wind Project
Sustainable Communities Plan - Open Space Within the Wind Farm Site
Oahu, HI
December 2014
Pacific Ocean
Kahuku
Kahuku District Park
Wind Farm Site
City/Town
Agricultural
Military
Rural Community
Golf Course, District, Community and Beach Parks
Preservation
Ahupua'a Boundary
Rural Community Boundary
Highway
Natural Drainageways/ Gulches
Mountain Access
Panoramic View
Kawela Bay
Kahuku Laie
Punaluu
Project
Honolulu
1:30,000 WGS 1984 UTM 4
0 0.25 0.5 1 1.5 2 Miles
Data Sources Champlin: project facilities / ESRI: roads / Hawaii Statewide GIS Program: detailed land classification
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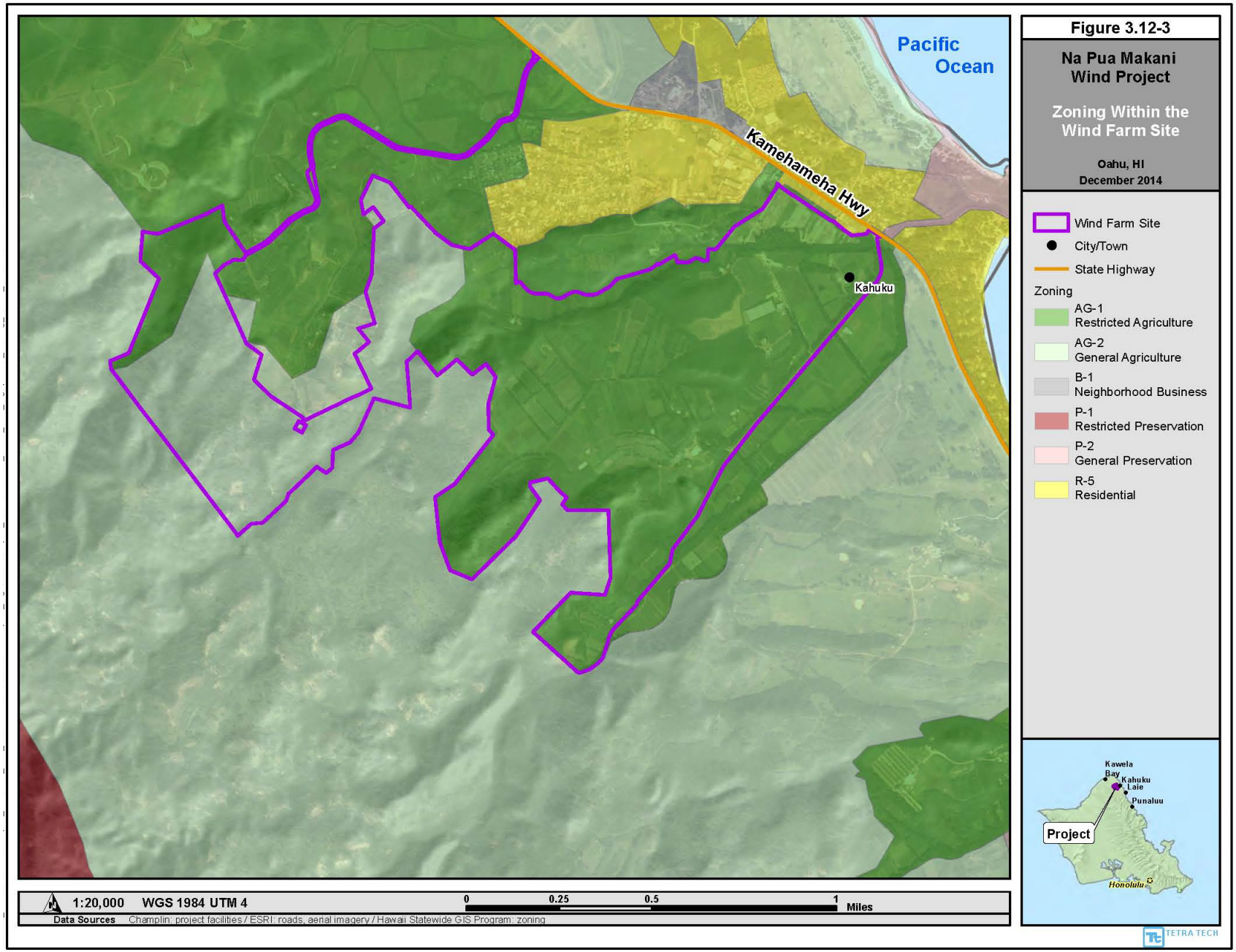
Pacific Ocean
Kamehameha Hwy
Kahuku
Figure 3.12-3
Na Pua Makani Wind Project
Zoning Within the Wind Farm Site
Oahu, HI
December 2014
Wind Farm Site
City/Town
State Highway
Zoning
AG-1 Restricted Agriculture
AG-2 General Agriculture
B-1 Neighborhood Business
P-1 Restricted Preservation
P-2 General Preservation
R-5 Residential
Kawela Bay
Kahuku
Laie
Punaluu
Project
Honolulu
1:20,000 WGS 1984 UTM 4
0 0.25 0.5 1 Miles
Data Sources Champlin: project facilities / ESRI: roads, aerial imagery / Hawaii Statewide GIS Program: zoning
TETRA TECH

3.12.1.2 Hamakua Marsh (waterbird)

The proposed waterbird mitigation area, known as the Hamakua Marsh, is a waterbird sanctuary that is State-owned and administered by DNLR (TMKs (1) 4-2-003:017 and 030; (1) 4-2-016:002, 004, 013, and 015; and (1) 4-2-038:024). Hamakua Marsh is located on the western edge of the town of Kailua and adjacent to Kawainui Marsh, a DLNR-owned and managed waterbird management area.

Hamakua Marsh is a smaller wetland that was historically connected to and immediately downstream (southeast) of Kawainui Marsh. Both Hamakua and Kawainui Marshes were designated as Ramsar Wetlands of International importance in 2005 for their biological, historical, and cultural significance (USACE 2008). Currently, Hamakua Marsh is designated as a Hawaii Sate Wildlife Sanctuary and is managed by the DOFAW.

Immediately adjacent to the Hamakua Marsh to the north, east and south are commercial and residential areas. The Kawainui Marsh conservation lands are immediately adjacent to the south and west. The Hamakua Marsh area provides a buffer between urban land uses and conservation and fallow lands.

The Hamakua Marsh mitigation area is predominately located within the State urban land use district, with some slivers within the State conservation land use district. The area is also located within the boundaries of the Koolaupoko planning region of Oahu. The comprehensive plan applicable to this area is the Koolaupoko Sustainable Communities Plan, which designates the Hamakua Marsh for Open Space/Preservation areas (City and County of Honolulu, DPP 2000). The Hamakua Marsh mitigation area is a mix of several classifications of the City and County of Honolulu zoning districts, including P-2 General Preservation, P-1 Restricted Preservation, R-10 / R-5 / R-7.5 Residential, and B-1 / B-2 / BMX-3 Neighborhood Business, Community Business, Community Business Mixed Use.

3.12.1.3 Poamoho Ridge (bat)

The Poamoho Ridge mitigation area is owned and managed by the State (DLNR) and comprises two land areas within TMKs (1)7-2-001:006 (portion), (1)6-3-001:001 (portion), (1)5-3-011:001 (portion), and (1)5-2-001:001 (portion). Poamoho Ridge mitigation area is located near the ridgeline of the Koolau Mountain Range, within the Ewa Forest Reserve (Poamoho Section), which itself is a portion of the Army's Kawailoa Training Area see Section 3.19 Military).

The existing land use for the Poamoho Ridge is forest reserves as it is located entirely in the Ewa Forest Reserve. Immediately to the south is military owned Schofield Barracks. And over the ridge to the east are vacant ridge lands, and further east are the coastal towns of Kaawa and Punaluu.

The Poamoho Ridge bat mitigation area is located within the State conservation land use district. The Poamoho Ridge bat mitigation area is not located within the boundaries of a planning region of Oahu. The Poamoho Ridge mitigation area is within the City and County of Honolulu P-1 Restricted Preservation zoning district.

3.13 Recreation and Tourism

This section identifies recreation and tourism resources in the vicinity of the wind farm site and the HCP mitigation areas. Recreation resources were identified through review of a number of information sources, including the Koolau Loa Sustainable Communities Plan (City and County of Honolulu, DPP 2012) and Koolaupoko Sustainable Communities Plan (City and County of Honolulu, DPP 2000), the Hawaii Tourism Authority website (HTA 2014a), the Hawaii State Parks website (DLNR 2014), and the City and County of Honolulu online GIS mapping system (HoLIS 2014). The analysis area for recreation and tourism includes the area within 5 miles of the wind farm site, and within 1 mile of the bat and waterbird mitigation areas.

3.13.1 Wind Farm Site

Publicly-owned or –managed recreation and tourism resources near the wind farm site include resources owned or managed by the USFWS, DOFAW, DLNR Division of State Parks, and the City and County of Honolulu Department of Parks and Recreation (DPR). Public recreation resources in the analysis area include a national wildlife refuge, three State forest reserves, five State sea bird sanctuary islands, one State recreation area, one district park, one community park, one neighborhood park, nine beach parks, a State wayside, a public golf course, and one undeveloped park property. Designated trails are found in three of the forest reserves and along the western edge of the KTA.

Important privately-owned recreation and tourism resources near the wind farm site include the Turtle Bay Resort and its two associated golf courses, the Kahuku Motocross Course and the Hukilau Beach Park. The Polynesian Cultural Center is also located nearby in Laie town.

Identified public and private recreation and tourism resources are shown on Figure 3.13-1. Table 3.13-1 provides a brief description of each of these areas, identifies the owner or management agency, and indicates the distance and direction of each of these resources from the wind farm site and the respective mitigation areas. Table 3.13-1 is organized by type; Federal areas are first, followed by State-managed areas then by county-managed resources, and finally by private recreation and tourism resources.

There are no designated trails within or in close proximity to the wind farm site. The nearest designated trails are located in the westernmost portion of the KTA, in that area designated as the Pupukea-Paumalu Forest Reserve; the two designated hiking trails (Pupukea Summit Trail and Kaunala Trail) are accessed from the Waianae Valley. A third trail, the Koolau Summit Trail, is also accessed from the Waianae Valley; it runs along the southeastern boundary of the KTA, following the spine of the Koolau Mountain Range. Three additional trails are located within the Hauula Forest Reserve; one of these extends and provides the only discernable public access into the Kaipapau Forest Reserve.

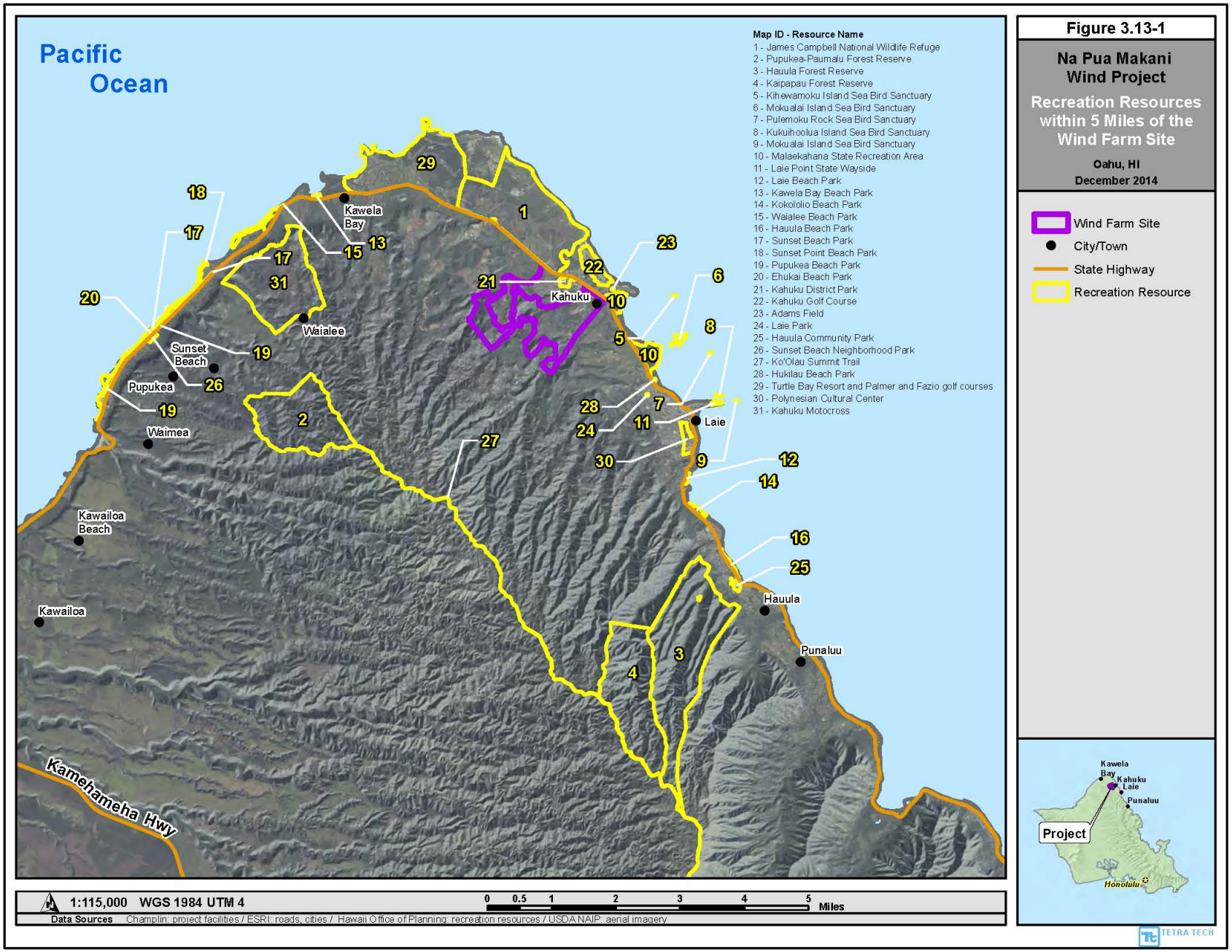
Figure 3.13-1
Na Pua Makani Wind Project
Recreation Resources within 5 Miles of the Wind Farm Site
Oahu, HI
December 2014
Pacific Ocean
Map ID - Resource Name
1 - James Campbell National Wildlife Refuge
2 - Pupukea-Paumalu Forest Reserve
3 - Hauula Forest Reserve
4 - Kaipapau Forest Reserve
5 - Kihewamoku Island Sea Bird Sanctuary
6 - Mokualai Island Sea Bird Sanctuary
7 - Pulemoku Rock Sea Bird Sanctuary
8 - Kukuihoolua Island Sea Bird Sanctuary
9 - Mokualai Island Sea Bird Sanctuary
10 - Malaekahana State Recreation Area
11 - Laie Point State Wayside
12 - Laie Beach Park
13 - Kawela Bay Beach Park
14 - Kokololio Beach Park
15 - Waialee Beach Park
16 - Hauula Beach Park
17 - Sunset Beach Park
18 - Sunset Point Beach Park
19 - Pupukea Beach Park
20 - Ehukai Beach Park
21 - Kahuku District Park
22 - Kahuku Golf Course
23 - Adams Field
24 - Laie Park
25 - Hauula Community Park
26 - Sunset Beach Neighborhood Park
27 - Ko'Olau Summit Trail
28 - Hukilau Beach Park
29 - Turtle Bay Resort and Palmer and Fazio golf courses
30 - Polynesian Cultural Center
31 - Kahuku Motocross
Wind Farm Site
City/Town
State Highway
Recreation Resource
Kawela Bay
Kahuku
Laie
Waialee
Sunset Beach
Pupukea
Waimea
Kawailoa Beach
Kawailoa
Hauula
Punaluu
Kamehameha Hwy
Project
Honolulu
1:115,000 WGS 1984 UTM 4
0 0.5 1 2 3 4 5 Miles
Data Sources Champlin: project facilities / ESRI: roads, cities / Hawaii Office of Planning: recreation resources / USDA NAIP: aerial imagery
TETRA TECH

Table 3.13-1. Recreation and Tourism Resources Near the Wind Farm Site and the Proposed Bat and Waterbird Mitigation Areas

GIS ID No.	Recreation Resource Name	Direction from Wind Farm Site or Mitigation Area	Distance from Wind Farm Site or Mitigation Area (Miles)	Owner/ Jurisdiction	Description
Recreation Resources Within 5 Miles of the Wind Farm Site					
1	James Campbell NWR	North	0.01	USFWS	Wildlife refuge consisting of over 160 acres of wetland habitat, primarily devoted to the recovery of Hawaii's four endemic water birds
2	Pupukea-Paumalu Forest Reserve	West	2.48	DoD/ DLNR, Division of Forestry and Wildlife (DOFAW)	Forest habitat conservation area, part of the Kahuku Training Area, open to public on weekends and Federal holidays for hiking and hunting; contains two designated trails, the Pupukea Summit Trail and Kaunala Trail
3	Hauula Forest Reserve	South	3.68	DOFAW	Forest habitat conservation area; contains three designated trails, the 2.5 mile Hauula Loop Trail, the 3 mile Maakua Gulch Trail (currently closed) and the 2.5 mile Maakua Ridge Trail; all trails begin in Hauula town
4	Kaipapau Forest Reserve	South	4.01	DOFAW	Forest habitat conservation area accessible via Hauula Loop Trail
5	Kihewamoku Island Sea Bird Sanctuary	Southeast	1.08	DOFAW	Small island off the windward coast that is protected for sea bird habitat
6	Mokuauia Island Sea Bird Sanctuary	Southeast	1.23	DOFAW	Small island off the windward coast that is protected for sea bird habitat
7	Pulemoku Rock Sea Bird Sanctuary	Southeast	1.82	DOFAW	Small island off the windward coast that is protected for sea bird habitat
8	Kukuihoolua Island Sea Bird Sanctuary	Southeast	2.27	DOFAW	Small island off the windward coast that is protected for sea bird habitat
9	Mokualai Island Sea Bird Sanctuary	Southeast	2.56	DOFAW	Small island off the windward coast that is protected for sea bird habitat
10	Mālaekahana State Recreation Area	East	0.03	DLNR, Division of State Parks	Wooded windward coast beach park with picnicking and camping; area divided into two sections
11	Laie Point State Wayside	Southeast	2.29	DLNR, Division of State Parks	Small windward coast park with scenic views and shore fishing; no facilities
12	Laie Beach Park	Southeast	2.61	City and County of Honolulu Department of Parks and Recreation (DPR)	Undeveloped windward coast beach park

Table 3.13-1. Recreation and Tourism Resources Near the Wind Farm Site and the Proposed Bat and Waterbird Mitigation Areas (continued)

GIS ID No.	Recreation Resource Name	Direction from Wind Farm Site or Mitigation Area	Distance from Wind Farm Site or Mitigation Area (Miles)	Owner/ Jurisdiction	Description
13	Kawela Bay Beach Park	Northwest	2.82	DPR	Secluded North Shore beach park with no developed facilities
14	Kokololio Beach Park	Southeast	2.96	DPR	Windward coast beach park with camping
15	Waialee Beach Park	West	3.28	DPR	Undeveloped North Shore beach park
16	Hauula Beach Park	Southeast	3.81	DPR	Windward coast beach park popular for camping and picnicking
17	Sunset Beach Park	West	4.05	DPR	North Shore beach park popular for summer swimming/snorkeling and winter surfing; picnic areas provided
18	Sunset Point Beach Park	West	4.15	DPR	Undeveloped North Shore beach park at eastern end of Sunset Beach
19	Pupukea Beach Park	West	4.34	DPR	North Shore beach park popular in summer for diving and snorkeling
20	Ehukai Beach Park	West	4.93	DPR	North Shore beach park popular for surfing; home to the Bonsai Pipeline
21	Kahuku District Park	East	0.18	DPR	15.9 acre district park located in Kahuku town. Facilities include baseball and soccer fields, tennis, basketball and volleyball courts, and restrooms
22	Kahuku Golf Course	Northeast	0.16	DPR	Municipal golf course located east of Kahuku town
23	Adams Field	Northeast	0.14	DPR	Undeveloped park located east of Kahuku town
24	Laie Park	Southeast	1.39	DPR	Community-based park with basketball and tennis courts, open play field with lights
25	Hauula Community Park	Southeast	4.26	DPR	Community park with sport field and multi-purpose building, offering variety of recreation, cultural and educational activities
26	Sunset Beach Neighborhood Park	Northwest	4.86	DPR	Community park with sport field and multi-purpose building, offering variety of recreation, cultural and educational activities
27	Koolau Summit Trail	East	2.42	Varies by location	North-south trail along the summit ridgeline of Koolau Mountain Range

Table 3.13-1. Recreation and Tourism Resources Near the Wind Farm Site and the Proposed Bat and Waterbird Mitigation Areas (continued)

GIS ID No.	Recreation Resource Name	Direction from Wind Farm Site or Mitigation Area	Distance from Wind Farm Site or Mitigation Area (Miles)	Owner/ Jurisdiction	Description
28	Hukilau Beach Park	Southeast	1.37	Private	Beach park located at northern end of Laie town
29	Turtle Bay Resort, Palmer and Fazio golf courses	North	1.40	Private	Private resort at northeastern corner of Oahu, with two challenging golf courses open to public
30	Polynesian Cultural Center	Southeast	2.07	Private	Very popular tourist attraction in Laie town.
31	Kahuku Motocross Course	Northwest	2.26	DoD/Private	A portion of the Army's Kahuku Training Area leased to the Hawaii Motorsports Association; open to the public on weekends and Federal holidays
Recreation Resources Within 1 Mile of the Hamakua Marsh Waterbird Mitigation Area					
32	Ulupo Heiau Cultural Park/State Monument	West	0.88	DLNR, Division of State Parks	Sacred cultural site now listed on National and State Registers of Historic Places
33	Kawainui Marsh Regional Park	Adjacent	0	DPR	Large regional park consisting primarily of Kawainui Marsh; other parks listed below are located around its perimeter
34	Hamakua Marsh/ Hamakua Marsh Wildlife Sanctuary	Within	0	DPR	Marsh and protected wildlife area in which mitigation area is proposed
35	Kailua District Park	East	0.26	DPR	18-acre park with swimming pool, tennis and basketball courts, and other developed facilities
36	Kawai Nui Neighborhood Park	North	0.82	DPR	Typical small neighborhood park with picnic area, restrooms, and open play area
37	Keolu Hills Neighborhood Park	Southwest	0.94	DPR	Typical small neighborhood park with picnic area, restrooms, and open play area
38	Kaelepulu Mini Park	East	0.56	DPR	Typical small neighborhood park with picnic area, restrooms, and open play area
39	Pohakupu Mini Park	Southeast	0.76	DPR	Typical small neighborhood park with picnic area, restrooms, and open play area
40	Enchanted Lake Community Park	Southeast	0.40	DPR	Typical small neighborhood park with picnic area, restrooms, and open play area

Table 3.13-1. Recreation and Tourism Resources Near the Wind Farm Site and the Proposed Bat and Waterbird Mitigation Areas (continued)

GIS ID No.	Recreation Resource Name	Direction from Wind Farm Site or Mitigation Area	Distance from Wind Farm Site or Mitigation Area (Miles)	Owner/ Jurisdiction	Description
41	Kailua Beach Park	East	0.85	DPR	Popular beach park with parking, picnic areas, restrooms and rinse areas
42	Kalama Beach Park	East	0.80	DPR	Popular beach park with parking, picnic areas, restrooms and rinse areas
43	Mid-Pacific Country Club	Southeast	0.75	Private	Private golf course
44	Windward YMCA	West	0.50	Private	Private recreational/ educational facility with swimming pool and fitness center
Recreation Resources Within 1 Mile of the Poamoho Ridge Bat Mitigation Area					
45	Ewa Forest Reserve	Within and extending west	0	DoD/ DOFAW	Forest habitat conservation area, part of the Kawailoa Training Area
46	Poamoho Ridge Trail & Poamoho Hele Loa Access	Adjacent/North side	0	DoD/ DOFAW	Primitive access road and hiking trail along the northern boundary of the Ewa Forest Preserve to Poamoho Ridge
47	Schofield-Waikane Trail	Adjacent/South side	0	DoD/ DOFAW	Trail along the southern boundary of the Ewa Forest Preserve to Poamoho Ridge
48	Ahupuaa O Kahana State Park	East	0	DLNR, Division of State Parks	One of a few publicly owned ahupuaa in the state, established as a "living park" to foster native Hawaiian cultural traditions and cultural landscape
49	Sacred Falls State Park	Northeast	0.99	DLNR, Division of State Parks	This state park and its trails are closed indefinitely following a fatal May 1999 landslide
27	Koolau Summit Trail	Adjacent/East side	0	Varies by location	North-south trail along the summit ridgeline of Koolau Mountain Range
1 mile = 1.6 kilometers					

The Pupukea-Paumalu Forest Reserve is open to the public for hunting and hiking on weekends and Federal holidays, when the area will not be used by the military for training purposes. An area in the northwestern corner of the KTA is also open to the public for recreational purposes; this area is under lease by the Hawaii Motor Sports Association for motocross racing on weekends and Federal holidays (U.S. Army 2010).

The open space map in the Koolau Loa Sustainable Community Plan indicates a "mountain access" route that begins in Kahuku and extends to the southwest, passing through the wind farm site. No other information regarding this route is included in the plan; it does not appear to be a formal trail or recognized public access, and is therefore not considered further in this analysis. The Koolau Loa Sustainable Community Plan also notes the presence of scenic views that are considered important. These include views along and outward from the coast from Makahoa Point, Kalanai Point, and other beach access areas, as well as a scenic view westward from the Kamehameha Highway up the Malaekahana valley. While not specifically recreational resources, these scenic views form a part of the overall character and attraction of the area, and the Hawaiian islands in general. Scenic views are addressed in Chapters 3.14, and are therefore not considered further in this analysis of recreation resources.

The public facilities map in the Koolau Loa Sustainable Community Plan (City and County of Honolulu, DPP 2012) identifies a future bike route along the Kamehameha Highway. Similarly, the Hawaii Bike Master Plan (HIDOT 2002) calls for shared bike usage on the Kamehameha Highway in the future. This signage project is a Class III priority recommendation, to occur more than 20 years in the future. However, the Koolau Loa Sustainable Communities Plan notes that recreational use of the highway, and in particular the number of organized bicycling events that use it, has been increasing and sometimes causes delays.

3.13.2 Hamakua Marsh (waterbirds)

The Hamakua Marsh Mitigation Area is located near the western edge of the city of Kailua, adjacent to the Kawainui Canal. It is located within the Hamakua Marsh, in an area known as the Hamakua Marsh Wildlife Sanctuary. This marsh is one of a number of public recreation and tourism resources in the area, and is popular for bird watching.

In terms of acreage, the Kawainui Regional Park, which contains the Kawainui Marsh, is the largest nearby recreation and tourism resource. This park is described as an area of cultural and archaeological significance, a habitat for endangered species and introduced wildlife, a critical flood control basin, an aesthetic open space resource, and an area providing a variety of recreational and educational opportunities. The 1994 Master Plan (Wilson Okamoto 1994) indicates a number of smaller parks around the edges of the Kawainui Marsh; of those, only the Ulupo Heiau Cultural Park (home to the Ulupo Heiau State Monument) along the southeastern side is within one mile of the waterbird mitigation area. The portion of the waterbird mitigation area south of Kailua Road (HI Highway 61) is identified in the Master Plan as the Puu O Ehu Wetland.

Other public recreation and tourism resources in the vicinity include district and community parks in Kailua and the surrounding residential areas, and beach access points along the coast. The

nearest of these is the Kailua District Park, an 18-acre recreation facility with a swimming pool, tennis and basketball courts, baseball fields, and other developed active recreation facilities, located approximately 0.3 mile (0.4 kilometer) east of the waterbird mitigation area. Community parks in the analysis area include the Kawai Nui Neighborhood Park, Kaelepulu Mini Park, Enchanted Lake Community Park, Kaelepulu Mini Park, and Keolu Hills Neighborhood Park. The Kailua Beach Park, Kalama Beach Park, and a number of beach access points are located along the coast, about a mile from the waterbird mitigation area. All of these identified public recreation and tourism resources are managed by the City and County of Honolulu, Department of Parks and Recreation, except for the State-owned Ulupo Heiau Cultural Park.

There are also a number of private recreational and tourism resources in the vicinity of the waterbird mitigation area. These include the Mid-Pacific Country Club golf course, located to the east of the mitigation area, and the Windward YMCA, located along the north side of Kailua Road about 0.6 mile (1.0 kilometer) west of the waterbird mitigation area.

Identified public and private recreation resources are listed in Table 3.13-1 including a brief description of each of these areas, the owner or management agency, and the distance and direction of each of these resources from the Hamakua Marsh mitigation area.

The Kawainui Marsh Master Plan calls for the development of a Kawai Nui Gateway Park, to be located at the northeastern corner and along the northeastern side of the Kawainui Regional Park, east of the flood control levee and about 0.5 mile (0.8 kilometer) north of the waterbird mitigation area; however, this park has not yet been developed. The 2001 Trails Plan (Helber Hastert & Fee 2001) for the park includes a pedestrian and/or multipurpose trail around the perimeter of the park, but not into the waterbird mitigation area. The trails plan shows the trail running along the top of the flood control levee along the eastern side of the park, and recommends a new parking lot at the southeastern corner of the park, north of Kailua Road. A primitive dirt parking lot is present on the north side of Kailua Road and a pathway is evident along the levee, but the parking lot improvements and the remainder of the trail do not appear to have been completed to date.

3.13.3 Poamoho Ridge (bat)

Recreation and tourism resources within 1 mile of the Poamoho Ridge mitigation area are few, and public access is limited. The Poamoho parcels are located near the ridgeline of the Koolau Mountain Range, within the Ewa Forest Reserve (Poamoho Section), which itself is a portion of the Army's Kawailoa Training Area (KLOA; see Section 3.19). Nearby recreation and tourism resources are limited to the Ahupuaa O Kahana State Park and Sacred Falls State Park and three trails, described in Table 3.13-1.

Aside from three hiking trails, there are no developed recreation facilities within the 1-mile analysis area for the Poamoho Ridge mitigation area. An access road and trail run along the northern boundary of the Ewa Forest Preserve (Poamoho Ridge Trail), and a second trail runs along the southern boundary of the Ewa Forest Preserve (Schofield-Waikane Trail); both are accessed from the west near Wahaiwa, and run to the ridgeline of the Koolau Mountain Range. According to DOFAW's Na Ala Hele Trail & Access Program website (DOFAW 2013b), hiking the Schofield-

Waikane Trail requires written authorization from the Army's Director of Public Works for access, as well as a hiking permit from DOFAW. Accessing the Poamoho Ridge Trail also requires a DOFAW permit, and access to this trail is limited to no more than 20 four-wheel-drive vehicles and 100 people per day (DOFAW 2013b). Use of these trails is limited to weekends and Federal holidays only, when the Army would not be using the area for training. There are no trails leading to the Poamoho Ridge mitigation area from the east. The third trail in the vicinity is the Koolau Summit Trail, which runs north-south along the ridgeline of the Koolau Mountain Range, passing along the eastern edge of the Poamoho Ridge mitigation area. The trail extends from Pupukea at the north end to Kipapa at the south. Limited access notwithstanding, both the Ewa Forest Preserve and the adjacent Ahupuaa O Kahana State Park are designated hunting areas for wild pigs and goats (DOFAW 1999).

Sacred Falls State Park is closed indefinitely following a fatal May 1999 landslide; it is unknown when or if it will re-open to the public. The nearby Oahu Forest National Wildlife Refuge is closed to the public (USFWS 2013b) and therefore does not represent a recreation resource.

Identified recreation resources are listed in Table 3.13-1 including a brief description of each of these areas, the owner or management agency, and the distance and direction of each of these resources from the Poamoho Ridge mitigation area.

3.14 Visual Resources

Visual resources are the natural and built features of the landscape that contribute to the public's experience and appreciation of the environment. The analysis area for visual resources is defined as the area within 10 miles (16 kilometers) of the Na Pua Makani wind farm site. As discussed in more detail in Chapter 4, the 10-mile (16-kilometer) area represents the approximate zone of visual influence for the Project, based on the viewshed analysis undertaken to assess the potential for Project components to be visible. Section 3.14 summarizes existing visual resource conditions on a regional and local basis. Section 4.16 of Chapter 4 provides additional information for specific viewing locations employed in the visual assessment for the Project.

3.14.1 Regional Setting

The Island of Oahu is located in the Hawaiian High Islands Ecoregion, which contains a variety of landforms, including Fresh, massive volcanic shields and cinderlands reaching over 13,000 feet (3,962 meter) elevation; high sea cliffs up to 3,000 feet (914 meters) in height; raised coral plains; and amphitheater-headed valley/ridge systems with alluvial/colluvial bottoms . The topography of Oahu was created by two erupting volcanoes, leaving two mountain ranges separated by a broad valley, or central plain. The Koolau Mountains occupy the eastern side of the island and the Waianae Mountains occupy the western side.

3.14.2 Wind Farm Site

The wind farm site is located in the northeastern portion of Oahu. The visual setting surrounding the wind farm site consists of steep, dissected ridges surrounding gently sloping valleys, with

elevations ranging from approximately 3 feet (1 meter) above mean sea level (amsl) on the northern edge to 614 feet (187 meters) amsl on the southwestern edge. The wind farm site exhibits the typical landscape character of Oahu, with a mixture of dense forests, urbanized use, and agricultural lands. Lands adjacent to the wind farm site include agricultural lands to the north; residential, community infrastructure, and agricultural lands to the east; a mixture of agricultural lands and undeveloped forest lands to the south; and undeveloped forest lands to the west.

Higher–elevation portions of the Project Area occur on vegetated ridges not actively used for agriculture and appear more natural, while cultivated lands occupy most of the lower–elevation areas. The agricultural areas support a wide array of crops being cultivated by lessees and landowners, and include some areas of fallow agricultural land. The colors and textures of agricultural lands appear more natural when compared to the developed communities.

The operational Kahuku Wind Power Project abuts the Project Area to the northwest. The James Campbell National Wildlife Refuge is approximately 0.01 mile (0.02 kilometer) to the north and Malaekahana State Recreation Area is approximately 0.03 mile (0.05 kilometer) to the east.

A number of primarily residential communities are located along the Kamehameha Highway, including Kahuku, Laie, Hauula, Punaluu, Kahana and Kaaawa. The Kamehameha Highway is the only arterial roadway linking these areas with the North Shore.

3.14.3 Mitigation Areas

3.14.3.1 Hamakua Marsh (waterbird)

The proposed waterbird mitigation area/sanctuary, known as the Hamakua Marsh, is State-owned and administered by the State of Hawaii DLNR. Hamakua Marsh is located on the western edge of the town of Kailua and adjacent to Kawainui Marsh, a DLNR-owned and managed waterbird management area.

Immediately adjacent to the Hamakua Marsh are commercial and residential areas. The Hamakua Marsh area provides a buffer between these residential and commercial areas and conservation and fallow farm lands.

The Hamakua Marsh is located within the boundaries of the Koolaupoko planning region of Oahu. The comprehensive plan applicable to this area is the Koolaupoko Sustainable Communities Plan, which designates the Hamakua Marsh for Open Space/Preservation areas (City and County of Honolulu, DPP 2012).

3.14.3.2 Poamoho Ridge (bat)

The Poamoho Ridge mitigation area is also owned and managed by the State (DLNR) and comprises two land areas located near the ridgeline of the Koolau Mountain Range, within the Ewa Forest Reserve, which is a portion of the Army's Kawailoa Training Area.

The existing landscape character for the Poamoho Ridge is forest as it is located entirely in the Ewa Forest Reserve. Immediately to the south is military owned Schofield Barracks. And over the ridge to the east are vacant ridge lands, and further east are the coastal towns of Kaawa and Punaluu.

3.14.4 Applicable Plans

Public agencies use planning policy to establish visual resource management objectives to protect and enhance visual resources. Goals, objectives, policies, implementation strategies, and guidance are typically found in comprehensive plans, and local specific plans.

The wind farm site is not identified as a scenic vista or viewshed in the county or State plans or studies. The wind farm site is located within the Koolau Loa area of Oahu, which spans the northern half of Oahu's windward coast. The KooLoa Sustainable Communities Plan (2012) identifies the need to "preserve the region's rural character and its natural, cultural, scenic and agricultural resources."

Scenic and visual resources referenced in The Koolau Loa Sustainable Communities Plan include sections of the Kamehameha Highway, a State-designated scenic highway, Turtle Bay Golf Course, Kahuku Golf Course, Kahuku Training Area, numerous parks and recreation areas (City and County of Honolulu, DPP 2012).

The Koolau Loa Sustainable Communities Plan designates the lands containing the wind farm site as rural. Policies listed in the Plan pertaining to electrical systems include:

- Provide adequate and reliable electrical service.
- Locate and design system elements such as renewable energy facilities (e.g., wind and solar), electrical sub-stations, communication sites, and transmission lines, including consideration of underground transmission lines, to avoid or mitigate visual impacts on scenic and natural resources, as well as public safety considerations.
- Discourage the use and installation of overhead utility lines and poles. Strong consideration should be given to placing replacement and new transmission lines underground to enhance viewplanes, increase highway safety and improve utility service.
- Encourage the development and use of renewable energy sources and energy conservation measures.

There were no other scenic resource policies in the Koolau Loa Sustainable Communities Plan pertaining to lands in the wind farm site. In addition there were no other applicable jurisdictions or land use plans identifying scenic resources in the wind farm site.

3.15 Transportation

This section addresses public and privately owned transportation infrastructure, including harbors, airports, highways, and roadways. A discussion of transportation and traffic includes the movement of motor vehicles, ships, airplanes, pedestrians, and bicyclists. The analysis area for transportation and traffic includes the routes of travel to and from Project Area, including the construction access routes, as described in Section 2.4.6, and the mitigation areas.

3.15.1 Existing Conditions

3.15.1.1 Harbors

There are two deep draft harbors in Oahu: Honolulu and Kalaeloa Barbers Point harbors. Project cargo would be transported to Kalaeloa Harbor which is a heavy lift berthing facility that is able to accommodate the equipment and materials for the Project, namely the turbines.

3.15.1.2 Airports

The Project is approximately 22 miles (35 kilometers) north of the Honolulu International Airport and is approximately 38 miles (61 kilometers) driving distance from the airport using Interstate H-3. The Project is approximately 15 miles (24 kilometers) east of the Dillingham Airfield and is approximately 24 miles (39 kilometers) driving distance from the Dillingham Airfield. Other farther away public airports on Oahu include Kalaeloa Airport. There are no privately-owned runways on Oahu. However, there are several military airports serving Oahu including Hickam Air Force Base, Marine Corps Base Hawaii Kaneohe Bay, and Wheeler Army Airfield.

The Applicant is required to receive approval from the Federal Aviation Administration (FAA) for the construction of the Project. Pursuant to 14 CFR 77, temporary or permanent structures higher than 200 feet amsl or exceeding any obstruction standards should generally be marked or lighted. This review process ensures that there are no adverse impacts to air traffic and determines the lighting plan that would be required at the Project.

3.15.1.3 Highways and Roadways

Wind Farm Site

State and county highways and roadways comprise the majority of the proposed construction route, as described in Section 2.4.6, to the wind farm site. These roads are further identified in Tables 2-3, 2-4, and 2-5 with the construction route segment, ownership/jurisdiction, and approximate distance.

Access to the Project is provided through two locations off of Kamehameha Highway; via the existing Malaekahana Road and via unnamed existing State-owned roads that lead to the Kahuku Agricultural Park. Kamehameha Highway is the regional State highway that serves the Koolau Loa area as a two-lane undivided highway. Kamehameha Highway is under the jurisdiction of the State of Hawaii, Department of Transportation. The lanes are 12 feet (3.7 meters) wide with grassed and, in some sections, paved shoulders. Posted speed limits along the Highway vary between 25 and 45 mph and generally have lower speed limits near towns and schools. The posted speed limit near the access road into the wind farm site is 35 mph.

The Na Pua Makani Wind Farm Traffic Assessment Report (see Appendix B) provided the morning and afternoon peak hour traffic volumes as well as the 24-hour volume at the Malaekahana Stream Bridge Hawaii Department of Transportation count station in 2013. Table 3.15-1 provides these traffic counts revealing that the morning peak hour was between 7:00 a.m. to 8:00 a.m. while the afternoon peak was between 3:45 p.m. and 4:45 p.m.

Table 3.15-1. Existing 2013 Traffic Counts

Time	Total Traffic Volume (Both Directions)
AM Peak Hour (7:00 a.m. – 8:00 a.m.)	1,095
PM Peak Hour (3:45 p.m. – 4:45 p.m.)	1,012
24 Hour	12,187
Source: State of Hawaii, Department of Transportation, Highways Division	

To note, the traffic volumes in 2013 reflect traffic volumes in previous years. The traffic volumes over 12 years of available data show a modest increase as noted in Appendix B.

Mitigation Areas

Access to the Poamoho Ridge for the Hawaiian bat mitigation is along Paalaa Uka Pupukea Road, near the entrance of Helemano Military Reservation, to a controlled gate leading to a jeep trail to the Poamoho Ridge trail head. Access to the Poamoho Ridge requires a permit from DOFAW and four-wheel-drive vehicle. At the end of the controlled access jeep trail is the start of the trail head for the Poamoho Trail which is a several mile hike to the mitigation area. Paalaa Uka Pupukea Road is a two-lane undivided Federal roadway mainly serving Helemano Military Reservation. The posted speed limit ranges from 15 to 35 mph (24 to 56 kph).

Access to the Hamakua Marsh for the waterbirds mitigation is along Hamakua Drive. Hamakua Drive is a four-lane undivided County roadway mainly serving Kailua residential neighborhoods. The posted speed limit is 25 mph (40 kph).

3.15.1.4 Transit Systems

The City and County of Honolulu operates the island's transit system called "TheBus". TheBus provides service island-wide and 7 days a week including holidays. Routes 55 (North Shore to Kaneohe to Ala Moana) and 88A (North Shore Express) run along the Kamehameha Highway adjacent to the Project Area.

There are no TheBus routes that stop nearby the controlled gate access to enter the jeep trail to get to the Poamoho Trail head nor Paalaa Uka Pupukea Road.

TheBus Routes 56, 57, 57A, 70, and 89 run along Kailua Road near Hamakua Drive that have bus stop locations near the Hamakua Marsh.

3.15.1.5 Pedestrians and Bicyclists

In addition to vehicular traffic, the majority of the Project's construction access route is used by pedestrians and bicyclists. These uses are generally highway and roadway shoulders shared by pedestrian and bicyclist alike. The closest bike and pedestrian path to the wind farm site access

road is Malaekahana Bike and Pedestrian Path along Kamehameha Highway is located south of the wind farm site approximately one mile away.

There is no bike access to the Koolau Mountain Watershed mitigation area. Hiking is available to this area but requires a permit from DOFAW.

Pedestrian access for the Hamakua Marsh is along Hamakua Drive as a sidewalk on both sides of the road while bike access is provided by a shared shoulder.

3.16 Public Health and Safety

The analysis of health and safety in this EIS examines the issues related to public health and safety as they relate to wind energy projects. The potential for injuries to workers and the general public during construction may result from 1) the movement of construction vehicles, equipment, and materials; 2) falling overhead objects; 3) falls into open excavations; and 4) electrocution. These types of incidents can be managed with standard construction practices and therefore are not discussed in detail here. Health and safety issues addressed here relate to the operation and/or failure of the Project or its components. Where applicable, discussion of Project-specific health and safety conditions is also included. Therefore, the analysis area for health and safety is the wind farm site and the surrounding community. The health and safely analysis in this EIS is based on information from scientific studies and data generated from wind projects currently operating in the United States and Europe.

3.16.1.1 Turbine Collapse and Blade Throw

Health and safety hazards related to wind turbines include collapse of the turbine tower and rotor blades breaking causing parts to fall or be thrown from the nacelle. It is not very common for a turbine to collapse or a rotor blade to be dropped or thrown from the nacelle, but such incidents do occur and are potentially dangerous for site personnel and the general public. A study by Caithness Windfarm Information Forum, documented 280 separate incidences from the 1990s through 2013 around the world of blade failure due to whole blades or pieces of blade being thrown from a turbine (CWIF 2013). Honolulu County's Land Use Ordnance provision (Article 4, Section 21-5.700) specifies that wind turbines must be set back from all property lines a minimum distance equal to the height of the system, where height shall include the height of the tower and the farthest vertical extension of the turbine. These setback distances are established for safety, should a turbine failure occur.

One concern raised during scoping was the risk to public safety associated with the ability of turbines to withstand hurricane force winds. The International Electrotechnical Commission (IEC) has a set of international design standards, collectively referred to as IEC 61400, which ensure that wind turbines are appropriately engineered against damage from hazards within their planned lifetime (IEC 2005). Wind conditions are one environmental factor that must be taken into account in turbine design, and to this end, the IEC has defined wind turbine classes determined by three parameters: the average wind speed, extreme 50-year gust (defined as a 3-second average gust that has a 50 percent probability of occurring in 50 years), and turbulence. All turbine models are

expected to be able to withstand a minimum average wind speed at hub height of 13.4 mph (6 meters per second), and extreme 50-year gusts of at least 94 mph (42 meters per second).

3.16.1.2 Shadow Flicker

A wind turbine's moving blades can cast a moving shadow on locations within a certain distance of a turbine. These moving shadows are called shadow flicker, and can be a temporary phenomenon experienced by people at nearby residences or public gathering places ("receptors"). The impact area depends on the time of year and day (which determines the sun's azimuth and altitude angles) and the wind turbine's physical characteristics (height, rotor diameter, blade width, and orientation of the rotor blades). Wind turbine shadow flicker generally occurs during low angle sunlight conditions, typical during sunrise and sunset. ~~Wind turbine shadow flicker has~~Moving shadows have the potential to induce epilepsy seizures annoyance, stress, and safety concerns including vehicle driver distraction; however, as discussed below, the rotational speed of modern wind turbines is well below the level at which these shadow flicker effects would be likely to occur.

Shadow flicker intensity for receptor-to-turbine distances beyond 4,921 feet (1,500 meters) is very low and generally considered imperceptible. Shadow flicker intensity for receptor-to-turbine distances between 3,281 and 4,921 feet (1,000 and 1,500 meters) is also low and considered barely noticeable (Tetra Tech 2012b). At this distance, shadow flicker intensity would only tend to be noticed under conditions that would enhance the intensity difference, such as observing from a dark room with a single window directly facing the turbine casting the shadow. There are no State or national standards for frequency or duration of shadow flicker from wind turbines.

Photosensitive epilepsy occurs in one in 4,000 (0.025 percent) of the population (Harding and Jeavons 1994 as cited in Harding et al. 2008). Harding et al. (2008) determined that flicker from turbines that interrupt or reflect sunlight at frequencies greater than 3 hertz poses a potential risk of inducing photosensitive seizures; at 3 hertz and below the cumulative risk of inducing a seizure should be 1.7 per 100,000 (0.0017 percent) of the photosensitive population. Harding et al. (2008) suggest that it is important to keep rotation speeds to a minimum, and in the case of turbines with three blades ensure that the maximum speed of rotation does not exceed 60 revolutions per minute, which is normal practice for large wind farms.

3.16.1.3 Fire

The presence of electrical gathering equipment and electrical cables, and oils used for lubricating, cooling and hydraulic functions within wind turbine towers and nacelles can create the potential for fire or medical emergencies. In addition, the storage and use of fuels, oils, and hydrolic fluid at various facilities such as the onsite substation, the equipment staging and laydown area and operations and maintenance building also have the potential for fire (see Section 3.18 – Public Infrastructure and Services for additional information).

In 2012, a fire at the Kahuku Wind Farm adjacent to the wind farm site destroyed the battery storage facility where the energy collected by the turbines was stored, however no one was hurt and toxic chemical levels were determined to be within safe range (Hawaii News Now 2012 and

Honolulu Civil Beat 2012). At the same building there was a fire reported in 2011 that destroyed inverters. The Na Pua Makani wind farm does not include a battery storage facility. The fire risk associated with Project operations and maintenance is similar to risks associated with other industrial and storage facilities. Operations and maintenance personnel for the Project would be trained in fire safety and response. See Section 3.6 – Natural Hazards for additional information on fire.

3.16.1.4 Noise and Vibration

Wind turbines emit low frequency noise and infrasound due to rotating blades. Low frequency noise is audible noise in the frequency range of 20 to 20,000 hertz and infrared sounds are below audible sound (i.e., less than 20 hertz) (Epsilon Associates, Inc. 2009). Low frequency noise and infrasound are thought by some to cause "Wind Turbine Syndrome" (WTS), a condition devised by Dr. Nina Pierpont to describe the collection of symptoms reported to her during interviews of people living near wind turbines (Pierpont 2009). She attributed reports of annoyance, sleep disturbance, headaches, nausea, and dizziness to exposure to low frequency noise and infrasound (Pierpont 2009) emitted by wind turbines. Pierpont interviewed a total of 23 people via telephone, and from them gathered information on the symptoms of another 15 people. There were no medical or diagnostic tests conducted with her investigation. Pierpont suggests that WTS is "mediated by the vestibular system—by disturbed sensory input to eyes, inner ears, and stretch and pressure receptors in a variety of body locations." (Pierpont 2009). Although WTS is not a recognized medical diagnosis and the Pierpont (2009) study was not peer-reviewed or published in a scientific journal, the topic has led to health concerns associated with wind energy projects. Pierpont states "Further research is needed to prove causes and physiologic mechanisms, establish prevalence, and explore effects in special populations, including children" (Pierpont 2009).

Crichton et al. (2013) tested the potential for symptom expectations regarding adverse health effects generated by wind turbines. This study concluded that healthy volunteers, when given information about the expected physiological effect of infrasound, reported symptoms that aligned with that information, during exposure to both infrasound and sham infrasound (Crichton et al 2013). Symptom expectations were created by viewing information readily available on the Internet, indicating the potential for symptom expectations to be created in real world settings (Crichton et al 2013). Results suggest psychological expectations could explain the link between wind turbine exposure and health complaints (Crichton et al 2013). Likewise, an expert panel review of wind turbine sound and health effects concluded that there is no evidence that the audible or sub-audible sounds emitted by wind turbines have any direct adverse physiological effects; the ground-borne vibrations from wind turbines are too weak to be detected by, or to affect, humans; and that the sounds from wind turbines could plausibly have direct adverse health consequences (Colby et al 2009).

In 2012 The Massachusetts Department of Environmental Protection (MassDEP) and the Massachusetts Department of Public Health (MDPH) convened an expert panel of seven doctors and scientists that found there is limited evidence suggesting that exposure to wind turbines could result in symptoms that could be characterized as WTS; in other words, it is possible that noise

from some wind turbines can cause sleep disruption but there is not enough evidence to provide particular sound-pressure thresholds at which wind turbines cause sleep disruption (MassDEP and MDPH 2012). This same study concluded that it is difficult to find reliable and comparable infrasound and low frequency noise measurement data in the peer-reviewed literature. This study also noted that it is important to make the clear distinction between amplitude-modulated noise (the whooshing sound) from wind turbines and the infrasound and low frequency noise from turbines. The whooshing noise created by modern wind turbines that is heard is not infrasound and much of its content is not at low frequency. Most of the sound is at higher frequency and as such it will be subject to higher atmospheric attenuation than the low frequency sound (MassDEP and MDPH 2012).

In 2013, an Australian team of researchers concluded the evidence for wind turbine noise and infrasound causing health problems is poor, and that reported symptoms were in response to nocebo effect (a nocebo effect is a worsening of mental or physical heath based on fear or belief in adverse effects, and is the opposite of the well-known placebo effect, where belief in positive effects of an treatment or intervention may produce positive results (Spiegel 1997) (Chapman et al 2013). It was found that there was a large variation in health complaints and wind farm noise among residents near 49 wind farms in Australia, and only 1 in 272 residents living within 3.1 miles (5 kilometers) of a wind facility complained (Chapman et al 2013). Over 80 percent of the complaints were received after 2009 when anti wind farm groups began to add health concerns to their wider opposition and following publicity generated by the publication of Dr. Nina Pierpont's "Wind Turbine Syndrome" book (Chapman et al 2013). Low frequency noise and infrasound are not currently regulated; see Section 3.4 for noise regulations.

3.16.1.5 Electromagnetic Interference

EMF refers to electric and magnetic fields that are present around any electrical device. Electric fields arise from voltage, or electrical charges and magnetic fields arise from current, or the flow of electricity that travels along transmission lines, power collection lines, substation transformers, house wiring, and electrical appliances. The intensity of the electric field is related to the voltage of the line, and the intensity of the magnetic field is related to the current flow through the conductors. Electric and magnetic fields decrease in intensity rapidly with distance from the source (NIEHS 2002).

Research has been conducted regarding exposure to EMF and potential health impacts, including cancer and childhood leukemia. The NIEHS evaluated over 20 years of active scientific research and concluded that the evidence for an association between childhood leukemia and exposure to EMF is weak, and it is not clear whether it represents a cause-and-effect relationship (NIEHS 2002). The NIEHS also concluded that at present, the available studies indicate no association between EMF exposure and childhood cancers (NIEHS 2002). While the general consensus is that electric fields pose no risk to humans, the question of whether exposure to magnetic fields can cause biological responses or health effects continues to be the subject of research and debate. The Project would generate EMF at the substation and the underground collection system.

3.16.1.6 Stray Voltage

For safety reasons, nearly all types of electrical systems in the United States are connected to the earth or "grounded." If a system is not properly wired, the point(s) at which a system is grounded can develop a small voltage that can push current through the earth and end up contacting unintended objects (AWEA 2008). Stray voltage is the result of faulty wiring on electrical systems and is easily prevented by industry-standard practices. It is also a strictly localized issue that will not affect off-site parties or properties (CanWEA undated). Stray voltage is commonly found at agricultural operations where electrical systems and wiring are not updated and where farms have metal features that may come in contact with water and wet conditions.

The main concern with stray voltage is electrical shock. This phenomenon is rare and primarily affects cattle, whose legs are far enough apart to stand on two points where different voltage levels in the ground exist (AWEA 2008). Suspected cases of stray voltage should be investigated by an inspector from a local utility operator to investigate the farm's existing wiring system to ensure proper installation, wire condition and code compliance. An inspector will seek to isolate the source of neutral-to-earth (ground) voltage through measurement of voltage at various points within the electrical system to determine whether the issue is related to on-farm wiring and distribution or whether the issue is related to the electrical distribution system off the farm (CanWEA undated).

3.17 Environmental Justice

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, requires each Federal agency to make the achievement of environmental justice part of its mission by identifying and addressing disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations. The Executive Order further stipulates that the agencies conduct their programs and activities in a manner that does not have the effect of excluding persons from participation in them, denying persons the benefits of them, or subjecting persons to discrimination because of their race, color, or national origin.

The White House Council on Environmental Quality's (CEQ's) Environmental Justice Guidance under the National Environmental Policy Act (CEQ 1997a) indicates that environmental justice concerns may arise from impacts on the natural or physical environment, such as human health or ecological impacts on minority and low-income populations, or from related social or economic impacts. The CEQ guidance also indicates that the identification of disproportionate effects does not preclude the agency from going forward with the proposed action, but should heighten attention to project alternatives, mitigation and monitoring needs, and the preferences of the affected communities (CEQ 1997a, p. 10).

The State of Hawaii has developed its own legislation and guidance related to environmental justice. Act 294, signed by Governor Lingle in July 2006, aimed to accomplish two goals: 1) to define environmental justice in the unique context of Hawaii, and 2) to develop and adopt environmental justice guidance document that addresses environmental justice in all phases of the

environmental review process (Kahihikolo 2008). Environmental Justice is defined for Hawaii as follows:

Environmental justice is the right of every person in Hawai`i to live in a clean and healthy environment, to be treated fairly, and to have meaningful involvement in decisions that affect their environment and health; with an emphasis on the responsibility of every person in Hawai`i to uphold traditional and customary Native Hawaiian practices that preserve, protect, and restore the `aina for present and future generations. Environmental justice in Hawai`i recognizes that no one segment of the population or geographic area should be disproportionately burdened with environmental and/or health impacts resulting from development, construction, operations and/or use of natural resources. (Kahihikolo 2008, p. 4-6)

Like the CEQ guidance, Hawaii Revised Statute (HRS) Chapter 343, indicates that the identification of disproportionate effects does not preclude the proposed action from going forward, but should result in increased attention to project alternatives, mitigation and monitoring needs, and the preferences of the affected communities (Kahihikolo 2008, p. 6-6).

The analysis area for the environmental justice analysis is the Koolau Loa District with emphasis on the individual communities in the Project vicinity, especially Kahuku and Laie. Data for Honolulu County and the State of Hawaii are provided for comparison, as appropriate.

3.17.1 Race and Ethnicity

The Environmental Justice guidelines provided by the CEQ (1997a) and similar direction provided by the EPA (1998) indicate that a minority community may be defined where either 1) the minority population comprises more than 50 percent of the total population, or 2) the minority population of the affected area is meaningfully greater than the minority population in the general population of an appropriate benchmark region used for comparison. Minority communities may consist of a group of individuals living in geographic proximity to one another, or a geographically dispersed set of individuals who experience common conditions of environmental effect.

The racial and ethnic composition of Hawaii is substantially different from that of the United States as a whole (Table 3.17-1 and Figure 3.17-1). Whites make up almost two-thirds of the total U.S. population, but account for just 23 percent of the population in Hawaii. No single group accounts for more than half of the population in Hawaii. The largest group is Asian, with 38 percent of the population in 2012, followed by Whites (23 percent). Asians make up just 5 percent of the total U.S. population. Another important difference between Hawaii and the United States as a whole is the proportion of the population reporting two or more races, 19 percent in Hawaii versus 2 percent nationally. Finally, Native Hawaiians and Other Pacific Islanders make up 9 percent of the Hawaiian population compared to 0.2 percent nationally (Table 3.17-1).

Table 3.17-1. 2012 Race and Ethnicity

Geographic Area	Total Population	Percent of Total Population					
		White[1/]	Asian[1/]	Native Hawaiian and Other Pacific Islander[1/]	Hispanic or Latino	Two or more races[1/]	Other Race[1/ 2/]
United States	309,138,711	63.7%	4.8%	0.2%	16.4%	2.0%	13.1%
Hawaii	1,362,730	22.8%	37.8%	9.3%	9.0%	19.3%	1.8%
Honolulu County	955,215	19.2%	43.1%	9.0%	8.3%	18.2%	2.2%
Koolau Loa CCD	20,111	29.0%	11.2%	22.6%	9.3%	26.8%	1.1%
Kahuku CDP	2,626	6.1%	24.2%	29.7%	11.3%	28.3%	0.5%
Kawela Bay CDP	279	77.4%	2.2%	1.1%	4.7%	9.0%	5.7%
Laie CDP	5,560	25.3%	9.7%	33.5%	3.7%	27.6%	0.1%

Source: U.S. Census Bureau 2012
1/ Non-Hispanic only. The Federal government considers race and Hispanic/Latino origin to be two separate and distinct concepts. People identifying Hispanic or Latino origin may be of any race. The data summarized in this table present Hispanic/Latino as a separate category.
2/ The "Other Race" category presented here includes Census respondents identifying as "Black or African American," "American Indian and Alaska Native," or "Some Other Race."

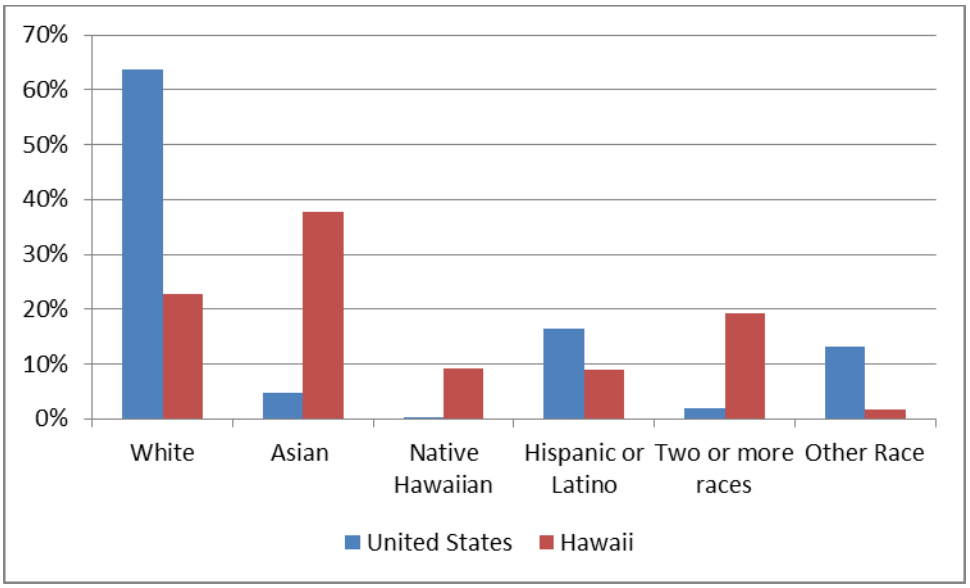

Figure 3.17-1. Racial and Ethnic Composition of the United States and Hawaii

Source: U.S. Census Bureau 2012

Substantial differences in racial composition between Hawaii and elsewhere in the United States suggest that the methodology developed by CEQ and EPA to identify minority populations is not applicable to Hawaii (Oahu Metropolitan Planning Organization and Department of Planning and Permitting 2004; Kahihikolo 2008). In racially diverse areas like Oahu, which had an overall minority population of 80.8 percent in 2012 (Table 3.17-1), it is necessary to identify those areas where minority populations are concentrated in a disproportionate way. Using 2000 Census data,

the Oahu Metropolitan Planning Organization identified minority environmental justice areas based on disproportionate concentrations of particular minority groups. Kahuku, Laie, and the coastal area south to Kaneohe Bay were identified as minority environmental justice populations based on the disproportionate concentration of Native Hawaiians and Other Pacific Islanders in these areas relative to Oahu as a whole.

Data presented for Kahuku and Laie in Table 3.17-1 suggest that these communities are still minority environmental justice areas. Native Hawaiian and Other Pacific Islanders accounted for 29.7 percent and 33.5 percent of the respective populations in Kahuku and Laie in 2012 compared to just 9 percent for Honolulu County as a whole (Table 3.17-1). Kawela Bay was not identified as a minority environmental justice population in the Oahu Metropolitan Planning Organization study and that appears to remain the case, with more than three-quarters (77.4 percent) of the population identified as non-minority (i.e., White) in 2012 (Table 3.17-1).

3.17.2 Income and Poverty

The environmental justice guidelines developed by the CEQ (1997a) and EPA (1998) indicate that low-income populations should be identified based on the annual statistical poverty thresholds established by the U.S. Census Bureau. The U.S. Census Bureau defines a poverty area as a census tract or other area where at least 20 percent of residents are below the poverty level (U.S. Census Bureau 2013). Median household income and per capita income are other measures that can be used to identify low income environmental justice populations.

Using 2000 Census Data, the Oahu Metropolitan Planning Organization identified a limited number of low income environmental justice populations based on disproportionate concentrations of low-income populations. None of the low-income environmental justice populations identified by this study were located in Koolau Loa District or in the vicinity of the Project.

Data presented for median household income, per capita income, and the percent of population below the poverty level in Table 3.17-2 suggest that this is still the case. None of the identified communities or the Koolau Loa CCD had 20 percent of more of total population below the poverty level. Median household income was higher than the state median in Kahuku and Laie, and lower in Kawela Bay. This pattern was reversed with per capita income, which was lower than the state

Table 3.17-2. Income and Poverty

Geographic Area	Median Household Income		Per Capita Income		Population Below the Poverty Level (Percent)
	Dollars	Percent of State Median	Dollars	Percent of State Per Capita	
United States	53,046	Na	28,051	na	14.9%
Hawaii	67,492	100%	29,227	100%	10.8%
Honolulu County	72,292	107%	30,219	103%	9.6%
Koolau Loa CCD	69,410	103%	23,743	81%	12.9%
Kahuku CDP	68,292	101%	17,489	60%	6.1%
Kawela Bay CDP	59,792	89%	42,706	146%	7.5%
Laie CDP	70,694	105%	15,258	52%	12.4%
Source: U.S. Census Bureau 2012					

average in Kahuku and Laie, and almost 1.5 times as high in Kawela Bay (Table 3.17-2). This discrepancy is largely the result of average household size. The average household size in Kahuku and Laie was twice as large as the average household in Kawela Bay, 4.43 persons per household and 4.89 persons, respectively, versus 2.13 persons (U.S. Census Bureau 2012).

3.18 Public Infrastructure and Services

This section addresses the availability and capacity of public infrastructure and services, including utilities, waste disposal, police and fire protection, health care facilities, and education facilities. Transportation facilities are addressed in Section 3.15. The analysis area for public infrastructure and services is intended to capture all potentially affected public infrastructure in the vicinity of the wind farm site. It therefore primarily addresses public infrastructure in and near Kahuku town; some discussion of services or infrastructure farther away is also included as appropriate.

3.18.1 Public Facilities and Services Near the Wind Farm Site

3.18.1.1 Electric Utilities

HECO provides all electrical service for the Island of Oahu. Its electrical grid is independent, relatively small, and sensitive to power fluctuations. Utility-scale electricity sold by renewable energy producers is sold directly to HECO. A HECO 46-kV electric transmission line runs along Kamehameha Highway through Kahuku, turning westward north of the town away from the highway to run through the Kahuku Wind Farm. Electric power from the Project would tie into this line and subsequently flow through HECO's grid (Figure 3.18-1).

There are utility distribution lines located along the Kamehameha Highway and throughout Kahuku town, Malaekahana, and other urbanized areas. The nearest known line to the wind farm site extends along the unnamed road running southwest near the Project access road, into the Malaekahana valley.

3.18.1.2 Gas

Hawaii Gas provides natural gas and propane service to Oahu and the other Hawaiian islands. There is no gas infrastructure in the Kahuku area; this area is served by gas cylinder delivery only.

3.18.1.3 Water

The Honolulu Board of Water Supply (HBWS) is the public agency supplying potable water to most of Oahu. HBWS manages the public water system in Kahuku and Malaekahana, and most other communities along Oahu's north and northeast coasts except for Laie, which is served by a private water system. All public water systems in Koolau Loa are supplied by groundwater. Streams in Koolau Loa are not used for the drinking water supply.

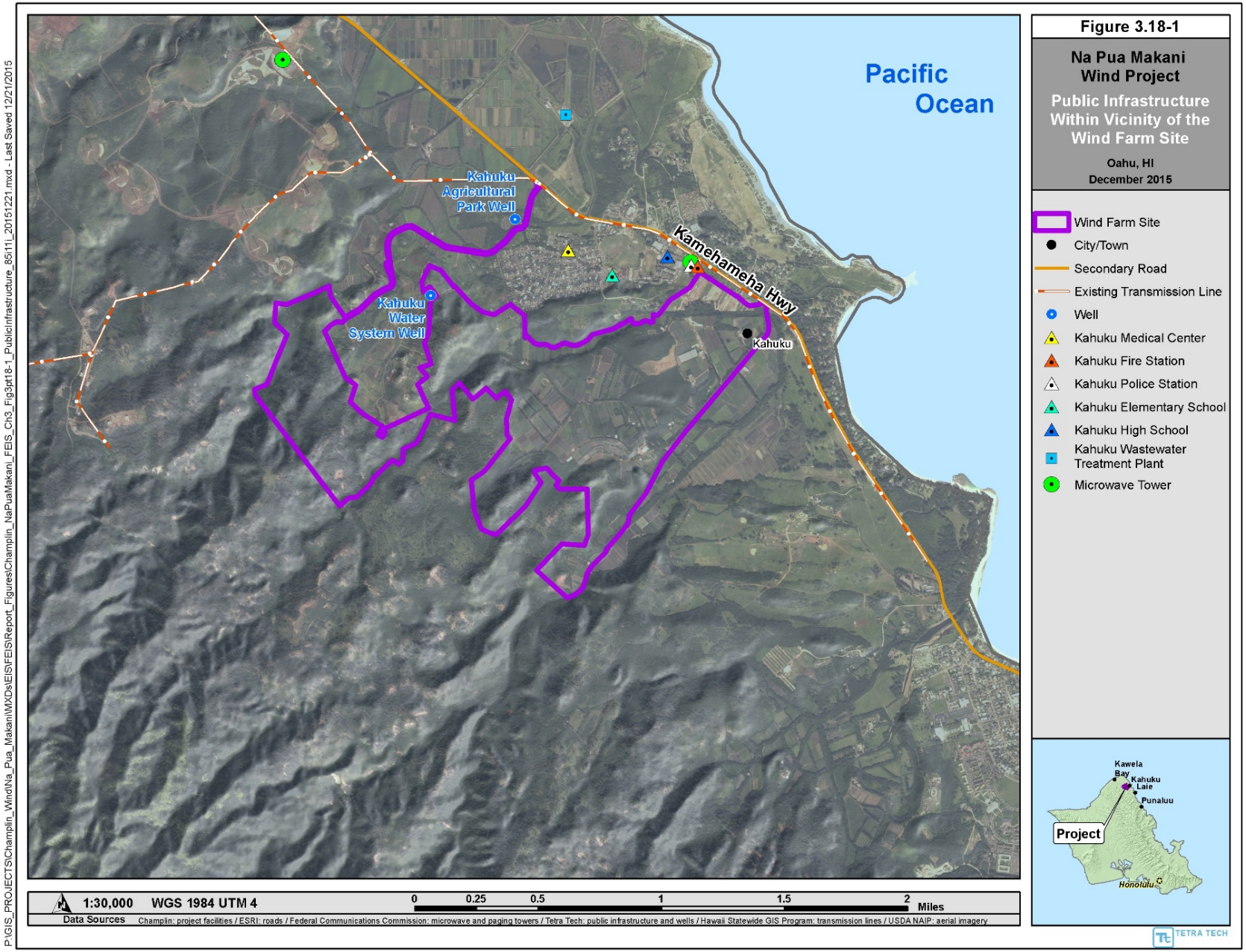
Figure 3.18-1
Na Pua Makani Wind Project
Public Infrastructure Within Vicinity of the Wind Farm Site
Oahu, HI
December 2015
Pacific Ocean
Kahuku Agricultural Park Well
Kahuku Water System Well
Kamehameha Hwy
Kahuku
Wind Farm Site
City/Town
Secondary Road
Existing Transmission Line
Well
Kahuku Medical Center
Kahuku Fire Station
Kahuku Police Station
Kahuku Elementary School
Kahuku High School
Kahuku Wastewater Treatment Plant
Microwave Tower
Kawela Bay
Kahuku
Laie
Punaluu
Project
Honolulu
1:30,000
WGS 1984 UTM 4
0 0.25 0.5 1 1.5 2 Miles
Data Sources
Champlin: project facilities / ESRI: roads / Federal Communications Commission: microwave and paging towers / Tetra Tech: public infrastructure and wells / Hawaii Statewide GIS Program: transmission lines / USDA NAIP: aerial imagery
TETRA TECH
P:\GIS_PROJECTS\Champlin_Wind\Na_Pua_Makani\MXDs\EIS\FEIS\Report_Figures\Champlin_NaPuaMakani_FEIS_Ch3_Fig3pt18-1_PublicInfrastructure_85i11l_20151221.mxd - Last Saved 12/21/2015

There are three public wells and water systems near the wind farm site. The water system serving Kahuku and Malaekahana is supplied by wells located west of the town. HBWS noted in a letter responding to Project scoping that "the project is in the vicinity of [HBWS] Kahuku wells, transmission mains and 228' reservoir. We have future plans to install a second reservoir at the site and will require sufficient setback around the entire facility." The well and reservoir are located more than 1,000 feet from the wind farm site. HBWS also provides water for the Turtle Bay Resort. The HBWS Kahuku water system is not connected to other HBWS systems. The State Department of Agriculture well supplies water to the Kahuku Agriculture Park. Based on property ownership records (HoLIS 2014), this well appears to be located at the upper end of the road through the Park, and is immediately adjacent to the wind farm site (Figure 3.18-1).

Water resources and distribution systems in the wind farm site are managed according to the HBWS' 2009 Koolau Loa Watershed Management Plan (KLWMP; HBWS 2009). The KLWMP notes that "The water supply in Koolau Loa is generally plentiful, and water availability has not been a limiting factor for local demand." The wind farm site is located within an area of the Koolau Loa watershed known as the Koolau Loa Aquifer System Area. The KLWMP reports that the sustainable yield for the Koolau Loa Aquifer System Area is 36 mgd (136 million liters per day), and that total public and private permitted withdrawals (as of 2000) are for 20.6 mgd (79 million liters per day). This indicates an excess availability of approximately 15.4 mgd (58 million liters per day). The KLWMP also includes projections for growth in water demand out to 2035, using three different sets of growth assumptions. Under the highest growth scenario, the projected water demand in 2017 (the anticipated year of Project construction and consequent water use) would be approximately 32 mgd (121 million liters per day); this would still leave an available excess of nearly 4 mgd (15 million liters per day).

Groundwater is also utilized via private wells and water distribution systems by public and private landowners with water use permits. Two of the largest water users are Turtle Bay Resort, which has a well-used for golf course irrigation, and the James Campbell NWR, which uses groundwater for wildlife habitat creation and maintenance. Both of their wells are east of the Kamehameha Highway. According to records from the CWRM, four wells serve the wind farm site within the Malaekahana Hui West, LLC-owned lands. Well No. 4057-06 is permitted to withdraw 0.670 mgd for irrigation to a turf farm. Well No. 4057-07 is permitted to withdraw 0.300 mgd for irrigation of diversified agriculture. Well Nos. 3957-01 and 3759-03 are permitted to withdraw 1.244 mgd for truck farms, taro, and domestic purposes. There are no public water systems or public water wells in the remainder of the wind farm site.

3.18.1.4 Wastewater

The closest developed wastewater system to the wind farm site serves development within the bounds of the town of Kahuku. Wastewater produced in Kahuku is treated at the Kahuku Wastewater Treatment Plant, located north of the town and east of the Kamehameha Highway, near the Kii Unit of the James Campbell NWR (R.M. Towill Corporation 2008).

Turtle Bay Resort is served by a private wastewater treatment facility, and uses the reclaimed water for golf course irrigation. The Kuilima Wastewater Treatment Plant is located south of the Kamehameha Highway, opposite the entrance to the resort. The treatment plant is approximately 2 miles (3.2 kilometers) northwest of the wind farm site.

3.18.1.5 Stormwater Drainage

There is no developed stormwater infrastructure within the wind farm site. The nearest stormwater infrastructure system is within the town of Kahuku. Some roadside ditches or other minimal facilities may occur along the private agricultural roads in the wind farm site.

3.18.1.6 Schools

Public schools on Oahu are operated by the Hawaii Department of Education. There are no public or private schools within the wind farm site. Two public schools are located in Kahuku Town: Kahuku Elementary and the Kahuku High and Intermediate School (KHIS). Kahuku Elementary is located on a 4.9-acre parcel, approximately 0.36 mile from the nearest proposed wind turbine. Kahuku Elementary School serves approximately 500 students from kindergarten to sixth grade (HDOE 2013b), with 27 teachers and classrooms. Kahuku High and Intermediate School is located on four separate parcels which are combined into an approximately 21.2 acre campus. ~~The two schools are based on a single 4.5-acre (1.8-hectare) campus, which is located approximately 0.1 mile (0.2 km) from the wind farm site~~ (Figure 3.18-1). The campus includes a football field, tennis courts, baseball diamond, and a soccer field. The nearest school building is approximately 0.45 mile from a proposed wind. KHIS serves approximately 1,500 students in grades 7 through 12, with 107 teachers and 103 classrooms. KHIS draws from communities along a 26-mile (42-kilometer) span of the north and northeastern coast; the district extends from Sunset Beach on the North Shore, to Kaaawa to the south (HDOE 2013a). The Kahuku elementary school district encompasses Kahuku town north to Kawela Bay. Of the other community elementary schools that feed into the high school, the nearest is the Laie Elementary School, located approximately 1.5 miles (2.4 kilometers) south of the wind farm site; the others are all at least 5 miles (8 kilometers) away. The Laie elementary school district extends from Malaekahana south to the boundary between Laie and Hauula, and includes the southern half of the Malaekahana valley. There are no known private schools in the vicinity of the Project (HAIS 2012).

One university is located within the analysis area: the Brigham Young University (BYU) Hawaii campus, located in Laie town. The 100-acre (40-hectare) campus is located approximately 1.7 miles (2.7 kilometers) southeast of the wind farm site. BYU-Hawaii has a student body of about 2,500 students. BYU is a private institution operated by the Church of Jesus Christ of Latter Day Saints. BYU-Hawaii is closely linked with the adjacent Polynesian Cultural Center, discussed in Section 3.13.

3.18.1.7 Emergency and Health Services

Because of its location near Kahuku Town, the Project will be close to health care, police, fire protection and other public services. The primary health service provider in the vicinity of the wind

farm site is the Kahuku Medical Center (KMC; formerly known as the Kahuku Hospital). KMC is an affiliate of the Hawaii Health System Corporation (HHSC 2014; KMC 2014), which itself is a quasi-public agency established and partially governed and funded by the State legislature (HHSC 2014). KMC is the only public medical facility serving communities along Oahu's north and northeast coasts; as such, it forms part of the "Safety Net" for Neighbor Island Acute Care and the "Safety Net" for Long-Term Care in the state of Hawaii (HHSC 2014). KMC is located in Kahuku Town (Figure 3.18-1), approximately 0.4 mile (0.6 kilometer) from the wind farm site. KMC offers a broad range of inpatient, outpatient, and ancillary services. The hospital facilities and services include patient 21 beds (all private rooms); a 24-hour emergency room; in-house laboratory, radiology and pharmacy; physical and speech therapy; and social services (KMC 2014).

Police, fire, paramedic and ambulance services are all provided by the City and County of Honolulu. Locally, these operate out of the Kahuku Police and Fire Station, located in Kahuku Town; this station is located approximately 0.1 mile (0.2 kilometer) from the wind farm site (Figure 3.18-1). Law enforcement is provided by the Honolulu Police Department; the Kahuku patrol district extends from Kawela Bay southward to Kaaawa, encompassing all of the Koolau Loa area (City and County of Honolulu, HPD 2014). The Honolulu Emergency Medical Services' Kahuku response district is similar to the police patrol district. Honolulu Emergency Medical Services has 20 advanced life support ambulances, one of which is stationed in Kahuku; a Rapid Response Paramedic unit is also stationed in Kahuku (City and County of Honolulu, EMS 2014). The Honolulu Fire Department provides emergency response for fires, emergency medical calls, hazardous materials incidents, motor vehicle accidents, natural disasters and technical rescues (City and County of Honolulu, HFD 2013). Specific equipment stationed in Kahuku is unknown. In emergencies, police, fire, paramedic and ambulance services are all dispatched in response to a standard 911 call.

3.18.1.8 Solid Wastes

Solid wastes generated during construction, not suitable for re-use onsite or recycling, would be transported for disposal at Waimanalo Gulch landfill on the Waianae coast or burned to make electricity at the H-Power (Honolulu Program of Waste Energy Recovery) facility in Kapolei; both facilities are owned by the City and County of Honolulu and operated by Waste Management. Alternatively, construction and demolition wastes could be taken to the privately-owned PVT landfill, also on the Waianae coast. Materials suitable for recycling, such as scrap steel, and wood and plastics used in shipping, would be recycled through a licensed facility. A refuse Drop-Off Convenience Facility and refuse collection yard is located near the north end of Laie.

The City and County of Honolulu is currently in the process of evaluating potential sites to supplement or replace its only municipal solid waste landfill, Waimanolo Gulch. However, the City estimates that the physical capacity of the landfill would enable it to continue to receive waste materials for at least the next 15 years (City and County of Honolulu, DES 2014), and the City has stated its intent to continue to use the landfill until it reaches full capacity (City and County of Honolulu, DES 2012). A third incinerator is under construction at the H-Power facility to enable it to divert a greater amount of waste from the landfill, potentially extending its life.

3.18.1.9 Telecommunications

Telecommunication services that are used in the vicinity of the wind farm may include a variety of radio, cell phone, internet, and radar technologies. There are six registered microwave towers in the vicinity of the wind farm site (Figure 3.18-2). One is located in Kahuku town at the Kahuku Police Station. Two are located atop Mt. Kawela within the Army's Kahuku Training Area, approximately 3.5 miles (5.6 kilometers) west of Kahuku. The tower in Kahuku and one of the two towers on Mt. Kawela are owned by the City and County of Honolulu, and presumably serve as part of the county's emergency communications system. The other tower on Mt. Kawela is a privately owned cellular communications tower. Two privately owned towers are located near Turtle Bay Resort, about 0.5 mile (0.8 kilometer) south (mauka) of the Kamehameha Highway. The final one in the vicinity is located in Sunset Beach, on the North Shore; it is also privately owned. A microwave beam path analysis has been completed to identify specific communications signal pathways within which turbines should not be placed.

The Honolulu Fire Department and several other city/county and State agencies have used very high frequency (VHF) band radios for emergency communications, and are currently in the process of migrating their communications to a more secure 800-megahertz trunking radio system (City and County of Honolulu, HFD 2013).

A Federal government communications installation is located south of Kawela Bay, approximately 0.6 mile (1.0 kilometer) south of the Kamehameha Highway within the Army's Kahuku Training Area. The installation is located at the former Opana Radar Site, famous for first detecting the incoming Japanese attack on Pearl Harbor that drew the United States into World War II. The site is now a Regional Relay Facility for Diplomatic Communications, and is operated by the U.S. State Department, Diplomatic Telecommunications Service (DTS). It is off limits to the public. DTS utilizes satellite communications as well as terrestrial wire-based communications.

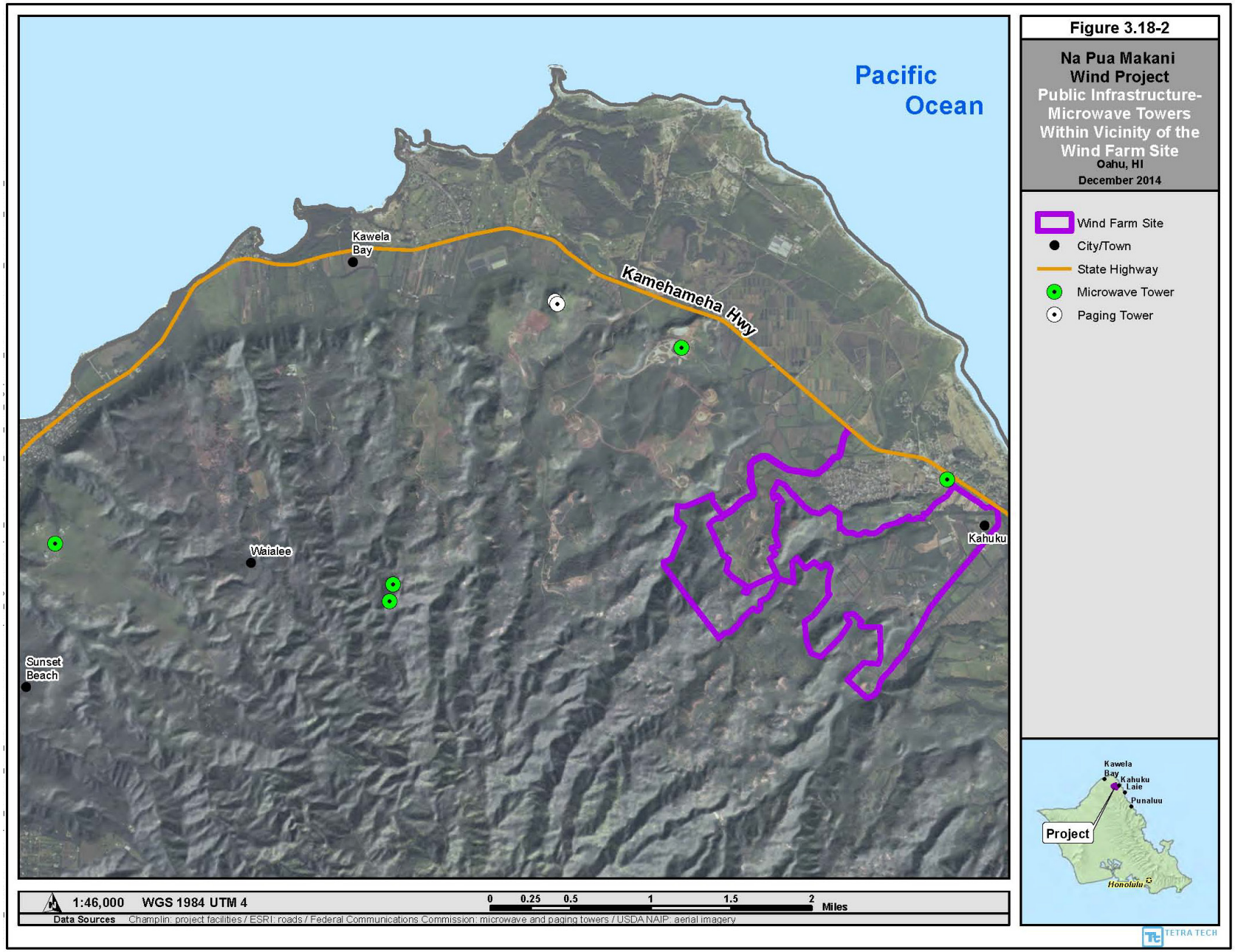
Figure 3.18-2
Na Pua Makani Wind Project
Public Infrastructure-Microwave Towers Within Vicinity of the Wind Farm Site
Oahu, HI
December 2014
Pacific Ocean
Kawela Bay
Kamehameha Hwy
Waialee
Sunset Beach
Kahuku
Wind Farm Site
City/Town
State Highway
Microwave Tower
Paging Tower
Kawela Bay
Kahuku
Laie
Punaluu
Project
Honolulu
1:46,000
WGS 1984 UTM 4
0 0.25 0.5 1 1.5 2 Miles
Data Sources Champlin: project facilities / ESRI: roads / Federal Communications Commission: microwave and paging towers / USDA NAIP: aerial imagery
TETRA TECH

3.18.2 Public Facilities and Services Near the Mitigation Areas

3.18.2.1 Hamakua Marsh (waterbird)

The proposed waterbird mitigation area is located in Hamakua Marsh near Kailua, and is surrounded by lands served by typical public urban infrastructure: public water and sewer services, solid waste services, electricity, telecommunications, transportation and stormwater infrastructure, police and fire services, parks and schools. Parks are addressed under Recreation, Section 3.13. Kailua Road (HI Highway 61) crosses the northern end of the conservation area, and Hamakua Drive forms its southeastern boundary. One overhead utility line crosses the central portion of the mitigation area, with one utility pole located in the marsh. Other roads, utilities and public infrastructure are located in and serve the developed areas to the east side and south of the marsh; aside from the aforementioned road and utility lines, there does not appear to be any public infrastructure within the Hamakua Marsh mitigation area.

3.18.2.2 Poamoho Ridge (bat)

The Poamoho Ridge bat mitigation area is located in an undeveloped area of the Koolau Mountain Range, where there are no existing public services or infrastructure. The nearest developed infrastructure is located in the town of Wahaiwa, approximately 3.5 miles (5.6 kilometers) to the west, and along the windward coast in the town of Kaaawa, more than 4 miles to the east. The U.S. Army's 2010-2014 Integrated Natural Resource Management Plan, Island of Oahu (U.S. Army 2010) notes the presence of two water supply reservoirs within the Schofield Barracks East Range (Ku Tree and Koolau reservoirs) approximately 3 miles west-southwest of the Poamoho Ridge parcel; neither is fed by streams emanating from within the Poamoho Ridge parcel.

There are no roads that lead to the Poamoho Ridge parcel. The nearest developed transportation infrastructure is a narrow dirt road that leads out of Wahaiwa along the northern boundary of the Ewa Forest Preserve; the road ends and turns into the Poamoho Ridge Trail about 2 miles (3.2 kilometers) west of the proposed bat conservation area. The nearest road to the east in the Kahana Valley ends over 2.5 miles (4.0 kilometers) east of the proposed bat conservation area.

3.19 Military

This chapter identifies military interests in the vicinity of the wind farm site and the associated waterbird and bat mitigation areas. The analysis areas vary by location; the analysis encompasses military interests within 5 miles of the wind farm site, and within 1 mile (1.6 kilometers) of the respective mitigation areas.

Two U.S. Army documents provide nearly all the background information presented in this Chapter. The 2010-2014 Integrated Natural Resource Management Plan, Island of Oahu (U.S. Army 2010) and the Final Implementation Plan for Oahu Training Areas (U.S. Army 2008) provide a wealth of information regarding the use and management of military facilities on Oahu; unless specifically noted otherwise, all information regarding military interests and facilities in this chapter is summarized from these two documents.

3.19.1 Military Interests Near the Wind Farm Site

The wind farm site abuts the eastern side of the Kahuku Training Area (KTA, Figure 3.19-1). KTA is the second largest maneuver training area on Oahu, containing 4,569 acres (1,849 hectares) suitable for maneuvers. The KTA is primarily utilized to conduct and support multiple infantry battalion-sized Army Training and Evaluation Program missions, which include mountain and jungle warfare, and air support training. Nearly all tactical maneuver training takes place in the northern portion of the KTA; the rugged terrain and dense vegetation in the southern portion of the KTA make it unsuitable for most training activities, except for small unit exercises conducted on foot. The portion of the KTA nearest the wind farm site is mapped as having no or limited training constraints (see U.S. Army 2010, Figures 2.6.c and 2.6.d).

Live-fire and tracer ammunition is prohibited at KTA except at the Combined Arms Collective Training Facility (CACTF). Ammunition is currently limited to blanks and pyrotechnics (e.g., smoke and incendiary devices), but no pyrotechnics are allowed within 3,281 feet (1,000 meters) of the KTA borders. There are no existing ordnance impact areas or Surface Danger Zones on KTA. The CACTF is a 24-building facility designed for urban warfare training; in the CACTF live-fire exercises are permitted using short-range training ammunition with low-velocity plastic bullets.

There are 11 designated helicopter landing zones and three parachute drop zones in the KTA. The nearest of these are located approximately 0.6 mile (1.0 kilometer) west and southwest of the wind farm site (see U.S. Army 2010, Figure 2.6.b).

There are no primary or secondary roads within the KTA; all roads within the KTA are paved or gravel tertiary roads or unimproved four-wheel-drive trails.

There are no permanent aviation assets on the KTA; all aviation support assets on the KTA are temporary in nature and associated with specific training events. Military aircraft from Wheeler Army Airfield support KTA. Wheeler Army Airfield also provides air traffic control during training exercises.

Portions of the KTA are open to the public for recreational purposes including hunting and motocross racing. The areas open to recreation are located in the northwestern and western-most portions of KTA, and are not adjacent to the wind farm site (see Section 3.13). The westernmost portion of the KTA is designated as the Pupukea-Paumalu Forest Reserve; this area is open to the public for hunting, and contains two designated hiking trails that are accessed from the Waianae Valley. No other hiking trails are located within the KTA.

There are three known telecommunications facilities within KTA. Two microwave towers are located atop Mt. Kawela, approximately 3.5 miles (5.6 kilometers) west of Kahuku; one is privately owned, and the other is owned by the City and County of Honolulu. The DTS Regional Relay Facility is located within the northern end of KTA. These are addressed in Section 3.18. There are no known permanent military telecommunications facilities within KTA.

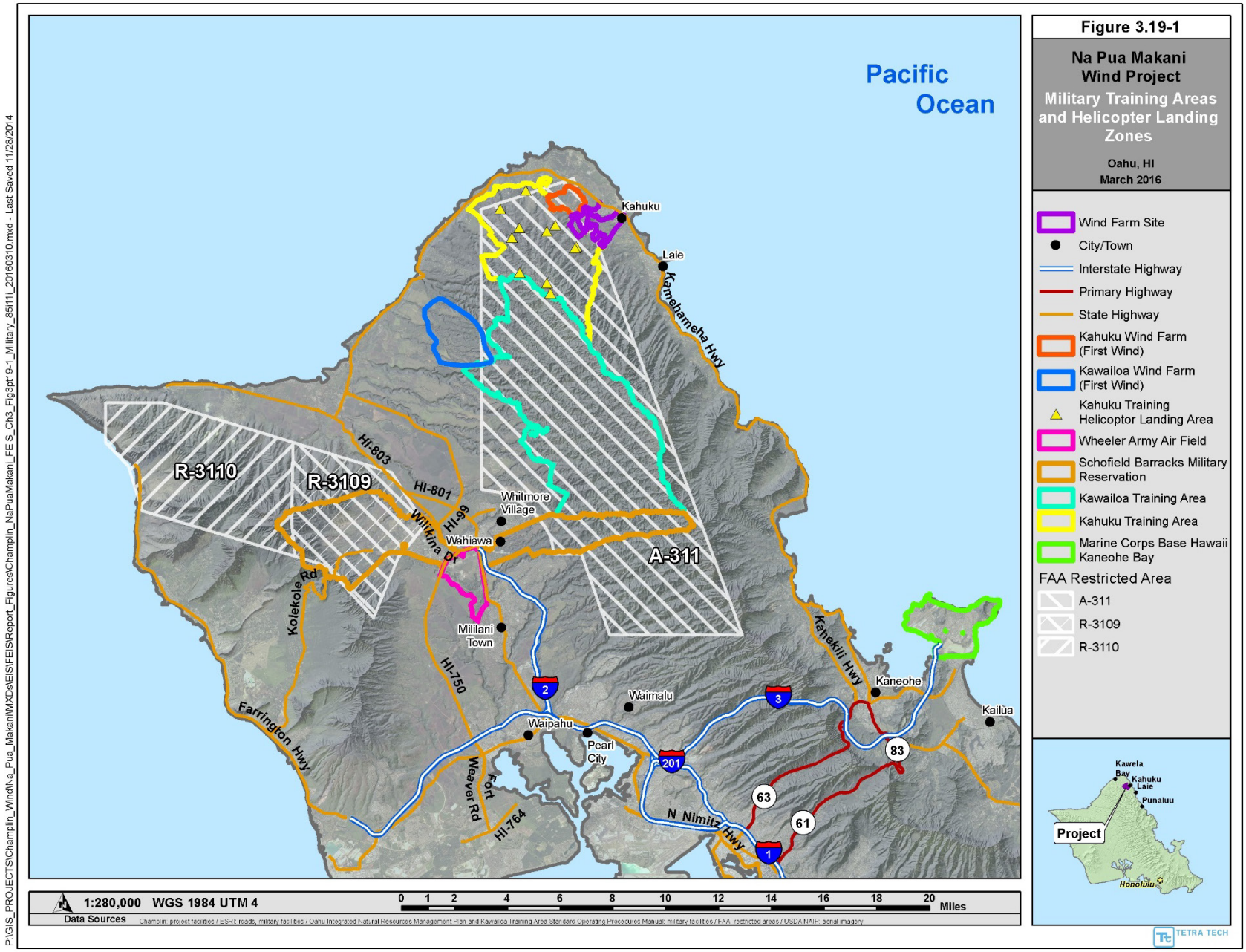
Figure 3.19-1
Na Pua Makani Wind Project
Military Training Areas and Helicopter Landing Zones
Oahu, HI
March 2016
Pacific Ocean
Wind Farm Site
City/Town
Interstate Highway
Primary Highway
State Highway
Kahuku Wind Farm (First Wind)
Kawailoa Wind Farm (First Wind)
Kahuku Training Helicoptor Landing Area
Wheeler Army Air Field
Schofield Barracks Military Reservation
Kawailoa Training Area
Kahuku Training Area
Marine Corps Base Hawaii Kaneohe Bay
FAA Restricted Area
A-311
R-3109
R-3110
R-3110
R-3109
A-311
Kahuku
Laie
Kamehameha Hwy
Whitmore Village
Wahiawa
Mililani Town
Waimalu
Waipahu
Pearl City
Kaneohe
Kailua
Kanekili Hwy
Farrington Hwy
Kolekole Rd
Wilikina Dr
HI-803
HI-801
HI-99
HI-750
HI-764
Weaver Rd
Fort
N Nimitz Hwy
1
2
3
201
63
61
83
Kawela Bay
Kahuku
Laie
Punaluu
Project
Honolulu
1:280,000 WGS 1984 UTM 4
0 1 2 4 6 8 10 12 14 16 18 20 Miles
Data Sources
Champlin project facilities / ESRI: roads, military facilities / Oahu Integrated Natural Resources Management Plan and Kawailoa Training Area Standard Operating Procedures Manual: military facilities / FAA: restricted areas / USDA NAIP: aerial imagery
TETRA TECH
P:\GIS_PROJECTS\Champlin_Wind\Na_Pua_Makani\MXDs\EIS\FEIS\Report_Figures\Champlin_NaPuaMakani_FEIS_Ch3_Fig3pt19-1_Military_85i11i_20160310.mxd - Last Saved 11/28/2014

The northern end of the U.S. Army's Kawailoa Training Area (KLOA) is also located within 5 miles (8 kilometers) of the wind farm site. KLOA is used primarily for helicopter aviation training, helicopter unit tactical training, long-range patrol, and command post displacement. KLOA is characterized by very deep ravines, dense vegetation, and tropical rainforest, and contains some of the most rugged terrain in Hawaii. Terrain is the major constraint to training in KLOA; less than one-quarter of the area is considered suitable for maneuvers. Areas with greater than 20 percent slope are considered unsuitable for all except single-file, small unit maneuvers on foot along ridgelines; most of the KLOA is shown as having slopes greater than 30 percent (see U.S. Army 2010, Figures 2.5.c and 2.5.d). Live-fire, tracer ammunition, and pyrotechnics are prohibited, while blanks are permitted under some conditions. There are 23 helicopter landing zones and one parachute drop area in KLOA; the nearest of these is over 5 miles (8 kilometers) from the wind farm site.

Access to KLOA is very limited due to the lack of improved roads, steep terrain, and dense vegetation. An improved paved roadway traverses through a small portion of the northwestern KLOA, and a few primitive four-wheel-drive tracks provide limited access to the interior of the training area. There are no developed facilities within the KLOA. Training and land management activities take place on foot or use helicopters to transport people, equipment and supplies. The Implementation Plan states that, although the U.S. Army may train via foot maneuvers in the high-elevation environmentally sensitive areas of KLOA, in practice foot maneuvers and bivouacs in the upper areas have not occurred in over ten years, and the likelihood of U.S. Army training maneuvers in those areas is low.

The U.S. Army's A-311 Alert Area overlays the KTA and KLOA (Figure 3.19-1); it is commonly referred to as the Tactical Flight Training Area (TFTA). TFTA A-311 is defined as a Special Use Airspace (SUA) which is used for helicopter training exercises, with an average of 3,500 helicopter movements per month. There are no formal flight routes; rather, flights may occur anywhere within the alert area. The alert area encompasses the airspace from ground level to 500 feet above ground level. Between the hours of 7 a.m. and 10 p.m., air traffic in the TFTA A-311 area is controlled from Wheeler Army Air Force Base. Outside of those hours the airspace is not restricted.

Operation of unmanned aircraft systems (UAS; also referred to as unmanned aerial vehicles or "drones") in the National Airspace System of the United States requires FAA-designated controlled airspace and SUA so that there would be no conflicts between commercial and military aircraft, or between manned and unmanned aircraft. An Airspace Certificate of Authorization must be obtained from the FAA to allow UAS operations within currently defined airspace used by traditional fixed-wing and rotorcraft. Locations on Oahu where SUA is designated and UAS flights are currently permitted are limited to the Wheeler Army Airfield and the associated FAA-designated restricted airspace over Schofield Barracks and the adjacent Waianae Range and Makua Valley (the Restricted Areas R-3109 and R-3110, Figure 3.19-1), and the controlled airspace of the Marine Corps Base Hawaii in Kaneohe Bay and within the Marine Corps Training Area Bellows. (DOD 2014)

UAS are not new to Hawaii; the 3rd Marine Regiment has been operating UAS since 2007, while the U.S. Army's 2nd and 3rd Brigades and Hawaii Army National Guard (HIARNG) have operated UAS

out of the Wheeler Army Airfield since 2007. The Marines currently operate UAS in the controlled airspace of the Marine Corps Base Hawaii and within the Marine Corps Training Area Bellows, both near Kailua on the eastern side of Oahu, as well as in the Pohakuloa Training Area on the Big Island. All of the U.S. Army and HIARNG UAS utilize the FAA-designated restricted airspace at Schofield Barracks/Makua Valley (R-3109 and R-3110), and at the Pohakuloa Training Area. The Army/Missile Defense Agency has utilized the FAA-designated restricted airspace above the Pacific Missile Range Facility (DOD 2014). In the most recent military document that discusses UAS use in Hawaii (the EIS for the relocation of Marine UAS Squadron 3 to Hawaii; DOD 2014), it is noted that the likelihood of receiving FAA approval to operate UAS in other areas is low, and there is no mention of making a request to FAA to utilize UAS within the A-311 alert area, except for transiting across it to travel between the Marine Corps Base Hawaii and the Wheeler Army Airfield and the Schofield Barracks/Makua Valley restricted airspace.

Military and Airspace conflicts were checked using the FAA and the Department of Defense (DoD) Clearinghouse. In 2012, FAA issued a Determination of No Hazard letter, and the DoD Clearinghouse issued a letter stating "DoD will not oppose the project."

3.19.2 Military Interests Near the Mitigation Areas

3.19.2.1 Hamakua Marsh (waterbird)

There are no military interests near the proposed waterbird mitigation area located in Hamakua marsh. The nearest military lands or facilities are located in the Marine Corps Base Hawaii, on a peninsula to the north of Kailua, about 3 miles from Hamakua Marsh.

3.19.2.2 Poamoho Ridge (bat)

The Poamoho Ridge bat mitigation area is located within the southern end of the KLOA, in a portion of the KLOA designated as the Ewa Forest Reserve as well as Oahu Elepaio Critical Habitat. The Schofield Barracks East Range (SBER) is located adjacent to the south side of the KLOA/Ewa Forest Reserve.

As noted above, the major constraint to training in KLOA is extremely rugged terrain; the same is true of the eastern end of SBER near the mitigation area. There is no developed infrastructure and no roads near the mitigation area; the nearest road ends and turns into a foot trail about 2 miles west of the mitigation area (see Section 3.14 – Recreation). The Implementation Plan states that, although the U.S. Army may train via foot maneuvers in the high-elevation environmentally sensitive areas of KLOA or SBER, in practice foot maneuvers and bivouacs in the upper areas have not occurred in more than 10 years, and the likelihood of U.S. Army training maneuvers in those areas is low. No helicopter landing zones are located near the Poamoho Ridge Mitigation Area. The active training areas within SBER are located in the western half of the range, more than 2 miles from the mitigation area. Live-fire training is not allowed on the KLOA, SBER or leased lands.

The area within the Ewa Forest Reserve is proposed in the Integrated Natural Resource Management Plan as an area off-limits to training maneuvers. The Plan proposes two small fenced

areas on the KLOA within the Poamoho Ridge Mitigation Area's northern management unit, and one small fenced area in the southern management unit. Public access to KLOA is limited to hiking the Poamoho Ridge Trail and hunting within the Ewa Forest Reserve.

3.20 Agriculture

Public comments received on the original Draft EIS included requests for additional information on agricultural uses and activities within the wind farm site and a more detailed analysis of the potential for Project-related impacts to agricultural resources. In response to these comments, the discussion of agriculture (originally in Section 3.12 – Land Use of the original Draft EIS) has been expanded and placed in this standalone section. This section begins with an overview of agricultural land classification systems applicable to the analysis and then describes the existing agricultural uses and activities within the analysis area. The analysis area for agriculture is the wind farm site and the HCP mitigation areas. This area encompasses all areas where potential direct effects to agricultural resources could occur as well as areas where indirect effects to agricultural resources, such as changes in road access or irrigation, would occur. This section also describes the regional conditions on agriculture within the Koolauloa District to provide context for the analysis.

3.20.1 Agricultural Land Classifications

Several soil and land classification systems (collectively referred to as agricultural land classifications here) have been developed to identify high quality soils and productive agricultural lands. These classification systems provide an indication of the quality of agricultural lands within the analysis area and are briefly described below.

3.20.1.1 Land Study Bureau Agricultural Productivity Classification

The University of Hawaii Land Study Bureau (LSB) Detailed Land Classification rates the agricultural productivity of soils throughout the state based on characteristics of soil properties, topography, and climate. These include the following:

- Texture – the proportion of sand, silt, and clay in a particular soil.
- Structure – the cohesion of soil material into aggregates or clumps.
- Depth – the distance to which roots can penetrate.
- Drainage – the frequency and duration of soil saturation with moisture.
- Parent material – the geologic material from which a soil has developed.
- Stoniness – affects the productivity of land by limiting the use of machinery and the selection of crops.
- Topography – the slope and surface configuration. Cultivated lands generally have slopes of less than 20 percent. Lands with slopes between 20 and 35 percent usually are not machine tilled, but are still suitable for certain uses such as orchards and grazing.
- Climate, temperature, sunlight, and rainfall – these constitute the exterior environment of the land, versus the soil properties which constitute the interior segment.

- Rain – the basic source of irrigation. Ideally, it should fall at the place, in the quantity, and at the time when it is needed (The University of Hawaii 1972).

The productivity ratings for the above characteristics were used to classify soils as Category A, B, C, D, or E, with Category A representing the most productive soils and Category E the least productive soils. The classification also included Category U, urban lands, which were not rated for productivity.

3.20.1.2 Agricultural Lands of Importance to the State of Hawaii

The Agricultural Lands of Importance to the State of Hawaii (ALISH) is a classification system for identification of agriculturally important lands in the State of Hawaii. The ALISH classification system identifies land suitable for agricultural use and classifies identified lands primarily on the basis of soil characteristics, as well as factors such as growing season, temperature, humidity, elevation, aspect and other conditions. Three classes of agriculturally important lands have been established for the State of Hawaii:

- Prime Agricultural Land
- Unique Agricultural Land, and
- Other Important Agricultural Land.

These classifications correspond to the U.S. Department of Agriculture (USDA) Soil Conservation Service classification for prime farmlands. Prime Agricultural Lands are defined as "land best suited for the production of food, feed, forage, and fiber crops" (Hawaii State Department of Agriculture 1977). This is based on its ability to sustain high yields with relatively little input and with the least damage to the environment. Unique Agricultural Land is land other than Prime Agricultural Land and is used for the production of specific high-value crops (Hawaii State Department of Agriculture 1977). Other Agricultural Land is land that is of state-wide or local importance for the production of various crops, but may have properties such as seasonal wetness, erodibility, and other characteristics that precludes it from being characterized as Prime or Unique (Hawaii State Department of Agriculture 1977). Land considered for ALISH classification may or may not currently be in agricultural use.

3.20.1.3 NRCS Land Capability Classification

The USDA NRCS land capability classification provides an indication of soil productivity for agricultural uses. Higher ratings (Classes I and II) indicate areas that are most conducive to crop production (i.e., have the least restrictions based on soil characteristics). The NRCS land capability classification groups soils primarily on the basis of their capability to produce common cultivated crops and pasture plants without resulting in soil deterioration over a long time (NRCS 2015). Soils are divided into eight classes as follows (Soil Conservation Service 1961):

- Class I: soils with few limitations that restrict their agricultural use.
- Class II: soils have some limitations that reduce or restrict the choice of plants or that require moderate conservation practices.

- Class III: soils have severe limitations that reduce or restrict the choice of plants or that require special conservation practices, or both.
- Class IV: soils have very severe limitations that restrict the choice of plants or that require very careful management, or both.
- Class V: soils are subject to little or no erosion but have other limitations, impractical to remove, that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.
- Class VI: soils have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.
- Class VII: soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife habitat.
- Class VIII: soils and miscellaneous areas with limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or aesthetic purposes.

3.20.1.4 Important Agricultural Lands

The City and County of Honolulu Department of Planning and Permitting (DPP), in compliance with HRS, Chapter 205, is conducting a mapping project to identify lands on Oahu that meet the statutory requirements for consideration as "Important Agricultural Lands" (IAL). IAL is a special State land use classification for an exclusive sub-set of high-quality farm land within the State Agricultural Land Use District. The purpose of identifying IAL is to ensure that high-quality farmland is protected and preserved for long-term agricultural use (HHF Planners 2014). The IAL designation does not change the range of allowable uses on the land, but lands that receive the IAL designation are granted access to financial incentives that make farming more viable (HHF Planners 2014). IAL are defined under HRS Section 205-42 as lands that:

- Are capable of producing sustained high agricultural yields when treated and managed according to accepted farming methods and technology;
- Contribute to the State's economic base and produce agricultural commodities for export or local consumption; or
- Are needed to promote the expansion of agricultural activities and income for the future, even if currently not in production.

Standards and criteria for the identification of potentially eligible IAL lands are defined in HRS 205-44 and include:

- Land currently used for agricultural production;
- Land with soil qualities and growing conditions that support agricultural production of food, fiber, or fuel- and energy-producing crops;
- Land with sufficient quantities of water to support viable agricultural production;
- Land identified under agricultural productivity rating systems, such as the ALISH system adopted by the Board of Agriculture on January 28, 1977;

- Land types associated with traditional native Hawaiian agricultural uses, such as taro cultivation, or unique agricultural crops and uses, such as coffee, vineyards, aquaculture, and energy production;
- Land whose designation as important agricultural lands is consistent with general, development, and community plans of the county;
- Land that contributes to maintaining a critical land mass important to agricultural operating productivity; and
- Land with or near support infrastructure conducive to agricultural productivity, such as transportation to markets, water, or power.

The first three criteria listed above were ranked highest by the IAL Technical Committee for identifying potentially eligible IAL (HFF Planners 2014). To date, the City and County of Honolulu DPP has prepared draft IAL eligibility maps based on the above criteria. The next steps in the process, anticipated to occur in 2016, are formally adopting the IAL maps and Land Use Commission designation of IAL. The draft IAL maps were considered in this EIS for identifying potentially eligible IAL within the analysis area; however, it should be noted that maps may be modified prior to formal designation of IAL on Oahu. The mapping effort is being conducted in a phased approach with Phase I including county- and privately-owned lands within the State Land Use District; other lands (e.g., State-owned lands) may be considered in Phase II.

3.20.2 Regional Context

Agriculture has historically been an important activity in Hawaii for both subsistence and economic purposes (HFF Planners 2014). Due to the moderate climate, year-round growing conditions and availability of water, agriculture has been a predominant activity in the region and is reflected in its long history of agriculturally-based land use practices. The north shore of Oahu (including Waialua, Haleiwa, and Kahuku) within which the Project is located has been identified as one of the major agricultural areas on the island (HFF Planners 2014). Climate, temperature, rainfall, topography, and other characteristics of the region which influence agricultural productivity are described in Sections 3.1 – Geology and Soils and 3. 3 – Air Quality and Climate Change and are not discussed further here.

As noted in the Project AIS and CIA (Appendices F and G; Pacific Legacy 2015 a, b), traditional agriculture in the region surrounding the Project included both irrigated and non-irrigated farming with the main crops being taro, sweet potato, and breadfruit. Most crops were Polynesian introductions, but some plants were added after European contact (e.g., melons and tobacco). A wide range of economically useful trees were also important to residents of the area including hala, kukui, and koa. By the mid-1800s (post-European contact) large-scale commercial agriculture dominated cultivation of sugar cane and pineapple had replaced traditional practices. Plantations occupied major portions of the prime agricultural lands, and diversified crops (those other than sugar cane or pineapple) were located on lower quality agricultural land (HFF Planners 2014). The 25,000-acre Kahuku Ranch was established in the mid-1870s, a large portion of which became the Kahuku Plantation sugar mill which operated until 1971. In recent decades, due to the decline in the profitability of sugar and pineapple crops, the composition of agriculture in the region has

shifted from large-scale commercial production to small farmers growing a variety of crops on former plantation lands (HFFP Planners 2014).

In the vicinity of the Project, former plantation lands are now used commercially for various food crops and small scale animal husbandry (Pacific Legacy 2015b). The Kahuku Agriculture Park is located adjacent to the wind farm site to the north. Active farming also takes place within and adjacent to the wind farm site by various farming entities. One of these farming entities, Keana Farms, owns and operates an agribusiness within the proposed wind farm site featuring a zipline attraction which includes a guided agricultural educational tour of the property.

Approximately 123,000 acres on Oahu are designated as State Agricultural Land Use District (see Section 3.12 – Land Use for discussion of State land use designations). This includes farmland suitable for crops, pasture, and forestry, as well as non-agricultural land that does not have the qualities necessary to be classified as one of the other land use districts (Conservation, Urban, and Rural). Within the Agricultural Land Use District on Oahu, there are approximately 88,000 acres of useable agricultural land, including both farmland and grazing land, of which 56,000 acres are suitable for crop production (HFF Planners 2014). Approximately 51,700 acres are currently contributing to agricultural production on Oahu, including areas used for grazing, temporarily fallow land (i.e., to be returned to active production), or has the potential to be returned to active production (see HFF Planners 2014 for details regarding these classifications). Within the Koolauloa District, which surrounds the proposed Project, approximately 4,265 acres (1,726 hectares) are currently contributing to agricultural production (IAL mapping project maps; City and County of Honolulu, DPP 2015).

3.20.3 Wind Farm Site

3.20.3.1 Agricultural Land Classifications

This section summarizes land within the wind farm site by the agricultural land classifications described in Section 3.20.1. Acreages within each classification by wind farm site parcel are show in Table 3.20-1. Acreages within the surrounding Koolaloa District are provided for comparison.

Land Study Bureau (LSB) Agricultural Productivity Classification

The majority of the soils within the wind farm site are classified as LSB Category B (42 percent), followed by Category E (39 percent), Category C (12 percent), and Categories A and D (3 percent each); approximately 1 percent of wind farm site is unclassified (Table 3.20-1; Figure 30.2-1). The most productive soils (Categories A and B) are located on the Malaekahana Hui West, LLC portion of the wind farm site.

Agricultural Lands of Importance to the State of Hawaii (ALISH)

Approximately 49 percent of the land within the wind farm site is designated as agricultural lands of importance under the ALISH classification system (Table 3.20-1; Figure 3.20-2). This includes approximately 249 acres (101 hectares) of Prime Agricultural Land and 99 acres (40 hectares) of Other Agricultural Land. The majority (228 acres (92 hectares); 89 percent) of land found within the DLNR

portion of the wind farm site are not classified under the ALISH system, while the majority (approximately 236 acres [96 hectares]; 52 percent) of lands within the Malaekahana Hui West, LLC portion of the wind farm site are classified as Prime Agricultural Lands (Table 3.20-1; Figure 3.20-2).

Table 3.20-1. Agricultural Land Classifications for the Koolauloa District and Wind Farm Site

Land Classification	Koolauloa District (Acres)	Wind Farm Site		
		DLNR Parcel (Acres)	Malaekahana Hui West, LLC Parcel (Acres)	Total[1/]
LSB Agricultural Productivity Rating				
No Data	2,886.6	<0.1	8.2	8.2 (1%)
A	645.3	2.0	19.0	21.1 (3%)
B	3,124.7	40.0	253.9	293.9 (42%)
C	2,461.9	41.6	46.8	88.4 (12%)
D	919.9	0.5	22.3	22.8 (3%)
E	27,181.5	170.5	101.7	272.2 (39%)
Total[1/]	**37,220.3**	**254.7**	**451.9**	**706.6**
ALISH Classification				
No Data	28,801.9	227.6	102.1	329.7 (47%)
Other Agricultural Land	5,208.1	13.9	84.9	98.8 (14%)
Unique Agricultural Land	0.0	0.0	0.0	0.0 (0%)
Prime Agricultural Land	2,883.2	13.2	236.1	249.3 (35%)
Unclassified Agricultural Land	327.0	0.0	28.8	28.8 (4%)
Total[1/]	**37,220.3**	**254.7**	**451.9**	**706.6**
No Data	234.7	0.0	2.5	2.5 (<1%)
Class I	0.0	0.0	0.0	0.0 (0%)
Class II	1,413.0	0.6	45.5	46.1 (7%)
Class III	3,614.9	46.5	235.2	281.7 (40%)
Class IV	1,822.9	1.3	18.0	19.3 (3%)
Class V	749.2	0.0	0.0	0.0 (0%)
Class VI	3,575.2	15.4	46.7	62.1 (9%)
Class VII	21,370.3	190.7	71.3	262.0 (37%)
Class VIII	4,440.0	0.1	32.8	32.8 (5%)
Total[1/]	**37,220.3**	**254.7**	**451.9**	**706.6**
Important Agricultural Lands				
Area with 3 Top-rated Criteria	**1,352.4**	**NA[2/]**	**209.3**	**209.3 (30%)**

[1] Column and row totals may not sum exactly due to rounding
[2] State-owned lands in the State Agricultural Land Use District were not included in Phase I of the IAL mapping effort.

NRCS Land Capability Classification

Approximately 7 percent (46 acres; 19 hectares) of the wind farm site is classified under the NRCS Land Capability classification system as being the most conducive to crop production (Class II soils; Table 3.20-1, Figure 3.20-3); there are no Class I soils within the wind farm site. The majority of land (75 percent) within the DLNR portion of the wind farm site is classified unsuitable for cultivation (Class VII), whereas the majority of land (52 percent) on the Malaekahana portion of the wind farm site is classified as having soils with severe limitations that restrict the choice of crops that can be cultivated (Class III).

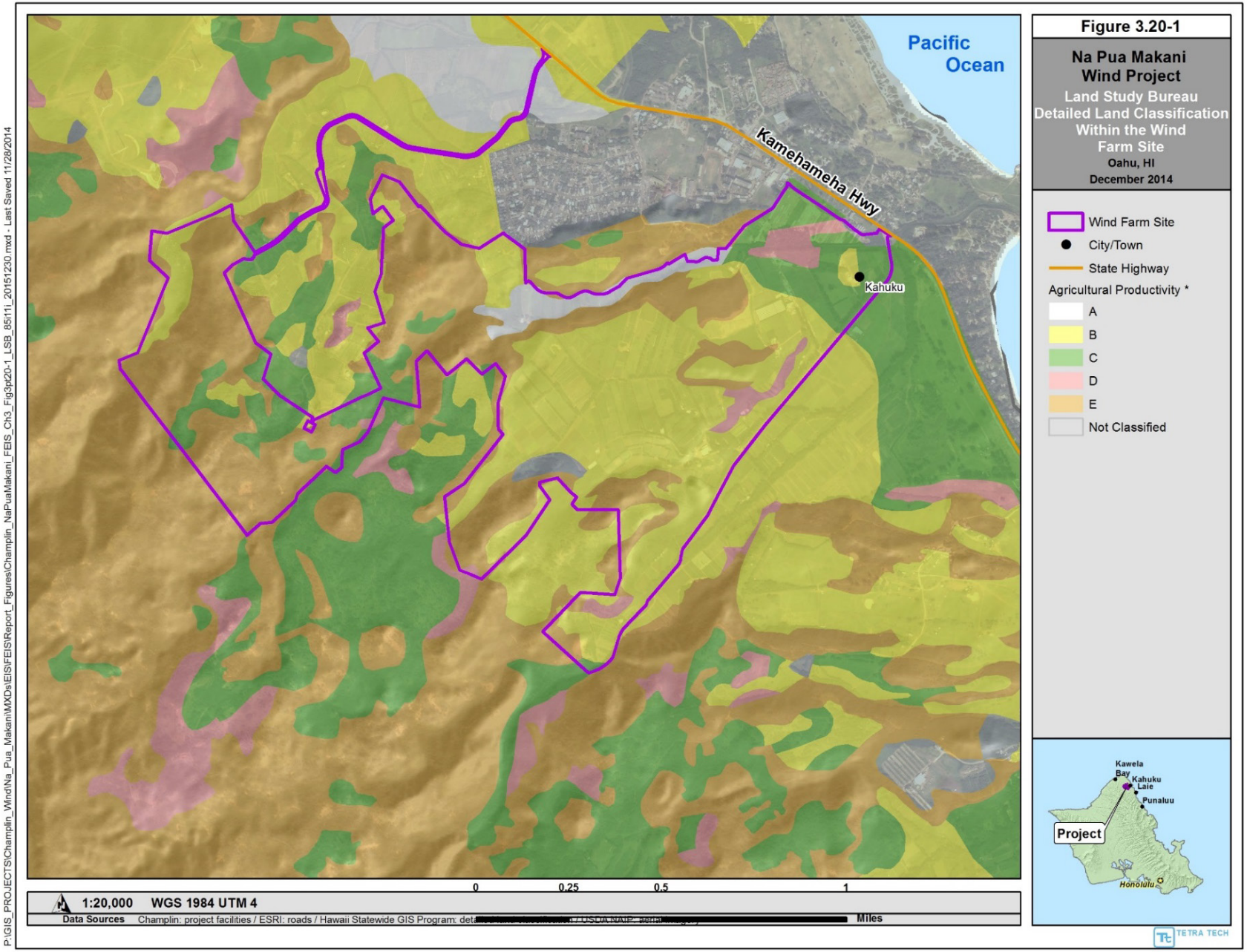
Figure 3.20-1
Na Pua Makani Wind Project
Land Study Bureau Detailed Land Classification Within the Wind Farm Site
Oahu, HI
December 2014
Pacific Ocean
Kamehameha Hwy
Kahuku
Wind Farm Site
City/Town
State Highway
Agricultural Productivity *
A
B
C
D
E
Not Classified
Kawela Bay
Kahuku
Laie
Punaluu
Project
Honolulu
0
0.25
0.5
1
Miles
1:20,000
WGS 1984 UTM 4
Data Sources
Champlin: project facilities / ESRI: roads / Hawaii Statewide GIS Program:
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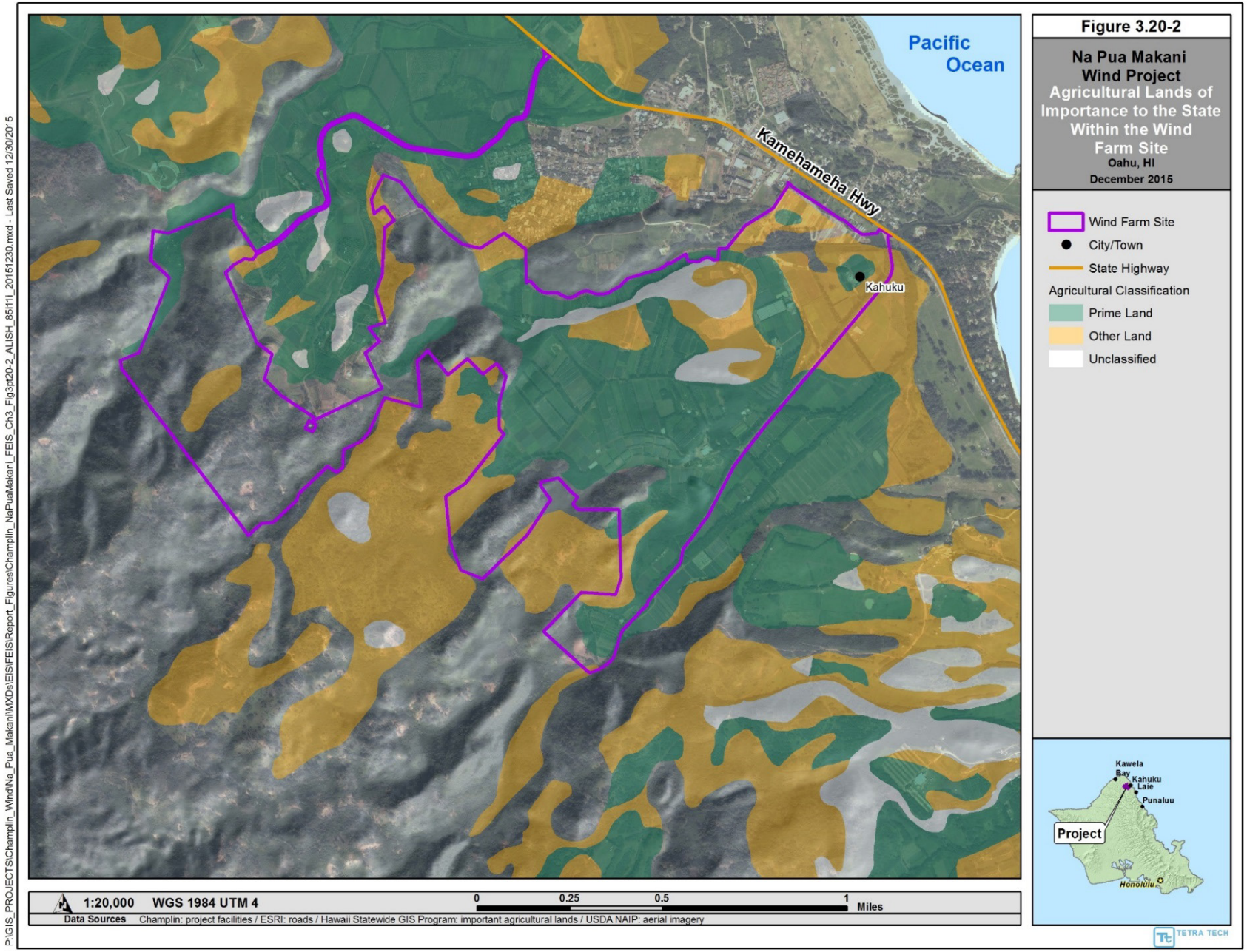
Figure 3.20-2
Na Pua Makani Wind Project
Agricultural Lands of Importance to the State Within the Wind Farm Site
Oahu, HI
December 2015
Pacific Ocean
Kamehameha Hwy
Kahuku
Wind Farm Site
City/Town
State Highway
Agricultural Classification
Prime Land
Other Land
Unclassified
Kawela Bay
Kahuku
Laie
Punaluu
Project
Honolulu
1:20,000
WGS 1984 UTM 4
0
0.25
0.5
1
Miles
Data Sources
Champlin: project facilities / ESRI: roads / Hawaii Statewide GIS Program: important agricultural lands / USDA NAIP: aerial imagery
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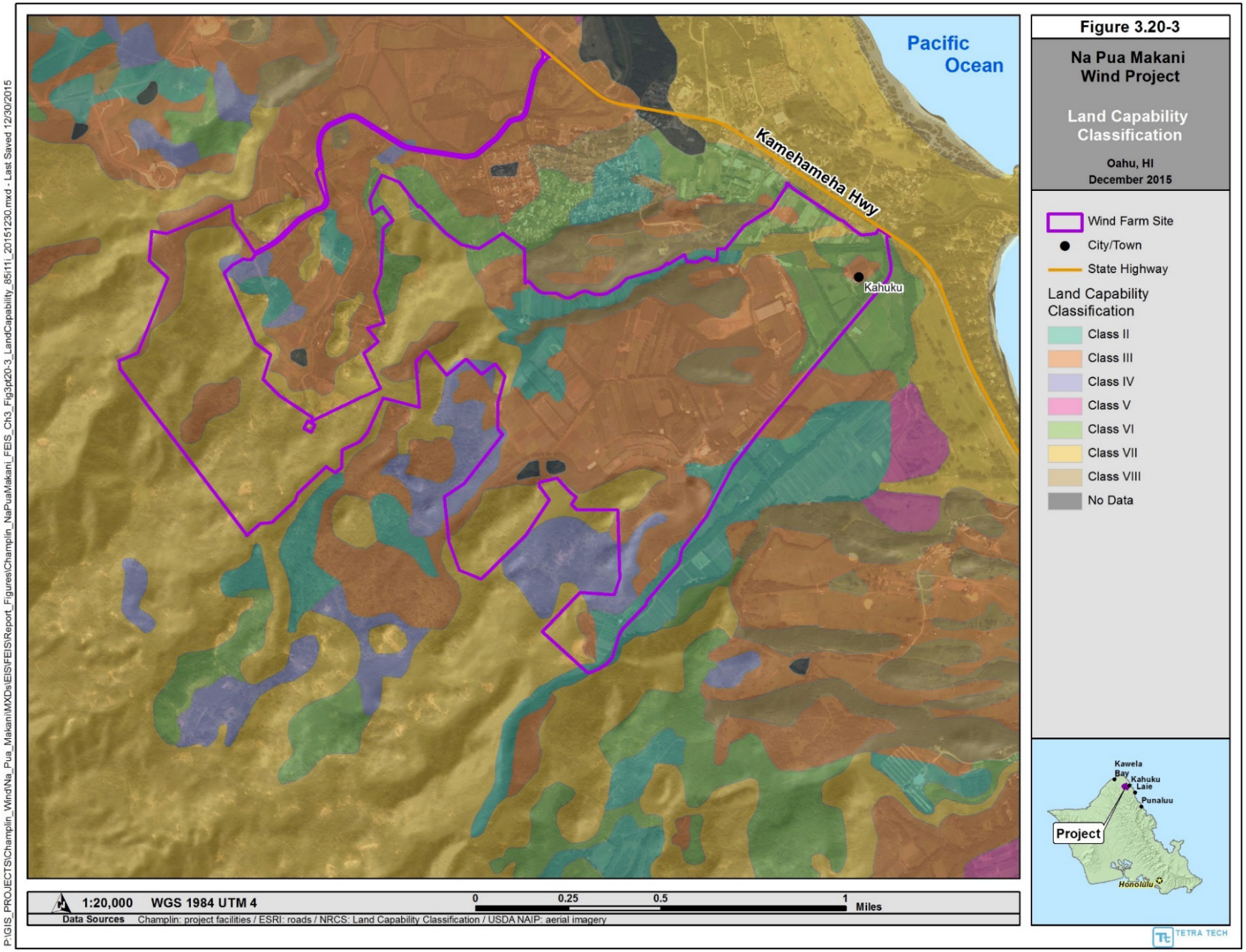
Figure 3.20-3
Na Pua Makani Wind Project
Land Capability Classification
Oahu, HI
December 2015
Pacific Ocean
Kamehameha Hwy
Kahuku
Wind Farm Site
City/Town
State Highway
Land Capability Classification
Class II
Class III
Class IV
Class V
Class VI
Class VII
Class VIII
No Data
Kawela Bay
Kahuku
Laie
Punaluu
Project
Honolulu
1:20,000
WGS 1984 UTM 4
0
0.25
0.5
1
Miles
Data Sources
Champlin: project facilities / ESRI: roads / NRCS: Land Capability Classification / USDA NAIP: aerial imagery
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Important Agricultural Lands (IAL)

Approximately 30 percent (209 acres; 85 hectares) of the wind farm site is identified as potentially eligible for IAL designation, characterized by meeting all three top-priority rating criteria (Table 3.20-1; City and County of Honolulu, DPP 2015). These are lands with sufficient quantities of water, which are currently used for agricultural production, and possess soil qualities and growing conditions that support agricultural production of food, fiber, or fuel- and energy-producing crops. All potentially eligible lands are located on the Malaekahana Hui West, LLC portion of the wind farm site. The DLNR portion of the wind farm site was not included in the study area for Phase I of the Oahu IAL mapping project because only county-owned and privately-owned lands in the State Agricultural Land Use District were considered during this phase.

3.20.3.2 Existing Agricultural Uses and Activities

Five active farming operations exist on leased land within the Malaekahana Hui West, LLC portion of the wind farm site. All but one of these five leases is a month-to-month lease. Based on Real Property Tax Assessment Reports, approximately 247 acres (100 hectares) of leased land is considered "agricultural use area" and approximately 205 acres (83 hectares) consists of "non-agricultural use area" (e.g., roads, streams, or other areas not currently being used for active agricultural; Table 3.20-2). NPMPP would lease approximately 10 acres from Malaekahana Hui West, LLC for the proposed wind farm.

Based on aerial photo interpretation, approximately 161 acres; 65 hectares (65 percent) of the leased farm lands within the Malaekahana Hui West, LLC portion of the wind farm site is actively farmed land (i.e., cultivated crops; Table 3.20-2). This equates to approximately 23 percent of the wind farm site or 36 percent of the Malaekahana Hui West, LLC parcel. Existing crops include papaya, bananas, taro, ginger, tomatoes, eggplant, cucumbers, and other herbs and vegetables. Farming activities typically occur 7 days a week during daylight hours. Each of the farmers have a variety of agricultural structures on the site including greenhouses, storage sheds, and an agricultural warehouse used for cleaning and packaging of produce.

Table 3.20-2. Leased Agricultural Land and Actively Farmed Areas in the Malaekahana Hui West Parcel of Wind Farm Site

Tenant	Total Leased Area (Acres)[1/]	Non-Agricultural Use Area (Acres)[1/]	Agricultural Use Area (Acres)	Actively being Farmed (Acres)[2/]	Agricultural Use Areas Not Actively being Farmed (Acres)
Farmer A	26.4	15.9	10.5	3.8	6.7
Farmer B	13.4	2.0	11.4	4.2	7.2
Farmer C	14.0	0.0	14.0	4.9	9.0
Farmer D	20.5	0.0	20.5	13.7	6.8
Farmer E	378.4	187.5	190.9	134.4	56.5
Total[3/]	**452.7**	**205.5**	**247.3**	**161.0**	**86.2**

[1/] From Real Property Assessment Tax Forms
[2/] Based on GIS delineation of aerial imagery
[3/] Column totals may not sum exactly due to rounding

None of the DLNR portion of the wind farm site is actively cultivated agriculture. The immediately adjacent lands surrounding the wind farm site, including the Kahuku Agriculture Park to the north, include both active and fallow agricultural lands.

3.20.3.3 Irrigation, Water Sources, and Road Access

The Hawaii Department of Agriculture, Agricultural Resource Management Division manages five irrigation systems in the state, including one in Kahuku. The Kahuku irrigation system is 3 miles long and serves approximately 445 acres (Agricultural Resource Management Division 2015). This irrigation system could serve the wind farm site on the DLNR lands, however currently no irrigation system is installed, nor anticipated to be needed in the future in this area.

Malaekahana Hui West, LLC has four wells within their property that service the wind farm site on the Malaekahana Hui West lands. These wells supply both potable water and water for irrigation, and are available for existing and expanded agricultural uses (see Section 3.19 – Public Infrastructure for additional details).

Access to the Project is provided through two locations off of Kamehameha Highway; via the existing Malaekahana Road and via the unnamed existing State-owned roads through the Kahuku Agricultural Park. Internal agricultural roads within the wind farm site consist of a mixed of paved, gravel, and compressed dirt roads. Internal agricultural roads within Malaekahana Hui West, LLC lands are sufficient for farmers to access their farm lands. There are no access roads within the DLNR portion of the wind farm site.

3.20.4 Hamakua Marsh (waterbirds)

Hamakua Marsh, located near the western edge of the city of Kailua, is a State-owned waterbird sanctuary administered by the DNLR. There is no existing agricultural production within the Hamakua Marsh mitigation area and the mitigation area is primarily located within the State Urban Land Use District, with a few small areas located within the State Conservation Land Use District; therefore, the Hamakua Marsh mitigation area does not lie within the study area for the Phase I Oahu IAL mapping project. The land within the Hamakua Marsh mitigation area is not classified under the ALISH system and the soils within the mitigation area are unclassified under the LSB system. Under the NRCS land capability classification system, soils within the Hamakua Marsh Mitigation area are classified as Class VI, VII, and VIII and, thus, are not suitable for agricultural production.

3.20.5 Poamoho Ridge (bat)

The Poamoho Ridge mitigation area is located within the Ewa Forest Reserve near the ridgeline of the Koolau Mountain Range. The mitigation areas is owned and managed by the DLNR. There is no existing agricultural production within the Poamoho Ridge mitigation area and the mitigation area is located within the State Conservation Land Use District; therefore, the Poamoho Ridge mitigation area does not lie within the study area for the Phase I Oahu IAL mapping project. The lands within the Poamoho ridge mitigation area are not classified under the ALISH system and the soils are classified as Category E (i.e., least productive soils) under the LSB system. Under the NRCS land

capability classification system, soils within the Poamoho Ridge Mitigation area are classified as Class VII and VIII and, thus, are not suitable for agricultural cultivation.

4.0 ENVIRONMENTAL CONSEQUENCES

This chapter provides the scientific and analytic basis for evaluation of the potential effects of each of the alternatives described in Chapter 2 on the physical, biological, and social environments. The resources discussed in this chapter include geology and soils, hydrology and water resources, air quality and climate change, noise, hazardous and regulated materials and wastes, natural hazards, vegetation, wildlife, threatened and endangered species, socioeconomic resources, historic, archaeological and cultural resources, land use, recreation and tourism, visual resources, transportation, public health and safety, environmental justice, public infrastructure and services, military, and agriculture. The discussion for each resource is divided into three primary sections: 1) direct and indirect effects associated with construction and operation of the Project; 2) direct and indirect effects associated with the issuance of the ITP and implementation of the HCP including the implementation of conservation measures, mitigation, and monitoring; and 3) cumulative effects. As discussed in Chapter 2, an evaluation of the Modified Proposed Action Option (Alternative 2a) has been added under each resource subsection.

This evaluation of potential cumulative effects is consistent with the following regulations and guidance:

- CEQ Regulations for Implementing the Procedural Provisions of the NEPA (40 CFR Part 1500-1508, 1978 as amended) (CEQ 2005a);
- EPA Procedures for Implementing the Requirements of the CEQ on the NEPA (40 CFR Part 6 [EPA 2009]);
- CEQ Guidance for Considering Cumulative Effects under the NEPA (January 1997) (CEQ 1997b);
- EPA Guidance for Consideration of Cumulative Impacts in EPA Review of NEPA Documents, EPA 315-R-99-002 (May 1999);
- USFWS NEPA Reference Handbook (550 WL 1.7; 505 WL 1);
- HRS Chapter 343, HAR 11-200; and
- State of Hawaii OEQC Guide to the Implementation and Practice of the Hawaii Environmental Policy (OEQC 2012) and HAR §11-200-10(6)

4.1 Direct and Indirect Effects Analysis

4.1.1 Methods for Determining Level of Impact

Direct impacts would be caused by the action, and would occur at the same time and place as the alternative (40 CFR § 1508.8). These impacts are limited to the Proposed Action and alternatives only. Indirect impacts would also be associated with the action, but would occur later in time or at a more distance location from the action. Indirect impacts "may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems" (40 CFR

§ 1508.8). Direct and indirect impacts could be associated with the construction, operation, maintenance, or decommissioning of the Project, or with implementation of mitigation measures identified in the HCP.

The specific analysis areas that were identified in Chapter 3 for each resource encompass all potential direct and indirect effects to that resource. For some resources, the analysis area is limited to the disturbance footprint of the Project, whereas for others is encompasses a larger geographical area to encompass potential indirect effects.

The direct and indirect impacts for each resource are discussed based on intensity (magnitude), duration, extent, and context of the impact. In addition, impacts may be adverse and beneficial within a resource category. Definitions are provided below.

Intensity (Magnitude)

- **Low**: A change in resource condition is perceptible, but it does not noticeably alter the resource's function in the ecosystem or cultural context.
- **Medium**: A change in a resource condition is measurable or observable, and an alteration to the resource's function in the ecosystem or cultural context is detectable.
- **High**: A change in a resource condition is measurable or observable, and an alteration to the resource's function in the ecosystem or cultural context is clearly and consistently observable.

Duration

- **Temporary**: Impacts would be intermittent, infrequent, or last only a single season or for the duration of a discreet activity, such as construction.
- **Long-term**: Impacts would be frequent, or extend from several years up to the life of the Project.
- **Permanent**: Impacts would cause a permanent change in the resource that would last beyond the life of the Project even if the actions that caused the impacts were to cease.

Extent

- **Local**: Impacts would be limited geographically; impacts would not extend to a broad region or a broad sector of the population.
- **Regional**: Impacts would extend beyond a local area, potentially affecting resources or populations throughout the Island of Oahu.
- **State-wide**: Impacts would extend beyond the wind farm site or region, potentially affecting resources or populations throughout the State.

Context

- **Common**: The affected resource is not rare in the locality and is not protected by legislation. The portion of the resource affected does not fill a unique role within the locality or region.
- **Important**: The affected resource is protected by legislation or is rare either within the locality or the region.

- **Unique**: The affected resource is protected by legislation and the portion of the resource affected fills a unique role within the locality or the region.

Summaries about the overall impacts on the resource synthesize information about intensity, duration, extent, and context, which are all weighed against each other to produce a final assessment. While each summary reflects a judgment call about the relative importance of the various factors involved, the following descriptors provide a general guide for how summaries are reached:

- **Negligible**: A negligible impact would result in no change to a resource, or a change so small it would not be measureable. Negligible impacts are considered less than significant.
- **Minor**: A minor impact would result in a change to a resource, but would be small, localized, and of little consequence. Minor impacts are considered less than significant.
- **Moderate**: A moderate impact would result in a measurable change to a resource, requiring mitigation. Implementation of mitigation would result in the downgrading of impact intensity from moderate to minor or negligible.
- **Major**: A major impact would result in a substantial change to the character of a resource over a large area, and even through mitigation would not be made less than significant.

BMPs and other avoidance and minimization measures associated with construction and operation of the Project are described in the resource-specific discussions below and in Table 2-3 and referenced under the appropriate resource sections. Measures for avoiding and minimizing Project-related impacts to Covered Species that would be implemented under the HCP are listed in Section 2.2.2. Some of these measures also apply to other resources and are identified below.

4.1.2 Incomplete or Unavailable Information

The CEQ guidelines require that:

> When an agency is evaluating reasonably foreseeable significant adverse effects on the human environment in an environmental impact statement and there is incomplete or unavailable information, the agency shall always make clear that such information is lacking (40 CFR § 1502.22).

In the analysis, this EIS identifies those areas where information is unavailable to support a thorough evaluation of environmental consequences of the alternatives. Efforts have been made to obtain all relevant information; however, data gaps still exist at this time for several reasons, such as the costs of obtaining the missing data are exorbitant, the data will take several years to obtain, or the means to obtain the data are unknown.

4.2 Cumulative Effects Analysis

Cumulative effects are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions" (40 CFR § 1508.7).

Cumulative impacts pertain to the additive or interactive effects that would result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. If the action has effects that simply contribute to the effects of past, present, and future actions, the impact is additive. Interactive impacts may be either greater or less than the sum of the individual impacts; therefore, the action's contribution to the cumulative case could increase or decrease the net impacts.

Hawaii Administrative Rules (HAR) § 11-200-17(g) requires that an EIS include "specific reference to related projects, public and private, existent or planned in the region … for purposes of examining the possible overall cumulative impacts of such actions." This includes:

- The basis for the assessment, including the regulatory framework, the scope of the analysis, and the cumulative impact analysis area (CIAA) by resource (Section 4.2.1.1); and
- A summary table and brief descriptions of the relevant past, present, and reasonably foreseeable actions that could contribute to a cumulative effect (Section 4.2.1.3).

4.2.1 Methods for Identifying Cumulative Effects

The level of analysis for each resource is commensurate with the intensity of the direct and indirect impacts identified. If the action does not have direct or indirect impacts to a resource, there would be no contribution to cumulative impacts, and the cumulative impact analysis would not be conducted for that resource. Cumulative impacts are identified using the following general approach:

1. Identify the appropriate level of analysis for each resource.
2. Identify resources for which no impacts are expected from the Project. These resources will not be considered further for cumulative impacts.
3. Describe current resource conditions and trends (Chapter 3).
4. List the potential impact producing factors related to construction and operation of the Project, and their potential direct and indirect impacts to specific resources.
5. Identify the potential impacts which each action might contribute to cumulative impacts.
6. Identify past, present, and reasonably foreseeable future actions that could affect resources.
7. Analyze the potential cumulative impacts.

4.2.1.1 Scope of the Analysis

A complete picture of forces already acting upon a particular environmental resource is essential in making reasonable decisions about the management of that resource. If sources of impact exist, whether they are on private or public land, or whether they were taken in the past, are ongoing, or have a reasonable chance of occurring in a future when the impacts of the proposal are also ongoing, their combined impacts give decision-makers and the public a clear idea of the "absolute" impact the resource is experiencing.

Spatial and temporal boundaries are the two critical elements to consider when deciding which past, present, and reasonably foreseeable future actions to include in a cumulative effects analysis. Spatial and temporal boundaries set the limits for selecting those actions that are most likely to contribute to a cumulative effect. The effects of those actions must overlap in space and time with the effects of the alternatives being analyzed for there to be a potential cumulative effect.

The CIAA to be considered in the cumulative effects analysis varies by resource, and consists of the full geographic extent of any direct and indirect impacts as well as any of the reasonably foreseeable future actions. For some resources, the CIAA consists of the analysis area identified in Chapter 3, which includes all impacts associated with the issuance of the ITP and implementation of the HCP, and construction and operation of the Project. However, in several cases, the CIAA for a given resource is substantially larger than the corresponding analysis area in order to consider an area large enough to encompass likely effects from reasonably foreseeable future actions on the same resource (i.e., water resources or air quality). For the purposes of the cumulative effects analysis, the CIAA for Alternative 3 and the Proposed Action are the same. Table 4.2-1 defines the CIAA considered for each resource.

The temporal extent used to identify reasonably foreseeable future projects to be considered in the cumulative effects analysis is the expected physical operational life of this Project and term of the ITP. This is approximately 21 years, which includes site rehabilitation and decommissioning activity if the Project is not repowered.

Table 4.2-1. Cumulative Impact Analysis Area by Resource.

Resource	Definition of Cumulative Impact Analysis Area (CIAA)[1/]	Rationale for Area
Geology and Soils	Wind farm site plus mitigation areas	Impact restricted to immediate areas where ground disturbance would occur.
Hydrology and Water Resources	Oio, Malaekahana, Kaelepulu, Kaukonahua, Poamoho, and Helemano watersheds; Koolauloa aquifer subunit	Watersheds and aquifers intersected by the Project facilities and mitigation areas.
Air Quality and Climate Change	Island of Oahu	Climate change impacts from greenhouse gas emissions and air quality impacts occur on regional and larger scales.
Noise	The area within 5 miles (8 km) of the wind farm site	Areas beyond which no noise from construction at the mitigation sites or construction or operation of Project would be detectable above EPA or Hawaii Community Noise Regulations recommended levels.
Hazardous and Regulated Materials and Wastes	Wind farm site and mitigation areas	Impacts would be limited to areas where construction equipment and vehicles would be used.
Natural Hazards	Island of Oahu	Natural hazards occur on a regional scale.
Vegetation	Project plus 0.25-mile (0.4-km) buffer, plus mitigation areas	Adequately covers the areas where project-related disturbance would occur and area where invasive plant introduction/spread impacts could occur.
Wildlife (Non-listed)	Project plus 0.5-mile (0.8-km) buffer, plus mitigation areas	Reasonable distance beyond which construction or operation of the Proposed Action or other projects is unlikely to disturb nesting birds or other native wildlife.

Table 4.2-1. Cumulative Impact Analysis Area by Resource (continued)

Resource	Definition of Cumulative Impact Analysis Area (CIAA)[1/]	Rationale for Area
Threatened & Endangered Species (Newell's Shearwater, Hawaiian hoary bat, Hawaiian waterbirds, Hawaiian short-eared owl, Hawaiian goose)	Island of Oahu	Captures impacts of other wind projects on the Oahu populations.
Socioeconomics	Koolauloa District	Corresponds with the socioeconomic and environmental justice analysis area where Project impacts may occur.
Historic, Archaeological, and Cultural Resources	Wind farm site	Includes areas were potential disturbance of cultural or archaeological resources would occur.
Land Use	Koolauloa District	Level at which land use regulations, plans, or authorizations are in effect.
Recreation and Tourism	The area within 5 miles (8 km) of the wind farm site, and within 1 mile (1.6 km) of the bat and waterbird mitigation sites	Includes all recreation and tourism opportunities with the potential to be impacted by the Project.
Visual Resources	Viewshed for Project	Furthest distance within which the Project is visible, given visual attenuation in this landscape.
Transportation	Existing roads used for the Project; the Honolulu Airport; and Kalaeloa Harbor	Where traffic and transportation impacts would occur in association with the Project and HCP.
Public Health and Safety	Areas occupied by people where crossed by Project or from which the Project is visible	Construction and operation of Project may affect the health and safety of people.
Environmental Justice	Koolauloa District	Corresponds with the socioeconomic and environmental justice analysis area.
Public Infrastructure and Services	Wind farm site and the surrounding area serviced by utility providers on Oahu	Coincides with the impacts analysis area for this resource.
Military	Military interests within 5 miles (8 km) of the wind farm site, and within 1 mile (1.6 km) of the respective mitigation areas	Coincides with the military analysis area.
Agriculture	Koolauloa District	Corresponds to larger region in which agricultural activities occur.
1/ Note that for the purposes of the cumulative effects analysis, the Alternative 3 and Proposed Action CIAA is the same. km = kilometers		

4.2.1.2 Past and Present Actions

Past actions are generally not identified individually; rather, this analysis relies on current environmental conditions as a proxy for the impacts of past actions. This is because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative impacts. Consequently, this cumulative impacts analysis does not attempt to quantify the impacts of past human actions by adding up all prior actions on an action-by-action basis. Current conditions have been impacted by innumerable actions over the last century, and trying to isolate individual actions that continue to have residual impacts would be nearly impossible. This approach is consistent with a CEQ interpretive memorandum issued on June 24, 2005, regarding analysis of past actions, which states,

"agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions" (CEQ 2005b). Past actions are reflected in the baseline information presented in Chapter 3, which provides context for the cumulative impacts analysis.

4.2.1.3 Reasonably Foreseeable Future Actions

This section discusses the reasonably foreseeable future actions that have the potential to overlap spatially and temporally with the Project. As described by the CEQ (2005b), "It is not practical to analyze how the cumulative effects of an action interact with the universe; the analysis of environmental effects must focus on the aggregate effects of past, present, and reasonably foreseeable future actions that are truly meaningful."

Identified reasonably foreseeable future actions were reviewed to determine if they should be considered further in the cumulative impacts analysis. Factors considered when identifying other actions to be included in the cumulative impacts analysis included the following:

- Whether the other action is likely or probable (i.e., reasonably foreseeable), rather than merely possible or speculative.
- Whether the other action and the Project would affect the same resources.
- Whether the other action would create impacts to the same populations at the same time as the Project.
- The current conditions, trends, and vulnerability of resources affected by the other action.
- The duration and intensity of the impacts of the other action, with and without the Project.
- Whether the impacts would likely be truly meaningful, historically significant, or identified previously as a cumulative impact concern.

Table 4.2-2 lists specific projects considered in the cumulative effects analysis and indicates for which resources there are direct or indirect impacts that overlap in space and time with impacts of the reasonably foreseeable future actions.

Table 4.2-2. Projects Considered in the Cumulative Effects Analysis

Location	Project Name/Activity	Project Sponsor	Year Planned	Project Description	Past, Present, or Future	Resource CIAAs Overlapped[1/]
Malaekahana lands	Agricultural operations	Various	Ongoing	Lands within the Malaekahana parcel will continue to be used for agriculture during Project operation.	Present	Vegetation; Hydrology and Water Resources; Land Use; Socioeconomics; Agriculture
Kamehameha Highway from Haleiwa to Kahaluu	Transportation safety improvements[2/]	State Department of Transportation	Anticipated sometime between 2015-2020	On list of potential projects scheduled through 2020. Construct turn lanes, guardrails, signage, crosswalks, etc. to improve safety. Widening of Kamehameha Highway will only be in areas where needed for storage/turn lanes safety improvements (OMPO 2011).	Future	Transportation
Koolauloa District	Residential and commercial development[3/]	Brigham Young University (BYU)	Ongoing (ground breaking in 2011)	Expanded staff and faculty housing in Malaekahana area to accommodate increased enrollment at Brigham Young University from 2,400 to 5,000 students. Also construction of technology park associated with BYU, primarily intended for emerging technology-oriented industries and support services.	Future	Socioeconomics; Transportation; Agriculture
Kahuku Training Area and associated airspace	Ongoing military operations	Department of Defense	Ongoing	Ongoing aviation and ground training, including low level, day, night, and night vision device training.	Present	Military
North end Koolauloa District, Turtle Bay	Turtle Bay Resort Expansion[4/]	Turtle Bay	2015-2025	Expansion of Turtle Bay Resort, including two new full-service hotels, 590 new Resort Residential Units, and 160 Community Housing Units that will be priced to be affordable to residents of the Koolauloa/North Shore region.	Future	Traffic/Transportation, Public Infrastructure and Services
~~DLNR~~State Department of Agriculture/Malaekahana lands	Existing roads	Numerous	Ongoing	Existing state- and county-owned roads within the TMKs that encompass the Project are used for local access, including the Kahuku Agricultural Park interior roadways. The Project is adjacent to the Kamehameha highway. The Hamakua Marsh is located adjacent to Hamakua Drive. The Poamoho Ridge is accessed via dirt State-owned roads.	Past, Present	Traffic; Noise

Table 4.2-2. Projects Considered in the Cumulative Effects Analysis (continued)

Location	Project Name/Activity	Project Sponsor	Year Planned	Project Description	Past, Present, or Future	Resource CIAAs Overlapped[1/]
Oahu	Existing 138-kV and 46-kv transmission lines	HECO	N/A	Electricity is delivered throughout Oahu through two primary transmission corridors—one in the north and the other in the south. HECO's138-kV transmission lines transport bulk power transmission substations where power is reduced to 46 kV and transported to local area distribution stations.	Past	Wildlife-non-listed wildlife; Newell's shearwater, Hawaiian goose; Natural Hazards; Vegetation
Koolauloa District	Residential solar energy, or photovoltaic (PV), system installation[5/]	Various/HECO	Ongoing	In 2012, HECO ranked 10th among U.S. utilities in watts per customer with a total of 65 MW of new solar capacity, of which approximately 43 MW were residential (SEPA 2013). Currently approximately 5 percent of HECO customers have PV systems. Given high electricity prices and State RPS, PV installation is anticipated to grow.	Present, Future	Socioeconomics
Kahuku	Kahuku Wind Farm	First Wind, LLC	2011-2031	Existing 30-MW wind project located adjacent to Na Pua Makani. Project obtained ITP authorizing incidental take of Newell's shearwater (18 total), Hawaiian petrel (12 total), Hawaiian hoary bat (32 total), Hawaiian duck (pure and hybrids; 24 each), Hawaiian stilt (18 total), Hawaiian coot (17 total), Hawaiian moorehen (20 total), Hawaiian short-eared owl (24 total)	Present	Visual; T&E; Public Infrastructure and Services; Noise; Socioeconomics; Air Quality/Climate Change; Recreation and Tourism; Military; Agriculture
North Shore of Oahu, approximately 5 miles northeast of Haleiwa town	Kawailoa Wind Farm	First Wind, LLC	2011-2031	Existing 69-MW wind project. Project obtained ITP authorizing incidental take of Newell's shearwater (9 total), Hawaiian duck (12 total), Hawaiian stilt (18 total), Hawaiian coot (18 total), Hawaiian moorhen (12 total), Hawaiian short-eared owl (12 total), Hawaiian bat (72 total)	Present	T&E; Air Quality/Climate Change; Military
Various	Road maintenance	City and County of Honolulu	2014-2017	Various road repaving projects (http://www1.honolulu.gov/ddc/roadrepavingupdate.htm)	Future	Transportation

Table 4.2-2. Projects Considered in the Cumulative Effects Analysis (continued)

Location	Project Name/Activity	Project Sponsor	Year Planned	Project Description	Past, Present, or Future	Resource CIAAs Overlapped[1/]
Malaekahana parcel	Envision Laie Project	Envision Laie	Anticipated before 2019 (20-year planning horizon of Koolauloa Sustainable Communities Plan)	Residential development on 300 acres of Malaekahana land	Future	Socioeconomics, Vegetation, Wildlife, Soils/Topography, Hydrology/Water Resources, Cultural/Archaeology; Agriculture
Kawainui-Hamakua Marsh	Kawainui-Hamakua Marsh master development plan projects[6/]	DOFAW and Hawaii Division of State Parks	Ongoing	Ongoing restoration efforts (wetland expansion, flood control, invasive species control) to enhance the Kawainui-Hamakua marsh complex	Future	T&E (waterbirds)
Ewa Forest Reserve (Poamoho Ridge)	Management activities in Ewa Forest Reserve[7/]	DOFAW	Pending funding	Fencing poamoho parcel and potentially installing fence around two units;	Future	T&E (Hawaiian hoary bat)

1/ Indicates that a past, present, or foreseeable project/activity effect overlaps in space and time with the same type of direct or indirect effect of the proposed Project.
2/ Source: Oahu Regional Transportation Plan (ORTP) 2035 (Oahu Metropolitan Planning Organization 2011)
3/ Source: Koolauloa Sustainable Community Plan (City and County of Honolulu, DPP 1999)
4/ Turtle Bay Expansion Supplemental EIS (Lee Sichter LLC, 2013)
5/ Source: Solar Electric Power Association (2013)
6/ Source: DLNR-DOFAW (2011)
7/ Source: http://manoa.hawaii.edu/hpicesu/DPW/ERMUP/2012_Waimano.pdf)
HECO = Hawaii Electric Company
RPS = Renewable Portfolio Standard
TMK = Tax Map Key
T&E = threatened and endangered
DOFAW = Division of Forestry and Wildlife
ITP = Incidental Take Permit

4.3 Geology and Soils

4.3.1 Impact Criteria

NEPA and CEQ guidelines state that protection of unique geological features, minimization of soil erosion, and the siting of facilities in relation to potential geologic hazards must be considered when evaluating impacts of the Project. Factors considered in determining whether the Project would have a significant impact on geology and soil resources include the extent to which the Project would:

- Damage or prevent access to areas of geologic importance or mineral resources with economic value to the region;
- Increase the exposure of people or structures to geologic hazards;
- Alter drainage patterns through large-scale excavation, filling, or leveling.
- Increase the probability or magnitude of mass soil movement through erosion (e.g., slope failures, slumps);
- Increase soil loss and erosion due to wind erosion or disturbance causing the formation of rills or gullies, and deposition of sediment in down-gradient areas;
- Cause a loss of soil that uniquely supports threatened or endangered plant species or sensitive ecosystems;
- Cause a long-term loss of productivity or vegetative growth from compaction or mixing of soils; and
- Result in loss of prime or unique farmland.

Impact criteria for determining effects on geology and soil resources from the Project are described further in Table 4.3-1 below.

Table 4.3-1. Impact Criteria for Geology and Soil Resources

Type of Effect	Impact Component	Effects Summary		
Changes to geology features and soil characteristics	Magnitude or Intensity	**High:** Acute or obvious changes in geology or soil resources	**Medium:** Noticeable changes in geology or soil resources	**Low:** Changes in geology or soil resources may not be measurable or noticeable
	Duration	**Permanent:** Chronic effects; geology or soil resources would not be anticipated to return to previous levels	**Long-term:** Geology or soil resources would be impacted through the life of the Project and would return to pre-activity levels at some point after completion of the Project	**Temporary:** Geology or soil resources would be impacted infrequently but not longer than the span of the Project construction and would be expected to return to pre-activity levels at the completion of the activity

Table 4.3-1. Impact Criteria for Geology and Soil Resources (continued)

Type of Effect	Impact Component	Effects Summary		
	Geographic Extent	**Extended**: Affects geology or soil resources beyond the region or wind farm site	**Regional**: Affects geology or soil resources beyond a local area, potentially throughout the wind farm site	**Local**: Impacts limited geographically; discrete portions of the wind farm site affected
	Context	**Unique**: Affects unique geology or soil resources or soil resources protected by legislation	**Important**: Affects depleted geology or soil resources within the locality or region or soil resources protected by legislation	**Common**: Affects usual or ordinary geology or soil resources; not depleted or protected by legislation

4.3.2 Alternative 1—No Action

4.3.2.1 Direct and Indirect Effects

Under the No Action Alternative, the Project would not be constructed, an ITP would not be issued by the USFWS, and the HCP conservation measures would not be implemented. Therefore, Alternative 1 would have no effect on geology or soil resources in the analysis area. As such, no mitigation measures would be warranted.

4.3.2.2 Cumulative Effects

Under the No Action Alternative, the Project would not be constructed, the ITP would not be issued by the USFWS, and the HCP conservation measures would not be implemented. Therefore, there would be no effect on geology or soil resources. Thus, Alternative 1 would not contribute to cumulative effects to geology or soil resources.

4.3.2.3 Summary

Alternative 1 would have no effect on geology or soil resources because no action would be undertaken.

4.3.3 Alternative 2—8 to 10 Turbine Project

4.3.3.1 Direct and Indirect Effects of Construction and Operation of the Project

No significant geologic features or mineral resources with economic value are known or expected to occur in the wind farm site, therefore, construction and operation of the Project would not impact these resources. Likewise, earthquake or seismic activity in the wind farm site is not anticipated. Therefore, construction and operation of the Project would not result in increased exposure of people or structures to geological hazards (see Section 4.8 – Natural Hazards). There would be no impact to listed plant species or sensitive ecosystems as none occur at the wind farm

site (see Section 4.9 – Vegetation). The effects of the Project during construction and operation would primarily be related to soil disturbance and are described in detail below.

Construction Impacts

Ground-disturbing activities including clearing and grubbing, topsoil stripping, grading, compaction, utility trenching, and placement of aggregate surfacing would occur during the construction of wind turbines and associated foundations and transformers, the electrical collection system and transmission line, met towers, access roads, construction staging areas, O&M building and associated storage yard, and the onsite substation. Grading activities would consist of the removal, storage, and/or disposal of earth, gravel, vegetation, organic matter, loose rock, and debris. Fill material would be utilized from onsite excavations and earthwork. Additional sources of this fill, if needed, include nearby pits or excess material taken from within the property. Construction materials and methods are described in detail in Chapter 2.

Up to approximately 89.0 acres (36.0 hectares) of ground disturbance would occur during construction (Table 2-1). Much of this disturbance would be temporary and subject to restoration activities at the end of Project construction. Up to approximately 59.9 acres (24.2 hectares) of ground disturbance would be long term, lasting through the life of the Project.

Grading and other construction activities have the potential to alter drainage patterns within the wind farm site. During scoping, concern was raised over potential impacts associated with flooding, particularly at the Kahuku football field. During the detailed design phase of the Project, the construction contractor will confirm stormwater runoff requirements and, if necessary, implement stormwater control measures such as seepage pits, drywells, and/or detention basins. New Project access roads would be located to follow natural contours and minimize side hill cuts to the extent possible and would include other BMPs such as ditches and culverts to capture and convey stormwater runoff. Additionally, with the exception of areas where permanent surface recontouring is required, disturbed areas would be restored to pre-existing grades and all disturbed areas where permanent gravel or aggregate is required would be revegetated. These measures would reduce the potential for erosion and adverse effects on drainage patterns. A Preliminary Drainage Study is included in Appendix H.

Depending on the subsurface conditions, blasting is not expected but may be required to install the trenches. Blasting, if required, would be conducted such that it would minimize the creation of excessive slopes. A design-level geotechnical investigation would be conducted prior to construction to identify geologic conditions that could require additional design consideration or mitigation measures.

Removing vegetation and disturbing the soil for construction of Project facilities may increase wind erosion in areas that contain soil made up of fine sediment. During construction, erosion would be minimized using common dust suppression techniques, such as regularly watering exposed soils, stockpiling soils, and stabilizing soils. Excavation, grading, trenching, and other earth-disturbing activities can expose soils to runoff, potentially causing the formation of rills and gullies.

To minimize impacts associated with soil erosion, NPMPP would prepare a Temporary Erosion and Sediment Control (TESC) Plan that would be implemented by the construction contractor. The TESC Plan would include standard stormwater BMPs including building during the summer months when rainfall potential is low, using silt fences or hay bales to prevent eroded soil from being transported off-site, and contouring to stop drainage from entering the site and to prevent runoff would also be implemented to reduce the risk of erosion. Temporary ditches and culverts used to capture and convey stormwater would be installed in areas of temporary disturbance. Permanent stormwater control structures would be installed to prevent erosion where access roads, buildings, storage areas, and parking areas are constructed. Upon completion of construction, disturbed areas would be revegetated. With implementation of these measures, construction activities would not increase the probability of mass soil movement or wind or water erosion and would not result in long-term loss of soil productivity.

Soils within the Malaekahana Hui portion of the wind farm site are classified under the ALISH system as Prime Agricultural Lands (Hawaii State Department of Agriculture 1977). Up to approximately 26.1 acres (10.6 hectares) of Prime Agricultural Lands would be impacted in association with construction of wind turbines, the substation, O&M building, laydown area, and portions of the underground collector line, transmission line, and access roads. Of this, 12.6 acres (5.1 hectares) would be impacted over the long term, through the life of the Project. This comprises approximately 5 percent of the Prime Agricultural Lands in the wind farm site.

Operation and Maintenance Impacts

During operations, roads, buildings, wind turbines, transmission lines, and electrical collection systems would be maintained in good condition to prevent adverse effects on soil resources. Maintenance vehicles and service trucks would continue to use the access roads for routine maintenance of the wind turbines, met towers, electrical collector cables and transmission line facilities. Access roads would be maintained in good working order by the NPMPP through periodic grading and compacting to minimize naturally occurring erosion. Permanent low-growing vegetation or gravel pads around each wind turbine would be maintained to allow for O&M requirements, which would also minimize erosion. The O&M building and surrounding storage yard and parking areas would undergo routine maintenance and upkeep to minimize erosion and control stormwater runoff and drainage.

Routine servicing of all components of the proposed Project typically would not require heavy equipment such as large cranes but does require service vehicle access. If there were a major component replacement (e.g., blades or generators), heavy equipment similar to that used during construction would be required. Should component replacement be required, BMPs similar to those in place during construction would be followed.

Potential erosion impacts, including mass soil movement, would be less than significant because features designed to control stormwater and minimize erosion would be included in the site design and engineering. Engineering and design features to minimize erosion would include stormwater management features and planting and maintaining vegetative cover.

4.3.3.2 Direct and Indirect Effects of the HCP Conservation Measures

Impacts of Avoidance and Minimization Measures

The avoidance and minimization measures proposed under the Project HCP are not expected to affect the geology and soils in the analysis area. There would be some potential for minor movement of soil in conjunction with routine post-construction monitoring efforts associated with surveyors traversing transects beneath the turbines. However, this impact is expected to be negligible.

Impacts of HCP Mitigation Measures

No impacts to geology or soil resources would occur in association with funding provided for Newell's shearwater research and management or short-eared owl research and management. Depending on the measures chosen, minor soil disturbance may occur due to regular visits to the research and management sites to carry out these activities; however, impacts would be negligible.

Installation and maintenance of a partial fence along the northeastern border of the Hamakua Marsh Mitigation Area for waterbird mitigation would have no effect on geological resources or hazards and would not alter drainage patterns or cause slope failure. Lands in the Hamakua Marsh Mitigation Area are not classified by ALISH (Hawaii State Department of Agriculture 1977) or the LSB (University of Hawaii Land Study Bureau 1972); therefore, there would be no impact to prime or other agricultural land or loss of soil productivity associated with waterbird mitigation.

Installation and maintenance of the fence at Hamakua Marsh would result in minor permanent and temporary vegetation clearing and ground disturbance along the fence perimeter, which could increase the potential for soil erosion. The fence would be approximately 1,555 feet (474 meters) long and 4 feet (1.2 meters) high. Permanent disturbance would be restricted to areas where fence poles are located. Proposed design criteria for the fence are outlined in the Project HCP. Therefore, soil loss would be localized and would not affect soil productivity. Maintenance of the fence would include regular walking along the fence line to check for breaches which would result in minor soil disturbance.

Funding for forest restoration and monitoring at the Poamoho Ridge Mitigation Area for bat mitigation would go toward activities such as maintenance of the ungulate-proof fence installed by DLNR, feral pig control and monitoring, and invasive plant removal which are covered under the DLNR's existing exemption from Chapter 343 for the Koolau Forest Watershed Protection Project. Therefore, would have negligible effects to geology and soil resources. Foot traffic and vehicle use associated with fence maintenance, removal and monitoring of non-native ungulates and invasive plant species, and bat monitoring may cause minor disturbances to soils and result in very low level of increased erosion. However, these impacts are expected to be temporary and negligible. Ultimately, forest restoration efforts would have beneficial effects on soil resources within the Poamoho Ridge Mitigation Area by increasing soil stability.

4.3.3.3 Mitigation for Unavoidable Impacts

BMPs listed in Table 2-6, which will be implemented by NPMPP, will minimize impacts to geology and soil resources. These measures include:

- Prepare and implement a TESC Plan, which would help prevent erosion.
- Site Project access roads to follow natural contours and minimize side hill cuts to the extent possible, to minimize the potential for erosion and impacts to site drainage patterns.
- Construct a retention basin at the onsite substation to avoid erosion and eliminate the possibility of degrading downstream waters.
- Use ditches and culverts and other erosion controls to capture and convey stormwater in areas of temporary disturbance.
- Conduct blasting, if required, such that creation of excessive slopes would be minimized.
- Minimize wind erosion during construction through common dust suppression techniques, such as regularly watering exposed soils, stockpiling soils, and stabilizing soils.
- Restore disturbed areas to pre-existing grades and revegetate these areas.
- Install permanent stormwater control structures to prevent erosion where access roads, buildings, storage areas, and parking areas are constructed.
- Prepare and implement a site-specific SWPPP.

No additional avoidance, minimization, or mitigation measures are required.

4.3.3.4 Cumulative Effects

The cumulative effects analysis area for geology and soil resources includes the wind farm site as well as areas that would be disturbed by HCP conservation measures implemented in the mitigation areas. This area encompasses the areas where potential direct and indirect effects to geology and soil resources could occur.

The wind farm site and mitigation areas are not known to contain areas of geologic importance and would not result in significant impacts to geology or geologic hazards. Therefore, the Project would not contribute to cumulative impacts on geology that could result in conjunction with the projects listed in Table 4.2-2.

Past agricultural and associated development activities, as well as urban development and associated infrastructure (i.e., existing HECO transmission lines) have contributed to the overall loss and alteration of soil resources within the wind farm site. Ongoing agricultural operation in Malaekahana area will continue to impact soils in the wind farm site. Human activity and development in the vicinity of the Hamakua Marsh Mitigation Area have also contributed to the overall loss and alteration of soil resources in the area. Although little development has occurred in the Poamoho Ridge Mitigation Area, soils have likely been altered and degraded due to feral pig activity. Removal and control of non-native ungulates in Poamoho Ridge Mitigation Area would improve soil resources in the area.

The only foreseeable project in the cumulative effects analysis area with the potential to impact soil resources is the Envision Laie Project. This project includes residential development on 300 acres

of Malaekahana land. It could result in additional permanent and temporary and localized impacts to soils and a temporary, localized increase in erosion. These impacts would be minimized if standard BMPs for minimizing the introduction and spread of invasive plant species would be implemented during construction and operation.

The Proposed Action would result in the disturbance of up to 89.0 acres (36.0 hectares) in association with construction and operation of the Project. Implementation of standard BMPs for soil erosion and restoring disturbed areas to pre-existing grades would minimize these impacts. Therefore, when viewed in conjunction with past, present, and foreseeable future projects in the cumulative effects analysis area, the contribution of Alternative 2 to cumulative effects on geology and soil resources would be minor.

4.3.3.5 Summary

Direct effects on geology and soils from the Proposed Action would include the disturbance of up to 89.0 acres (36.0 hectares), of which 59.9 acres (24.2 hectares) would be disturbed over the long term during Project operation. Soil disturbance would increase the potential for erosion and runoff; however, these effects would be minimized through the implementation of standard BMPs and Project design features. Effects on geology and soil resources under the Proposed Action would be considered minor because while the intensity would be high (obvious change in resource condition), and there would be short-term and long-term changes in the character and loss of soils in areas required for Project facilities, these effects would be localized (limited to a discrete portion of the wind farm site) and a minor amount of unique or important soils (lands classified as prime agricultural lands) would be affected.

4.3.3.6 Alternative 2a - Modified Proposed Action Option

Under Alternative 2a, direct, indirect, and cumulative effects on geology and soil resources would be similar to those described under Alternative 2. However, the Modified Proposed Action Option would result in up to approximately 84.5 acres (34.2 hectares) of ground disturbance, of which 56.7 acres (22.9 hectares) would be long term, lasting the life of the Project. Up to approximately 21.7 acres (8.8 hectares) of Prime Agricultural Lands would be impacted under the Modified Proposed Action Option. Of this, 9.4 acres (3.8 hectares) would be impacted over the long term , through the life of the Project. This comprises approximately 3.8 percent of the Prime Agricultural Lands in the wind farm site. Table 2-1 provides more detail on the disturbance areas associated with each Project component. Implementation of standard BMPs and other mitigation measures, as described under the Proposed Action, would minimize any adverse impacts to geology and soils.

4.3.4 Alternative 3—Larger Generation Facility (up to 12 Turbine Project)

4.3.4.1 Direct and Indirect Effects of Construction and Operation of the Project

Under Alternative 3, direct and indirect effects on geology and soil resources would be similar to those described under Alternative 2. However, with the construction of additional wind turbines and associated access roads (all other Project facilities would be the same; Table 2-1), Alternative 3

would result in up to approximately 98.6 acres (39.9 hectares) of ground disturbance, of which 69.8 acres (28.2 hectares) would be long term, lasting the life of the Project. Up to approximately 35.7 acres (14.5 hectares) of Prime Agricultural Lands would be impacted under Alternative 3 in association with construction of wind turbines, the substation, O&M building, laydown area, and portions of the underground collector line, transmission line, and access roads. Of this, 22.4 acres (9.0 hectares) would be impacted over the long term, through the life of the Project. This comprises approximately 9 percent of the Prime Agricultural Lands in the wind farm site. Table 2-1 provides more detail on the disturbance areas associated with each Project component. Implementation of standard BMPs, as described under the Proposed Action, would minimize any adverse impacts to geology and soils.

4.3.4.2 Direct and Indirect Effects of the HCP Conservation Measures

Impacts of Avoidance and Minimization Measures

The avoidance and minimization measures proposed under the Project HCP are not expected to affect the geology and soils in the analysis area. There would be some potential for minor movement of soil in conjunction with routine post-construction monitoring efforts associated with surveyors traversing transects beneath the turbines. However, this effect would be negligible.

Impacts of HCP Mitigation

Impacts of HCP mitigation under Alternative 3 would be the same as described under the Proposed Action. Prior to the construction of the additional turbines proposed under Alternative 3, NPMPP would reopen consultation with the USFWS and DOFAW to assess the potential impacts of the additional turbines to listed species and develop appropriate mitigation measures. The impacts of these mitigation measures to geology and soil resources would be evaluated under a separate environmental analysis at that time.

4.3.4.3 Mitigation for Unavoidable Impacts

Mitigation for unavoidable impacts under Alternative 3 would be the same as described under the Proposed Action (Section 4.3.3.3).

4.3.4.4 Cumulative Effects

The cumulative effects to geology and soil resources under Alternative 3 would be the same as those described under the Proposed Action, with the exception that Alternative 3 would contribute a total of 98.6 acres (39.9 hectares) of disturbance. Therefore, when viewed in conjunction with past, present, and foreseeable future projects in the cumulative effects analysis area, the contribution of Alternative 3 to cumulative effects on geology and soil resources would be minor. Because there will likely be a delay in time of up to 3 years before additional turbines would be built under Alternative 3, new projects and developments in the area will be assessed and reviewed to determine if there are additional cumulative impacts from future unknown projects.

4.3.4.5 Summary

Direct effects on geology and soils from Alternative 3 would include the disturbance of up to 98.6 acres (39.9 hectares), of which 69.8 acres (28.2 hectares) would be affected over the long term during Project operation. Soil disturbance would increase the potential for erosion and runoff; however, these effects would be minimized through the implementation of standard BMPs and Project design features. Effects on geology and soil resources under Alternative 3 would be considered minor because while the intensity would be high (obvious change in resource condition), and there would be short-term and long-term changes in the character and loss of soils in areas required for Project facilities, these effects would be localized (limited to a discrete portion of the wind farm site) and a minor amount of unique or important soils (lands classified as prime agricultural lands would be affected.

4.3.5 Conclusion

Table 4.3-2 summarizes potential impacts to geology and soil resources from the alternatives considered in this analysis.

Table 4.3-2. Summary of Potential Impacts to Geology and Soils

Impact Issues	No Action Alternative	Alternative 2 – Proposed Action	Alternative 2a – Modified Proposed Action Option	Alternative 3
Geologic resources and hazards	No Impact	Negligible	Negligible	Negligible
Drainage patterns and slope failure	No Impact	Minor	Minor	Minor
Erosion	No Impact	Minor	Minor	Minor
Sensitive species or ecosystems	No Impact	Negligible	Negligible	Negligible
Loss of agricultural land or soil productivity	No Impact	Minor	Minor	Minor

4.4 Hydrology and Water Resources

4.4.1 Impact Criteria

Factors considered in determining whether the Project would have a significant impact on hydrology and water resources include:

- Impacts to wetlands and other waters of the United States;
- Alteration of the existing drainage pattern of the site or area that would cause off-site erosion or siltation, adversely affecting adjacent properties;
- Contamination of surface water from erosion or stormwater runoff that would be a violation of Federal or State water quality standards;
- Groundwater quality degradation causing groundwater quality to not meet State or Federal standards; or
- Groundwater depletion or interference with groundwater recharge that adversely affects existing or proposed uses of the aquifers within the Project and mitigation areas.

Impact criteria for determining effects on hydrology and water resources from the Project are described further in Table 4.4-1 below.

Table 4.4-1. Impact Criteria for Hydrology and Water Resources

Type of Effect	Impact Component	Effects Summary		
Changes to Hydrology and Water Resources	Magnitude or Intensity	**High:** Acute or obvious changes in character of hydrology or water resources	**Medium:** Noticeable changes in character of hydrology or water resources.	**Low:** Changes in hydrology or water resources may not be measurable or noticeable.
	Duration	**Permanent:** Chronic effects; hydrology and water resources would not be anticipated to return to previous levels	**Long-term:** Hydrology and water resources would be adversely affected through the life of the Project and would return to pre-activity conditions at some point after completion of the Project.	**Temporary:** Hydrology and water resources would be adversely affected but not longer than the span of the Project construction and would be expected to return to pre-activity conditions at the completion of the activity.
	Geographic Extent	**Extended:** Affects hydrology and water resources beyond the region or wind farm site	**Regional:** Affects hydrology and water resources beyond a local area, potentially throughout the wind farm site	**Local:** Impacts limited geographically; discrete portions of the wind farm site affected.
	Context	**Unique:** Affects unique hydrologic or water resources or resources protected by legislation	**Important:** Affects depleted hydrologic or water resources within the locality or region or resources protected by legislation.	**Common:** Affects usual or ordinary hydrologic or water resources; not depleted or protected by legislation.

4.4.2 Alternative 1—No Action

4.4.2.1 Direct and Indirect Effects

Under the No Action Alternative, the Project would not be constructed, an ITP would not be issued by the USFWS, and the HCP conservation measures would not be implemented. Therefore, Alternative 1 would have no effect on hydrology and water resources. As such, no mitigation measures would be warranted.

4.4.2.2 Cumulative Effects

Under the No Action Alternative, the Project, the ITP would not be issued by the USFWS, and HCP conservation measures would not be implemented. Therefore, there would be no effect on hydrology and water resources. Thus, Alternative 1 would not contribute to cumulative effects on hydrology and water resources.

4.4.2.3 Summary

Alternative 1 would have no direct, indirect, or cumulative impacts to hydrology and water resources because no action would be undertaken.

4.4.3 Alternative 2—8 to 10 Turbine Project

4.4.3.1 Direct and Indirect Effects of Construction and Operation of the Project

Construction Impacts

Surface Water

There are no wetlands within the wind farm site; therefore construction of Alternative 2 would have no direct or indirect impact on wetlands.

Three streams—Malaekahana, Keaaulu, and Ohia—run through the wind farm site. Based on preliminary determination (Hobdy 2013b, SWCA 2015, USACE 2015), all three streams qualify as jurisdictional waters of the U.S. and are subject to jurisdiction under Section 404 of the CWA and Section 10 of the Rivers and Harbors Act (RHA). Additional regulations applicable to waters of the U.S. (including wetlands) and water quality are discussed in Chapter 5. The Project footprint has been designed to avoid jurisdictional features where possible and Proposed Action Project components would not directly impact Malaekahana Stream, Keaaulu Stream, or Ohia Stream.

Project components, including the electrical collector line, transmission line, and internal access roads, would cross Keaaulu Stream in two locations within the wind farm site; however, NPMPP would avoid placing any fill material or project components within the stream's ordinary high water mark (OHWM), thus avoiding the need for a USACE Section 404 CWA permit or Section 10 RHA permit. Under the Proposed Action, the electrical collector line would cross the upper (mauka) portion of Keaaulu Stream near the point where it crosses the boundary between the two leased parcels. Impacts to Keaaulu Stream would be avoided by installing the collector line via an underground directional bore or an overhead distribution line and all ground-disturbing activities would occur outside of the stream's OHWM. Additionally, lower Keaaulu Stream is crossed by the existing Malaekahana road near its intersection with Malaekahana Stream. Improvements to this road may be required at this crossing, which would potentially impact Keaaulu Stream; however, NPMPP would avoid impacts to Keaaulu Stream by installing an aluminum box culvert or bridge-type structure to span the stream channel. Excavation would take place approximately 3 feet outside the OHWM on each side of the feature for installation of the spanning structure's footings. Appropriate BMPs will be installed around each excavation area to avoid sediment runoff into Keaaulu Stream. If during final Project design, it is determined that Keaaulu Stream cannot be avoided the appropriate Federal and State permits would be obtained.

Likewise, ground disturbance associated with the construction of the wind turbine pad located in the northwestern portion of the Project (the wind turbine closest to the adjacent Kahuku Wind Farm) near Ohia Stream are anticipated to occur outside of the OHWM. However, if during final

Project design it is determined that Ohia Stream cannot be avoided the appropriate Federal and State permits would be obtained.

Ground-disturbing activities associated with construction of crossings of Keaaulu Stream or associated with turbine pad construction near Ohia Stream have the potential to directly increase the amount of sediment and other pollutants released into the streams which could adversely affect the water quality in Ohia Stream and Keaaulu Stream as well as downstream into Malaekahana Stream, and potentially near shore waters. Erosion and sediment control measures, including measures in the TESC Plan, would be put in place prior to initiating earth-moving activities to minimize these effects. Permanent stormwater control structures would also be installed to prevent erosion where access roads are constructed.

Ground disturbance during construction of the Project would also increase the potential for sediment and other pollutants present onsite to be conveyed in stormwater runoff into streams within the wind farm site, and potentially into downstream receiving waters. A site-specific Storm Water Pollution Prevention Plan (SWPPP) would be prepared for the Project. The SWPPP would identify BMPs that would be used to minimize or eliminate the potential for sediments and pollutants to reach surface waters through stormwater runoff. Erosion control measures included in the TESC Plan would also prevent water quality degradation from stormwater runoff during the construction phase of the Project. Additional BMPs that will be implemented to reduce erosion during Project construction are described in Section 4.4.3.3 – Mitigation for Unavoidable Impacts.

Alternative 2 would result in up to approximately 10.1 acres (4.1 hectares) of impervious surfaces in the wind farm site, which includes 10.0 acres (4.0 hectares; 99 percent) of gravel surfaces which would be considered semi-pervious.

This increase in impervious surface is less than 0.1 percent of the watersheds within which the Project is located. Additionally, the net increase in stormwater runoff under Alternative 2 was estimated at 11.9 cubic feet per second (cfs) (Belt Collins Hawaii LLC 2016a). With implementation of stormwater control measures, such as seepage pits, drywells, and/or detention basins, this minor increase in impervious surface and increase in the volume of stormwater is expected to have a negligible effect on the volume of stormwater runoff leaving the wind farm site.

Localized topographic alterations resulting from site grading and the construction of building pads and roads would also potentially alter local drainage patterns and stormwater runoff pathways. During scoping, concern was raised over potential impacts associated with flooding, particularly at the Kahuku High School football field and in the Kahuku Agriculture Park, adjacent to the wind farm site. During the detailed design phase of the Project, the construction contractor will confirm net increase in stormwater runoff and, if necessary, implement stormwater control measures such as seepage pits, drywells, and/or detention basins. New Project access roads would be located to follow natural contours and minimize side hill cuts to the extent possible. Additionally, construction of the Project would be designed to minimize changes to naturally existing topography and drainage and to ensure that, during construction, stormwater is directed to the designated drainage systems. These measures, in addition to the low amount of stormwater volume expected to leave

the wind farm site, would ensure that the Project would not increase the likelihood of flooding at the Kahuku High School football field and the Kahuku Agriculture Park.

Groundwater

During construction, peak water needs of approximately 10,000 to 15,000 gallons (37,850 to 56,780 liters) per day would be required for dust suppression and emergency fire suppression. Water required during construction would be delivered to the site and stored in an onsite water tank, come from existing wells, or come from a similar source. Therefore, construction of the Project would have no impact on the quantity of available groundwater in the wind farm site.

Construction activities would require the use of hazardous materials such as fuels (e.g., diesel fuel, gasoline), lubricants, cleaning solvents, and paints. If these materials were to enter stormwater, they could reduce groundwater quality. Prior to construction, NPMPP would prepare a project Spill Prevention, Containment, and Countermeasures (SPCC) Plan that would include measures for the safe transport, handling, and storage of these materials. The groundwater in the Koolauloa aquifer is considered to have high vulnerability to contamination; however, with implementation of the SPCC Plan, the potential for localized, temporary adverse impacts to groundwater quality from construction of the Project would be reduced to a negligible level.

As stated above, Alternative 2 would result in only slight increases in impervious surfaces, less than 0.1 percent of the watersheds within which the Project is located. Precipitation falling on these impervious surfaces would likely runoff to adjacent open lands where aquifer recharge would occur, therefore, the slight increase in impervious surfaces is not expected to measurably reduce potential for groundwater recharge.

Operation and Maintenance Impacts

Surface Water

As noted above, Alternative 2 would result in a minor increase in the amount of impervious surfaces in the wind farm site. Operation of the Project under Alternative 2, therefore, would not substantially increase the volume of stormwater runoff that reaches streams and drainages within the wind farm site or downstream of the Project. A Preliminary Drainage Study is provided in Appendix H.

Alterations to topography resulting from site grading for construction of the permanent Project facilities, including wind turbines and pads and access roads, would have the potential to alter drainage and stormwater runoff patterns onsite during Project operations. However, these alterations would be highly localized, and in compliance with City and County of Honolulu requirements, the Project would be designed to ensure that no net additional changes in stormwater volume and runoff patterns would occur off-site. The presence of new access roads and use of these roads during operations could also increase erosion and sedimentation into streams within the wind farm site. Access roads would be maintained in good working order by the NPMPP through periodic grading and compacting to minimize naturally occurring erosion. Additionally, with the exception of areas where permanent surface recontouring is required, disturbed areas

would be restored to pre-existing grades and all disturbed areas where permanent gravel or aggregate is not required would be revegetated. Additionally, permanent stormwater control structures would be installed to prevent erosion where access roads, buildings, storage areas, and parking areas are constructed. With the implementation of the measures described here and listed in Section 4.4.3.3, impacts to surface water during Project operations associated with stormwater runoff and erosion, would be reduced to less than significant. Additional design features and BMPs that will be implemented during O&M of the Project to reduce erosion and soil movement are described in Section 4.3 – Geology and Soils.

Groundwater

The Project would result in a small increase in the amount of new impervious and semi-pervious surfaces in the analysis area (approximately 10.1 acres [4.1 hectares]). Precipitation falling on these new impervious surfaces would drain to adjacent pervious surfaces, and therefore, O&M of the Project would not measurably reduce the potential for groundwater recharge.

During operations, water would be required for use at the O&M building resulting in an average daily demand of up to approximately 200 gallons (757 liters) of water per day, with a maximum daily demand of up to approximately 500 gallons (1,893 liters) and a peak hour demand of 100 gallons (379 liters) per minute. Water for the O&M building would be trucked in and stored in tanks for operations or would be obtained by connecting to existing sources. Therefore, operations of the Project would not measurably reduce the quantity of available groundwater in the analysis area.

4.4.3.2 Direct and Indirect Effects of the HCP Conservation Measures

Impacts of Avoidance and Minimization Measures

The avoidance and minimization measures proposed under the Project HCP would not be expected to affect the hydrology and water resources within the analysis area. Although grading for construction of the Project would result in localized, onsite alterations in topography and thus drainage patterns, in accordance with the Project HCP stormwater management employed for the turbine pads and access roads will be designed to minimize the potential for accumulating standing water, which could serve as an attractant to waterbird species.

Impacts of HCP Mitigation

No impacts to hydrology or water resources would occur in association with funding provided for Newell's shearwater research and management or short-eared owl research and management. Depending on the measures chosen, minor, short-term, localized soil disturbance (and thus the increased potential for soil erosion) could occur due to regular visits to the research and management sites to carry out these activities; however, impacts to water resources would be negligible. No adverse impacts to any wetlands or waters of the U.S. would occur in association with the HCP mitigation measures.

Installation and maintenance of a partial fence along the northeastern border of Hamakua Marsh Mitigation Area for waterbird mitigation would have no direct impact on Hamakua Canal, Hamakua

Marsh, or other wetlands or other waters of the U.S. Additionally, fence construction would result in a negligible increase in impervious surfaces in the mitigation areas. A minor amount of soil disturbance would occur in association with installation of the fence, which would increase the potential for temporary, localized erosion and sedimentation. Construction activities may require the use of hazardous materials such as fuels (e.g., diesel fuel or gasoline for power tools and vehicles), which could reduce ground water quality if they were to enter stormwater. NPMPP would work with USFWS and DOFAW to ensure fence design and construction methods meet mitigation objectives. Standard erosion and sediment control measures, as well as measures for the safe transport, handling, and storage of hazardous materials, would be employed to reduce any temporary, localized impacts to surface and ground water quality to a negligible level.

Funding for forest restoration and monitoring at the Poamoho Ridge Mitigation Area for bat mitigation would go toward activities such as maintenance of the ungulate-proof fence installed by DLNR, feral pig control and monitoring, and invasive plant removal which are covered under the DLNR's existing exemption from Chapter 343 environmental analysis for the Koolau Forest Watershed Protection Project. Therefore, these activities are expected to have negligible effects to hydrology and water resources. Foot traffic and vehicle use associated with fence maintenance, removal and monitoring of non-native ungulates and invasive plant species, and bat monitoring may cause minor, localized disturbances to soils which could result in very low levels of increased erosion that could enter streams and drainages in the watershed. However, these impacts are expected to be temporary and negligible.

Fence maintenance and invasive plant removal may require the use of hazardous materials such as fuels (e.g., diesel fuel or gasoline for power tools and vehicles), which could reduce groundwater quality if they were to enter stormwater. Standard practices for the safe transport, handling, and storage of these materials consistent with DLNR's current practices would be implemented to minimize the potential for impacts to water quality. Likewise, invasive plant control at Poamoho Ridge may include of the application of herbicides. Only appropriate herbicides for the forest will be used, in accordance with labeled instructions to ensure that no significant impacts to water resources are expected from the use of herbicides.

Ultimately, forest restoration efforts would reduce soil disturbance and associated erosion currently being caused by non-native ungulate activity within the Poamoho Ridge Mitigation Area. Therefore, there would likely be an overall beneficial effect on hydrology and water resources within the Poamoho Ridge Mitigation Area through increased soil stability.

4.4.3.3 Mitigation of Unavoidable Impacts

BMPs listed in Table 2-6, which will be implemented by NPMPP, will minimize impacts to hydrology and water resources. These measures include:

- Preparation and implementation of a TESC Plan, which would include standard stormwater BMPs such as building during the summer months when rainfall potential is low, using silt fences or hay bales to prevent eroded soil from being transported off-site, and contouring to minimize impacts to onsite drainage and to prevent runoff from entering surface water.

- Siting Project access roads to follow natural contours and minimize side hill cuts to the extent possible to minimize the potential for erosion and impacts to site drainage patterns.
- Constructing a retention basin at the onsite substation to avoid erosion and eliminate the possibility of degrading downstream waters.
- Using ditches and culverts and other erosion controls to capture and convey stormwater in areas of temporary disturbance.
- Restoring disturbed areas, with the exception of areas where permanent surface recontouring is required, to pre-existing grades and revegetation of these areas.
- Installing permanent stormwater control structures to prevent erosion where access roads, buildings, storage areas, and parking areas are constructed.
- Preparing an SPCC Plan.
- Preparing and implementing a site-specific SWPPP.

No additional avoidance, minimization, or mitigation measures are required.

4.4.3.4 Cumulative Effects

The cumulative effects analysis area for impacts on hydrology and water resources includes the Oio, Malaekahana, Kaelepulu, Kaukonahua, Poamoho, and Helemano watersheds. This area encompasses the areas where cumulative effects to hydrology and water resources would occur.

Past agricultural and associated development activities, as well as urban development and associated infrastructure, and construction of the Kahuku Wind Farm have contributed to the overall loss and alteration of hydrology and water resources in the wind farm site watersheds. Ongoing agricultural operations will continue to impact these resources in the Oio and Malaekahana watersheds. Human activity and development in the vicinity of the Hamakua Marsh Mitigation Area have also contributed to the overall loss and alteration of hydrology and water resources in the Kaelepulu watershed. Although little development has occurred in the Poamoho Ridge Mitigation Area, feral pig activity in the area has resulted in disturbances to soil that has likely had minor impacts to streams and drainages in the Kaukonahua, Poamoho, and Helemano watersheds. Removal and control of non-native ungulates in Poamoho Ridge Mitigation Area would reduce soil disturbances and associated erosion and sedimentation in the area.

The only foreseeable future project in the cumulative effects analysis area with the potential to impact hydrology and water resources is the Envision Laie Project located in the Malaekahana parcel in the vicinity of the wind farm site and ongoing and proposed restoration efforts in the Kawainui-Hamakua Marsh complex (see Table 4.2-2). The Envision Laie Project, which includes residential development on 300 acres of Malaekahana land, has the potential to cause temporary increases in erosion and sedimentation into the streams and drainages of the Oio and Malaekahana watersheds. Increased amounts of impervious surfaces associated with this development could also alter drainage and stormwater runoff patterns. Groundwater within the Koolauloa Aquifer system could be impacted through contamination due to the use of hazardous materials during construction or through water withdrawals, if required. It is assumed that potential impacts to hydrology and water resources would be minimized by the avoidance of wetlands and other waters

of the U.S. and through the implementation of standard BMPs for minimizing erosion, stormwater runoff, and contamination (e.g., preparation of SPCC, SWPPP, and TESC plans). Restoration activities in Kawainui-Hamakua Marsh, including wetland expansion, flood control, and invasive species control may have temporary adverse impacts to hydrology and water resources in the Kaelepulu Watershed associated with the implementation of each activity; however, over the long term these activities benefit the hydrology and water resources in the watershed.

The Proposed Action would result in temporary, localized contributions in the effects to hydrology and water resources within the analysis area through erosion and stormwater runoff potentially affecting surface waters including Keaaulu, Malaekahana, and Ohia streams in the wind farm site and waterbodies in the Hamakua Marsh Mitigation Area; no measurable impacts would occur to groundwater quality or quantity. Implementation of mitigation measures described in Section 4.4.3.3 would minimize these impacts. Forest restoration activities at the Poamoho Ridge Mitigation Area would contribute to beneficial effects to hydrology and water resources through increased soil stability. Therefore, when viewed in conjunction with past, present, and foreseeable projects in the analysis area, the contribution of Alternative 2 to cumulative effects on hydrology and water resources would generally be minor.

4.4.3.5 Summary

Direct effects to hydrology and water resource from the Proposed Action will be avoided to the extent feasible. Ground disturbance (associated with construction and operation of the Project and implementation of HCP conservation measures) and the creation of impervious surfaces (permanent Project facilities) would increase the potential for erosion, sedimentation, and stormwater runoff, which could affect surface water quality. These effects would be minimized through the implementation of standard BMPs and design features. Negligible effects to groundwater quality or quantity are anticipated. Effects to hydrology and water resources, including impacts to jurisdictional waters of the U.S., (Keaaulu, Ohia, and Malaekahana streams) under the Proposed Action would be considered negligible to minor because while there would be the potential for impacts to water quality, the intensity would be low (changes to hydrology and water resources not likely to be measurable), disturbance would be temporary and localized, and Project activities would not significantly alter the flow or change the function or character of the streams.

4.4.3.6 Alternative 2a - Modified Proposed Action Option

Direct, indirect, and cumulative effects on hydrology and water resources from the Modified Proposed Action Option would be similar to those described under the Proposed Action. However, the Modified Proposed Action Option would result in up to approximately 9.1 acres (3.7 hectares) of impervious surfaces, which includes 9 acres (3.6 hectares; 99 percent) of gravel surfaces which would be considered semi-pervious. Additionally, the net increase in stormwater runoff under Alternative 2a was estimated at 10.9 cfs (Belt Collins Hawaii LLC 2016a). Table 2-1 provides more detail on the disturbance areas associated with each Project component. Implementation of

standard BMPs and other mitigation measures, as described under the Proposed Action, would minimize any adverse impacts to hydrology and water resources.

4.4.4 Alternative 3—Larger Generation Facility (Up to 12 Turbine Project)

4.4.4.1 Direct and Indirect Effects of Construction and Operation of the Project

Construction Impacts

Surface Water

The types of direct and indirect effects on hydrology and water resources from construction of the Project under Alternative 3 would be the same as those described under Alternative 2. There would be no additional direct impacts to wetlands or streams within the wind farm site under Alternative 3 as compared to Alternative 2. Because there would be a lag time of at least 3 years between construction the first 8 to 10 turbines and the additional 2 to 4 turbines under Alternative 3, the time frame of temporary, localized construction-related impacts associated with increases in erosion, sedimentation, and stormwater runoff conveyed into streams and downstream waters would be extended.

Alternative 3 would result in a total of 11.1 acres (4.5 hectares) of impervious surfaces within the wind farm site, approximately 1.0 acres (0.4 hectares) more than under Alternative 2; of this 11 acres [4.4 hectares], approximately 99 percent, are semi-pervious). However, this increase in impervious surfaces amounts to less than 0.1 percent of the watershed within which the Project is located. Additionally, the net increase in stormwater runoff under Alternative 3 was estimated at 13.0 cfs (Belt Collins Hawaii LLC 2016a). With implementation of stormwater control measures, such as seepage pits, drywells, and/or detention basins the increase in impervious surfaces under Alternative 3 would not significantly increase the volume of stormwater runoff leaving the wind farm site. Although stormwater runoff has the potential to adversely affect streams within the wind farm site, with implementation of BMPs and mitigation measures described in Section 4.4.3.3 impacts to surface waters would be minor.

Groundwater

Peak water needs for construction of Alternative 3 would be up to approximately 10,000 to 15,000 gallons (37,850 to 56,780 liters) for dust suppression and emergency fire suppression, as under Alternative 2. Water sources would be the same as those described for Alternative 2. Therefore, construction of Alternative 3 would not measurably reduce the quantity of available groundwater in the wind farm site. Implementation of the SPCC Plan would reduce adverse impacts to groundwater quality from construction of Alternative 3 to a negligible level.

Alternative 3 would result in a minor increase in the amount of impervious surface in the analysis area. Precipitation falling on these impervious surfaces would likely run off to adjacent open lands where aquifer recharge would occur; therefore, the slight increase in impervious surfaces is not expected to measurably reduce the potential for groundwater recharge.

Operation and Maintenance Impacts

Surface Water

Impacts to surface water from O&M activities under Alternative 3 would be as described under Alternative 2. The addition of 2 to 4 additional turbines and 0.7mile (1.1 kilometer) of additional internal access roads would result in additional operational and maintenance needs; however, implementation of BMPs described under Alternative 2 for reducing erosion, sedimentation, and stormwater runoff, which would be implemented under Alternative 3, would minimize impacts to hydrology and water resources during O&M.

Groundwater

Groundwater impacts under Alternative 3 would be the same as those described under Alternative 2.

4.4.4.2 Direct and Indirect Effects of the HCP Conservation Measures

Impacts of Avoidance and Minimization Measures

The avoidance and minimization measures proposed under the Project HCP would not be expected to affect the hydrology and water resources within the analysis area.

Impacts of HCP Mitigation

Impacts of the HCP mitigation measures under Alternative 3 would be the same as described under the Proposed Action. Prior to construction of the additional turbines proposed under Alternative 3, NPMPP would reopen consultation with the USFWS and DOFAW to assess the potential impacts of the additional turbines to listed species and develop appropriate mitigation measures. The impacts of these mitigation measures to hydrology and water resources would be evaluated under a separate environmental analysis at that time.

4.4.4.3 Mitigation of Unavoidable Impacts

Mitigation for unavoidable impacts under Alternative 3 would be the same as described under the Proposed Action (Section 4.2.3.3).

4.4.4.4 Cumulative Effects

The cumulative effect analysis area for impacts on hydrology and water resources from HCP conservation measures and construction and operation is as described under Alternative 2. Impacts of past, present, and foreseeable activities within the cumulative effects analysis area for hydrology and water resources would be as described under Alternative 2 (see Section 4.2.3.4). Alternative 3 would result in temporary, localized contributions in the effects to hydrology and water resources within the analysis area through erosion and stormwater runoff potentially affecting surface waters including Keaaulu, Malaekahana, and Ohia streams in the wind farm site and waterbodies in the Hamakua Marsh Mitigation Area; no measurable impacts would occur to groundwater quality or quantity. Implementation of mitigation measures described in Section 4.2.3.3 would minimize these impacts. Forest restoration activities at the Poamoho Ridge Mitigation Area would contribute to

beneficial effects to hydrology and water resources through increased soil stability. Therefore, when viewed in conjunction with past, present, and foreseeable projects in the analysis area, the contribution of Alternative 3 to cumulative effects on hydrology and water resources would be minor. As stated above, there would be a lag of at least 3 years between the construction of the first 8 to 10 turbines and the additional 2 to 4 turbines. New projects and developments in the area will be assessed and reviewed to determine if there are additional cumulative impacts to hydrology and water resources from future unknown projects.

4.4.4.5 Summary

Direct effects to hydrology and water resource from the Alternative 3 would be avoided to the extent feasible. Ground disturbance (associated with construction and operation of the Project and implementation of HCP conservation measures) and the creation of impervious surfaces (permanent Project facilities) would increase the potential for erosion, sedimentation, and stormwater runoff which could affect surface water quality. These effects would be minimized through the implementation of standard BMPs and design features. Negligible effects to groundwater quality or quantity are anticipated. Direct and indirect effects to hydrology and water resources under Alternative 3 would be considered negligible to minor because while there would be the potential for impacts to water quality, the intensity would be low (changes to hydrology and water resources not likely to be measurable), disturbance would be temporary and localized, and Project activities would not significantly alter the flow or change the character or function of Keaaulu, Ohia, Malaekahana streams or other streams. .

4.4.5 Conclusion

Table 4.4-2 summarizes potential impacts to hydrology and water resources from the alternatives considered in this analysis.

Table 4.4-2. Summary of Potential Impacts to Hydrology and Water Resources

Impact Issues	No Action Alternative	Alternative 2 – Proposed Action	Alternative 2a – Modified Proposed Action Option	Alternative 3
Impacts to wetlands and other waters of the U.S.	No Impact	Minor	Minor	Minor
Alteration of existing drainage patterns	No Impact	Negligible	Negligible	Negligible
Contamination of surface water quality from increased erosion, sedimentation, stormwater runoff and/or pollutants	No Impact	Minor	Minor	Minor
Alteration of surface water quality resulting in long-term loss or use by humans or aquatic wildlife and plants	No Impact	Minor	Minor	Minor
Decrease in available groundwater or groundwater recharge	No Impact	Negligible	Negligible	Negligible
Degradation of ground water quality	No Impact	Negligible	Negligible	Negligible

4.5 Air Quality and Climate Change

4.5.1 Impact Criteria

The analysis area for the air quality and climate change includes the full extent of the island of Oahu. This analysis area includes the entire Project footprint, the extent of proposed mitigation areas (see Chapter 2 for more details), as well as the full extent of potential Project-related impacts to air quality or climate change. Data used in this analysis comes from air quality monitoring stations (as described below), estimates for traffic levels derived from the Project's Traffic Report (Belt Collins Hawaii LLC 2016b), the EPA's Motor Vehicle Emission Simulator (MOVES) model (EPA 2014a), and the EPA's Non-road Engines Equipment and Vehicles (NONROAD) model (EPS 2014c). The following assumptions were used in the MOVES and NONROAD models:

- 72 percent of vehicles would be heavy trucks used for deliveries, 14 percent would be passenger trucks, and 14 percent would be passenger cars.
- All workers would commute from Honolulu for a round trip of 84 miles per day.
- Emission Factors for each vehicle type (ton/VMT) were derived from the MOVES Model using the most current input files provided by the State of Hawaii.
- To estimate the $C0_2$ equivalent (i.e., CO_{2e}) a multiplier of 25 was applied to CH_4 and a multiplier of 298 was applied to N_2O.

Table 4.5-1 lists the impact criteria considered when determining the level of effect (i.e., negligible, minor, moderate, major) that the Project could have to air quality or climate change. Note that all Project-related impacts to air quality and climate change would affect "important" resources at a "regional" level. Impacts to these resources would, however, vary by magnitude (i.e., high, medium, or low) and duration (i.e., permanent, long term, or temporary), as described in Section 4.1.1.

Table 4.5-1. Impact Criteria for Air Quality and Climate Change

Type of Effect	Impact Component	Effects Summary		
Changes to Air Quality or Climate Change	Magnitude or Intensity	**High:** Acute or obvious changes in resource character considerably above State and Federal ambient air quality standards	**Medium:** Noticeable changes in resource character above or near State and Federal ambient air quality standards	**Low:** Changes in resource character may not be noticeable or are lower than State and Federal ambient air quality standards
	Duration	**Permanent:** Chronic effects; resource would not be anticipated to return to previous levels	**Long-term:** Resource would be reduced through the life of the Project and would return to pre-activity levels at some point after completion of the Project.	**Temporary:** Resource would be reduced infrequently but not longer than the span of the Project construction and would be expected to return to pre-activity levels at the completion of the activity.

Table 4.5-1. Impact Criteria for Air Quality and Climate Change (continued)

Type of Effect		Impact Component	Effects Summary		
		Geographic Extent	**Extended:** Affects resources beyond the Island of Oahu	**Regional:** Affects resources beyond a local area, potentially throughout the Island of Oahu	**Local:** Impacts are limited geographically; may include the extent of the wind farm site.
		Context	**Unique:** Affects rare resources or resources protected by legislation	**Important:** Affects resources regulated by legislation.	**Common:** Affects usual or ordinary resources; not depleted or protected by legislation.

4.5.2 Alternative 1—No Action

4.5.2.1 Direct and Indirect Effects

Under the No Action Alternative, the Project would not be constructed, an ITP would not be issued by the USFWS, and the HCP conservation measures would not be implemented. As a result, the emissions (including the emission of greenhouse gases) and air quality impacts associated with construction and operation of the Project would not occur. However, if the power that would have been generated by this Project is instead produced through facilities that burn fossil fuels (e.g., coal, gas, or oil burning facilities), then the long-term displacement of green-house-gas emissions associated with generating power via wind instead of burning fossil fuels would not occur. This could potentially result in higher green-house-gas emissions in the long term.

4.5.2.2 Cumulative Effects

Under the No Action Alternative, the Project would not be constructed, an ITP would not be issued by the USFWS, and the HCP conservation measures would not be implemented. Therefore, there would be no adverse or beneficial effects on air quality or climate change. Thus, Alternative 1 would not contribute to cumulative effects on air quality or climate change.

4.5.2.3 Summary

The No Action Alternative would have no direct, indirect, or cumulative effects on air quality or climate change as no action would be undertaken.

4.5.3 Alternative 2—8 to 10 Turbine Project

4.5.3.1 Direct and Indirect Effects of Construction and Operation of the Project

Construction Impacts

Construction of the Project would result in the emission of some pollutants as well as the generation of fugitive dust. Heavy equipment (such as trucks, cranes, and earthmovers) would be

required in order to construct this Project. The internal combustion of fuels to power this equipment would generate green-house gases and air pollutants. In addition, soil disrupting activities associated with construction of the Project would result in the generation of fugitive dust (which is measured as PM_{10} and $PM_{2.5}$)[1]. Air pollutant emissions and fugitive dust levels would be highest near the Project's construction sites (where the majority of activities would occur); however, lower levels of emissions and fugitive dust would also occur along travel routes to and from the Project site. Table 4.5-2 lists the estimated levels of air pollutants and fugitive dust that would be generated during the construction of the Project on an annual basis.

As these emissions and increased fugitive dust levels would be temporary (with elevated fugitive dust levels occurring only in a localized area), would occur at relatively low levels compared to the State and Federal ambient air quality standards (see Section 3.3 – Air Quality and Climate Change), and BMPs would be implemented to minimize the effects of these emissions (see Table 2-6), construction of the Project is expected to have a minor effect to air quality. Construction-related emissions would occur at a low enough level that they are expected to have a negligible effect to climate change.

Table 4.5-2. Construction Emissions for Criteria Pollutants under Alternative 2 (tons/year) 1/

Emission Source	Volatile Organic Compounds	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$ 5/	CO_2e 6/
Construction Equipment Emissions 2/	1.20	6.79	14.47	0.02	0.89	0.89	2,905
Fugitive Construction Dust (including unpaved and paved roads) 3/	–	–	–	–	101.61	10.18	–
Vehicle Emissions 4/	0.15	1.22	0.38	0.00	0.01	0.01	644
Total	**1.35**	**8.01**	**14.85**	**0.02**	**102.51**	**11.08**	**3,549**

1/ Note that ozone is not emitted directly from emission sources (e.g., vehicle exhaust) and instead is a result of chemical reactions near the ground from NOx (i.e., oxides of nitrogen including NO_2 and NO) and volatile organic compounds. Therefore, ozone is not included in this table.

2/ Construction emission factors (EF) were generated from the EPA NONROAD model for the 2015 calendar year.

3/ Fugitive dust based on 89.0 acres of land disturbance and WRAP Fugitive Dust Handbook (WRAP 2006). Paved roadway vehicle dust emissions calculated per AP-42 (EPA 2011) estimation methods for paved roads.

4/ Vehicle mission rates were generated using EPA MOVES Vehicle Emissions Model. Fleet Characterization: 87 light utility vehicles commuting to work, assuming 50% are pickup trucks and 50% passenger cars, and 225 heavy duty diesel trucks. See Traffic Assessment Technical Report for additional details on traffic volumes for the Project.

5/ For construction equipment emissions from combustion sources PM_{10} and $PM_{2.5}$ are conservatively estimated to be equal.

6/ Note that CO_2e includes compounds that are equivalent to CO_2 in regards to their "global warming potentials" (e.g., CH_4 and N_2O)

Operation and Maintenance Impacts

Operation of the Project has the potential to impact air quality. Vehicles used by the Project's employees as well as some heavy equipment, such as cranes that may be required periodically for maintenance or repair of the Project, would produce emission via the internal combustion of fuels. However, operation of the Project is expected to have a negligible adverse effect to air quality because the use of vehicles and equipment during operation is expected to be low (see Chapter 2

[1] PM_{10} is defined as particulate matter that is 10 microns or less in aerodynamic diameter; these particles are typically considered "coarse" particles. $PM_{2.5}$ is defined as particulate matter that is 2.5 microns or less in aerodynamic diameter; these particles are typically considered "fine" particles.

for more details), and estimated emission levels would be low compared to the State and Federal ambient air quality standards (see Section 3.3 – Air Quality and Climate Change).

Recent modeling efforts have shown that extremely large wind facilities can have effects on local climate conditions. For example, a modeling study of a theoretical wind facility consisting of a 100 by 100 array of wind turbines (covering approximately 6,250 square miles) could result in moderate warming and drying of surface air, could slow down the measurable wind speeds at the turbine hub-height level, and could enhance vertical mixing of air thereby affecting the vertical distribution of temperature and humidity, but would have no effect to evapotranspiration (Roy et al. 2004). However, the proposed project consists of 8 to 10 turbines; as a result, the effects described in Roy et al. (2004) are unlikely to occur at wind facilities of the size proposed for this Project. As a result, this Project is expected to have negligible direct effect to local climate conditions.

The Project should have a long-term beneficial indirect effect to air quality and climate conditions. Currently, approximately 75 percent of the electricity generated on Oahu is a result of burning oil; this proposed Project has the potential to offset some of the adverse effects associated with power generating facilities that burn fossil fuels, assuming that the power that would be generated by this wind-facility would have been generated by facilities that burn fossil fuels if this Project is not implemented. As the burning of one barrel of crude oil generates about 0.000196 MW of power, approximately 127,551 barrels of crude oil would need to be burnt annually to generate the up to approximately 25 MW of power that is estimated to be generated by Alternative 2 (ODOE 2014). The EPA estimates that approximately 0.43 metric tons of CO_2 are released by burning one barrel of crude oil (EPA 2014b); therefore, a power facility that burns oil would release about 54,847 metric tons of CO_2 annually in order to generate the amount of energy that would be produced by this wind Project. Comparatively, this Project is estimated to release 66.52 metric tons of CO_2 annually[2], which is a 54,780 reduction in the annual release of CO_2 emissions compared to an oil burning facility of comparable power.[3] Therefore, the potential offset of CO_2 levels that would be generated by this Project compared to an oil-burning facility would have a moderate beneficial impact to air quality (i.e., a reduction in the amount of annual CO_2 emissions).

[2] This value is based on the assumption that three workers would commute from the Honolulu area (42 miles each way) daily, for 365 days per year; and that a mix of equipment would be used on site to conduct operations/maintenance activities (including dozers, backhoes, dump trucks, and loaders, which would range from 175 to 750 horse-power).

[3] This is a conservative estimate, as it does not take into consideration the amount of CO_2 that could be released by fossil fuel burning facilities beyond what would be generated by the burning oil (e.g., the CO_2 released by worker's vehicles or equipment at these fossil fuel burning facilities is not included in the calculation). Therefore, the off-set and benefit of this wind facility may be larger than what is currently estimated.

4.5.3.2 Direct and Indirect Effects of the HCP Conservation Measures

Impacts of Avoidance and Minimization Measures

The avoidance and minimization measures proposed under the Project HCP would have no effect on air quality or climate change.

Impacts of HCP Mitigation Measures

Emission of air pollutants as a direct result of the NPMPP's activities under the HCP would be negligible. During implementation of activities associated with funding for forest restoration activities at Poamoho Ridge for bats (maintenance of the ungulate-proof fence, feral pig control and monitoring, invasive plant removal, and bat acoustic monitoring), Newell's shearwater research and management and short-eared owl research and management vehicles may be used on a regular basis to transport staff and equipment to management or research sites which would result in immeasurable exhaust emissions. Installation of the partial fence along the border of Hamakua Marsh Mitigation Area for waterbird mitigation would involve the use of some motor driven equipment, resulting in a temporary elevation in emissions levels and fugitive dust. However, the levels of emissions and fugitive dust generated during the construction of this fence would have negligible effects to air quality and climate change due to the temporary nature of the emissions, the low levels that would be produced by installing a fence, and the existing high air quality of the area.

4.5.3.3 Mitigation of Unavoidable Impacts

NPMPP would implement standard BMPs in order to avoid or minimize impacts to air quality and climate change, as listed in Table 2-6. These include measures to limit fugitive dust generation, limit the risk of wildfires, and requirements to keep all equipment in proper working order. As described above, no anticipated adverse impacts to air quality or climate change rise above a "minor" impact level (as described in Section 4.1.1). In addition, the Project has the potential to have beneficial long-term impacts to air quality and climate change (i.e., offsetting some of the adverse effects associated with power generating facilities that burn fossil fuels). Therefore, no additional mitigation measures would be required.

4.5.3.4 Cumulative Effects

The analysis area for the cumulative effects to air quality and climate change includes the full extent of the island of Oahu. As shown in Table 4.2-2, there are multiple existing and reasonably foreseeable projects on the island of Oahu that could incrementally add to the pollutant and fugitive dust levels on the island; these include existing agricultural operations, multiple road projects, existing wind facilities, as well as proposed development and expansion of resorts and developments. Of these projects, the existing agricultural operations would likely have the greatest impact to fugitive dust levels on the island (due to the continuous soil disturbance associated with agricultural operations), while the existing and proposed roads would likely have the greatest long-term impact to pollutant levels (due to on-going combustion of fuels by vehicles using these roads).

However, due to the low expected levels of air pollutants expected to occur from these projects, the temporary nature of construction related impacts for the reasonable foreseeable project (i.e., those that do not currently exist and would be constructed in the future), the existing high air quality of the region (see Section 3.3 – Air Quality and Climate Change), and the presence of the trade winds which rapidly remove air pollutants from the region, cumulative impacts to air quality and climate change would be minor.

4.5.3.5 Summary

Construction of the Project under Alternative 2 would have a minor effect to air quality because Project-related emissions and increased fugitive dust levels would be temporary in nature, would occur at relatively low levels compared to the State and Federal ambient air quality standards, and BMPs would be implemented to minimize the effects of these emissions. Construction-related emissions would occur at a low enough level that they are expected to have a negligible effect to climate change. Operation of the Project would have a negligible adverse effect to air quality and climate change (due to the low estimated rate of emissions and limited size of the proposed facility), but a potential moderate beneficial impact to climate change (due to the potential offset of CO_2 generated by this Project compared to facilities that burn oil). Likewise, the implementation of HCP conservation measures would have negligible impact on air quality and climate change. For these reasons, the Proposed Action, in conjunction with past, present, and reasonably foreseeable projects, would have a minor adverse cumulative impact on air quality and climate change during construction and a moderate beneficial cumulative impact on air quality and climate change.

4.5.3.6 Alternative 2a - Modified Proposed Action Option

Direct, indirect, and cumulative effects on air quality and climate conditions from the Modified Proposed Action Option would be the same as those described under the Proposed Action. There may be a slightly reduced amount of air pollutant emissions and fugitive dust levels associated with construction under the Modified Proposed Action Option due to the decrease in the number of turbines; however, this reduction would be negligible. Implementation of standard BMPs, as described under the Proposed Action, would minimize any adverse impacts to air quality and climate conditions. In addition, similar to the Proposed Action, the Modified Proposed Action Option has the potential to have beneficial long-term impacts to air quality and climate change (i.e., offsetting some of the adverse effects associated with power generating facilities that burn fossil fuels).

4.5.4 Alternative 3—Larger Generation Facility (Up to 12 Turbine Project)

4.5.4.1 Direct and Indirect Impacts of Construction and Operation of the Project

The impacts to air quality and climate change under Alternative 3 would be similar to those discussed above for Alternative 2. The main difference between the two alternatives in regard to air quality and climate change would be related to the longer construction period for Alternative 3, as

well as the offset of CO_2 levels that would be generated by this Project during operation compared to those produced by a facility that burns fossil fuels.

Construction Impacts

As discussed in Chapter 2, Alternative 3 would involve construction of the first 8 to 10 turbines in the first quarter of 2015. There would be a lag of at least 3 years between the construction of the first set of turbines and the additional 2 to 4 turbines proposed under this alternative. Table 4.5-3 lists the additional estimated levels of air pollutants and fugitive dust that would be generated during the construction of the additional turbines under Alternative 3 on an annual basis (total emissions would be those listed in Table 4.5-2 plus those listed in Table 4.5-3).

Table 4.5-3. Additional Construction Emissions for Criteria Pollutants under Alternative 3 (tons/year)[1/]

Emission Source	Volatile Organic Compounds	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$[5/]	CO2e[6/]
Construction Equipment Emissions[2/]	0.60	3.4	7.24	0.01	0.45	0.45	1,452
Fugitive Construction Dust (including unpaved roads)[3/]					112.42	11.24	
Vehicle Emissions[4/]	0.08	0.67	0.20	0.00	0.005	0.004	340
Total	**0.68**	**4.06**	**7.44**	**0.01**	**112.87**	**11.69**	**1,792**

1/ Note that ozone is not emitted directly from emission sources (e.g., vehicle exhaust) and instead is a result of chemical reactions near the ground from NOx (i.e., oxides of nitrogen including NO_2 and NO) and volatile organic compounds. Therefore, ozone is not included in this table.

2/ Construction emission factors were generated from the EPA NONROAD model for the 2015 calendar year.

3/ Fugitive dust based on 98.6 acres of land disturbance and WRAP Fugitive Dust Handbook (WRAP 2006). Paved roadway vehicle dust emissions calculated per AP-42 (EPA 2011) estimation methods for paved roads.

4/ Vehicle mission rates were generated using EPA MOVES Vehicle Emissions Model. Fleet Characterization: 87 light utility vehicles commuting to work, assuming 50% are pickup trucks and 50% passenger cars, and 225 heavy duty diesel trucks. See Traffic Assessment Technical Report for additional details on traffic volumes for the Project.

5/ For construction equipment emissions from combustion sources PM_{10} and $PM_{2.5}$ are conservatively estimated to be equal.

6/ Note that CO_2e includes compounds that are equivalent to CO_2 in regards to their "global warming potentials" (e.g., CH_4 and N_2O)

As these emissions and increased fugitive dust levels would be temporary (with elevated fugitive dust levels occurring only in a localized area), would occur at relatively low levels compared to the State and Federal ambient air quality standards (see Section 3.3 – Air Quality and Climate Change), and BMPs would be implemented to minimize the effects of these emissions (see Table 2-3), construction of the Project is expected to have a minor effect to air quality. Construction-related emissions would occur at a low enough level that they are expected to have a negligible effect to climate change.

Operation and Maintenance Impacts

As the burning of one barrel of crude oil generates about 0.000196 MW of power, approximately 214,285 barrels of crude oil would need to be burnt annually to generate the up to approximately 42 MW of power that is estimated to be generated by Alternative 3 (ODOE 2014). The EPA estimates that approximately 0.43 metric tons of CO_2 are released by burning one barrel of crude oil (EPA 2014b); therefore, a power facility that burns oil would release about 92,143 metric tons of

CO_2 annually in order to generate the amount of energy that would be produced by this wind Project. Comparatively, this Project is estimated to release 66.52 metric tons of CO_2 annually[4], which is a 92,076 metric ton reduction in the annual release of CO_2 emissions compared to an oil-burning facility of comparable power.[5] Therefore, the potential off-set of CO_2 levels that would be generated by this Project compared to an oil-burning facility would have a moderate beneficial impact to air quality (i.e., a reduction in the amount of annual CO_2 emissions).

4.5.4.2 Direct and Indirect Effects of the HCP Conservation Measures

Impacts of Avoidance and Minimization Measures

The avoidance and minimization measures proposed under the Project HCP would have no effect on air quality or climate change.

Impacts of HCP Mitigation Measures

Impacts of HCP mitigation under Alternative 3 would be the same as described under the Proposed Action. Prior to construction of additional turbines proposed under Alternative 3, NPMP would reopen consultation with the USFWS and DOFAW to assess the potential for impacts of the additional turbines to listed species and develop appropriate mitigation measures. The impacts of these mitigation measures to air quality and climate change would be evaluated under a separate environmental analysis at that time.

4.5.4.3 Mitigation of Unavoidable Impacts

The Applicant will implement standard BMPs in order to avoid or minimize impacts to air quality and climate change, as listed in Table 2-6. These include measures to limit fugitive dust generation, limit the risk of wildfires, and requirements to keep all equipment in proper working order. As described above, no anticipated adverse impacts to air quality or climate change rise above a "minor" impact level (as described in Section 4.1.1). In addition, the Project has the potential to have beneficial long-term impacts to air quality and climate change (i.e., offsetting some of the adverse effects associated with power generating facilities that burn fossil fuels). Therefore, no additional mitigation measures would be required under Alternative 3.

[4] This value is based on the assumption that three workers would commute from the Honolulu area (42 miles each way) daily, for 365 days per year; and that a mix of equipment would be used on site to conduct operations/maintenance activities (including dozers, backhoes, dump trucks, and loaders, which would range from 175 to 750 horse-power).

[5] This is a conservative estimate, as it does not take into consideration the amount of CO_2 that could be released by fossil fuel burning facilities beyond what would be generated by the burning oil (e.g., the CO_2 released by worker's vehicles or equipment at these fossil fuel burning facilities is not included in the calculation). Therefore, the offset and benefit of this wind facility may be larger than what is currently estimated.

4.5.4.4 Cumulative Effects

The analysis area for the cumulative effect analysis includes the full extent of the island of Oahu. As shown in Table 4-2, there multiple existing and reasonably foreseeable projects on the island of Oahu that could incrementally add to the pollutant and fugitive dust levels on the island; these include existing agricultural operations, multiple road projects, existing wind facilities, as well as proposed development and expansion of resorts and developments. Of these projects, the existing agricultural operations would likely have the greatest impact to fugitive dust levels on the island (due to the continuous soil disturbance associated with agricultural operations); while the existing and proposed roads would likely have the greatest long-term impact to pollutant levels (due to on-going combustion of fuels by vehicles using these roads). However, due to the low expected levels of air pollutants expected to occur from these projects, the temporary nature of construction related impacts for the reasonable foreseeable project (i.e., those that do not currently exist and would be constructed in the future), the existing high air quality of the region (see Section 3.3.1.1 of Chapter 3), and the presence of the trade winds which rapidly remove air pollutants from the region, cumulative impacts to air quality and climate change would be minor.

4.5.4.5 Summary

Construction of the Project under Alternative 3 would have a minor effect to air quality because Project related emissions and increased fugitive dust levels would be temporary in nature, would occur at relatively low levels compared to the State and Federal ambient air quality standards, and BMPs would be implemented to minimize the effects of these emissions. Construction-related emissions would occur at a low enough level that they are expected to have a negligible effect to climate change. Operation of the Project would have a negligible adverse effect to air quality and climate change (due to the low estimated rate of emissions and limited size of the proposed facility), but a potential moderate beneficial impact (due to the potential offset of CO_2 generated by this Project compared to facilities that burn oil). The construction of the Project, in conjunction with past, present, and reasonably foreseeable projects, would have a minor adverse cumulative impact on air quality and climate change. The operation of the Project, in conjunction with past, present, and reasonably foreseeable projects, would have a moderate positive cumulative impact on air quality and climate change.

4.5.5 Conclusion

Table 4.5-4 summarizes potential impacts to air quality and climate change from the alternatives considered in this analysis.

Table 4.5-4. Summary of Potential Impacts to Air Quality and Climate Change

Impact Issues	No Action Alternative	Alternative 2 – Proposed Action	Alternative 2a – Modified Proposed Action Option	Alternative 3
Violations of State or Federal air quality standards as a result of construction activity or traffic	No Impact	No Impact	No Impact	No Impact
Greenhouse gas emissions from Project construction	No Impact	Minor	Minor	Minor
Greenhouse gas emissions from Project operation	No Impact	Negligible Adverse/Moderate Beneficial	Negligible Adverse/Moderate Beneficial	Negligible Adverse/Moderate Beneficial

4.6 Noise

Noise during Project construction and operation were assessed. Project construction was assessed in a semi-qualitative manner using information available at this stage of the design process and using representative equipment information where necessary. The operational acoustic assessment was completed using DataKustik GmbH's CadnaA, the computer-aided noise abatement program (v 4.14.145). Details on the prediction approaches used are provided in Appendix D – Noise Impact Assessment.

4.6.1 Impact Criteria

A significant impact on noise would occur if an exceedance of the State noise regulation occurred at a NSR such as a residence. As described in Section 3.4 – Noise, the HAR 11-46 provides daytime and nighttime maximum permissible noise limits according to zoning districts, which are considered the controlling criteria for the Project. The HAR provide the regulatory environment for the State of Hawaii. These criteria are absolute and independent of the existing acoustic environment.

Wind farm site zoning districts are mixed with the Project components themselves located on and adjacent to property classified as Class C (70 dBA day or night limit) zoning districts, see Figure 3.4-1. Nearby, within the acoustic analysis area, are a number of other properties that are classified as Class A zoning (45 dBA night and 55 dBA day limit)or Class B (50 dBA night and 60 dBA day). An exceedance of the HAR 11-46 limit at any of the properties within the acoustic analysis area would be considered a significant impact. Additionally, the magnitude of an increase, if any, from Project received sound levels at a given NSR is used to quantify what the public response may be as a result of the Project.

Scientific research demonstrates that the following general relationships hold between sound level and human perception for two sound levels with the same or very similar frequency characteristics:

- 1 dBA is the practically achievable limit of the accuracy of sound measurement systems and corresponds to an approximate 10 percent variation in sound pressure. A 1 dBA increase or decrease is a non-perceptible change in sound.

- 3 dBA increase or decrease is a doubling (or halving) of acoustic energy and it corresponds to the threshold of perceptibility of change in a laboratory environment. In practice, the average person is not able to distinguish a 3 dBA difference in environmental sound outdoors.
- 5 dBA increase or decrease is described as a perceptible change in sound level and is a discernable change in an outdoor environment.
- 10 dBA increase or decrease is a tenfold increase or decrease in acoustic energy but is perceived as a doubling or halving in sound (i.e., the average person will judge a 10 dBA change in sound level to be twice or half as loud).

Although the Project is only required to demonstrate compliance with HAR 11-46 noise limits, NPMPP elected to also evaluate the potential for impacts from Project-related low frequency noise (LFN) and infrasound (IS). Because there are no Federal, State, or local regulations for LFN and IS from wind energy projects the acoustic analysis implemented other guidelines and standards to assess potential impact conditions, specifically comparisons were made to the American National Standards Institute (ANSI) S12.9 Part 4 guidelines (ANSI 2005) and the United Kingdom Department of Environment, Food & Rural Affairs (DEFRA) guidelines (DEFRA 2005).

The initial LFN/IS impact assessment focusses exceedances of the ANSI S12.9 Part 4 and DEFRA guidelines. ANSI S12.9 Part 4 recommends that project-related sound levels remain below 65 dB for the 16-63 Hz midband frequencies; DEFRA limits are provided in Table 4.6-1 and are based on community response to LFN/IS around Europe. Additionally, a comparison is made to existing monitored LFN and IS to assess the magnitude of change in LFN/IS, if any, from the Project.

Table 4.6-1. DEFRA Equivalent Outdoor dB L_{eq} 1/3-Octave Band Sound Pressure Thresholds

Location	1/3-Octave Band Center Frequency (Hz)												
	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
Non-Steady Outdoor	94	89	86	78	68.5	61	56	51	51	49	47	45	43
Steady Outdoor	99	94	91	83	73.5	66	61	56	56	54	52	50	48
Source: DEFRA 2005; O'Neal et al. 2011													

The assessment of noise impacts is based on magnitude or intensity, duration, geographic extent, and context of the impact. Table 4.6-2 provides descriptions on how these impacts are classified.

Table 4.6-2. Impact Criteria for Noise Impacts

Type of Effect	Impact Component	Effects Summary		
Effects on Noise	Magnitude or Intensity	**High:** Exceedance of HAR 11-46 noise limits from operation or changes in existing noise levels by 10 dBA or more from operation at HAR 11-46 Class A or B Zones.	**Medium:** Exceedance of HAR limits from construction noise. Changes in noise levels of 3 to 5 dBA from operation at HAR 11-46 Class A or B Zones.	**Low:** Changes in construction or operational noise levels of 2 dBA or less at HAR 11-46 Class A or B Zones.
	Duration	**Permanent:** Permanent changes in the acoustic environment that would result even with removal of the Project.	**Long-term:** Operational impacts would last through the life of the Project.	**Temporary:** Construction noise impacts of medium magnitude or intensity.
	Geographic Extent	**Extended:** Noise impacts that extend across Oahu.	**Regional:** Noise affects in areas outside the acoustic analysis area.	**Local:** Affects confined to the acoustic analysis area.
	Context	**Unique:** High magnitude or intensity impacts.	**Important:** Medium magnitude or intensity impacts.	**Common:** Low magnitude or intensity impacts.

4.6.2 Alternative 1—No Action

4.6.2.1 Direct and Indirect Effects

Under the No Action Alternative, the Project would not be constructed, the ITP would not be issued by the USFWS, and the HCP conservation measures would not be implemented. As a result, Alternative 1 would have no effects related to noise. As such, no mitigation measures would be warranted.

4.6.2.2 Cumulative Effects

Under the No Action Alternative, the Project would not be constructed, an ITP would not be used by the USFWS, and the HCP conservation measures would not be implemented. Therefore, there would be no effects related to noise. Thus, Alternative 1 would not contribute to cumulative effects to noise.

4.6.2.3 Summary

Alternative 1 would have no effects related to noise because no action would be undertaken.

4.6.3 Alternative 2—8 to 10 Turbine Project

4.6.3.1 Direct and Indirect Effects of Construction and Operation of the Project

Temporary construction noise and permanent operational noise from Alternative 2 would result in changes in noise levels in the acoustical analysis area. These effects are described in detail below. A more detailed Noise Impact Assessment is included in Appendix D.

Construction

Construction of Alternative 2 would involve constructing of access roads, excavating and forming wind turbine foundations, work associated with preparing the site for crane-lifting and actual turbine assembly and commissioning. Typically, wind energy projects are constructed in four phases consisting of the following:

- Site Clearing: The initial site mobilization phase includes the establishment of temporary site offices, workshops, stores, and other onsite facilities. Installation of erosion and sedimentation control measures will be completed as well as the preparation of initial haulage routes.
- Excavation: This phase would begin with the excavation and formation of access roads and preparation of laydown areas. Excavation for the concrete turbine foundations would also be completed.
- Foundation Work: Construction of the reinforced concrete turbine foundations would take place in addition to installation of the internal transmission network.
- Wind Turbine Installation: Delivery of the turbine components would occur followed by their installation and commissioning.

Work on these construction activities is expected to overlap. It is likely that the turbines would be erected in small groupings. Each grouping may undergo testing and commissioning prior to commencement of full commercial operation. Other construction activities include those for the supporting infrastructure such as the onsite substation, maintenance building, and the transmission line. The construction of the Project may cause short-term but unavoidable noise impacts depending on the construction activity being performed and the distance to receiver. The sound levels resulting from construction activities vary significantly depending on several factors such as the type and age of equipment, the specific equipment manufacturer and model, the operations being performed, and the overall condition of the equipment and exhaust system mufflers. The construction equipment that may be used on the Project and estimates of near and far sound source levels are presented in Table 4.6-3.

Table 4.6-3. Alternative 2 Estimated L_{max} Sound Pressure Levels from Construction Equipment

Equipment	Estimated Sound Pressure Level at 50 feet (15 meters) (dBA)	Estimated Sound Pressure Level at 2000 feet (610 meters) (dBA)
Forklift	80	48
Backhoe	80	48
Grader	85	53
Man basket	85	53
Dozer	83 - 88	51 - 56
Loader	83 - 88	51 - 56
Scissor Lift	85	53
Truck	84	52
Welder	73	41
Compressor	80	48
Concrete Pump	77	45
Sources: Federal Highway Administration, "Roadway Construction Noise Model User's Guide," Report FHWA-HEP-05-054 / DOT-VNTSC-FHWA-05-01, January 2006. Power Plant Construction Noise Guide, Bolt Beranek and Newman, Inc. 1977. Federal Highway Administration, "Procedures for Abatement of Highway Traffic Noise and Construction Noise." Code of Federal Regulations, Title 23, Part 772, 2010.		

Sounds generated by construction activities would likely require a permit, obtained from the HDOH, to allow the operation of construction equipment that result in exceedances of the maximum permissible noise level at property line locations. While the permit and permitting procedures do not limit the sound level generated at the construction site, time restrictions may be placed on time periods when the loudest construction activities are likely to occur, i.e., 7:00 a.m. and 7:00 p.m., Monday through Friday, and between 9:00 a.m. and 6:00 p.m. on Saturday. The HDOH would require reasonable and standard practices be employed to minimize the impact of noise resulting from construction activities. Provisions to conduct noise monitoring and community meetings may also be required, but will likely be deemed unnecessary given the remote location. The Project would proactively work with the community and attempt to resolve any complaints or concerns due to noise from construction by coordinating activities and informing the community of the timing of the expected construction noise at the closest NSRs to avoid conflicts, i.e., if blasting for foundation or removal of ledge or other potentially noisy activities are required during the construction period, nearby residents shall be notified in advance.

Construction activity would generate traffic having potential noise effects, such as trucks travelling to and from the site on public roads. Traffic noise is categorized into two categories: 1) the noise that will occur during the initial temporary traffic movements related to turbine delivery, haulage of components and remaining construction; and 2) maintenance and ongoing traffic from staff and contractors, which is expected to be minor. At the early stage of the construction phase, equipment and materials would be delivered to the site, such as hydraulic excavators and associated spreading and compacting equipment needed to form access roads and foundation platforms for each turbine. Once the access roads are constructed, equipment for lifting the towers and turbine components would arrive. Concrete would be mixed offsite and delivered to the Project site, rather than produced by an onsite concrete batch plant.

Federal laws prohibit State and local governments from regulating off-site sound levels generated by trucks and automobiles operating on a private site or public roadways. This Federal regulatory preemption is specified in the Federal Noise Control Act of 1972 and in the Surface Transportation Assistance Act of 1982, both of which prohibit states and local authorities from regulating the noise emitted by trucks engaged in interstate commerce, i.e., truck deliveries. A Federal OSHA preemption also prohibits local and state governments from regulating safety signals on trucks and construction equipment. Under Alternative 2, construction would be coordinated with individual landowners regarding the operation of trucks, cars and other vehicles on private site access roadways as necessary to prevent the occurrences of unexpected noise resulting from construction and transport related vehicle movements.

Operation

Operational broadband (dBA) sound pressure levels were calculated assuming that all Alternative 2 turbines (a total of 10, two Vestas V110-2.0 and eight Siemens SWT 3.0-113 selected for the purposes of analysis; see Appendix D for additional detail) are operating continuously and concurrently at the highest manufacturer-rated sound level at the given operational condition. Ultimately, the manufacturer of the wind turbines could vary. The sound energy was then summed

to determine the equivalent continuous A-weighted downwind sound pressure level at a point of compliance with HAR 11-46, in this case the property or as referred to in Hawaii Tax Map Key (TMK) limit. Calculations were completed using receptor points along each property limit in the acoustic analysis area at a height of 5 feet (1.5 meters) above ground (the approximate height of a standing person's ears). Table 4.6-4 presents the range of sound levels received at each TMK zoning class in the acoustic analysis area. In response to public comments on the original Draft EIS, an evaluation of noise impacts based on the C-weighted (dBC) scale is included in Appendix D.

Table 4.6-4. Alternative 2 Predicted Operational Received Sound Pressure Levels (L_{eq}) by Zoning Class

HAR 11-46 Zoning Class	Controlling HAR 11-46 Zoning Limit (dBA L_{eq})	Baseline Sound Level (dBA L_{eq})	Range of Received Sound Levels dBA L_{eq}	Increase over Baseline
Class A	45	42-47	8 - 44	0 - 4
Class A (Day Only)	55	42	31 – 44	2 – 4
Class B	50	42-44	38 – 41	1 – 2
Class C	70	42-47	10 – 58	0 - 15

Acoustic modeling for Alternative 2 was completed for turbine cut-in and full rotational operating conditions, thereby describing sound pressure levels over the full range of future Project operational conditions. The cut-in wind speed at hub height is the lowest wind speed, 3 m/s, at which a turbine begins producing usable power. Though turbines generate less noise under these conditions, oftentimes there is the potential for increased audibility due to the lower ambient levels and reduced masking as compared to sound levels generated under the maximum rotational operation condition and wind speeds. However, baseline monitoring results demonstrate that ambient sound levels are relatively consistent regardless of wind speed with sound levels in calm conditions at or above 41 dBA L_{eq} vs. sound levels at full rotation ranging from 43 to 49 dBA L_{eq}. Wind turbines operating at the highest manufacturer specified sound level, typically coinciding with maximum rotational operation, is the assumed worst-case condition for noise generation by the turbines considered in the analysis for Alternative 2 and was used for comparisons with the applicable regulatory criteria. For time-varying sources such as wind turbines, assessing sound levels generated during these conditions will likely ensure compliance during all other turbine operational conditions. Sound contour isopleths for the maximum rotational operating condition are shown in Figure 4.6-1.

The analysis for Alternative 2 demonstrates compliance with HAR 11-46, although there would be some increases in sound levels at nearby TMKs. As shown in Table 4.6-4 increases at the most sensitive Zone A TMKs are predicted to be no more than 4 dB over existing sound levels. As described in Section 4.6.1 a 3 dBA increase is generally not discernable to the average person, but a 5 dBA increase is; therefore, a 4 dBA increase may be discernable to some people but only considered a minor impact. Class B TMKs are predicted to experience increases in noise over baseline conditions of 1 to 2 dBA, which is not discernable to the average human and therefore considered a negligible impact. Class C TMKs located adjacent to the Project would experience the highest increases in sound levels with some increases predicted to be as high as 15 dBA over

baseline conditions. Most of these Class C TMKs have no residences; however, there are some Class C TMKs that have residences and that are predicted to experience increases over baseline conditions in excess of 5 dBA. These include several legal residences on Department of Agriculture land immediately adjacent to the DLRN portion of the wind farm site; however, the majority of receptors on the Class C TMKs are farm structures (storage sheds and warehouses) located within the Malaekahana Hui West, LLC portion of the wind farm site near proposed turbine locations. A 5 dBA increase is considered perceptible to the average human and a 10 dBA increase is perceived as a doubling of sound. While these increases would be perceptible Class C TMKs intentionally allow for higher sound levels to accommodate sound from sources such as tractors for agricultural activities.

The World Health Organization (WHO) has also published guidelines including the Night Noise Guidelines for Europe (WHO 2009) which recommend a nighttime noise level of 40 dBA or below to minimize adverse health effects. Existing noise levels in the vicinity of the wind farm site are already above 40 dBA outside; therefore, the minor increase in noise predicted as a result of the Project would not be expected to result in additional noise effects to people sleeping with the windows open or closed who are already used to the existing level of noise exposure (see Section 4.6.3.3 below for additional discussion indoor versus outdoor noise levels).

Low Frequency Noise and Infrasound

LFN/IS analysis was conducted at the nearest NSRs to the Project's proposed turbines to determine if LFN/IS would exceed the threshold of human hearing, the DEFRA limits, and/or the ANSI S12.9 Part 4 guidelines. The nearest legal residence (on Department of Agriculture land) is located approximately 814 feet (248 meters) from a proposed turbine (see Figure 4.6-2). Received LFN/IS levels are predicted to be 83 dB at 8 Hz and 76 dB at 16 Hz, which are both well below the threshold of human hearing and the DEFRA limits but higher than the ANSI S12.9 Part 4 guideline of 65 dB at 16 Hz. Monitored sound levels in this area would be similar to those monitored at position LT-1, which shows that existing LFN/IS sound levels range from 69 to 76 dB at 8 Hz and 63 to 71 dB at 16 Hz, all below the threshold of human hearing, but at 16 Hz baseline sound levels are on average above the ANSI S12.9 Part 4. The Project would result in an increase in LFN/IS of approximately 2 to 9 dB at 8 Hz and 1 to 7 dB at 16 Hz; however, these increases are from baseline sound levels and project-related sound levels that are all below the threshold of human hearing and therefore are not predicted to result in an impact at the nearest residence. With regard to the 65 dB ANSI S12.9 Part 4 guideline, because the baseline sound levels are already above this threshold, the likelihood of complaints is low given that the LFN/IS would be at least partially masked by existing LFN/IS. Therefore, there is no anticipated LFN/IS impact from Alternative 2. The Noise Impact Assessment in Appendix D provides additional detail for LFN/IS from the Project.

4.6.3.2 Direct and Indirect Effects of the HCP Conservation Measures

Impacts of Avoidance and Minimization Measures

The avoidance and minimization measures proposed under the Project HCP are not expected to result in any noise-related effects in the analysis area.

Impacts of HCP Mitigation

No measurable noise impacts would occur in association with Newell's shearwater research and management and short-eared owl research and management, or implementation of activities funded at the Poamoho Ridge Mitigation Area for bat mitigation (forest restoration and monitoring). Depending on the measures chosen, regular visits by vehicles and personnel to the research and management sites may be made to carry out these activities; however noise impacts associated with vehicle use would be negligible, and would negligibly increase existing noise levels in the mitigation areas.

Installation and maintenance of a partial fence along the northeastern border of the Hamakua Marsh Mitigation Area for waterbird mitigation would result in minor increases in noise levels due to the use of vehicles. However, the noise would occur during normal work hours and the mitigation area is located adjacent to existing sound sources such as a parking lot and road where there is already some human sound.

4.6.3.3 Mitigation for Unavoidable Impacts

Operational noise would be in compliance with the HAR 11-46 thresholds under Alternative 2; however, construction noise would exceed the HAR 11-46 sound level limits at some TMKs in the acoustic analysis area resulting in impacts. While there are no operational exceedances of the HAR 11-46 thresholds, increases over ambient sound levels are predicted at some noise sensitive TMKs resulting in medium, long-term, local, and important effects. These increases would be experienced outdoors and only under full rotational conditions. Residents at these homes would realize little to no noise impact from the turbines when inside and with windows closed; therefore, noise impacts such as sleep disturbance are not anticipated, and no mitigation is recommended. However, with windows open, wind turbine noise would be greater in the homes and periodically audible over background sounds. Studies have shown, however, that even with windows open there is attenuation of noise going from outdoor to indoor conditions. For example, the Federal Highways Administration (FHWA) conservatively estimates that noise is reduced by 10 dBA when transitioning from outdoor to indoor conditions with windows open (FHWA, Highway Traffic Noise: Analysis and Abatement Guidance, 2011). Predicted Project sound levels were evaluated at the exterior of each noise-sensitive land use; therefore, interior sound levels would be 10 dBA less assuming windows are open at each of the noise-sensitive structures. If windows are assumed to be closed, the noise reduction going from outside to inside is typically around 20 dBA.

In addition to working with the HDOH to minimize construction noise impacts, additional mitigation measures for construction and operational effects include the following:

- A process shall be established for documenting, investigating, evaluating, and resolving project-related noise complaints.
- All equipment shall be maintained in good working order in accordance with manufacturer specifications. Suitable mufflers and/or air-inlet silencers should be installed on all internal combustion engines and certain compressor components.
- Select equipment with the lowest noise levels available and no prominent discrete tones, when possible.
- All vehicles traveling within and around the wind farm site should operate in accordance with posted speed limits.
- Noisy construction activities should be limited to the least noise-sensitive times of day (daytime only, between 7 a.m. and 7 p.m.) and weekdays.
- Noisy activities should be scheduled to occur at the same time whenever feasible, since additional sources of noise generally do not greatly increase noise levels at the site boundary. Less-frequent but noisy activities would generally be less annoying than lower-level noises occurring more frequently.
- Stationary construction equipment (e.g., compressors or generators) should be located as far as practical from nearby sensitive receptors.

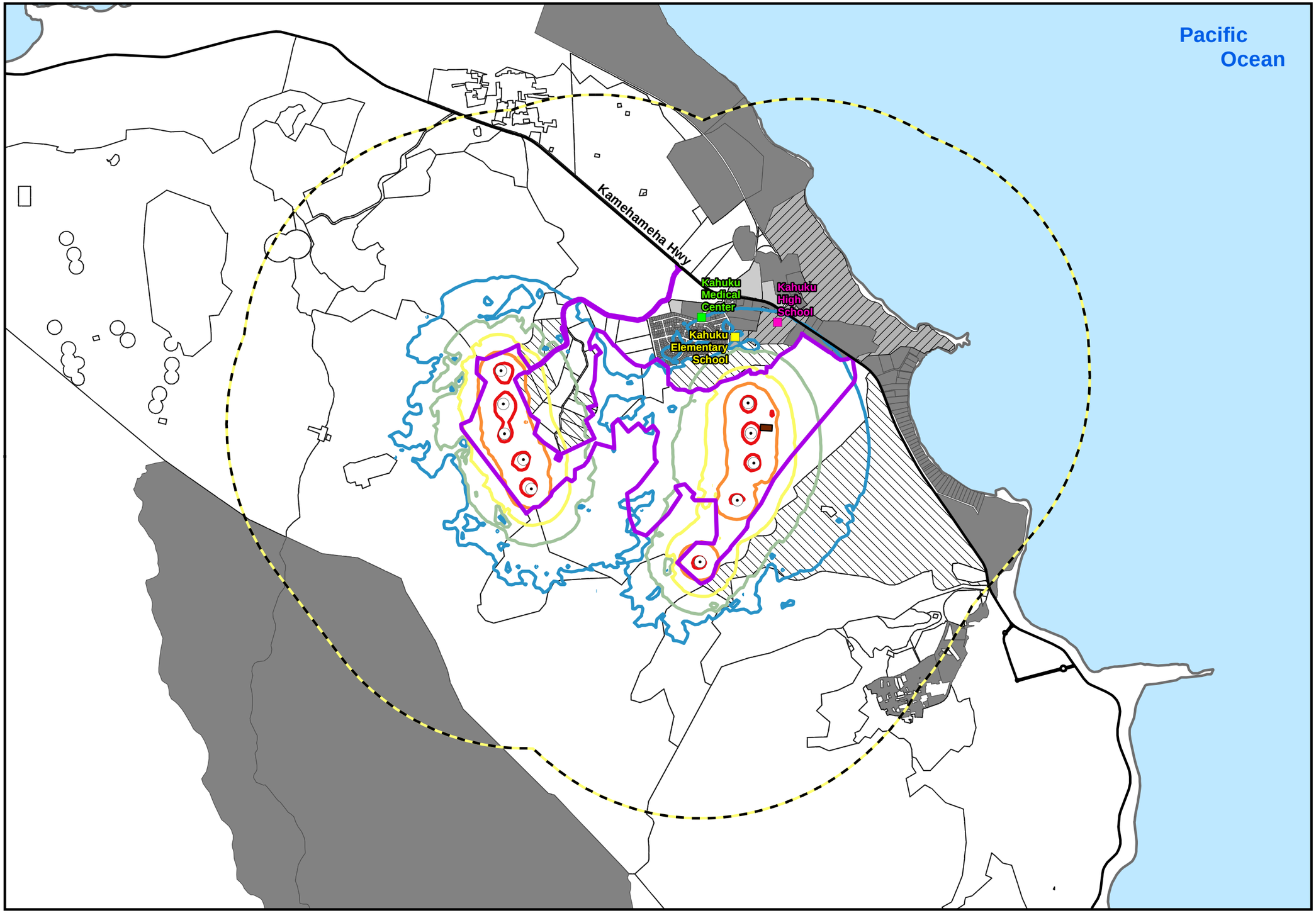


Figure 4.6-1

Na Pua Makani Wind Project

Alternative 2 Operational Sound Level Isopleths

Oahu, HI
December 2015

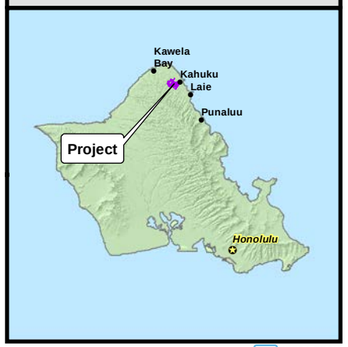
- Wind Farm Site
- Acoustic Study Area
- Collector Substation and Point of Interconnect
- Local Road
- Kahuku Elementary School
- Kahuku High School
- Kahuku Medical Center
- Potential Turbine Location

Hawaii Administrative Rule Zone

- Class A (45 dBA Limit)
- Class A (55 dBA Limit) - Day Use Only
- Class B (50 dBA Limit)
- Class C (70 dBA Limit) - Has Residence
- Class C (70 dBA Limit) - No Residence or Project TMK

Sound Contour Range (dBA)

- 40
- 45
- 50
- 55
- 60



1:32,000 WGS84 UTM 4

0 0.5 1 2 3 4 5 Miles

Data Sources Champlin: project facilities / ESRI: roads / Hawaii Statewide GIS Program: TMK parcels / Tetra Tech: sound contours generated in CadnaA

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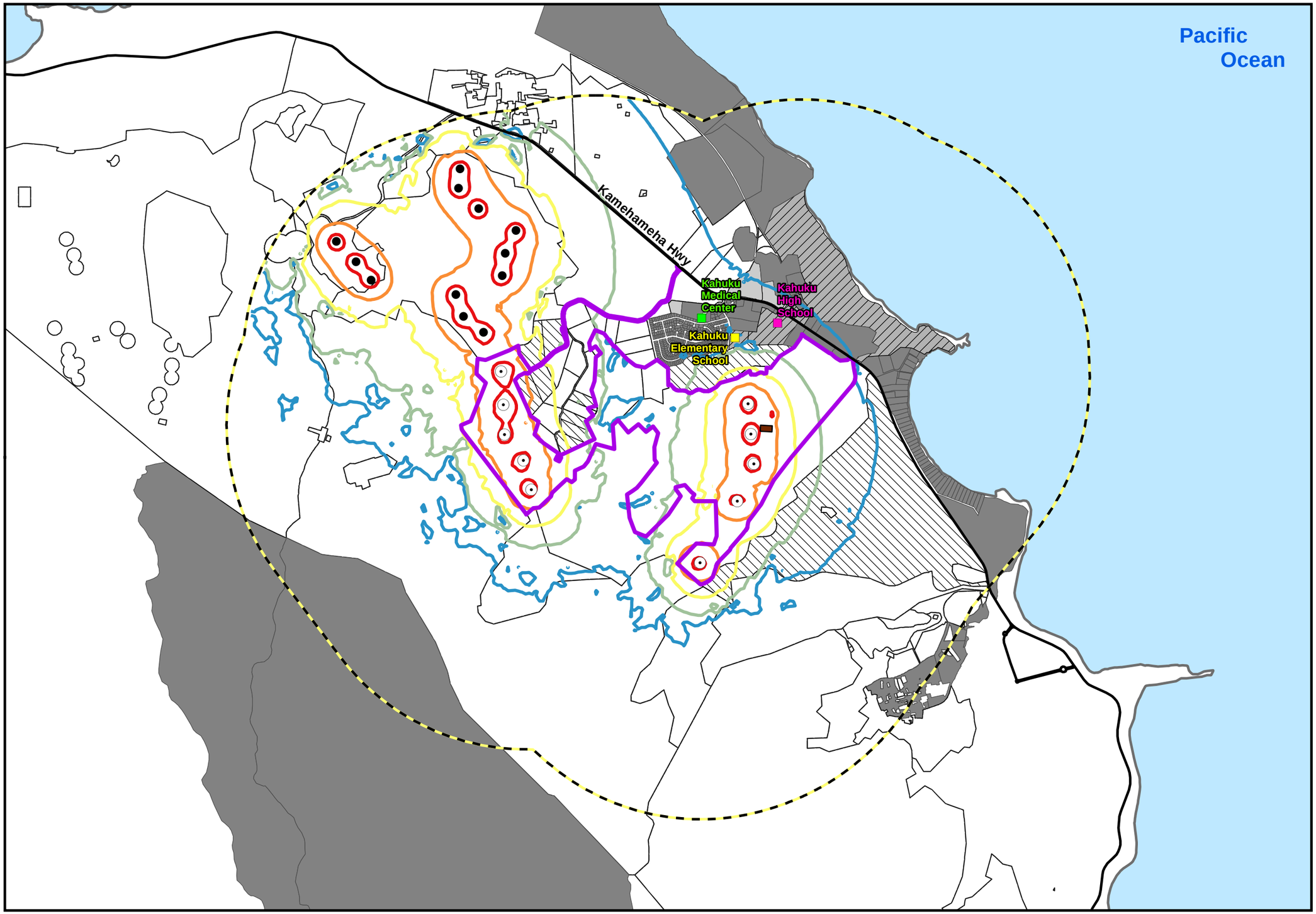


Figure 4.6-2

Na Pua Makani Wind Project

Alternative 2 Cumulative Sound Level Isopleths

Oahu, HI
December 2015

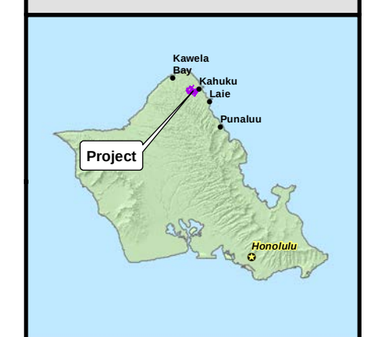
- Wind Farm Site
- Acoustic Study Area
- Collector Substation and Point of Interconnect
- Local Road
- Kahuku Wind Turbine Generator
- Kahuku Elementary School
- Kahuku High School
- Kahuku Medical Center
- Potential Turbine Location

Hawaii Administrative Rule Zone

- Class A (45 dBA Limit)
- Class A (55 dBA Limit) - Day Use Only
- Class B (50 dBA Limit)
- Class C (70 dBA Limit) - Has Residence
- Class C (70 dBA Limit) - No Residence or Project TMK

Sound Contour Range (dBA)

- 40
- 45
- 50
- 55
- 60



1:32,000 WGS84 UTM 4

0 0.5 1 2 3 4 5 Miles

Data Sources Champlin: project facilities / ESRI: roads / Hawaii Statewide GIS Program: TMK parcels / Tetra Tech: sound contours generated in CadnaA

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4.6.3.4 Cumulative Effects

Cumulative effects from noise were identified using both quantitative and qualitative analyses. Quantitatively, baseline sound levels were used to ascertain the contribution of the Project to existing sound levels, which include past and present anthropogenic sound sources. Existing anthropogenic sound sources include the Kahuku Wind Farm, Kamehameha Highway, local roadways, air craft overflights, and other developed areas. Note that when baseline sound levels were monitored 11 of the 12 existing wind turbines at the Kahuku Wind Farm, including those closest to the Project, were operating; one turbine was not functioning (assumed to be down for maintenance) during deployment of the monitoring equipment and a different turbine not functioning during retrieval of the monitoring equipment two weeks later. Cumulative sound levels anticipated during Project operation were predicted using the highest acoustic emissions as specified by the turbine manufacturers for turbine models being considered for the Project as well as those operating at the Kahuku Wind Farm; therefore, the cumulative acoustic analysis of operational sound levels represents the highest acoustic emissions anticipated during Project operation. To identify future development that could result in increased sound levels a review of public records was conducted. Potential foreseeable sources of noise would result from expansion of the Turtle Bay resort, residential developments, and widening of the Kamehameha Highway to accommodate a center turn lane. These developments would increase human activity in the area and also result in increased sound levels, although the increase is expected to be in the range of 1 to 3 dB over existing conditions. For example, noise from roadway traffic is not expected to result in substantial increases, or greater than 3 dB, over existing traffic noise conditions because according to the Traffic Assessment Report (Appendix B) Project traffic is predicted to only represent 0.05 percent of the total traffic in the area. For an appreciable increase of at least 3 dB, the Project would need to result in a doubling of traffic area roadways, which is not expected. Received sound levels from the Project at NSRs located close to the highway are low and would be masked by sounds from the highway resulting in no appreciable change with the Project. Cumulative sound levels from wind energy at both the Kahuku Wind Farm and from Alternative 2 were also evaluated and would not exceed HAR 11-46 limits. Figure 4.6-2 provides a map of cumulative wind energy noise levels under the highest operational scenario modeled.

4.6.3.5 Summary

Alternative 2 would result in construction and operational impacts of varying magnitude or intensity, duration, geographic extent, and context. Construction noise would result in, at worst, medium intensity, temporary, local, and common impacts to TMKs sensitive to noise (e.g., Class A) in the acoustic analysis area. Construction impacts would be mitigated by working with the HDOH to obtain a construction permit for the Project that may include stipulations such as use of construction equipment during daytime hours only. Operational noise impacts would be characterized as, at worst, being medium (3 to 15 dBA increases over ambient conditions), local, and important (medium magnitude or intensity impacts), although for the majority of the Project acoustic analysis area increases are predicted to be less than 3 dBA. Note that the predictions of operational noise are intentionally conservative and the likelihood of a 3 to 4 dBA increase at noise-

sensitive TMKs (e.g., Class A) would only occur outside under downwind propagation conditions under maximum rotation operational conditions. Because impacts are nonexistent for most TMKs and at worst result in medium 3 to 4 dBA increases over ambient levels at some Class A TMKs, no mitigation measures of operational noise are recommended; therefore, impacts would be considered minor.

4.6.3.6 Alternative 2a - Modified Proposed Action Option

Direct, indirect, and cumulative effects of noise from the Modified Proposed Action Option would be similar as those described under the Proposed Action. Construction noise under Alternative 2a would be almost the same as Alternative 2 with the exception that one less turbine would be constructed. Construction noise, similar to Alternative 2 is likely to exceed HAR 11-46 limits at some TMKs in the Project area and would require a permit from the HDOH under Alternative 2a.

Direct and indirect effects of operational noise from the Modified Proposed Action Option would be similar to those described under the Proposed Action. Impacts from LFN/IS would be the same under Alternative 2a as under Alternative 2 because the nearest legal residence to a proposed wind turbine is the same under both alternatives. Operational broadband (dBA) sound pressure levels for the Modified Proposed Action Option; however, were calculated based on a total of nine Siemens SWT 3.3-130 turbines. Table 4.6-5 presents the range of sound levels received at each TMK zoning class in the acoustic analysis area under Alternative 2a. Similar to the Proposed Action, the operational noise analysis for the Modified Proposed Action Option demonstrates compliance with HAR 11-46, although there would be some increase in sound levels at nearby TMKs (Figure 4.6-3). Increases at the most sensitive Zone A TMKs are predicted to be no more than 3 dBA over existing sound levels. As described in Section 4.6.1 a 3 dBA increase is generally not discernable to the average person. Cumulative sound levels from wind energy at both the Kahuku Wind Farm and from the Modified Proposed Action Option were also evaluated and would not exceed HAR 11-46 limits. Figure 4.6-4 provides a map of cumulative wind energy noise levels under the highest operational scenario modeled. Implementation of mitigation measures, as described under the Proposed Action, would minimize any adverse noise impacts under the Modified Proposed Action Option.

Table 4.6-5. Alternative 2a Predicted Operational Received Sound Pressure Levels (L_{eq}) by Zoning Class

HAR 11-46 Zoning Class	Controlling HAR 11-46 Zoning Limit (dBA L_{eq})	Baseline Sound Level (dBA L_{eq})	Range of Received Sound Levels dBA L_{eq}	Increase over Baseline
Class A	45	42-47	8 – 43	0 - 3
Class A (Day Only)	55	42	27 - 43	2 – 3
Class B	50	42-44	35 - 38	1 – 2
Class C	70	42-47	8 - 56	0 - 11

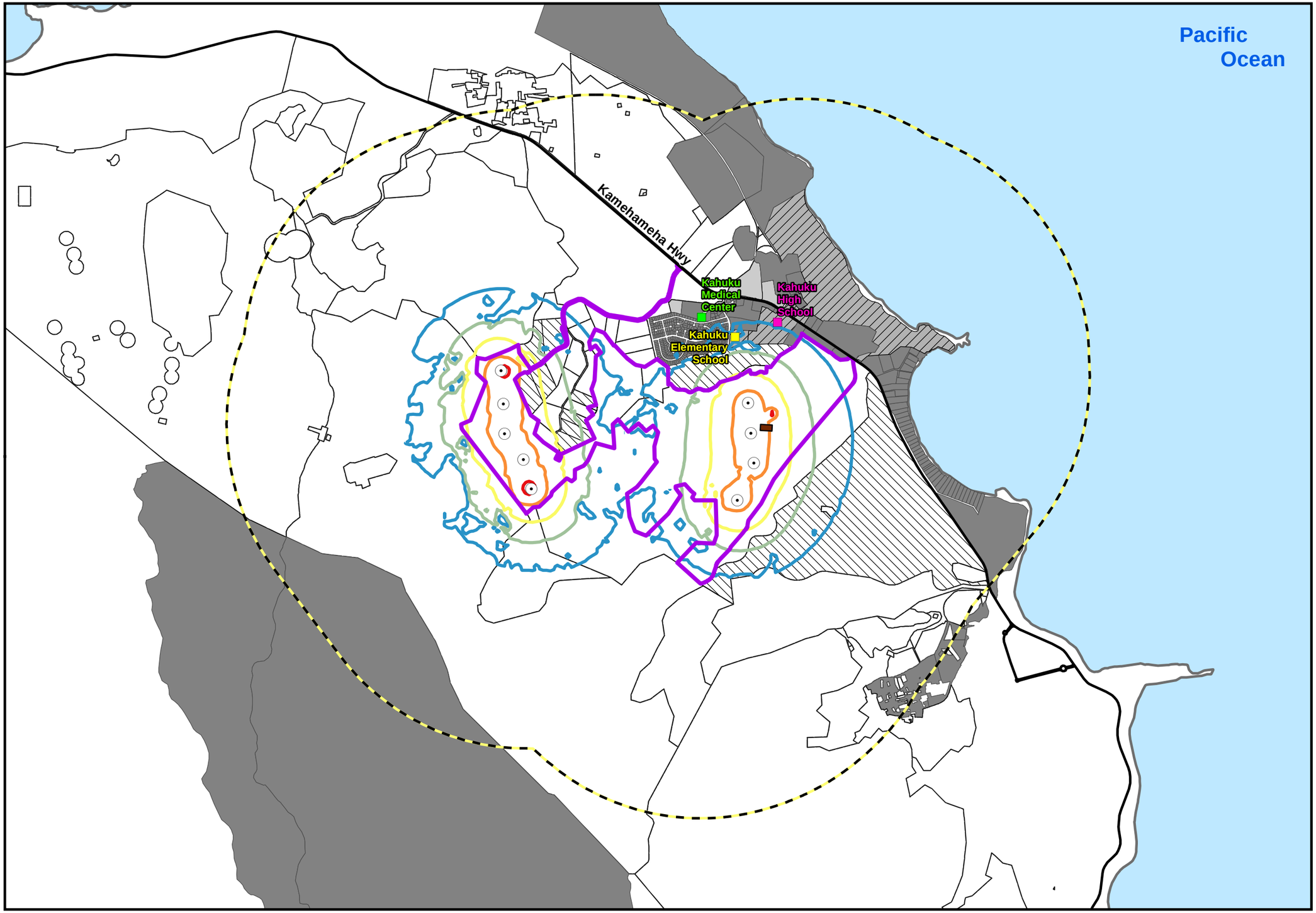


Figure 4.6-3

Na Pua Makani Wind Project

Alternative 2a Operational Sound Level Isopleths

Oahu, HI
December 2015

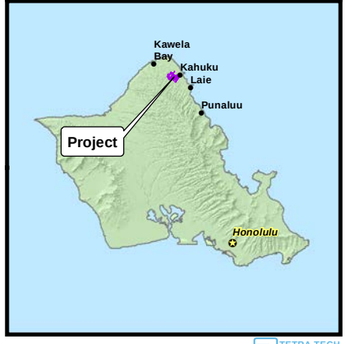
- Wind Farm Site
- Acoustic Study Area
- Collector Substation and Point of Interconnect
- Local Road
- Kahuku Elementary School
- Kahuku High School
- Kahuku Medical Center
- Potential Turbine Location

Hawaii Administrative Rule Zone

- Class A (45 dBA Limit)
- Class A (55 dBA Limit) - Day Use Only
- Class B (50 dBA Limit)
- Class C (70 dBA Limit) - Has Residence
- Class C (70 dBA Limit) - No Residence or Project TMK

Sound Contour Range (dBA)

- 40
- 45
- 50
- 55
- 60



1:32,000 WGS84 UTM 4

0 0.5 1 2 3 4 5 Miles

Data Sources Champlin: project facilities / ESRI: roads / Hawaii Statewide GIS Program: TMK parcels / Tetra Tech: sound contours generated in CadnaA

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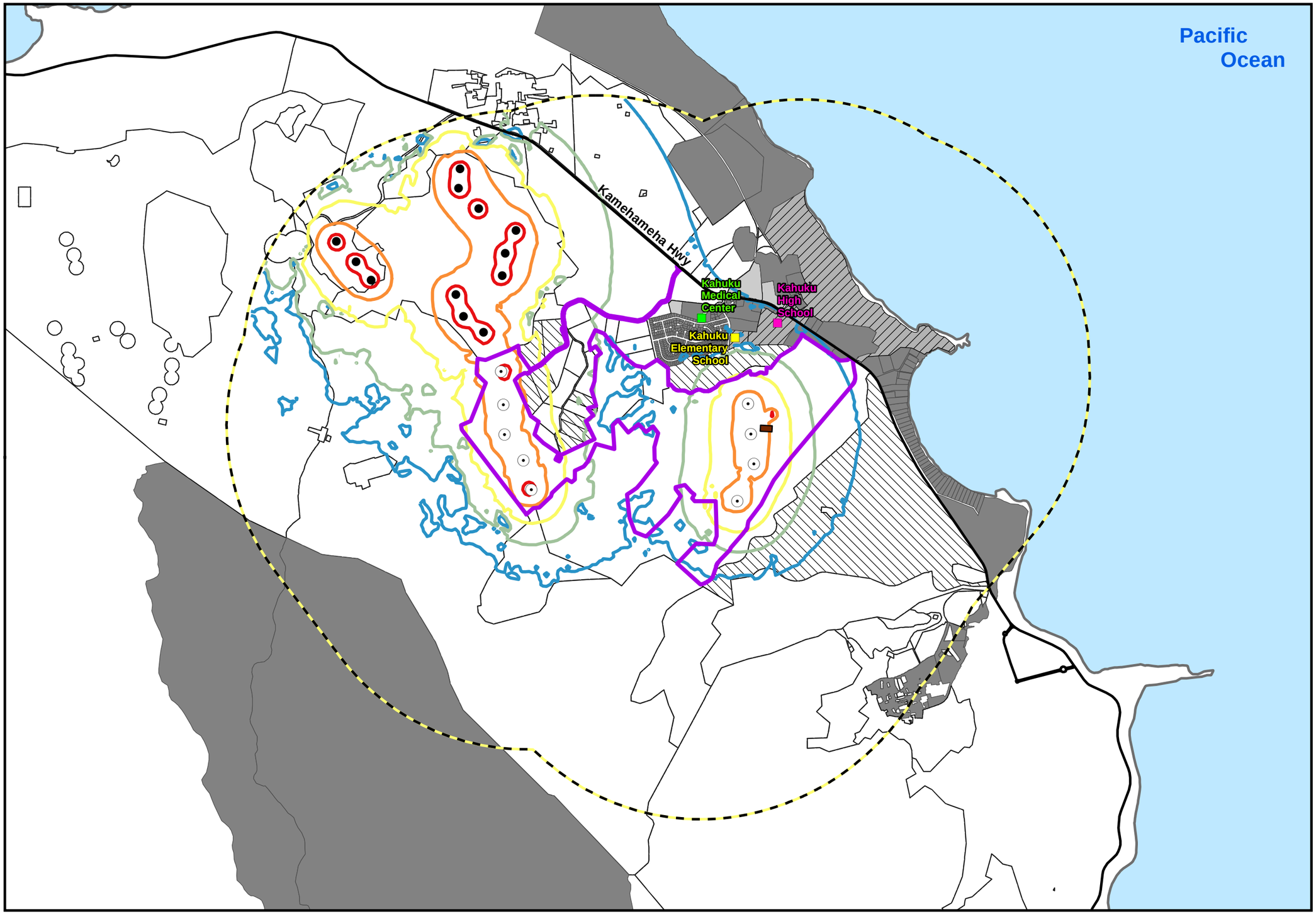


Figure 4.6-4

Na Pua Makani Wind Project

Alternative 2a Cumulative Sound Level Isopleths

Oahu, HI
December 2015

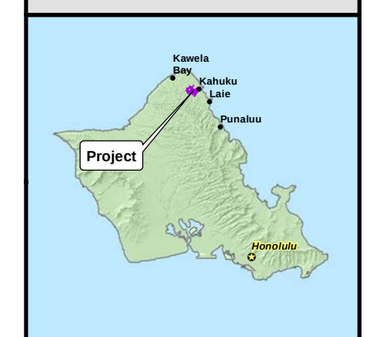
- Wind Farm Site
- Acoustic Study Area
- Collector Substation and Point of Interconnect
- Local Road
- Kahuku Wind Turbine Generator
- Kahuku Elementary School
- Kahuku High School
- Kahuku Medical Center
- Potential Turbine Location

Hawaii Administrative Rule Zone

- Class A (45 dBA Limit)
- Class A (55 dBA Limit) - Day Use Only
- Class B (50 dBA Limit)
- Class C (70 dBA Limit) - Has Residence
- Class C (70 dBA Limit) - No Residence or Project TMK

Sound Contour Range (dBA)

- 40
- 45
- 50
- 55
- 60



1:32,000 WGS84 UTM 4

0 0.5 1 2 3 4 5 Miles

Data Sources Champlin: project facilities / ESRI: roads / Hawaii Statewide GIS Program: TMK parcels / Tetra Tech: sound contours generated in CadnaA

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4.6.4 Alternative 3—Larger Generation Facility (Up to 12 Turbine Project)

4.6.4.1 Direct and Indirect Effects of Construction and Operation of the Project

Temporary construction noise and permanent operational noise from Alternative 3 would result in changes in noise levels in the acoustical analysis area. Alternative 3 is similar to Alternative 2 in that the first portion or phase of Alternative 3 is identical to Alternative 2. Where the alternatives differ is in the second phase of Alternative 3, which includes additional turbines to achieve power generation of up to approximately 42 MW. Therefore, construction and operational noise impacts for the first phase of Alternative 3 are identical to Alternative 2. Because of this, the discussion of Alternative 3 focuses on the sound levels associated with the larger facility inclusive of the second phase of construction of Alternative 3.

Construction

The first phase of construction of Alternative 3 would be identical to Alternative 2 and the second phase of Alternative 3 would use an identical method as that for the first phase of construction. The variation in construction noise between phases one and two of construction are a result of where construction would take place and that construction would occur at least 2 years later for the second phase. Like Alternative 2, construction noise is likely to exceed HAR 11-46 limits at some TMKs in the acoustic analysis area, and therefore, a permit from the HDOH would likely be required. Mitigation of construction noise would be the same for Alternative 3 as that for Alternative 2.

Operation

Alternative 3 includes more turbines that Alternative 2 and therefore operational noise levels from Alternative 3 would cover a larger area. There would be a total of up to 12 turbines, which for this analysis were assumed to be two Vestas V110-2.0 and 10 Siemens SWT 3.0-113. Operational sound levels would not exceed the HAR 11-46 limits at any TMKs. Table 4.6-6 provides the range of predicted sound levels by zoning class for Alternative 3. Figure 4.6-5 provides operational sound contour isopleths for Alternative 3. In response to public comments on the original Draft EIS, an evaluation of noise impacts based on the C-weighted (dBC) scale is included in Appendix D.

Table 4.6-6. Alternative 3 Predicted Operational Received Sound Pressure Levels (L_{eq}) by Zoning Class

HAR 11-46 Zoning Class	Controlling HAR 11-46 Zoning Limit (dBA L_{eq})	Baseline Sound Level (dBA L_{eq})	Range of Received Sound Levels dBA L_{eq}	Increase over Baseline
Class A	45	42 - 47	8 – 44	0 – 4
Class B	50	42 - 44	38 – 41	1 – 2
Class A (Day Only)	55	42	31 – 44	2 – 4
Class C	70	42 - 47	10 – 58	0 - 15

The analysis for Alternative 3 demonstrates compliance with HAR 11-46, although there would be some increases in sound levels at nearby TMKs. As shown in Table 4.6-6 received sound levels in Class A TMKs would be no more than 4 dB over existing sound levels. As described in Section 4.6-1, a 3 dBA increase is generally not discernable to the average person, but a 5 dBA increase is; therefore, a 4 dBA increase may be discernable to some people but only considered a minor impact. Class B TMKs are predicted to experience increases in noise over baseline conditions of 1 to 2 dBA, which is not discernable to the average human and therefore considered a negligible impact. Class C TMKs located adjacent to the Project would experience the highest increases in sound levels with some increases predicted to be as high as 15 dBA over baseline conditions. Most of these Class C TMKs have no residences; however, there are some Class C TMKs that have residences and that are predicted to experience increases over baseline conditions in excess of 5 dBA. A 5 dBA increase is considered perceptible to the average human and a 10 dBA increase is perceived as a doubling of sound. While these increases would be perceptible, Class C TMKs intentionally allow for higher sound levels to accommodate sound from sources such as tractors for agricultural activities.

Low Frequency Noise and Infrasound

While sound from more turbines under Alternative 3 would cover a greater area, the worst-case LFN/IS noise levels would be the same under Alternative 3 as they are under Alternative 2 because the nearest legal residence (located on Department of Agriculture land) is also 814 feet (248 meters) from the nearest proposed turbine. Therefore, there are no anticipated impacts from LFN/IS from Alternative 3.

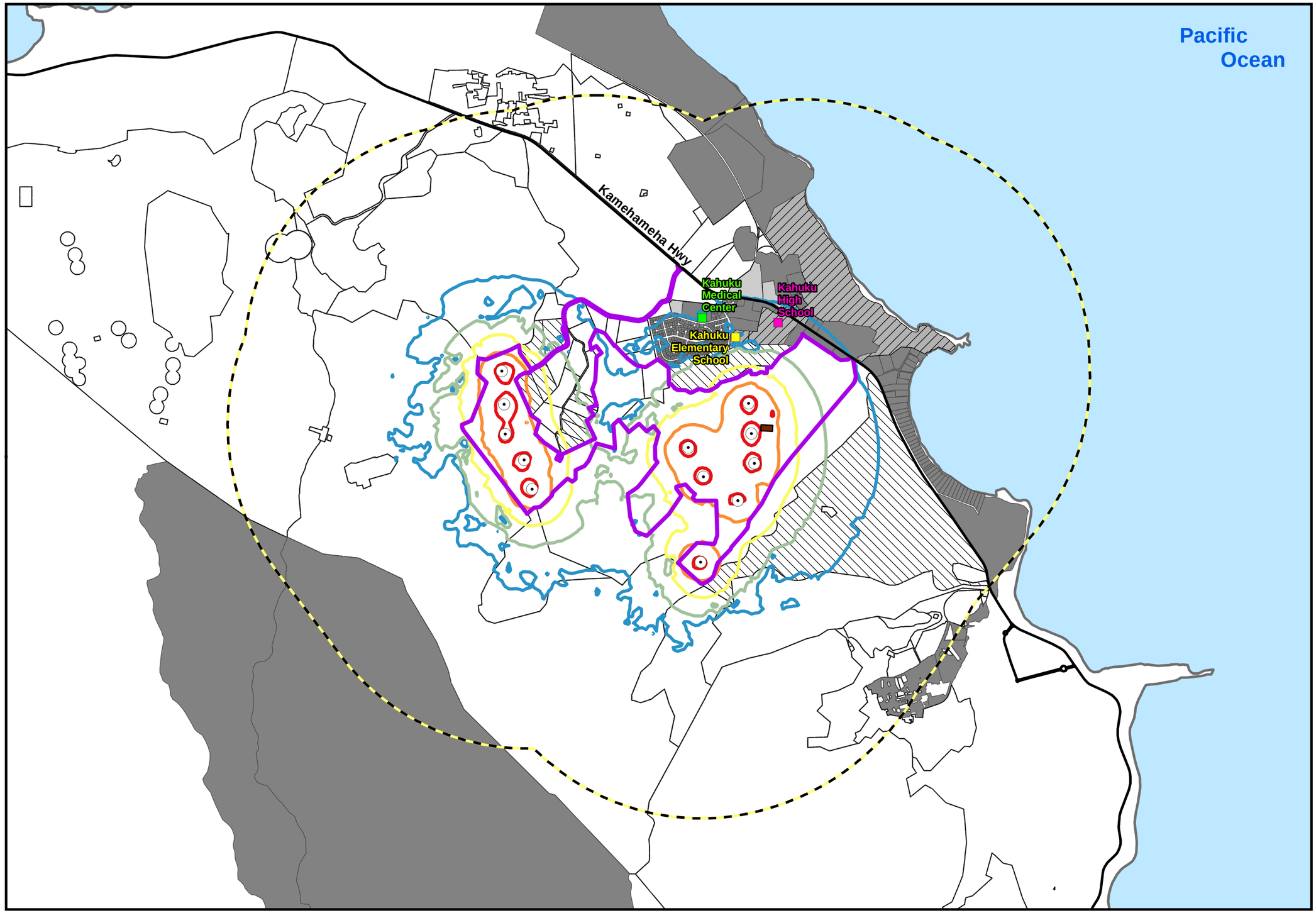
Figure 4.6-5

Na Pua Makani Wind Energy

Alternative 3 Operational Sound Level Isopleths

Oahu, HI

December 2015



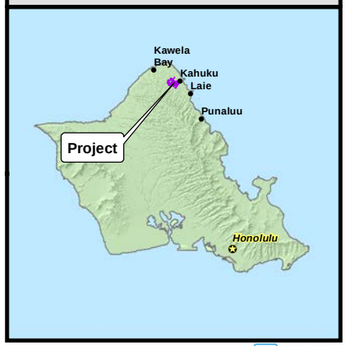
- Wind Farm Site
- Acoustic Study Area
- Collector Substation and Point of Interconnect
- Local Road
- Kahuku Elementary School
- Kahuku High School
- Kahuku Medical Center
- Potential Turbine Location

Hawaii Administrative Rule Zone

- Class A (45 dBA Limit)
- Class A (55 dBA Limit) - Day Use Only
- Class B (50 dBA Limit)
- Class C (70 dBA Limit) - Has Residence
- Class C (70 dBA Limit) - No Residence or Project TMK

Sound Contour Range (dBA)

- 40
- 45
- 50
- 55
- 60



1:32,000 WGS84 UTM 4

0 0.5 1 2 3 4 5 Miles

Data Sources Champlin: project facilities / ESRI: roads / Hawaii Statewide GIS Program: TMK parcels / Tetra Tech: sound contours generated in CadnaA

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4.6.4.2 Direct and Indirect Effects of the HCP Conservation Measures

Impacts of Avoidance and Minimization Measures

The avoidance and minimization measures proposed under the Project HCP are not expected to result in any noise-related effects in the analysis area.

Impacts of HCP Mitigation

Impacts of HCP mitigation under Alternative 3 would be the same as described under the Proposed Action. Prior to the construction of the additional turbines proposed under Alternative 3, NPMPP would reopen consultation with the USFWS and DOFAW to assess the potential impacts of the additional turbines to listed species and develop appropriate mitigation measures. The impacts of these mitigation measures related to noise would be evaluated under a separate environmental analysis at that time.

4.6.4.3 Mitigation for Unavoidable Impacts

Operational noise would be in compliance with the HAR 11-46 thresholds under Alternative 3; however, construction noise would exceed the HAR 11-46 sound level limits at some TMKs in the acoustic analysis area resulting in impacts. While there are no operational exceedances of the HAR 11-46 thresholds, increases over ambient sound levels are predicted to at some noise sensitive TMKs that would result in medium, long-term, local, and important effects. These increases would be experienced outdoors and only under full rotational conditions. Residents at these homes would realize little to no noise impact from the turbines when inside and with windows closed; therefore, noise impacts such as sleep disturbance are not anticipated, and no mitigation is recommended. However, with windows open, wind turbine noise would be greater in the homes and periodically audible over background sounds, although even with windows open, there is noise attenuation when transitioning from outdoor to indoors (see Section 4.6.3.3 for discussion). In addition to working with the HDOH to minimize construction noise impacts, additional mitigation measures would be the same as those proposed for Alternative 2.

4.6.4.4 Cumulative Effects

Cumulatively, Alternative 3 would be nearly identical to Alternative 2 with the only difference in cumulative sound levels resulting in areas close to the 2 to 4 additional turbines. Future non-Project related noise would be the same as that under Alternative 2 and the addition of 2 to 4 turbines under Alternative 3 does not change sound levels enough to result in exceedances of the HAR 11-46 limits. Of potential concern to the public are cumulative sound levels from wind turbines at the Kahuku Wind Farm and from Alternative 3; however, no exceedances of the HAR 11-46 limits are predicted cumulatively from wind energy in the area. Figure 4.6-6 provides a map of cumulative wind energy noise levels under the highest operational scenario modeled.

4.6.4.5 Summary

Alternative 3 would result in construction and operational impacts of varying magnitude or intensity, duration, geographic extent, and context. Construction noise would result in, at worst, medium intensity, temporary, local, and common impacts to TMKs (e.g., Class A) sensitive to noise in the acoustic analysis area. Construction impacts would be mitigated by working with the HDOH to obtain a construction permit for the Project that may include stipulations such as use of construction equipment during daytime hours only. Operational noise impacts would be characterized as, at worst, being medium (3 to 15 dB increases over ambient conditions), local, and important (medium magnitude or intensity impacts); although for the majority of the Project acoustic analysis area increases are predicted to be less than 3 dB. Note that the predictions of operational noise are intentionally conservative and the likelihood of a 3 to 4 dB increase at noise-sensitive TMKs (e.g., Class A) would only occur outside under downwind propagation conditions under maximum rotation operational conditions. Because impacts are minimal or nonexistent for most TMKs and, at worst, result in medium 3 to 4 dBA increases over ambient levels at some Class A TMKs, no mitigation measures of operational noise are recommended.

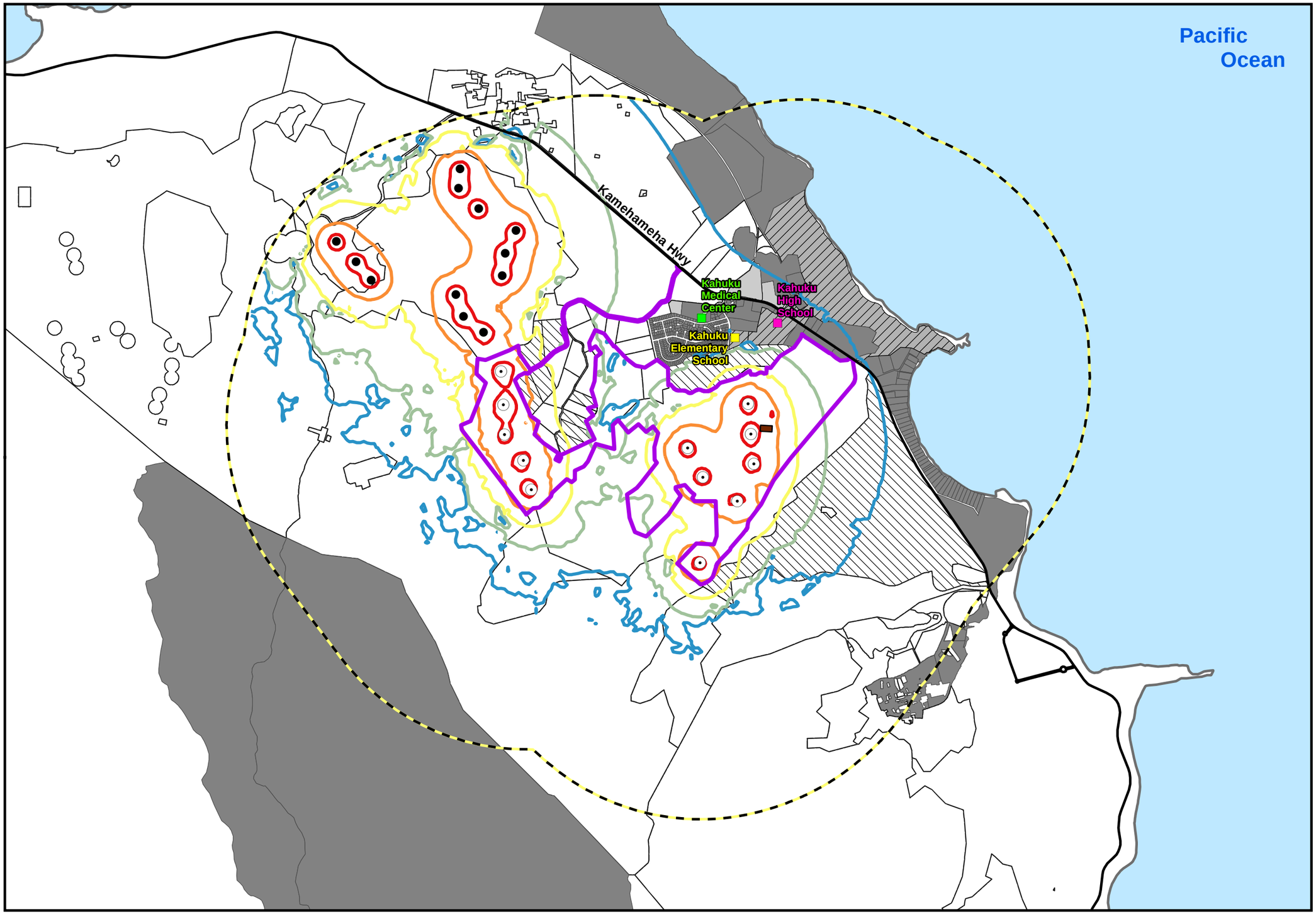


Figure 4.6-6

Na Pua Makani Wind Energy

Alternative 3 Cumulative Sound Level Isopleths

Oahu, HI
December 2015

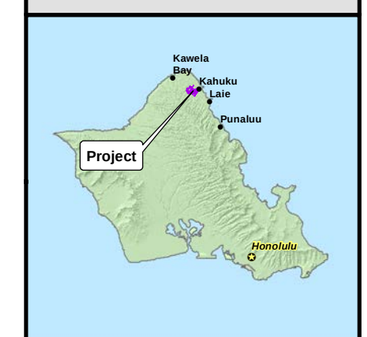
- Wind Farm Site
- Acoustic Study Area
- Collector Substation and Point of Interconnect
- Local Road
- Kahuku Wind Turbine Generator
- Kahuku Elementary School
- Kahuku High School
- Kahuku Medical Center
- Potential Turbine Location

Hawaii Administrative Rule Zone

- Class A (45 dBA Limit)
- Class A (55 dBA Limit) - Day Use Only
- Class B (50 dBA Limit)
- Class C (70 dBA Limit) - Has Residence
- Class C (70 dBA Limit) - No Residence or Project TMK

Sound Contour Range (dBA)

- 40
- 45
- 50
- 55
- 60



1:32,000 WGS84 UTM 4

0 0.5 1 2 3 4 5 Miles

Data Sources Champlin: project facilities / ESRI: roads / Hawaii Statewide GIS Program: TMK parcels / Tetra Tech: sound contours generated in CadnaA

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4.6.5 Conclusion

Alternatives 2 and the Modified Proposed Action Option (Alternative 2a) would result in lower overall sound levels than Alternative 3 due to the smaller number of turbines being constructed and operated. Both Alternatives, however, would be able to be constructed in compliance with HAR 11-46, but would require the construction contractor to obtain a noise permit from HDOH. Operationally, the alternatives are not predicted to exceed the HAR 11-46 sound level limits, but are predicted to increase sound levels in the acoustic analysis area by greater than 2 dBA at some Zone A or B TMKs (e.g., the most noise-sensitive TMKs according to HAR 11-46). No mitigation of operational noise is recommended because much of the increase in noise would be masked by existing sound levels; therefore, noise impacts are characterized as being minor. Table 4.6-7 summarizes potential impacts by alternative.

Table 4.6-7. Summary of Potential Noise Impacts

Impact Issues	No Action Alternative	Alternative 2 – Proposed Action	Alternative 2a – Modified Proposed Action Option	Alternative 3
Audible noise	No Impact	Minor	Minor	Minor
Low frequency noise/infrasound	No Impact	Negligible	Negligible	Negligible

4.7 Hazardous and Regulated Materials and Wastes

4.7.1 Impact Criteria

The impacts from the use of hazardous materials, solid waste, and petroleum products were assessed based on whether construction and operation of the Project as well as the implementation of HCP conservation measures could:

- Increase a significant hazard to the public or the environment through routine transport, storage, use, or disposal of hazardous materials;
- Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment;
- Expose workers or the public to hazardous materials at levels in excess of those permitted by OSHA in 29 CFR Part 1910;
- Increase exposure of humans or the environment to potentially hazardous levels of chemicals from the disturbance of existing contamination or from the improper discharge or disposal of hazardous materials; and
- Expose people to significant hazards or structures to loss as a result of intentionally destructive acts (i.e., vandalism).

Impact criteria for determining effects of the use of hazardous materials, solid waste, and petroleum products from the Project are described further in Table 4.7-1 below.

Table 4.7-1. Impact Criteria for Hazardous and Regulated Materials and Wastes

Type of Effect	Impact Component	Effects Summary		
Effects on public and worker health and safety and the environment	Magnitude or Intensity	**High:** Above background conditions and causes effects that are chronic, irreversible, or fatal.	**Medium:** Above background conditions and causes effects that necessitate treatment or medical management and are reversible.	**Low:** Above background conditions but within normal variation of human health and environmental conditions.
	Duration	**Permanent:** Changes in health or environmental indicators persist after actions that caused the impacts to cease.	**Long-term:** Changes in health or environmental indicators extend up to the life of the Project and would return to pre-activity levels sometime after actions causing impacts were to cease.	**Temporary:** Changes in health or environmental indicators last for less than 1 year or the period of Project construction.
	Geographic Extent	**Extended:** Affects communities throughout the region.	**Regional:** Affects 2 or more communities in the region.	**Local:** Affects individuals in a single community

4.7.2 Alternative 1—No Action

4.7.2.1 Direct and Indirect Effects

Under the No Action Alternative, the Project would not be constructed, the ITP would not be issued by the USFWS, and the HCP conservation measures would not be implemented. The wind farm site would continue to be undeveloped and used for agricultural purposes. No hazardous materials and petroleum products, beyond those currently used for agricultural purposes or activities within the mitigation areas, would be transported, stored, used, or disposed of at the site; therefore, there would be no impacts.

4.7.2.2 Cumulative Effects

Under the No Action alternative, the Project would not be constructed, an ITP would not be issued by the USFWS, and the HCP conservation measures would not be implemented. Therefore there would be no effect related to the use of hazardous materials. Thus, Alternative 1 would not contribute to cumulative effects related to the use of hazardous materials, solid waste, and petroleum products.

4.7.2.3 Summary

There would be no direct, indirect, or cumulative impacts caused by the transport, storage, use and disposal of hazardous materials, solid waste and petroleum products under the No Action Alternative.

4.7.3 Alternative 2—8 to 10 Turbine Project

4.7.3.1 Direct and Indirect Effects of Construction and Operation of the Project

Construction Impacts

Routine Use, Storage and Transport of Hazardous Materials

Construction of the Project involves the routine transport, use, storage, and disposal of hazardous materials. Construction requires the operation of heavy equipment and construction vehicles. Hazardous materials required for construction equipment include antifreeze, diesel fuel, gasoline, hydraulic oil, lube oil, and grease. It would not be practical to remove construction equipment from the wind farm site for refueling and general maintenance such as changing fluids and lubricating parts; therefore, these activities would take place onsite. Other hazardous or regulated materials that would be used during construction include paints, adhesives, curing compounds, concrete, bentonite, and fertilizer. Construction equipment used to mix and pour concrete would be washed onsite because it would not be practical to remove this equipment from the site for washing. There would be waste disposal and collection receptacles and sanitary facilities on site during construction.

NPMPP would prepare and implement a Hazardous Materials and Wastes Management Plan (HMWMP) that details proper procedures for storing and using hazardous materials and storing and disposing of hazardous waste. The plan would contain sufficient detail to address the purpose of the plan and to readily translate into the actions necessary to comply with relevant regulations. The plan would include information about site activities, site contacts, worker training procedures, and a hazardous materials inventory in accordance with Article 80 of the Uniform Fire Code.

A qualified hazardous materials management professional, such as a Certified Hazardous Materials Manager, would prepare and oversee implementation of the plan. The HMWMP would include emergency response procedures. The plan would be provided to local emergency responders so they could properly respond to an emergency at the site. All workers would be trained to understand the established emergency response procedures. Emergency response equipment such as fire extinguishers and first aid kits would be onsite at all times. In addition, water tanks would be onsite for dust suppression and would be available in the event of a fire.

Regulatory requirements and standard industry BMPs for managing the routine transport, use, storage, and disposal of hazardous materials, petroleum products, and solid waste would be implemented. These requirements and BMPs include the following:

- Keep materials in their original containers with the original manufacturer‘s label;
- Seal containers whenever they are not in use;
- Procure and store only the amount of chemicals needed for the job;
- Follow the manufacturer‘s recommendation for proper handling and disposal;
- Store smaller hazardous materials containers in a secure cabinet designed for storage of such materials;

- Conduct routine inspections to ensure that all chemicals are being stored, used, and disposed of appropriately; and
- Place construction debris and trash into a dumpster to prevent it from being wind-blown or left on the ground.

Table 4.7-2 presents a list of pollutants that could be used during construction, a brief description of their storage and use, and a brief description of control measures that would be implemented to ensure they are properly stored. Implementation of these control measures and BMPs would ensure that impacts from routine transport, use, storage, and disposal of hazardous materials would be minor.

Table 4.7-2. Potential Pollutants and Control Measures

Potential Pollutant	Storage or Use	Control Measures
Antifreeze	Vehicles, Equipment	Secure secondary containment; drip pan
Diesel Fuel	Vehicles, Equipment, AST	Secure secondary containment; drip pan
Gasoline	Vehicles, Equipment, AST	Secure secondary containment; drip pan
Hydraulic Oils/Fluids	Vehicles, Equipment	Secure secondary containment; drip pan
Grease	Vehicles, Equipment	Secure secondary containment; drip pan
Sanitary Waste Restrooms	Various	Service provider would secure units to prevent tipping
Trash and Construction Debris	Various	Dumpster
Paints	Contractor	Secure secondary containment; secure, covered storage
Glue, Adhesives, Curing Compounds	Contractor	Secure secondary containment; secure, covered storage
Soil Amendments	Various	Secure secondary containment; secure, covered storage
Landscaping Materials, Fertilizer	Various	Secure secondary containment; secure, covered storage
Concrete Mortar	Mobile Mixer	Secure secondary containment; washout area; secure, covered storage
Concrete	Trucks, Washout	Secure secondary containment; secure, covered storage

Accidental Spills and Releases

There could be accidental releases or spills from the routine transport, use, storage, and disposal of hazardous materials. NPMPP would prepare an SPCC Plan that would be implemented by the construction contractor and operations staff. The SPCC Plan would be reviewed and certified by a Professional Engineer to ensure its adequacy. The Plan would include measures for the safe transport, handling, and storage of hazardous materials and will address security, safety, training, inspections, and spill response. Regulatory requirements and BMPs designed to prevent and respond to spills and releases that would be implemented include:

- Maintain spill containment and cleanup kits in all areas where hazardous materials would be used or stored;
- Fuel and maintain vehicles and equipment in areas protected from releases onto the ground;
- Provide secure secondary containment with a volume of at least 150 percent of the tank volume for all fuel tanks;
- Place drip pans under vehicles to prevent fluids from dripping onto the ground;
- Perform timely maintenance on vehicles and equipment that leaks oil or other fluids;

- Wash equipment and vehicles used for concrete in a designated area where wash water would be properly contained. Pump wash water into trucks and remove it from the site for proper disposal; and
- Construct a sump to contain the waste product of bentonite during drilling operations.

There is the potential for accidental releases or spills from the routine transport, use, storage, and disposal of hazardous materials during construction. Implementation of the control measures and BMPs described above that are designed to prevent and respond to spills and releases would ensure that impacts remain minor.

Worker Exposure to Chemicals Exceeding OSHA Limits

Construction workers could come into contact with hazardous materials in excess of the exposure limits defined by OSHA in 29 CFR Part 1910. To minimize this risk, a Site Safety Handbook would be prepared and implemented in accordance with 29 CFR 1926.65. For more information on the Site Safety Handbook, see Section 4.18 – Public Health and Safety. All persons entering the construction areas would be required to review and adhere to the Site Safety Handbook. NPMPP would implement regulatory requirements and BMPs to prevent harmful exposure of workers, including:

- Have Material Safety Data Sheets available to all workers for all hazardous materials stored and used onsite;
- Ensure that all personnel who handle or could come into contact with hazardous materials are sufficiently trained in the proper way to use and dispose of these materials; and
- Ensure the proper use of personal protective equipment.

The potential for injury to workers from exposure to hazardous materials would be minor with the implementation of the Site Safety Handbook.

Disturbance of Existing Contamination or Improper Disposal

As described in Section 3.5.1, there is no known contamination at the wind farm site; however, there is always some potential that existing contamination such as an illegal dump site could be found during construction. Even though the risk of encountering existing contamination is low, workers would be trained to recognize signs of illegal dumping or subsurface contamination such as odors and soil discoloration. If contamination were discovered, NPMPP would work with the Hawaii Department of Health to take appropriate action, including characterizing the type, extent, and concentration of the contamination and removing contaminated soil.

Construction activities would generate waste including construction debris, concrete wash water, used oil, and other vehicle fluids, and restroom waste. Proper procedures for temporary onsite storage of such wastes would be documented in the HMWMP. All waste, including non-hazardous waste, would be disposed of off-site at an appropriately permitted facility. Facilities where waste may be disposed of and the type of waste each facility accepts are discussed in Section 4.20 – Public Infrastructure and Services. The impacts associated with disturbance of existing contamination or improper handling of waste generated during construction would be minor with implementation of the HMWMP.

Vandalism

Because most construction activities would be in remote areas not readily accessible to or visible by the public, the risk of vandalism would be low. However, onsite project roads would be off limits to public during construction for both security and safety reasons. Site security would be sufficient to prevent vandalism. The wind farm site is currently not fenced. The step-up transformers at the individual turbines would be on access roads that would be physically closed to the public. The transformers would be inside padlocked and wrench-locked vaults to prevent access to the level gauges and valves that would result in oil discharge if tampered with. Security fencing and gates would be installed around the O&M building, it would be locked, and additional security measures such as alarms and security personnel could be used. The onsite substation would also have security fencing. Impacts associated with vandalism would be minor and would be reduced further with the implementation of security measures at the site.

Operations and Maintenance Impacts

Routine Use, Storage and Transport of Hazardous Materials

The amounts of hazardous materials required during O&M would be less than the amounts needed for construction and storage would be limited to designated areas on the wind farm site. The HMWMP would be updated with information about hazardous materials pertaining to the O&M phase, BMPs for managing hazardous materials would be implemented, and appropriate control measures such as secondary containment to contain leaks and spills would be provided.

Hazardous materials would be stored in the O&M building and used at each turbine. Specific hazardous materials inventories, including quantities, would be documented in the HMWMP and updated annually or as required by regulation. Nonhazardous batteries would be stored at the substation. Inspections of each of these facilities for leaks and spills would be done at least monthly. Implementing these measures would ensure that impacts would be minor.

Operations and Maintenance Building

The O&M building would contain hazardous materials needed for routine O&M of the turbines and a backup generator. These materials include mineral oil, hydraulic oil, grease, waste oil, cleaners, degreaser, and diesel fuel. These items would be stored on spill-absorbent materials and inspected routinely. There would likely be 55 gallons or less of each material onsite at any time.

Wind Turbines

Each of the 8 to 10 turbine sites would have a transformer containing mineral oil. A transformer would be mounted on a concrete pad adjacent to the base of each turbine. Pad-mounted transformers themselves have some built in containment in case of failure. Preventive maintenance would help prevent leaks and spills and ensure the proper and continuous functioning of the turbines.

Onsite Substation

The onsite substation would have two transformers that contain mineral oil. The main power transformer would be surrounded by a containment dike. Appropriate control measures to contain

leaks and spills for the other transformers are still being determined and would be included in the substation design.

Accidental Spills and Releases

Because hazardous materials would be used at the site, there would be a potential for accidental releases or spills. The SPCC Plan would be updated with information pertaining to the O&M phase. BMPs for spill prevention, response, containment, and reporting would be implemented. When possible, alternatives using fewer amounts of hazardous materials will be used during the O&M phase. For example, manual weed control around the turbines would be preferably used rather than herbicides. Implementation of these measures ensures that impacts would be minor.

Worker Exposure to Chemicals Exceeding OSHA Limits

Because hazardous materials would be used at the site, there would be a potential for worker exposure in excess of the exposure limits specified by OSHA in 29 CFR Part 1910. To minimize this risk, a Site Safety Handbook would be prepared and BMPs for hazardous materials management would be implemented. The HMWMP, updated to address O&M activities, would address proper hazardous materials management and worker training procedures to minimize the risk of worker exposure. The potential for injury to workers from exposure to hazardous materials would be minor with the implementation of the Site Safety Handbook.

Disturbance of Existing Contamination or Improper Disposal

The potential to encounter existing contamination is only relevant to ground-disturbing construction activities; therefore, there would be no impacts during O&M. Used oil from the turbines would be the primary waste generated during the O&M phase. Used oil would temporarily be stored in the O&M building. It would be transported off-site and recycled or disposed of at an appropriately-permitted waste disposal facility. The HMWMP, updated to address O&M activities, would detail proper waste storage and disposal procedures. The impacts associated with disturbance of existing contamination or improper handling of waste generated during construction would be minor with implementation of the updated HMWMP.

Vandalism

The risk of vandalism would be low; however, there would be site security such as fencing, road closures, and locks. These measures are expected to be sufficient to prevent acts of vandalism; however, additional security measures could be implemented such as building alarms and security personnel. Impacts associated with vandalism would be minor and would be reduced further with the implementation of these security measures.

4.7.3.2 Direct and Indirect Effects of the HCP Conservation Measures

Impacts of Avoidance and Minimization

The avoidance and minimization measures proposed under the Project HCP would have no effect related to the transport, storage, use, and disposal of hazardous materials, solid waste, and petroleum products.

Impacts of HCP Mitigation

For waterbird mitigation, NPMPP would be directly involved with the design and installation of a partial fence at Hamakua Marsh. There is a potential for fuel spills during the use of motor driven equipment that may be used during these efforts. However, with the proper use of standard BMPs the use of fuel for motor driven equipment would have negligible impacts.

The remainder of NPMPP's responsibilities under the HCP is to provide funding for existing conservation projects including Newell's shearwater research and management, short-eared owl research and management, or to carry out restoration activities at Poamoho Ridge for bat mitigation. Fuel (diesel or gasoline) would be used to operate vehicles to transport staff and equipment to the management or research sites and may be used to run equipment to carry out mitigation measures. Herbicides may be used as part of vegetation control at Poamoho Ridge. It is assumed that standard BMPs would be implemented for these activities. Therefore the direct and indirect impacts as the result of the transport, storage, use and disposal of hazardous materials, solid waste and petroleum products during NPMPP's implementation of conservation and mitigation measures in the mitigation areas are considered negligible.

4.7.3.3 Mitigation for Unavoidable Impacts

NPMPP will implement standard BMPs in order to avoid or minimize impacts as the result of the transport, storage, use, and disposal of hazardous materials, solid waste and petroleum products, as listed in Table 4.7-2, including the implementation of a Hazardous Materials and Waste Management Plan, SPCC Plan, and measures outlined in the Site Safety Handbook. These include measures to limit the risk of spills and requirements to properly maintain all equipment. As described above, no anticipated adverse impacts as the result of the transport, storage, use, and disposal of hazardous materials, solid waste, and petroleum products rise above a minor impact level. Therefore, no additional mitigation measures would be required.

4.7.3.4 Cumulative Effects

As presented in Table 4.2-1, the cumulative effects analysis area for impacts as the result of the transport, storage, use, and disposal of hazardous materials, solid waste, and petroleum products is the wind farm site and the mitigation areas where construction equipment and vehicles would be used.

The transport, storage, use and disposal of hazardous materials (in particular pesticides), solid waste and petroleum products are associated with past, ongoing and future agricultural activities within the wind farm site. These impacts would be minimized if standard BMPs would be implemented during

ongoing and future agricultural operations within the wind farm site. With the implementation of proper BMPs and mitigation measures, the Project as described under Alternative 2 would not cause significant impacts as a result of the transport, storage, use and disposal of hazardous materials, solid waste and petroleum products. Therefore, the Project would not contribute to cumulative impacts that could result in conjunction with the projects listed in Table 4.2-2.

Direct and indirect impacts as a result of the transport, storage, use, and disposal of hazardous materials, solid waste, and petroleum products, with implementation of the mitigation measures described in Section 4.7.3.1, from construction and operation of the Project under Alternative 2 would be minor. Therefore, when viewed in conjunction with past, present, and foreseeable future projects in the cumulative effects analysis area, the contribution of Alternative 2 to cumulative effects is considered to be low.

4.7.3.5 Summary

Construction and operation of the Project and implementation of the HCP conservation measures under Alternative 2 have the potential to have direct and indirect impacts as the result of the transport, storage, use, and disposal of hazardous materials, solid waste, and petroleum products. However, with implementation of mitigation measures described above, these impacts are expected to be minimal and would only result in temporary and localized effects on the public, worker health and safety, and the environment.

4.7.3.6 Alternative 2a - Modified Proposed Action Option

Direct, indirect, and cumulative effects from use of hazardous materials, solid waste, and petroleum projects under the Modified Proposed Action Option would be the same as under the Proposed Action. There may be a reduced amount of hazardous materials, solid waste, or petroleum products generated or used under the Modified Proposed Action Option due to the decrease in the number of turbines; however, this reduction would be negligible. Indirect impacts under the Modified Proposed Action Option would be the same as described above for the Proposed Action. Implementation of standard BMPs and other mitigation measures, as described under the Proposed Action, would minimize any adverse effects from the use of hazardous and regulated materials and wastes.

4.7.4 Alternative 3—Larger Generation Facility (Up to 12 Turbine Project)

4.7.4.1 Direct and Indirect Effects of Construction and Operation of the Project

Construction Impacts

The impacts as the result of the transport, storage, use, and disposal of hazardous materials, solid waste, and petroleum products during the construction period under Alternative 3 would be similar to those discussed earlier for Alternative 2.

The construction period under Alternative 3 would be longer than under Alternative 2 and split into two phases. The longer duration would slightly increase the potential for accidental releases or spills

and worker exposure. The construction of additional turbines under Alternative 3 would increase the amount of construction and solid waste generated at the wind farm site. With the implementation of the BMPs described under Alternative 2, the impacts under Alternative 3 would be minor.

Operations and Maintenance Impacts

The impacts as the result of the transport, storage, use, and disposal of hazardous materials, solid waste, and petroleum products during the O&M period under Alternative 3 would be similar to those discussed earlier for Alternative 2. The installation of additional turbines under Alternative 3 would generate more waste oil requiring disposal over the duration of the Project. With the implementation of the BMPs described under Alternative 2, the impacts under Alternative 3 would be minor.

4.7.4.2 Direct and Indirect Effects of the HCP Conservation Measures

The direct and indirect effects of the HCP conservation measures would be the same as under Alternative 2.

4.7.4.3 Mitigation for Unavoidable Impacts

Under Alternative 3, NPMPP will implement standard BMPs to avoid or minimize impacts as the result of the transport, storage, use, and disposal of hazardous materials, solid waste, and petroleum products, as listed in Table 4.7-2. These include measures to limit the risk of spills and requirements to properly maintain all equipment. As described above, no anticipated adverse impacts as the result of the transport, storage, use and disposal of hazardous materials, solid waste, and petroleum products rise above a minor impact level. Therefore, no additional mitigation measures would be required under Alternative 3.

4.7.4.4 Cumulative Effects

The cumulative effects of Alternative 3 related to the transport, storage, use, and disposal of hazardous materials, solid wastes, and petroleum products would be similar to those described for the Proposed Action. However, because of the 3-year lag between construction of the first 8 to 10 turbines and the construction of the additional 2 to 4 turbines (and associated infrastructure) proposed under Alternative 3, there would be a longer period during which there would be the risk of accidental spills or releases of contaminants. It is assumed that agricultural activities within the wind farm site would continue. With the implementation of standard BMPs and mitigation measures during the construction of Alternative 3, and impacts as the result of the transport, storage, use, and disposal of hazardous materials, solid waste, and petroleum products thus minimized, the cumulative effects of Alternative 3, when viewed in conjunction with past, present, and foreseeable future projects, would be minor.

4.7.4.5 Summary

Construction and operation of the Project under Alternative 3 has the potential to have direct and indirect impacts as the result of the transport, storage, use, and disposal of hazardous materials,

solid waste, and petroleum products. Alternative 3 would have a slightly larger short-term adverse impact in this respect over a longer construction period than the Proposed Action. In addition, the greater number of turbines in Alternative 3 would generate more waste oil over the course of the Project. However, with implementation of mitigation measures described above, these impacts are expected to be minimal and would only result in temporary and localized effects on the public, worker health and safety, and the environment.

4.7.5 Conclusion

No anticipated adverse impacts as the result of the transport, storage, use and disposal of hazardous materials, solid waste and petroleum products would rise above a minor impact level under Alternatives 2, 2a or 3. Table 4.7-3 provides a summary of the potential impacts as the result of the transport, storage, use, and disposal of hazardous materials, solid waste, and petroleum products.

Table 4.7-3. Summary of Potential Impacts Associated with Hazardous and Regulated Materials and Wastes

Impact Issues	No Action Alternative	Alternative 2 – Proposed Action	Alternative 2a – Modified Proposed Action Option	Alternative 3
Routine use, storage and transport of hazardous materials	No Impact	Minor	Minor	Minor
Accidental spills and releases	No Impact	Minor	Minor	Minor
Worker exposure to chemicals exceeding OSHA limits	No Impact	Minor	Minor	Minor
Disturb existing contamination or improper disposal	No Impact	Minor	Minor	Minor
Vandalism	No Impact	Minor	Minor	Minor

4.8 Natural Hazards

4.8.1 Impact Criteria

Natural hazards, such as hurricanes, tsunamis, or earthquakes, can impact a project and, in some cases, may be a justifiable risk and reason not to build a project in a certain location. While most of the resource topics in this EIS discuss how the Project might impact a specific resource, this section primarily discusses how natural hazards might impact the Project. Therefore, this section does not identify specific impact criteria as is done for the other resources analyzed but rather describes generally the context of impacts.

Impacts from natural hazards were evaluated qualitatively based on known information about natural hazard occurrences on Oahu. Although the occurrence rate on Oahu is low to very low, construction and operation of the Project and HCP conservation measures could be adversely affected by a natural hazard such as a hurricane, tsunami, or earthquake. Depending on the severity of the natural hazard, electrical supply to the HECO grid could be disrupted. Construction and operation of the Project and implementation of HCP conservation measures would increase the

potential for wildfires related to the use of vehicles and electrical equipment and increased human presence in the Project and mitigation areas.

4.8.2 Alternative 1—No Action

4.8.2.1 Direct and Indirect Effects

Under the No Action Alternative, the Project would not be constructed, an ITP would not be issued by the USFWS, and the HCP conservation measures would not be implemented. Therefore, Alternative 1 would have no effects related to natural hazards.

4.8.2.2 Cumulative Effects

Under the No Action Alternative, the Project would not be constructed, an ITP would not be issued by the USFWS, and HCP conservation measures would not be implemented; therefore, there would be no effect related to natural hazards. Thus, Alternative 1 would not contribute to cumulative effects related to natural hazards as no action would be undertaken.

4.8.2.3 Summary

There would be no direct, indirect, or cumulative impacts related to natural hazards under the No Action Alternative.

4.8.3 Alternative 2—8 to 10 Turbine Project

4.8.3.1 Direct and Indirect Effects of Construction and Operation of the Project

Construction Impacts

In the event of a hurricane, tropical storm, tsunami, earthquake, flooding, or wildfire, safety procedures in the Site Safety Handbook would be implemented. For more information on the Site Safety Handbook, see Section 4.18 – Public Health and Safety,

Hurricanes and Tropical Storms

No impacts to construction activities resulting from hurricanes or tropical storms are anticipated. In the event that the National Weather Service issues a storm watch or warning, the site construction manager would be responsible for implementing the appropriate procedures in accordance with the Site Safety Handbook to ensure the safety of staff.

Tsunamis

A small portion of the northeastern edge of the wind farm site, near Kamehameha Highway, is within the Civil Defense Tsunami Evacuation Zone (NOAA 2013b). A small segment of proposed access road, the transmission line, and the line tap location lie within the evacuation zone. However, the majority of the wind farm site, including all wind turbine locations, are not within the Civil Defense Tsunami Evacuation Zone. The probability of impacts to the Project resulting from tsunamis during the construction phase is low.

Earthquakes and Seismicity

The entire island of Oahu has a UBC seismic risk zone ranking of 2A (USGS 2001), which indicates a low level of seismic risk. No impacts to the Project from earthquakes and seismicity during construction are anticipated. To reduce the risk of earthquake damage, all structural elements of the proposed Project would meet or exceed current building code requirements for the seismic risk on Oahu. The current design standard is defined by the 2006 UBC. In the event of an earthquake, the site construction safety manager would be responsible for implementing the appropriate procedures in accordance with the Site Safety Handbook to ensure the safety of staff.

Flooding

During scoping, concern was raised over potential impacts associated with flooding, particularly at the Kahuku High School football field. The majority of the wind farm site, including the majority of Project facilities and all proposed wind turbine locations, is located within Flood Zones D and X (Figure 3.6-1). Zone D includes areas where analysis of flood hazards has not been conducted and flood hazards are undetermined, thus flood risks to construction activities in these portions of the wind farm site are unknown. The National Flood Insurance Program does not have any regulations regarding development within Zone D. Areas classified as Zone X are classified as minimal risk areas (FEMA 2013a, 2013b) and include areas determined to be outside of the 0.2-percent-annual-chance (or 500-year) floodplain. The risk of impacts to construction activities from flooding in these portions of the wind farm site is very low.

A small segment of the proposed access road, the transmission line, and the line tap location lie within Flood Zones AE and AEF. These zones are designated as special flood hazard, or high risk, areas (FEMA 2013a, 2013b) and are mapped as lying within the 1-percent-annual-chance (or 100-year) floodplain. Zone AEF include areas along the floodway of a stream in areas that must be kept free of encroachment so that the 1-percent-annual chance flood can be carried without substantial increases in flood heights (FEMA 2013a). The risk of impacts to construction activities due to flooding in these portions of the wind farm site is moderate. During the detailed design phase of the Project, the construction contractor will confirm stormwater runoff requirements and, if necessary, implement stormwater control measures such as seepage pits, drywells, and/or detention basins. The implementation of these measures would minimize the potential for flood events. Moreover, the City and County of Honolulu will require would require the project to be designed such that no net additional drainage would occur off-site.

In the event of a flood event, the site construction safety manager would be responsible for implementing the appropriate procedures in accordance with the Site Safety Handbook to ensure the safety of staff.

Wildfire

Wildfire is one natural hazard that could potentially be created by the Project. Unlike the other natural hazards discussed in this section, the Project could impact the potential for this natural hazard to occur.

The Project could increase the potential for wildfires associated with the use of vehicles and electrical equipment and increased human presence during construction of the Project. Sparks from vehicles and construction equipment, spark producing construction activities such as welding, and improper disposal of matches or cigarettes, for example, could start a fire. There would also be increased presence and use of petroleum products, including oils and lubricants onsite, thereby increasing the potential for fires. Climatic conditions in the vicinity of the wind farm site, including high relative humidity and high precipitation, however, tends to prohibit the production of fires.

A Fire Management Plan (FMP) has been prepared for the proposed Project. The FMP analyzed the available pertinent information including fuel conditions, weather and climate conditions, fire history in the vicinity of the Project, firefighter access, and other factors (see Appendix C). The FMP concluded that the likelihood of a wildfire ignition during construction of the Project is very low and that no mitigation measures beyond normal construction BMPs would be required to mitigate the threat (see Appendix C). The impacts to the Project related to wildfires during the construction phase, with the implementation of standard construction BMPs, are anticipated to be very low.

Operation and Maintenance Impacts

Hurricanes and Tropical Storms

Impacts to O&M of the Project from hurricanes or tropical storms are anticipated to be low. The wind turbine models that would be considered for the Project are designed to operate in winds up to approximately 55 miles per hour (25 meters per second). When the wind speed reaches approximately 7.8 miles per hour (3.5 meters per second), the controller automatically "pitches" the blades into the wind and the rotor starts low speed revolutions. At wind speeds in excess of 55 miles per hour (25 meters per second), the controller automatically "pitches" the blades out of the wind and the rotor comes to a complete stop until the wind speeds drop below this threshold. The wind turbine models that would ultimately be selected for the Project would be those designed to withstand wind gusts typical of the region, and would take into account site-specific meteorological data. In the unlikely event that wind speeds are high enough to damage a wind turbine and cause it to fall, the damage would likely be confined to the turbine pad and potentially the areas immediately adjacent. See Section 4.18 – Public Health and Safety for more information on tower collapse and blade throw.

Tsunamis

Impacts from tsunamis during O&M of the Project are the same as those discussed for the construction phase. The probability of impacts to Project O&M resulting from tsunamis during the operation is low and would be restricted to components (i.e., access road, transmission line, and line tap) in a small area in the northern portion of the wind farm site.

Earthquakes and Seismicity

Impacts from earthquakes and seismicity during O&M of the Project are the same as those discussed for the construction phase. No impacts to the Project from earthquakes and seismicity during O&M of the Project are anticipated. As stated above, all structural elements of the proposed

Project, including wind turbines, would meet or exceed current building code requirements for the seismic risk on Oahu. In the event of an earthquake, it is possible that electricity fed to the HECO grid could be disrupted.

Flooding

Impacts from flooding during O&M of the Project are the same as those discussed for the construction phase. The risk of impacts to O&M from flooding in portions of the wind farm site designated as Flood Zone D or X is very low. The risk of impacts to O&M due to flooding in portions of the wind farm site designated as Zone AE or AEF is moderate.

Wildfire

Similar to construction of the Project, O&M activities would increase the potential for wildfires associated with the use of vehicles and electrical equipment and increased human presence during O&M. Implementation of the FMP would be required during O&M activities. With implementation of the FMP, the impacts to the Project related to wildfires during the O&M phase are anticipated to be very low. The risk of fire is further minimized by the design features of the wind turbines, such as over-temperature sensors that will shut down the turbine if normal temperature limits are exceeded. In addition, undergrounding of the electrical collection system would reduce the risk of fire.

Water tanks will be maintained onsite for emergency fire suppression during construction. Additional fire suppression measures to be implemented during construction and operation will be developed in coordination with the City and County of Honolulu Fire Department and will be incorporated into a Site Safety Handbook. These measures may include, but are not limited to requiring vehicles to carry fire suppression equipment when onsite such as fire extinguishers, flappers, and shovels, and storing fire suppression tools at designated locations within the wind farm.

4.8.3.2 Direct and Indirect Effects of the HCP Conservation Measures

Impacts of Avoidance and Minimization Measures

The avoidance and minimization measures proposed under the Project HCP would have no effect related to natural hazards.

Impacts of HCP Mitigation

No impacts associated with natural hazards (hurricanes, tropical storms, tsunamis, earthquakes and seismicity, flooding, or fire) would occur in association with funding provided for Newell's shearwater research and management or short-eared owl research and management.

No impacts to the Hamakua Marsh Mitigation Area or to waterbird mitigation activities implemented in this mitigation area are anticipated from hurricanes and tropical storms, tsunamis, or earthquakes and seismicity. The Hamakua Marsh Mitigation Area is located within Flood Zones AE, AEF and X. The risk of flooding in the portions of the mitigation area designated as Flood Zone

X, outside of the 0.2-percent-annual-chance (or 500-year) floodplain, is very low. The risk of impacts to the mitigation area and mitigation activities due to flooding in areas designated as Flood Zone AE and AEF is moderate. Conservation and mitigation measures in the Hamakua Marsh Mitigation Area include installation and maintenance of a partial fence along the northeastern border of the mitigation area. The area proposed area for installation of the fence lies within Flood Zone AEF.

Installation and maintenance of fencing in the Hamakua Marsh Mitigation Area would increase the potential for wildfires associated with the use of vehicles and electrical equipment and increased human presence during construction and maintenance of the fence. However, this increased fire risk is anticipated to be very low.

No impacts to the Poamoho Ridge Mitigation Area or to conservation and mitigation activities implemented in this mitigation area are anticipated from hurricanes and tropical storms, tsunamis, earthquakes and seismicity, or flooding. Maintenance of fencing, non-native ungulate removal and monitoring, invasive plant removal and monitoring, and bat acoustic monitoring, in the Poamoho Ridge Mitigation Area would increase the potential for wildfires associated with the use of vehicles and electrical equipment and increased human presence during these activities. However, this increased fire risk is anticipated to be very low.

4.8.3.3 Mitigation of Unavoidable Impacts

The potential for impacts from natural hazards is low. BMPs listed in Table 2-6, which will be implemented by NPMPP, will minimize and reduce risk of impacts from natural hazards. These measures include:

- Implementation of the Project FMP to reduce the potential for fires during construction and operations.
- To reduce the risk of earthquake damage, all structural elements of the Project will meet or exceed current building code requirements for the seismic risk on Oahu. The current design standard is defined by the 2006 UBC.
- A Site Safety Handbook will be prepared for construction and O&M.

4.8.3.4 Cumulative Effects

The cumulative effects analysis area for natural hazards is the island of Oahu because natural hazards take place on a regional scale. The only natural hazard likely to be impacted by the Project is a potential for increased fire risk. The potential for fire risk during construction and operations, especially with implementation of standard construction BMPs and other mitigation measures proposed in the FMP, is very low. Other development projects in the cumulative effects analysis area, such as the Turtle Bay Resort Expansion and the Envision Laie Project (see Table 4.2-2 for additional development projects), as well as ongoing agricultural operations and O&M of existing HECO transmission lines, have the potential to increase fire risks. Assuming similar BMPs and mitigation measures are implemented for these other projects, the Project, in conjunction with other projects would have a low cumulative impact of fire risk.

4.8.3.5 Summary

No impacts to construction or O&M activities are anticipated from hurricanes and tropical storms or earthquakes and seismicity. There is a low potential for impacts from tsunamis, and a low-to-moderate potential for impacts from flooding. The Project itself has a very low potential to create a wildfire impact. The overall potential for impacts from natural hazards during construction and operation of the Project under Alternative 2 is low. Therefore, effects related to natural hazards would be considered negligible to minor.

4.8.3.6 Alternative 2a - Modified Proposed Action Option

Impacts to construction and operation of the Project from natural hazards and the cumulative impact to fire risk under the Modified Proposed Action Option are the same as those described for the Proposed Action. Implementation of standard BMPs and other mitigation measures, as described under the Proposed Action, would minimize and reduce risk of impacts from natural hazards under the Modified Proposed Action Option.

4.8.4 Alternative 3—Larger Generation Facility (Up to 12 Turbine Project)

4.8.4.1 Direct and Indirect Effects of Construction and Operation of the Project

Impacts to construction and operation of the Project from natural hazards under Alternative 3 are the same as those described for Alternative 2. No additional turbines would be located within Flood Zone hazard areas (Figure 3.6-1).

4.8.4.2 Direct and Indirect Effects of the HCP Conservation Measures

Impacts associated with avoidance, minimization, and mitigation measures proposed under the Project HCP would be the same as those described for Alternative 2.

4.8.4.3 Mitigation of Unavoidable Impacts

The potential for impacts from natural hazards is low. BMPs listed in Table 2-6, which will be implemented by NPMPP, will minimize impacts from and reduce risk of natural hazards. These measures include:

- Implementation of the Project FMP to reduce the potential for fires during construction and operations.
- To reduce the risk of earthquake damage, all structural elements of the Project will meet or exceed current building code requirements for the seismic risk on Oahu. The current design standard is defined by the 2006 UBC.
- A Site Safety Handbook will be prepared for construction and O&M.

4.8.4.4 Cumulative Effects

Cumulative effects related to natural hazards under Alternative 3 are as described under Alternative 2.

4.8.4.5 Summary

No impacts to construction or O&M activities are anticipated from hurricanes and tropical storms or earthquakes and seismicity. There is a low potential for impacts from tsunamis, and a low-to-moderate potential for impacts from flooding. The Project itself has a very low potential to create a wildfire impact. The overall potential for impacts from natural hazards during construction and operation of the Project under Alternative 3 is negligible to minor.

4.8.5 Conclusion

Impacts related to natural hazards from the alternatives considered in this analysis are summarized in Table 4.8-1.

Table 4.8-1. Summary of Potential Natural Hazards to Impact Project

Impact Issues	No Action Alternative	Alternative 2 – Proposed Action	Alternative 2a – Modified Proposed Action Option	Alternative 3
Hurricanes and tropical storms	No Impact	None expected/negligible	None expected/negligible	None expected/negligible
Tsunamis	No Impact	Negligible	Negligible	Negligible
Earthquakes and seismicity	No Impact	None expected/negligible	None expected/negligible	None expected/negligible
Flooding	No Impact	Minor	Minor	Minor
Wildfire	No Impact	Negligible	Negligible	Negligible

4.9 Vegetation

4.9.1 Impact Criteria

Impacts to vegetation were evaluated by assessing the effects to existing vegetation and vegetation communities from Project construction and O&M activities as well as from implementation of HCP conservation measures within the mitigation areas. Impacts were also evaluated based on the potential for the Project and conservation measures to promote, spread, or expand the range of non-native invasive plants and the potential for the Project and conservation activities to result in an increased fire risk.

A significant impact on vegetation would result if any of the following were to occur as a result of construction or operation of the Project or implementation of conservation measures:

- Loss to a population of plant species that would result in the species being listed or proposed for listing as threatened or endangered;
- Introduction or increased spread of invasive species; or
- Increased fire risk that would impact vegetation resources.

Impacts to threatened and endangered plant species are discussed in Section 4.11 – Threatened and Endangered Species.

Impact criteria for determining effects on vegetation resources from the Project and HCP conservation measures are described further in Table 4.9-1 below.

Table 4.9-1. Impact Criteria for Vegetation

Type of Effect	Impact Component	Effects Summary		
Change to vegetation or vegetation communities	Magnitude or Intensity	**High:** Acute or obvious changes in vegetation and vegetation communities.	**Medium:** Noticeable change in vegetation and vegetation communities.	**Low:** Changes in vegetation or vegetation communities may not be noticeable.
	Duration	**Permanent:** Chronic effects; vegetation and vegetation communities would not be anticipated to return to previous levels.	**Long-term:** Vegetation and vegetation communities would be adversely affected by actions associated with the Project for more than 1 year up to the life of the Project and/or vegetation communities would not return to pre-activity conditions within five years.	**Temporary and Short-term:** Vegetation and vegetation communities would be adversely affected by actions associated with the Project, but not longer than the span of 1 year. Vegetation and Vegetation communities would be expected to return to pre-activity conditions within five years.
	Geographic Extent	**Extended:** Affects vegetation and vegetation communities beyond the region or wind farm site.	**Regional:** Affects vegetation and vegetation communities beyond a local area, potentially throughout the wind farm site.	**Local:** Impacts limited geographically; limited to vicinity of the Project footprint.
	Context	**Unique:** Vegetation and vegetation communities are protected by legislation and the portion of the vegetation or vegetation community affected fills a unique ecosystem role within the locality or region.	**Important:** Affects depleted vegetation or vegetation communities within the locality or region or vegetation and vegetation communities are protected by legislation.	**Common:** Affects usual or ordinary vegetation and vegetation communities in the wind farm site; vegetation and vegetation communities are not depleted in the locality or protected by legislation.

4.9.2 Alternative 1—No Action

4.9.2.1 Direct and Indirect Effects of Construction and Operation of the Project

Under the No Action Alternative, the Project would not be constructed, the ITP would not be issued by USFWS, and HCP conservation measures would not be implemented. Therefore, there would be no effect on vegetation resources under Alternative 1.

4.9.2.2 Cumulative Effects

Under the No Action Alternative, the Project would not be constructed, an ITP would not be issued by USFWS, and the HCP conservation measures would not be implemented. Therefore, there would be no effect on vegetation. Thus, Alternative 1 would not contribute to cumulative effects to vegetation resources because no action would be undertaken.

4.9.2.3 Summary

There would be no direct, indirect, or cumulative impacts to vegetation resources under the No Action Alternative.

4.9.3 Alternative 2—8 to 10 Turbine Project

4.9.3.1 Direct and Indirect Effects of Construction and Operation of the Project

Construction of the Proposed Action would result in permanent ground clearing and vegetation removal for installation of Project facilities including wind turbines and pads, permanent access roads, met towers, substation, an O&M building, and O&M parking and storage areas. Temporary disturbances would occur during construction of the underground electrical collection system and the transmission line, as well as in temporarily cleared areas around wind turbine pads, and construction staging and equipment laydown areas. Gravel pads up to 2 acres (1 hectare) around each turbine would be maintained to allow for O&M requirements. An additional area extending out to 50 percent of the maximum turbine tip height above the ground around each turbine would be maintained to facilitate post-construction mortality monitoring efforts, as practicable (see Appendix A of the HCP).

A total of up to approximately 89.0 acres (36.0 hectares) of vegetation would be impacted for construction and operation under this alternative, including 59.9 acres (24.2 hectares) of long-term impacts. This is conservative in that it includes some previously disturbed areas (e.g., existing road bed and areas of agriculture). Table 2-1 in Section 2.1 – Project Description provides more detail on the disturbance areas associated with each Project component.

Construction Impacts

As stated above, a total of up to approximately 89.0 acres (36.0 hectares) of ground disturbance would be impacted for construction of Alternative 2. Impacts can occur directly or indirectly and can be considered short or long term. Direct impacts include the physical destruction or degradation of vegetation and vegetation communities resulting from construction of Project facilities. Indirect impacts to vegetation communities from Project construction include the introduction and spread of noxious weeds and the potential increased risk of wildfire, both of which can impact and alter vegetation communities within the wind farm site.

Impacts are considered short term if they disturb vegetation but do not prevent the reestablishment of vegetation communities to pre-impact functionality within 5 years. Impacts to herbaceous communities are frequently considered short term because these communities typically recover quickly. Long-term impacts are impacts where a complete change in functionality occurs (e.g., land conversion) or where return to pre-impact conditions takes an extended time to occur, such as in shrub or forested vegetation communities.

Vegetation within the wind farm site is predominantly shrubland and forest; thus, impacts to these vegetation communities from construction of the Project would be considered long term. As described in Section 3.7, however, vegetation within the wind farm site is predominantly non-

native shrubland and forest dominated by a mixture of aggressive non-native weedy species, and construction of the Project would generally occur in areas that have been extensively disturbed. Thus, the vegetation impacted is primarily common, and does not include native vegetation communities with the exception of some native species including shrubs such as ulei and akia, and forbs such as uhaloa, and the vine huehue, which would be removed for construction of this alternative, primarily along the ridgetops. Additionally, a few iliahi aloe trees may need to be removed under this alternative.

Due to historic disturbance to vegetation within the wind farm site, there are very few areas free of non-native and invasive plant species. Non-native and invasive plant species infestations are typically greatest near disturbed areas, although non-native species are also commonly found along ridgetops in the wind farm site. Over time, infestations of non-native plant species would continue to spread throughout the area without construction of the Project; however, ground disturbance and movement of construction vehicles and personnel associated with the Project have the potential to result in an increase in spread and colonization of non-native and invasive plant species throughout the wind farm site. Introduction and spread of non-native species have the potential to change the composition, abundance, and diversity of native plants in the wind farm site through competition, by altering the fire regime, or through the alteration of other ecosystem processes (e.g., nitrogen cycling).

The impact of introduction and spread of invasive species from ground disturbance associated with construction and movement of construction equipment and personnel has the potential to noticeably alter vegetation communities long term within the wind farm site; these impacts, however, would be localized and would occur primarily to non-native vegetation communities. With implementation of the BMPs identified in Section 4.9.3.3 below, Alternative 2 is not expected to result in a significant increase in the introduction and spread of invasive species.

There is a slight chance of Project-related fires during construction associated with the presence and use of vehicles and heavy equipment and activities such as welding and grinding that could produce sparks. A Project-related fire could impact vegetation within the wind farm site. Fire has the potential to result in long-term impacts that noticeably alter the impacted vegetation community. However, a Project-related fire is likely to be localized and would impact primarily non-native vegetation communities. Implementation of the Project FMP (Appendix C) would further minimize the potential for Project-related fires during construction of this alternative; therefore, this alternative is not expected to result in significant impacts to vegetation resources due to fire.

Operation and Maintenance Impacts

Qualified personnel would routinely monitor, inspect, and maintain the components of the wind farm (e.g., wind turbines, electrical collection system, and communications equipment) and transmission line facilities during Project operations. O&M activities would be accomplished with the use of off-road vehicles and light trucks, which would result in trampling of vegetation if off-road travel is necessary.

Roads used for operation of the Project would include portions of an existing road network which would be widened plus the addition of new roads. It is anticipated that off-road travel during operations would be rare. However, should a major component replacement be necessary for any of these facilities (e.g., blade or transformer), heavy equipment similar to that used during construction would be required, and the access roads, crane pads (for wind turbines only), and staging areas would be used in a similar manner as with the original construction resulting in similar disturbance impacts to vegetation with similar mitigation being required.

Vegetation maintenance (trimming) may be required in areas where vegetation exceeds maximum height limitations in relation to the above ground portions of the electrical collection system and/or transmission line. However, this maintenance is expected to be minimal and existing vegetation in the area predominantly consists of low-growing non-native shrubs and forb species. Additionally, gravel pads up to 2 acres (1 hectare) around each turbine would also be maintained to allow for O&M requirements. An additional area extending out to 50 percent of the maximum turbine tip height above the ground would be maintained (e.g., planting low growing crops or maintaining low growing vegetation) to facilitate post-construction mortality monitoring efforts, as practicable (see Appendix A of the HCP).

O&M activities could result in the introduction and spread of invasive species and a very low increased risk of fire. Prior to the start of O&M activities, standard BMPs to control the spread of invasive species would be implemented (see Section 4.9.3.3). Fire risk associated with transmission line operations is extremely low as it would be primarily underground. Likewise, fire risk associated with wind turbine operations is also very low and would be prevented by the design features and various onsite and off-site control capabilities of the wind turbine model selected. Implementation of the Project FMP (Appendix C) during O&M would minimize the already extremely low risk of fire and associated impacts on vegetation in the wind farm site. Effects to vegetation from introduction and spread of invasive species and fire risk associated with O&M activities would be considered minor, because while there may be long-term impacts to vegetation, the intensity would be low, disturbance would be localized, and common, ordinary vegetation resources would be affected.

4.9.3.2 Direct and Indirect Effects of the HCP Conservation Measures

Impacts of Avoidance and Minimization Measures

The avoidance and minimization measures proposed under the Project HCP would have no effect on vegetation. There would be some potential for vegetation trampling in conjunction with post-construction monitoring efforts associated with surveyors traversing transects beneath the turbines. However, this impact is expected to be negligible.

Impacts of HCP Mitigation

No impacts to vegetation would occur in association with funding provided for Newell's shearwater research and management and short-eared owl research and management. Depending on measures

chosen, some vegetation trampling could occur in association with regular visits made by staff to research or management sites to carry out these activities; however, impacts would be negligible.

Installation and maintenance of a partial fence along the northeastern border of the Hamakua Marsh Mitigation Area would result in ground clearing and disturbance to vegetation. The fence would be approximately 1,555 feet (474 meters) long and 4 feet (1.2 meters) high. Proposed design criteria for the fence are outlined in the Project HCP. Although installation of fencing would result in clearing of vegetation, existing vegetation within the area proposed for fence installation currently consists predominantly of non-native species and areas of bare dirt. Installation and maintenance of the fence has the low potential to increase spread of non-native plant species in the area through construction equipment and movement of personnel. Additionally, the overall benefits of installation of fencing (e.g., controlling access to limit illegal dumping of garbage, and eliminating the use of the marsh as a play area for pets) would result in an overall benefit to vegetation within the Hamakua Marsh Mitigation Area.

Funding for forest restoration activities and monitoring within the Poamoho Ridge Mitigation Area would go toward activities such as maintenance of the ungulate-proof fence installed by DLNR, non-native ungulate removal and monitoring, invasive plant removal and monitoring, and bat acoustic monitoring. Foot traffic and vehicle use associated with removal and monitoring of non-native ungulates and invasive plant species and bat acoustic monitoring may trample existing native vegetation. However, these impacts are expected to be temporary, localized, and negligible.

Movement of equipment and personnel through the area during non-native ungulate and invasive plant removal and monitoring, and bat monitoring activities, have the potential to increase spread of non-native plants within the mitigation area. Although these activities have the potential to increase spread and colonization of non-native species in the area which would impact native communities, potentially long term, the intensity of effects would be low and localized. Standard BMPs for invasive plant management would be implemented to minimize adverse impacts to native vegetation communities at the mitigation area.

Ultimately, forest restoration activities within the Poamoho Ridge Mitigation Area would reduce the spread of non-native plant species and would help foster a vegetative community with a predominance of native plants. Therefore, there would be an overall net benefit to vegetation resources within the Poamoho Ridge Mitigation Area from implementation of conservation and mitigation measures discussed above.

4.9.3.3 Mitigation of Unavoidable Impacts

BMPs listed in Table 2-6, which will be implemented by NPMPP, will minimize impacts to vegetation. These measures include:

- Preparing and implementing a TESC Plan, which would help prevent erosion;
- Revegetating temporarily disturbed areas with non-invasive resident species;

- Inspecting potential off-site sources of materials (gravel, fill, etc.) and prohibiting the import of materials from sites that are known or likely to contain seeds or propagules of invasive species;
- Requiring vehicle operators transporting materials to the Project site from off-site to follow protocols for removing soils and plant material from vehicles and equipment prior to entry onto the site;
- Consulting with the Hawaii Department of Agriculture and Oahu Invasive Species Commission to establish protocols and training orientation methods for screening invasive species introductions during construction; and
- Implementing the Project FMP to reduce the potential for fires during construction and operations.

In addition to the mitigation measures above, the following mitigation measures and BMPs would be implemented to reduce impacts to vegetation resources under Alternative 2:

- Areas temporarily disturbed during construction would be revegetated with non-invasive, resident species immediately following construction. A portion of the turbine pad area would be revegetated through replanting with non-aggressive resident species that are compatible with Project operations in order to minimize erosion.
- Using only certified weed-free seed mixes and mulches for use in revegetation
- At the end of construction, areas impacted by construction would be surveyed to determine if problematic and/or new invasive species had been introduced.
- If new or problematic invasive species are introduced, remedial actions would be implemented to contain or control these target species.

4.9.3.4 Cumulative Effects

The cumulative effects analysis area for impacts on vegetation includes the Project construction footprint, as well as areas that would be disturbed by activities implemented in the mitigation areas plus a 0.25-mile (0.4-kilometer) buffer around these areas. This area encompasses the areas where potential direct and indirect effects to vegetation could occur.

Past agricultural and associated development activities, as well as urban development and associated infrastructure (i.e., existing HECO transmission lines) have contributed to the overall permanent loss and long-term degradation of vegetation and contributed to the spread of non-native invasive plant species within the wind farm site. Ongoing agricultural operations in Malaekahana area would continue to impact vegetation in the wind farm site. These effects would depend on the level of agricultural activity that continues through the life of the Project. Effects from past activities in the vicinity of the wind farm site have resulted in permanent and long-term obvious changes in vegetation and vegetation communities in an extended area that have affected important native vegetation communities.

Human activity and development and associated introduction of non-native plant species, as well as impacts from non-native wildlife species, have also resulted in long-term, obvious degradation of important native vegetation within and in the vicinity of the Hamakua Marsh Mitigation Area.

Within the Poamoho Ridge Mitigation Area, vegetation along the ridge is steadily decreasing in quality due to the presence of invasive plant species and feral pigs (pers. com., M. Zoll, Hawaii Department of Land and Natural Resources, 2013). Proposed mitigation activities, including fence installation in Hamakua Marsh and Poamoho Ridge Mitigation Areas, and removal and control of non-native animal and plant species in Poamoho Ridge Mitigation Area, would help foster establishment of native vegetation.

The only foreseeable project in the cumulative effects analysis area with the potential to impact vegetation is the Envision Laie Project located in the Malaekahana parcel in the vicinity of the wind farm site. This project includes residential development on 300 acres (121.4 hectares) of Malaekahana land. It could result in moderate impacts to vegetation due to additional permanent and temporary, localized vegetation removal, which could locally increase the spread of invasive plant species. These impacts would be minimized if standard BMPs for minimizing vegetation removal and controlling introduction and spread of invasive plant species are implemented during construction and operation.

The Proposed Action would contribute 89.0 acres (36.0 hectares) of disturbance, of which 59.9 acres (24.2 hectares) would be long term, to primarily non-native vegetation communities. However, mitigation under the Project HCP would have beneficial effects to vegetation associated with forest restoration activities at Poamoho Ridge Mitigation Area. When viewed in conjunction with past, present, and foreseeable future projects in the cumulative effects analysis area, the contribution of Alternative 2 to cumulative effects on vegetation resources is considered to be low.

4.9.3.5 Summary

Construction and operation of the Project under Alternative 2 has the potential to impact vegetation resources in the Project and mitigation areas directly through vegetation removal and indirectly through the introduction and spread of invasive species. Impacts would be considered minor, because the intensity would be low (changes in vegetation or vegetation communities may not be noticeable), a majority of impacts would be temporary, disturbance would be localized, and common, ordinary vegetation resources would be affected. With implementation of mitigation measures described above, these impacts are expected to be minimal and would result in a less than significant impact to vegetation resources.

4.9.3.6 Alternative 2a - Modified Proposed Action Option

Direct, indirect, and cumulative effects on vegetation resources from the Modified Proposed Action Option would be similar to those described under the Proposed Action. However, the Modified Proposed Action Option would result in up to approximately 84.5 acres (34.2 hectares) of ground disturbance, of which 56.7 acres (22.9 hectares) would be long term, lasting the life of the Project. Table 2-1 provides more detail on the disturbance areas associated with each Project component. Indirect impacts under the Modified Proposed Action Option would be the same as described above for the Proposed Action. Implementation of standard BMPs and other mitigation measures, as

described under the Proposed Action, would minimize any adverse impacts to vegetation resources.

4.9.4 Alternative 3—Larger Generation Facility (Up to 12 Turbine Project)

4.9.4.1 Direct and Indirect Effects of Construction and Operation of the Project

Similar to Alternative 2, construction of Alternative 3 would result in permanent ground clearing and vegetation removal for installation of Project facilities including wind turbines and pads, permanent access roads, met towers, substation, transmission line, an O&M building, and O&M parking and storage areas. Temporary construction disturbances would occur in association with the underground electrical collection system and transmission line, temporarily cleared areas around wind turbine pads, and construction staging and equipment laydown areas. Permanent gravel pads up to 2 acres (1 hectare) around each turbine would be maintained to allow for O&M requirements. An additional area extending out to 50 percent of the maximum turbine tip height above ground would be maintained to facilitate post-construction mortality monitoring efforts, as practicable (see Appendix A of the HCP). Approximately 98.6 acres (39.9 hectares) of vegetation would be impacted for construction and operation under Alternative 3, including 69.8 acres (28.2 hectares) of long-term impacts. Table 2-1 in Section 2.1 – Project Description provides more detail on the disturbance areas associated with each Project component.

Construction Impacts

The types of direct and indirect impacts of construction under Alternative 3, as well as the duration of impacts (i.e., short term and long term) are as described under Alternative 2. However, approximately 98.6 acres (39.9 hectares) of impacts, including 69.8 acres (28.2 hectares) of long-term impacts to vegetation, would occur under Alternative 3. The location of the additional turbines and associated infrastructure under Alternative 3 would primarily be in land previously disturbed for agricultural activities (see Section 4.22 - Agriculture for additional discussion). Therefore, the majority of the additional temporary construction impacts under Alternative 3 would result in short-term impacts to vegetation communities. Direct effects on vegetation resources from Alternative 3 are considered low because while there would be permanent removal of vegetation, the intensity would be low, disturbance would be localized, and only common, ordinary vegetation resources would be affected. There would also be temporary removal of vegetation. The intensity of this effect would also be low, the disturbance would be primarily short term and localized, and only common, ordinary vegetation resources would be affected.

Similar to Alternative 2, Alternative 3 has the potential to increase the introduction and spread of noxious weeds and increase the risk of wildfire, both of which can impact and alter vegetation communities within the wind farm site. While the impact of introduction and spread of invasive species from construction of Alternative 3 has the potential to noticeably alter vegetation communities within the wind farm site long term, these impacts would be localized and would occur primarily to non-native vegetation communities. With implementation of BMPs (see Section 4.9.3.3), Alternative 3 is not expected to result in a significant increase in the introduction and

spread of invasive species. Additionally, although a Project-related fire under Alternative 3 also has the potential to impact vegetation communities over the long term, the intensity of impacts would likely be low and localized and impacts would occur primarily to non-native vegetation. Implementation of the Project FMP (Appendix C) would further minimize the potential for Project-related fires during construction of this alternative; therefore, this alternative is not expected to result in significant impacts to vegetation resources due to fire.

Operation and Maintenance Impacts

The types of direct and indirect impacts of O&M under Alternative 3 are similar to those described under Alternative 2. Direct impacts from routine O&M activities under Alternative 3 are considered low because while there may be some long-term removal of vegetation, the intensity would be low, disturbance would be localized, and common, ordinary vegetation resources would be affected.

With implementation of BMPs described under Alternative 2 and in Section 4.9.3.3, indirect effects to vegetation from introduction and spread of invasive plant species and increased fire risk under Alternative 3 are considered low, because while there may be long-term impacts to vegetation, the intensity would be low, disturbance would be localized, and common, ordinary vegetation resources would be affected.

4.9.4.2 Direct and Indirect Effects of the HCP Conservation Measures

Impacts of Avoidance and Minimization Measures

The avoidance and minimization measures proposed under the Project HCP would have no effect on vegetation. There would be some potential for vegetation trampling in conjunction with post-construction monitoring efforts associated with surveyors traversing transects beneath the turbines. However, this is expected to be negligible.

Impacts of HCP Mitigation

Impacts of HCP mitigation under Alternative 3 would be the same as described under the Proposed Action. Prior to the construction of the additional turbines proposed under Alternative 3, NPMPP would reopen consultation with the USFWS and DOFAW to assess the potential impacts of the additional turbines to listed species and develop appropriate mitigation measures. The impacts of these mitigation measures to vegetation resources would be evaluated under a separate environmental analysis at that time.

4.9.4.3 Mitigation of Unavoidable Impacts

Mitigation measures for this alternative are as described under Alternative 2 (Section 4.9.3.3).

4.9.4.4 Cumulative Effects

The cumulative effects to vegetation resources under Alternative 3 would be the same as that described under the Proposed Action, with the exception that Alternative 3 would contribute a total of 98.6 acres (39.9 hectares) of disturbance. Therefore, when viewed in conjunction with past,

present, and foreseeable future projects in the cumulative effects analysis area, the contribution of Alternative 3 to cumulative effects on vegetation resources would be minor. Because there would likely be a delay in time of up to 3 years before additional turbines would be built under Alternative 3, new projects and developments in the area will be assessed and reviewed to determine if there are additional cumulative impacts from future unknown projects.

4.9.4.5 Summary

Construction and operation of the Project under Alternative 3 has the potential to impact vegetation resources in the Project and mitigation areas. Similar to Alternative 2, with implementation of mitigation measures as describe in Section 4.9.3.3, these impacts are expected to be minimal and would result in a minor impact to vegetation resources.

4.9.5 Conclusion

Table 4.9-2 summarizes potential impacts to vegetation from the alternative considered in this analysis.

Table 4.9-2. Summary of Potential Impacts to Vegetation

Impact Issues	No Action Alternative	Alternative 2 – Proposed Action	Alternative 2a – Modified Proposed Action Option	Alternative 3
Introduction or spread of noxious weeds	No Impact	Minor	Minor	Minor
Loss to any population of plant species resulting in proposal for listing or listing	No Impact	Negligible	Negligible	Negligible
Loss of native plant communities	No Impact	Minor	Minor	Minor
Fire	No Impact	Minor	Minor	Minor

4.10 Wildlife

4.10.1 Impact Criteria

Impacts to wildlife would occur when individuals are disturbed or killed or when habitat is removed or altered. Effects are discussed both qualitatively (e.g., noise and disturbance) and quantitatively (e.g., acres of habitat impacted), where possible. Effects to State and Federally listed wildlife species are specifically addressed in Section 4.11 – Threatened and Endangered Species.

Table 4.10-1 summarizes the definitions for impact criteria used to evaluate effects of the Project and HCP conservation measures on wildlife resources. Definitions for overall impact conclusion statements—i.e., negligible, minor, moderate, and major—are provided in Section 4.1.1.

Table 4.10-1. Impact Criteria for Wildlife Resources

Type of Effect	Impact Component	Effects Summary		
Behavioral Disturbance	Magnitude or Intensity	**High:** Acute or obvious change in behavior due to Project activity; animals displaced from wind farm site or mitigation areas.	**Medium:** Noticeable change in behavior due to Project activity; animals displaced from the wind farm site or mitigation areas.	**Low:** Changes in behavior due to Project activity may not be noticeable; animals remain in the vicinity of wind farm site or mitigation areas.
	Duration	**Permanent:** Change in behavior patterns would continue even if actions that caused the impacts were to cease; behavior not expected to return to previous patterns.	**Long-term:** Behavior patterns altered for several years and would return to pre-activity levels at some point after actions causing impacts cease.	**Temporary:** Behavior patterns altered infrequently and not longer than the span of Project construction or during maintenance activities and would be expected to return to pre-activity levels after actions causing impacts cease.
	Geographic Extent	**Extended:** Affects wildlife beyond the region (i.e., north shore of Oahu).	**Regional:** Affects wildlife beyond a local area, potentially throughout the analysis area (wind farm site and mitigation areas).	**Local:** Impacts limited geographically; limited to vicinity of the Project footprint or immediate vicinity of HCP mitigation activities.
	Context	**Unique:** Wildlife are protected by legislation and the portion of the resource affected fills a unique ecosystem role within the locality or region.	**Important:** Affects depleted wildlife within the locality or region or wildlife that are protected by legislation.	**Common:** Affects usual or ordinary wildlife; wildlife is not depleted in the locality or protected by legislation.
Collisions/Direct mortality	Magnitude/Intensity	**High:** Potential for direct mortality not reduced through implementation of HCP avoidance and minimization measures.	**Medium:** Moderate potential for direct mortality and reduced through implementation of HCP avoidance and minimization measures.	**Low:** Potential for direct mortality low and reduced through implementation of HCP avoidance and minimization measures.
	Duration	**Permanent:** Potential for direct impacts extends beyond the life of the Project.	**Long-term:** Potential for direct impacts last through the life of the Project.	**Temporary:** Potential for direct impacts last through the construction phase of the Project.
	Geographic Extent	Same as above	Same as above	Same as above
	Context	Same as above	Same as above	Same as above

Table 4.10-1. Impact Criteria for Wildlife Resources (continued)

Type of Effect	Impact Component	Effects Summary		
Habitat Alteration	Magnitude or Intensity	**High:** Acute or obvious changes in habitat character.	**Medium:** Noticeable change in habitat character.	**Low:** Changes in habitat character may not be noticeable.
	Duration	**Permanent:** Chronic effects; habitat would not be anticipated to return to previous levels.	**Long-term:** Habitat would be reduced for up to the life of the Project and would return to pre-activity levels at some point afterward.	**Temporary:** Habitat would be reduced infrequently but not longer than the span of 1 year and would be expected to return to pre-activity levels. Habitat expected to return to pre-activity conditions within five years.
	Geographic Extent	**Extended:** Affects habitat beyond the region or wind farm site.	**Regional:** Affects habitat beyond a local area, potentially throughout the wind farm site and mitigation areas.	**Local:** Impacts limited geographically; limited to vicinity of the Project footprint.
	Context	**Unique:** Habitat is protected by legislation and the portion of the habitat affected fills a unique ecosystem role within the locality or region (e.g., North Shore of Oahu).	**Important:** Affects depleted habitat within the locality or region or habitat is protected by legislation.	**Common:** Affects usual or ordinary habitat in the wind farm site; habitat is not depleted in the locality or protected by legislation.

4.10.2 Alternative 1—No Action

4.10.2.1 Direct and Indirect Effects

Under the No Action Alternative, the Project would not be constructed, an ITP would not be issued by the USFWS, and the HCP conservation measures would not be implemented. Therefore, Alternative 1 would have no adverse effects on any non-listed wildlife species, MBTA-protected species, or other avian species of concern. However, under the No Action Alternative there would be no contribution to forest restoration within the Poamoho Ridge Mitigation Area associated with bat mitigation or protection of waterbirds and their habitat at the Hamakua Marsh Mitigation Area, which would have beneficial effects to other wildlife species. Thus, under the No Action Alternative, current land uses within the wind farm site and mitigation areas would continue without the benefit of habitat protection, invasive species removal, or monitoring associated with HCP conservation measures.

4.10.2.2 Cumulative Effects

Under the No Action Alternative, the Project would not be constructed, an ITP would not be issued by the USFWS, and the HCP conservation measures would not be implemented. Therefore, there would be no effect on wildlife. Thus, Alternative 1 would not directly contribute to cumulative effects to wildlife; however, conditions within the Poamoho Ridge and Hamakua Marsh mitigation areas would continue to degrade without implementation of mitigation activities under the Project

HCP. Beneficial impacts to non-listed wildlife, including MBTA-protected species and other avian species of concern, associated with HCP mitigation activities would not occur.

4.10.2.3 Summary

Under Alternative 1, there would be no direct or indirect adverse or beneficial cumulative impacts to wildlife resources because no action would be undertaken.

4.10.3 Alternative 2—8 to 10 Turbine Project

4.10.3.1 Direct and Indirect Effects of Construction and Operation of the Project

Construction Impacts

Direct effects to wildlife from construction activities include injury or mortality (e.g., collision with construction equipment), habitat removal and alteration, and noise and disturbance. Indirectly, construction activities can also result in the introduction and spread of non-native plant and animal species. The following discusses potential impacts to wildlife, including MBTA-protected and other avian species of concern, from construction of Alternative 2.

Direct Mortality

Wildlife could be killed or injured during by construction equipment or vehicles, particularly in association with grading of roads and turbine pads. However, due to ability of most species to avoid Project construction activities, the potential for direct mortality is expected to be low for avian species, mammal, and invertebrate species. These effects would be localized and temporary, lasting for the duration of construction.

Although there is no habitat within the wind farm site for MBTA-protected shorebirds, seabirds, wading birds, or waterfowl, species from these groups could pass through during migration or in transit to wintering or breeding habitats. Species that fly at night or during times of low visibility would be most susceptible to collisions with construction cranes or turbine towers. Additionally, nighttime lighting has been shown to attract and disorient seabirds. To minimize these risks, NPMPP will maximize the amount of construction activity that can occur in daylight during the seabird breeding season to minimize the use of nighttime lighting that could be an attraction to seabirds. To the extent practicable, NPMPP will avoid nighttime construction during the peak fledging period. Should nighttime construction be required, to minimize the attractiveness of construction lights to wildlife, NPMPP will use shielded lights and non-white lights to the extent practicable and allowable, taking into account safety considerations.

Habitat Removal and Alteration

Construction of the Project under Alternative 2 would disturb up to approximately 89.0 acres (36.0 hectares; Table 2-1). Of this, approximately 59.9 acres (24.2 hectares) would be removed for the life of the Project in association with Project facilities (e.g., turbines, access roads). This comprises approximately 8.5 percent of the wind farm site. These impacts would occur in an area that has been previously disturbed and consists primarily of agriculture in the lower-elevation portions of

the wind farm site and vegetation dominated by a mixture of non-native weedy vegetation and common native vegetation at the higher-elevations. Therefore, vegetation removal would not affect any unique or high quality wildlife habitats and no large contiguous blocks of high quality wildlife habitat would be fragmented as a result of the Project. Additionally, with the exception of some avian species and bat (discussed in detail in Section 4.11 – Threatened and Endangered Species), most of the wildlife species likely to breed or forage within the wind farm site are common, non-native, and widespread, and the habitats affected are abundant in the surrounding area. Therefore, vegetation removal would not result in a substantial local loss of wildlife habitat.

The introduction and spread of invasive species can reduce habitat quality both within and adjacent to the wind farm site by replacing native vegetation with exotic plant species that can favor non-native wildlife that compete with or prey on native wildlife. On Oahu, target invasive species include plants, amphibians, and insects. Although most of the wildlife species occurring in the wind farm site are non-native, and much of the available habitat has been disturbed, the implementation of BMPs listed in Table 2-6 for invasive species prevention and control, would help minimize Project-related introduction or spread of invasive species. These include measures for cleaning and inspection of equipment and vehicles and revegetation of newly disturbed areas with non-invasive resident species that are compatible with Project operations. Therefore, construction of the Project would not reduce terrestrial wildlife habitat quality.

There is no breeding or foraging habitat within the wind farm site for any MBTA-protected seabird, shorebirds, waterfowl, or wading bird species. Therefore, construction would not result in terrestrial or aquatic habitat removal or modification for these species, with the exception of the Pacific golden-plover which could use the newly cleared turbine pads and roads for foraging.

Noise and Disturbance

Construction-related activities, including installation of turbines and other infrastructure, as well as construction of access roads, would involve the use of heavy equipment and high levels of human activity around the construction sites. These activities would result in increased onsite noise and human presence that could disturb wildlife using the wind farm site. However, given the temporary nature of the construction period, and the existing level of human activity in the area associated with agriculture operations, construction of the Project would not preclude wildlife from using the wind farm site and at most, temporary displacement of individual animals would be expected. Additionally, due to the temporary and localized nature of construction noise and human activity, no long-term disruption of breeding or foraging activities for MBTA-protected species or other avian species of concern would be expected. Construction activities would have no noise or disturbance-related effects to MBTA-protected shorebirds, seabirds, waterfowl, or wading birds because there is no habitat for these species within the wind farm site.

Operation and Maintenance Impacts

Direct Mortality

Non-listed avian species, including MBTA-protected species and other avian species of concern, that fly through the wind farm site have the potential to collide with turbines or other Project structures. A number of native or migratory birds protected by the MBTA, which may have cultural importance (see Section 4.13 – Historic, Archaeological, and Cultural Resources) have been observed in or near the wind farm site (see Section 3.8 – Wildlife). There have been documented fatalities of MBTA-protected species at the existing Kahuku wind farm adjacent to the Project, and at other Hawaii wind farms (USFWS, pers. comm. 2013). Potential impacts to MBTA-protected species groups are addressed specifically below. The wind farm site does not contain suitable habitat for most MBTA-protected shorebirds, waterfowl, seabirds, or wading birds (see exceptions below) which minimizes the potential for adverse effects to these species.

Shorebirds – There are a number of migratory shorebirds that pass through or overwinter in the Hawaiian Islands. In the vicinity of the Project, the James Campbell NWR provides important wintering habitat for a number of shorebird species. Although shorebirds appear to avoid turbines (they are uncommon fatalities at wind energy facilities), they may be susceptible to collisions with wires, particularly when located near wetlands (Powlesland 2009). Installing a permanent unguyed, lattice met tower, flagging and installing bird flight diverters on the guy wires of the two temporary met towers and the above-ground transmission line, and installing the electrical collection system below ground, would reduce this risk by improving visibility. Additionally, stormwater management on the turbine pads and roads will be designed to minimize the potential for accumulating standing water, which could serve as an attractant to shorebird species.

Of the shorebird species of conservation importance, the Pacific golden-plover is most likely to be at risk of collisions with Project structures. This species has been documented as a fatality at other operational wind facilities in Hawaii and is common in the vicinity of the Project. Additionally, clearing for turbine pads and roads may create habitat for this species, thereby increasing its presence in the wind farm site. However, due to its abundance in the Hawaiian Islands, collisions of individual Pacific golden-plovers with turbines or other project structures are unlikely to have population level effects. The bristle-thighed curlew and wandering tattler are both migrant species on Oahu, and therefore, the potential for collision risk is low.

Waterfowl – There are a number of migratory waterfowl that pass through or overwinter in the Hawaiian Islands. In the vicinity of the Project, the James Campbell NWR provides important wintering habitat for a number of waterfowl species. Migrating waterfowl typically fly at high altitudes, and therefore, the risk of collision with Project turbines is low. Wintering waterfowl passing through the wind farm site between wetland habitats would be most at risk of collision. However, observations at mainland wind farms suggest that the likelihood of waterfowl collisions with wind turbines is extremely low, even in areas with high waterfowl use, and that waterfowl exhibit avoidance of turbines during both daytime and nighttime flights (Koford et al. 2005, Pettersson 2005). Moreover, waterfowl have reduced movement during periods of low visibility and inclement weather; therefore, they are at a lower risk of collision with turbines and other

Project structures than other species groups. Few waterfowl were observed during Project Surveys, and those that were documented were at wetlands outside of the wind farm site. Nighttime lighting of the turbines is not expected to increase the risk of collision by waterfowl (AWWI 2015).

Seabirds – Seabirds are most likely to fly through the wind farm site when in transit. There is the potential for seabirds flying in the vicinity of the Project to become attracted to and disoriented by unshielded white lights on Project facilities. Flashing red lights on the nacelle have been shown to not be attractive to birds and will be used in accordance with FAA requirements. Additionally, onsite lighting at the O&M building and substation will be shielded and/or directed downward, triggered by a motion detector, and fitted with non-white light bulbs to the extent possible. Lighting is expected to be used only when workers are at the site at night. These measures will reduce the potential for seabird attraction to Project lights.

Seabirds are also susceptible to collisions with turbines, although as a group they typically exhibit high avoidance of collisions with structures. To reduce the potential for collisions, the majority of the electrical collection system will be placed below ground. The installation of line-marking devices on any above ground portions, as well as along the above-ground transmission line, will improve their visibility. Additionally, the implementation of turbine low wind speed curtailment from March to November will reduce the risk of seabird collisions (see Section 4.11 – Threatened and Endangered Species for additional discussion). Wedge-tailed shearwaters, Laysan albatross, great-frigatebirds, and white-tailed tropic birds have been observed in the vicinity of the Project and/or documented as fatalities at operating wind energy facilities in Hawaii and were documented during Projects surveys; therefore, there is the potential that these species in particular could be affected by the Project. However none of these species has a large breeding colony on Oahu or in the vicinity of the Project, although a small colony of wedge-tailed shearwaters occurs in the vicinity of the Project, and therefore, it is most likely that individuals would transit though the wind farm site. Therefore, although individual birds could collide with turbines, no population level effects are expected.

Wading birds – Although wading birds are not common wind energy facility fatalities, cattle egrets have been documented as fatalities at operational wind energy facilities in Hawaii. This species is also common in the vicinity of the Project and has the potential to collide with Project wind turbines. Additionally, USFWS has proposed a control rule to allow take of cattle egrets in Hawaii without a permit in order to manage the depredation threat these introduced species pose to listed species in Hawaii (78 FR 65955 – 65959). Due to the abundance of this species, no population-level effects are anticipated. The black-crowned night heron is not common in the immediate vicinity of the Project, but is found commonly at the James Campbell NWR and the wind farm site contains no foraging or breeding habitat for this species; therefore, the likelihood of Project impacts is very low.

Based on the above discussion, with the expected low level of Project-related mortality, no local or regional population-level effects are anticipated for any species, including non-listed MBTA-protect species or other avian species of concern.

Although any impact to an MBTA-protected species is considered a violation of the MBTA, there are currently no “take” permits for MBTA-species available. The USFWS exercises discretionary

prosecutorial authority where a wind farm demonstrates a good faith effort to avoid and minimize take of MBTA species. Measures described above and in Section 2.5.1, which are designed to avoid and minimize impacts to the species covered under the Project HCP, would further avoid and minimize impacts to MBTA-protected species and other avian species of concern to the extent possible. The Project has committed to implementing a post-construction monitoring program to assess Project-related impacts to species covered under the Project HCP and would use the results of this monitoring to ensure that impacts to avian species, including MBTA-protected species and other avian species of concern, are avoided and minimized to the extent practicable.

Direct mortality of non-listed mammals during project operation is not anticipated. Invertebrates could be injured or killed during Project operations due to collisions with equipment and vehicles. However, given that onsite traffic would be infrequent and speed limits would be observed, the likelihood of Project-related impacts to invertebrates during O&M would be low.

Habitat Removal and Alteration

No additional terrestrial habitat would be removed during Project operations, and portions of the wind farm site not needed for operations would be revegetated with non-invasive, resident species and restored to approximate their pre-construction condition and function as wildlife habitat. Maintenance activities, such as vegetation clearing or removal around any necessary above ground portions of the transmission line, could remove or reduce the quality of wildlife habitat in these areas. The installation of the turbines would add a new structural element to the landscape and the airspace above the wind farm site. Habitat use within the wind farm site (foraging in and transit through) by birds would be altered locally because they would need to navigate around or through the turbines; however, this impact would be minor due to the small number of turbines proposed and because the Project is not located in between major wintering, breeding, or migratory stopover habitats.

Noise and Disturbance

Low levels of noise and disturbance would occur during operations in association with routine O&M activities at the wind farm site. Given the temporary and localized nature of the noise and disturbance, no long-term impacts to wildlife breeding or foraging activities within the wind farm site would be anticipated during O&M. Disturbance to foraging activities within or transit through the wind farm site associated with the presence of the turbine (and associated noise/motion) in the airspace above the wind farm site is addressed above.

4.10.3.2 Direct and Indirect Effects of the HCP Conservation Measures

Impacts of Avoidance and Minimization

Avoidance and minimization measures proposed under the Project HCP are designed to reduce the risk of incidental take to threatened and endangered species. Many of these measures would also minimize impacts to non-listed wildlife species, including MBTA-protected species or other avian species of concern. Some of these avoidance and minimization measures, including below-ground installation of Project electrical collection system and marking of the above-ground transmission

line to the extent possible and revegetation of temporarily disturbed areas, were taken into account in the analysis of impacts to wildlife species.

Impacts of HCP Mitigation

No adverse impacts to non-listed wildlife, including MBTA-species or other avian species of concern, would occur in association with funding provided for Newell's shearwater or Hawaiian short-eared owl research and management. The exception would be where impacts are intentional, such as though predator control which could be funded by Newell's shearwater mitigation and result in impacts to rats, mice, feral cats, and similar species.

Fence installation at Hamakua Marsh would result in a temporary, local disturbance to wildlife due to worker presence and vehicle noise and ground disturbance. This impact is expected to be negligible because the area is currently disturbed and is located in an area with a high level of human activity. Additionally, the resulting fence would reduce human disturbance, reduce the risk of vehicle collisions with waterbirds, and reduce predation by feral and domestic dogs. The overall benefits of installation of fencing (e.g., controlling access to limit illegal dumping of garbage, and eliminating the use of the marsh as a play area for pets) would result in an overall benefit to wildlife, MBTA-protected and other avian species of concern, within the Hamakua Marsh Mitigation Area.

At the Poamoho Ridge Mitigation Area fence maintenance, the removal of feral pigs and invasive plant species, and the conducting of bat acoustic monitoring, could result in a temporary, local disturbance to wildlife caused by worker and equipment noise, helicopter noise, and minor ground disturbance (associated with foot traffic). Adverse impacts due to noise and disturbance associated with these activities are expected to be temporary, localized, and negligible. These activities would not preclude the use of the area by wildlife (except for feral pigs which would be the target of mitigation efforts). However, removal of non-native plant and animal species would result in a beneficial impact to wildlife within the Poamoho Ridge Mitigation Area, including MBTA-protected and other avian species of concern, by enhancing habitat quality.

Overall, adverse impacts from the HCP conservation measures would be considered negligible. These measures would protect and enhance valuable wildlife habitat, and therefore, are expected to provide net benefits to the species covered under the HCP as well as other wildlife in the mitigation areas.

4.10.3.3 Mitigation for Unavoidable Impacts

BMPs listed in Table 2-6, which will be implemented by NPMPP, will minimize impacts to wildlife resources. These measures include:

- Preparing and implementing a TESC Plan, which would help prevent erosion;
- Revegetating temporarily disturbed areas with non-invasive, resident species;
- Inspecting potential off-site sources of materials (gravel, fill, etc.) and prohibiting the import of materials from sites that are known or likely to contain seeds or propagules of invasive species;

- Requiring vehicle operators transporting materials to the Project site off-site to follow protocols for removing soils and plant material from vehicles and equipment prior to entry onto the site; and
- Implementing the Project FMP to reduce the potential for fires during construction and operations.

HCP avoidance and minimization measures are discussed in detail in Section 2.5.1. These measures are designed to avoid and minimize impacts to the species covered under the Project HCP but would do the same for non-listed avian species including MBTA-protected species and other avian species of concern.

4.10.3.4 Cumulative Effects

The cumulative effects analysis area for non-listed wildlife and MBTA-protected species and other avian species of concern is the Proposed Action footprint plus a 0.5-mile (0.8-kilometer) buffer, as well as the mitigation areas. This area encompasses the areas where potential direct and indirect effects to wildlife could occur. Past, present, and reasonably foreseeable actions that overlap in space and time with the impacts of the Project are identified in Table 4.2-2 and described below where appropriate.

Past and ongoing agricultural operations and associated development, as well as urban development and associated infrastructure, including two existing transmission lines (138-kV and 46-kV) in the area have decreased habitat quality with the removal of native vegetation and the introduction of non-native invasive vegetation. The Project would result in a minor contribution to the reduction of habitat for some non-listed wildlife species; however, all of the non-listed wildlife species occurring in the wind farm site are common and widespread, and generally tolerant of development. The only foreseeable project in the cumulative effects analysis area for wildlife is the planned Envision Laie residential development on 300 acres (122 hectares) of Malaekahana land, which could result in injury or mortality during construction and permanent loss of habitat for non-listed wildlife, including MBTA-protected species and other avian species of concern. The Envision Laie development would also likely contribute moderately to noise and disturbance during construction, with lower but ongoing levels of human disturbance after construction is complete and residents have moved to the area.

Mitigation measures proposed under the Project HCP would improve habitat for non-listed wildlife, including MBTA-protected species, by removing invasive plant and animal species, protecting habitat, and restoring native vegetation. Installation of mitigation fencing at Hamakua Marsh would reduce human disturbance, prevent vehicle collisions with waterbirds, and reduce predation by feral and domestic dogs, which would result in an overall benefit to wildlife within the mitigation area. Likewise, mitigation activities at the Poamoho Ridge Mitigation Area for Hawaiian hoary bat mitigation would also provide beneficial effects to wildlife. These activities would contribute to the ongoing restoration and management efforts for wildlife within the mitigation areas.

The existing transmission lines and the existing Kahuku wind farm and associated facilities present a potential collision risk for MBTA-protected species and other avian species. The Project turbines

and met tower would contribute to this risk. Post-construction monitoring at the Project site would assess effects to all species. Avoidance and minimization measures under the Project HCP, listed in Section 2.5.1 (e.g., unguyed, free-standing permanent met tower, line marking devices on guy wires of temporary met towers and the transmission line, and installing the majority of the electrical collection system below ground), will minimize risk of collision.

Existing sources of noise and disturbance in the cumulative effects analysis area for wildlife include ongoing agricultural operations and current use of roads, which would be expected to continue during operation of the Project and over the term of the HCP. Implementation of the HCP conservation measures as well as construction and operation of the Project would contribute to short-term and long-term noise levels; however, it would not be expected to preclude non-listed wildlife, including MBTA-protected species or other avian species of concern, from using the area. Therefore, when viewed in combination with past, present, and reasonably foreseeable projects, the contribution of Alternative 2 to cumulative effects on wildlife resources would be considered minor.

4.10.3.5 Summary

Effects to non-listed wildlife, including MBTA-protected species and other avian species of concern, are considered minor under Alternative 2 because the magnitude of the impacts would be low or medium; impacts would be confined to a local area; primarily common, non-native, and widespread species would be impacted; and impacts would not preclude use of the area by these species. The greatest impacts would be temporary. Nevertheless, there is some long-term risk to MBTA-protected species and other avian species of concern from collision with turbines. These groups would, however, benefit from mitigation under the Project HCP; therefore, the impact remains minor.

4.10.3.6 Alternative 2a - Modified Proposed Action Option

Under Alternative 2a, direct, indirect, and cumulative effects on wildlife resources would be similar to those described under Alternative 2. However, the Modified Proposed Action Option would disturb up to approximately 84.5 acres (34.2 hectares), of which 56.7 acres (22.9 hectares) would be long term, lasting the life of the Project. Table 2-1 provides more detail on the disturbance areas associated with each Project component. Implementation of standard BMPs, avoidance and minimization, and other mitigation measures, as described under the Proposed Action, would minimize adverse impacts to wildlife resources.

4.10.4 Alternative 3—Larger Generation Facility (Up to 12 Turbine Project)

4.10.4.1 Direct and Indirect Effects of Construction and Operation of the Project

Direct and indirect impacts associated with the construction and operation of the Project under Alternative 3 would be similar to those for Alternative 2. Project components such as the substation, met towers, and transmission line would be the same as under Alternative 2; however, Alternative 3 would involve the construction and operation of an additional 2 to 4 turbines and associated access road and electrical collection system. The additional turbines and road

construction would result in a total of up to 98.6 acres (39.9 hectares) of disturbance, representing a minor increase in habitat removal (9.6 acres [3.9 hectares] above Alternative 2). Alternative 3 would also result in a slight increase in noise and disturbance, and construction-related mortality risk, associated with two separate construction periods. However, because all impacts would be temporary and localized, Alternative 3 would not result in a substantial loss of habitat for any species or preclude any species from using the wind farm site, and the species most likely to be impacted are non-native. The collision risk associated with Project operation would increase due to the additional turbines. However, impacts would be minimized through the implementation of the HCP avoidance and minimization measures described above under Alternative 2 and in Sections 2.5.1 and 2.5.2.

4.10.4.2 Direct and Indirect Effects of the HCP Conservation Measures

Impacts of Avoidance and Minimization

Impacts of HCP avoidance and minimization measures under Alternative 3 would be the same as described under Alternative 2.

Impacts of HCP Mitigation

Impacts of the HCP mitigation measures under Alternative 3 would be the same as described under Alternative 2. Prior to the construction of the additional turbines proposed under Alternative 3, NPMPP would reopen consultation with the USFWS and DOFAW to assess the potential impacts of the additional turbines to listed species and develop appropriate mitigation measures. The impacts of these mitigation measures to wildlife resources would be evaluated under a separate environmental analysis at that time.

4.10.4.3 Mitigation for Unavoidable Impacts

Measures that would be implemented to avoid and minimize impacts under Alternative 3 would be the same as described under Alternative 2.

4.10.4.4 Cumulative Effects

Cumulative effects to wildlife resources under Alternative 3 would be the same as described under Alternative 2, with the exception that Alternative 3 would contribute a total of 98.6 acres (39.9 hectares) of habitat disturbance and alteration of which 69.8 acres (28.2 hectares) would be impacted over the long term (through the life of the Project). This additional disturbance is primarily located in existing agricultural areas that currently provide low-quality habitat for wildlife. Due to the lag time of up to 3 years between construction of the first 8 to 10 turbines and the additional 2 to 4 turbines, there would be no incremental increase in temporary noise disturbance; rather, it would extend the period of noise disturbance contributing to the noise and disturbance within the cumulative effects analysis area. When viewed in conjunction with past, present, and foreseeable future projects in the cumulative effects analysis area, the contribution of Alternative 3 to cumulative effects on non-listed wildlife, including MBTA-protected and other

avian species of concern, would be minor. Because there would likely be a delay in time of up to 3 years before additional turbines would be built under Alternative 3, new projects and developments in the area will be assessed and reviewed to determine if there are additional cumulative impacts from future unknown projects.

4.10.4.5 Summary

Effects to wildlife resources are considered minor for Alternative 3. This is because the magnitude of impacts would remain at a low or medium level; impacts would be confined to a local area; and impacts would occur to mostly common, non-native species that would remain in the area. Further, the greatest impacts would be temporary, with some long-term risk to MBTA-protected species and other avian species of concern from collision with turbines. However, these species would benefit from mitigation measures under the Project HCP.

4.10.5 Conclusion

Potential adverse impacts to wildlife resources associated with the Project include minor, localized habitat removal, the potential for collision with Project structures, and temporary noise and disturbance. The Project would represent a minor contribution to cumulative effects to wildlife. As discussed above, Alternative 3 would have slightly greater impacts than Alternative 2 or 2a due to additional turbines and access road construction. For the action alternatives, impacts would be minimized through measures discussed in Chapter 2, and further mitigated through avoidance and minimization and mitigation measures under the Project HCP. HCP actions would benefit wildlife over the long term through protection and enhancement of native habitats. Therefore, direct, indirect, and cumulative effects of the Project, given the avoidance, minimization, and mitigation measures proposed, would be minor for non-listed wildlife, MBTA-protected species, and other avian species of concern. Table 4.10-2 summarizes potential impacts to wildlife resources from the alternatives considered in this analysis.

Table 4.10-2. Summary of Potential Impacts to Wildlife Resources

Impact Issues	No Action Alternative	Alternative 2 – Proposed Action	Alternative 2a – Modified Proposed Action Option	Alternative 3
Habitat removal and alteration	No Impact	Minor adverse/Moderate Beneficial	Minor adverse/Moderate Beneficial	Minor Adverse/Moderate Beneficial
Direct mortality	No Impact	Minor	Minor	Minor
Noise and disturbance	No Impact	Minor	Minor	Minor

4.11 Threatened and Endangered Species

4.11.1 Impact Criteria

Impacts to threatened and endangered species include four components: 1) estimated direct take for the permit term, 2) estimated indirect take for the permit term, 3) estimated combined overall Project take based on conservative assumptions, and 4) an assessment of population-level effects

for estimated combined overall Project take. Section 3 of the ESA defines "take" as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct" (16 U.S.C. § 1532 (19)). Similar to the ESA, Hawaiian State statute Section 195D-2 defines "take" as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect endangered or threatened species of aquatic life or wildlife, or to cut, collect, uproot, destroy, injure, or possess endangered or threatened species of aquatic life or land plants, or to attempt to engage in any such conduct."

The four components are considered for each of the eight State and Federally threatened and endangered species that are known to occur, or have the potential to occur, in the vicinity of the wind farm site (see Section 3.9 for a description of each species). General impacts to wildlife as discussed in Section 4.10 would also be applicable for threatened and endangered species, and are considered in the summary discussion of impacts for each alternative, but will not be repeated in this section specifically. The definitions of impact magnitude, duration, geographic extent, and context described in Table 4.10-1 (Section 4.10) also apply to the terms used in this section for conclusions regarding impacts to threatened and endangered species.

4.11.2 Alternative 1—No Action

4.11.2.1 Direct and Indirect Effects

Under the No Action Alternative, the Project would not be constructed, an ITP would not be issued by the USFWS, and the HCP conservation measures would not be implemented. Therefore, Alternative 1 would have no effect on threatened and endangered species in the analysis area. As such, no mitigation measures would be warranted. However, there would also be no beneficial effect to threatened and endangered species associated with implementation of HCP mitigation.

4.11.2.2 Cumulative Effects

Under the No Action Alternative, the Project would not be constructed, an ITP would not be issued by the USFWS, and the HCP conservation measures would not be implemented. Therefore, there would be no effect on threatened and endangered species. Thus, Alternative 1 would not contribute to cumulative effects to threatened and endangered species.

4.11.2.3 Summary

Alternative 1 would have no direct, indirect, or cumulative effect on threatened and endangered species because no action would be undertaken.

4.11.3 Alternative 2—8 to 10 Turbine Project and Alternative 2a – Modified Proposed Action Option

The discussion of the effects of the Proposed Action and the Modified Proposed Action Option are combined in this section. The Final HCP includes incidental take calculations based on the Modified Proposed Action Option, incorporating 9 turbines with larger dimensions (see the Project HCP and Section 2.2.2 of this EIS for additional detail). However, Project take estimates under the Proposed Action (i.e., included in the Draft HCP and evaluated in the original Draft EIS) and Modified

Proposed Action Option are comparable ~~(the same or less than presented in the Draft HCP)~~ and do not result in different levels of requested take for any of the Covered Species. Additionally, the Modified Proposed Action Option does not result in changes to the HCP avoidance, minimization, and mitigation measures. Therefore, the following discussion reflects revisions made to the Draft HCP, based on refinements in the Project design made subsequent to the publication of the original Draft EIS (see Chapter 2 for a description), public and agency comments, and new information about the Covered Species (refinement of assumptions used to estimate Project-related take of the Covered Species).

4.11.3.1 Direct and Indirect Effects of Construction and Operation of the Project

As take for some species may vary based on the number and size of turbines comprising the final turbine array selection, within each species discussion below, estimated take is presented based on conservative turbine array design assumptions (see the Project HCP for additional detail). For all species, impacts would be minimized through the avoidance and minimization measures outlined in Section 2.5.1.

Hawaiian Hoary Bat

Direct Take

The most likely potential source of direct bat mortality is a collision or barotrauma associated with an operational turbine, as has been documented at other Oahu wind facilities (Kahuku Wind Power 2013; Kawailoa Wind Power 2013). The Kahuku Wind Project provides the best available data to estimate potential direct take resulting from turbine interactions at the wind farm site for two primary reasons. First, the Kahuku Wind Project is immediately adjacent to the proposed Na Pua Makani site, so the sites have similarities in landscape features (e.g., slope, aspect, elevation). Second, the Kahuku Wind Project has the longest operational history on Oahu, which provides the most comprehensive dataset for these estimates.

Estimates of direct take for the Project were derived by adjusting observed take at the Kahuku Wind Project to the maximum number of turbines at Na Pua Makani and scaling these values for unobserved take. Calculations were based on the Kahuku Wind Project's fatality monitoring data while the Kahuku Wind Project was operational between March 2011 - August 2012 and between August 2013 – July 2015 (note that the Kahuku Wind Project remains operational, but estimates are based on observed fatality data through July 31, 2015). During a portion of this period, the Kahuku Wind Project implemented low wind speed curtailment to reduce the risk of bat fatalities. The Kahuku Wind Project documented three observed bat fatalities during approximately 13 months of operation (March 2011 to April 2012) when operations did not include seasonal low wind speed curtailment, and one observed bat fatality during the approximately 26 months when operations included seasonal low wind speed curtailment. This translates to an observed bat mortality of 0.21 bats per turbine per year when low wind speed curtailment was not implemented and 0.04 bats per turbine per year when turbines were operated using seasonal low wind speed curtailment.

Not all fatalities are expected to be found; to evaluate actual direct take, estimates need to account for undiscovered fatalities. The probability that a carcass is available to be found when the search takes place (i.e., it has not been scavenged prior to the search) and the likelihood that a searcher actually observes an available carcass both have an effect on the proportion of actual fatalities that are discovered by searchers. Post-construction monitoring efforts at the Kahuku Wind Project have been adaptively managed over time with changes including the implementation of scavenger trapping and the training and deployment of canine search teams. Through these changes, the Kahuku Wind Project has increased carcass persistence times and improved searcher efficiency. Based on analyses in the 2014 annual HCP compliance report from the Kahuku Wind Project, approximately one undetected bat fatality may be present for each detected fatality. To conservatively estimate actual take at the Kahuku Wind Project for use in estimating impacts for the Na Pua Makani Project, it is assumed on average two undetected bat fatalities my occur for each observed bat fatality. Table 4.11-1 demonstrates how the observed fatality rates were combined and adjusted for the undetected fatalities to generate an estimate of direct take for the Project assuming no low wind speed curtailment. Adjustments to this estimate to account for uncertainty and proposed implementation of low wind speed curtailment are described in Total Take and Authorized Take Request for ITP and ITL, below.

Table 4.11-1. Direct Take Estimates for Hawaiian Hoary Bat

Component	Value	Rationale
A. Observed fatality rate per turbine at Kahuku under no low wind speed curtailment	0.21 bats/turbine/year	Calculated as (3 fatalities/1.7 years of operation/12 turbines at Kahuku)
B. Observed fatality rate per turbine at Kahuku under low wind speed curtailment adjusted to represent fatality rate without low wind speed curtailment	0.11 bats/turbine/year	Calculated as: 1 fatality/2.17 years of operation/12 turbines at Kahuku/0.35, where dividing by 0.35 scales results under curtailment to their expected value with no curtailment
C. Combined estimated observed fatality rate at Kahuku	0.15 bats/turbine/year	Calculated as A*1.17 years + B*2.17 years/(3.33 years)
D. Estimated unobserved fatality rate (unobserved fatalities/ observed fatality)	2	Based on conservative interpretation of the Kahuku Wind Project's annual compliance report (Kahuku Wind Power 2014)
E. Number of turbines	9	
F. Permit term	21 years	
G. Estimate of direct take	85 bats	Calculated as ([C*E]+[C*D*E])*F

Other potential sources of direct mortality were evaluated but considered negligible. Vehicle collisions are considered negligible given the limited nighttime traffic expected in the wind farm site and low speed limits posted and enforced on Project roads. Mortality through collision with stationary objects (e.g., met tower, construction cranes, transmission line) is considered negligible given the general ability of bats to avoid colliding with stationary objects, and NPMPP's commitment to avoid the use of barbed wire at the Project. Hawaiian hoary bats have been known to become entangled in barbed wire fences (Zimpfer and Bonaccorso 2010).

Indirect Take

The take of a bat during the breeding season may result in the indirect loss or take of dependent offspring. The rationale and values used to estimate indirect take are outlined in Table 4.11-2 and include the proportion of the take that is female, the proportion of the young that are dependent, and the average offspring per pair. Because frameworks for bat mitigation are based on compensation for adult bats, the estimated indirect take of young is converted to an equivalent number of adult bats by adjusting for the estimated number of young that would survive to reproductive age. Together, these calculations result in an indirect take estimate of the equivalent of 10 adult bats over the permit term. Adjustments to this estimate to account for uncertainty, and to account for the benefits of low wind speed curtailment, are described in Total Take and Authorized Take Request for ITP and ITL, below.

Table 4.11-2. Indirect Take Estimates for Hawaiian Hoary Bat

Component	Value	Rationale
A. Proportion of take that is adult	1.00	As a conservative estimate, it was assumed that all take would be of adult bats, despite the potential for newly volant young (i.e., young of the year) to pass through the wind farm site during the fall.
B. Proportion of take that is female	0.50	Hawaiian hoary bats are assumed to have an adult sex ratio of 1:1 and no sex-based differential susceptibility to turbine interactions. Therefore, female bats should comprise 50 percent of total take.
C. Proportion of the year that the young are dependent	0.42 (5 months/12 months)	Adult Hawaiian hoary bats potentially occur at the Project throughout the year. However, as the breeding season only spans April through August (Menard 2001), it is only the loss of adult bats during this 5-month period that may result in the indirect loss of dependent young.
D. Proportion of taken breeding adults with dependent young	1.00	Until weaning, young of the year are completely dependent on the female for survival. Therefore, all female mortality during the breeding season results in the loss of her young.
E. Average offspring/pair	1.83 bats/year	Data are limited, average reproductive success in terms of young/year based on Bogan (1972) and Koehler and Barclay (2000) for mainland hoary bat.
F. Indirect take rate	0.38 dependent young/direct bat take	Calculated as A*B*C*D*E
G. Estimate of direct take	85 bats	From Table 4.11-1
H. Estimate of indirect fatalities of young	33 bats	Calculated as F*G
I. Estimated rate of survival of young to reproductive age	0.30	Data are limited, estimated rate of survival of young to reproductive age based on Humphrey and Cope (1976), Humphrey (1982; based on little brown bat [*Myotis lucifugus*])
J. Equivalent indirect adult fatalities estimated	10 bats	Calculated as H*I

Total Take and Authorized Take Request for ITP and ITL

NPMPP has committed to implementing low wind speed curtailment to reduce the risk to bats, and thus reduce overall potential direct take based on results presented in Arnett et al. (2009, 2010). Arnett et al. (2009, 2010) have conducted studies on the mainland researching the effects of low wind speed curtailment on bat mortality. Their studies indicate that most bat collisions occur at

relatively low wind speeds, and consequently, the risk of fatalities may be significantly reduced by curtailing operation on nights when winds are light. Their research shows that bat fatalities were reduced by an average of 82 percent (95 percent CI: 52–93 percent) in 2008 and by 72 percent (95 percent CI: 44–86 percent) in 2009 when cut-in speed was increased to 5 m/s and turbine blades were feathered at lower wind speeds. No significant additional improvement over this level was detected when the cut-in speed was increased to 6.5 m/s (Arnett et al. 2009, 2010).

To reduce take, NPMPP plans to implement low wind speed curtailment by raising the cut-in speed of the turbines to 5 m/s and feathering turbine blades below 5 m/s from sunset to sunrise during the months of March to November, a time period when acoustic bat activity was highest at the Kawailoa and Kahuku wind projects (SWCA 2010, 2011b). Based on Arnett et al. (2009, 2010), NPMPP estimates that this application of low wind speed curtailment would decrease fatalities of bats by 65 percent. Thus, the estimated take is reduced from 95 bats to 34 bats (Table 4.11-3).

To address the uncertainty associated with the prediction of take and estimating actual mortality, NPMPP increased this take estimate to develop the maximum authorized take request and also developed tiers of take. The first tier take limit was established at the estimated take level, and a second tier was established to create a maximum combined limit of 150 percent of estimated take (i.e., the combined take of tiers 1 and 2 would be 150 percent of estimated take). Tier 2 provides a conservative buffer for which additional mitigation would be required (Table 4.11-3). To provide confidence that mitigation for Tier 2 will precede the take that is being mitigated, clear triggers and timing for the initiation of planning and implementation of Tier 2 are described in the Project HCP.

Table 4.11-3. Total Take Estimates for Hawaiian Hoary Bat for 21-year Permit Term

Description	Value	Rationale
A. Estimated direct take	85	Row E from Table 4.11-1
B. Estimated indirect take (equivalent adult bats)	10	Row J from Table 4.11-2 (young that would have survived to reproductive age)
C. Estimated proportional reduction in fatalities due to implementation of low wind speed curtailment	0.65	Arnett et al. (2009, 2010)
D. Estimated take (equivalent adult bats)	34 bats	Calculated as (A+B)*(1-C)
Authorized Take Request and Tiers[1/]		
Tier 1	34	Tier 1 represents estimated take; Tier 2 (authorized take request) represents a conservative buffer at 150 percent of estimated take
Tier 2 (Authorized Take Level)	51	
1/ Each tier represents the total take requested for that tier plus lower level tier; take is not additive among tiers.		

Potential Population-level Effects

Recent population estimates for Hawaiian hoary bat have ranged from several hundred to several thousand, although population studies are ongoing (pers. com., F. Bonaccorso, USGS-BRD, 2013; Menard 2001). The greatest overall numbers of this species are thought to occur on the islands of Hawaii and Kauai (Menard 2001). Systematic monitoring has not been conducted on Oahu to estimate the size (total, or effective based on genetics) of its local population (pers. com., F. Bonaccorso, USGS-BRD, 2013). Therefore, it is difficult to assess the effect that take of Hawaiian hoary bat resulting from the proposed Project may have on the local population of this species;

however, the Hawaiian hoary bat population on Oahu may be larger than previously expected. Potential Project impacts are not anticipated to have statewide population-level impacts because Hawaiian hoary bat numbers appear to be concentrated on Maui, Kauai, and the island of Hawaii (USFWS 1998).

Newell's Shearwater

Direct Take

Direct take of Newell's shearwaters could occur as a result of collision with the turbines or the permanent met tower. Avoidance and minimization measures described in Section 2.5.1 of this EIS are assumed to reduce the potential for take due to nighttime lighting and other Project infrastructure to a negligible level. Direct take is estimated based on observed passage rates and flight heights of potential Newell's shearwaters during three seasons of avian radar surveys, the physical attributes of the turbines, and an estimate of the species' ability to avoid collision. Table 4.11-4 presents the relative contributions of the risk at the turbines to the estimate of direct take, using per-turbine and per-met tower annual fatality based on the analysis presented in Sanzenbacher and Cooper (2013).

Table 4.11-4. Direct Take Estimates for Newell's Shearwaters Based on Radar Surveys

Component Interaction	Value	Rationale
A. Annual direct take—turbines	0.0.093 birds/9 turbines/year	Used methodology presented in Sanzenbacher and Cooper (2013) to estimate risk for an array of 10 turbines with a maximum blade tip height of 512 feet (156 meters) and a rotor diameter of 384 feet (117 meters). Used radar data for shearwater-like targets, assumed 99% avoidance.[1/]
B. Annual direct take—met tower	0.001 birds/met tower/year	Used methodology presented in Sanzenbacher and Cooper (2013) to estimate risk for an un-guyed lattice met tower 262 ft (80 m) tall. Used radar data for shearwater-like targets, assuming 99% avoidance.
C. Permit Term	21 years	
D. Calculated estimate of direct take	1.95 birds	Calculated as (A + B) * C
E. Estimated direct take	4 birds	Increased to account for uncertainty that is inherent when estimating the frequency and magnitude of a rare event over an extended time period.
1/ The methodology presented in Sanzenbacher and Cooper (2013) uses two risk assessments, one for a frontal approach and one for a side approach. As observed flight paths ranged widely, values here represent the mean of the frontal and side approach exposure risks.		

Adjustments to this estimate to account for uncertainty are described in Total Take and Authorized Take Request for ITP and ITL, below.

Use of radar passage rate data for shearwater-like targets is a conservative measure of risk for Newell's shearwaters, and this is supported by the results of the Project radar surveys. Unconfirmed targets meeting the criteria for shearwater-like targets are assumed to be Newell's shearwaters after criteria designed to minimize false negatives are applied (i.e., the mistaken exclusion of a radar target that was a Newell's shearwater). This generates a conservative result because a number of common resident and migrant species would be included as they may meet the criteria for shearwater-like targets, but few Newell's shearwaters would be excluded. During surveys, observers confirmed no Newell's shearwaters but did confirm the identification of 56

individuals of at least 5 species that were not Newell's shearwaters including barn owl and Pacific golden-plover (Sanzenbacher and Cooper 2013 [Appendix B of the Project HCP]). Each of these species was considered a potential mimic of Newell's shearwater flight patterns. Thus, radar surveys are certain to over-count Newell's shearwaters. Shearwater-like targets from Project radar surveys peaked in the spring and were lowest during the summer, contrary to expectations based on life history information (Harris 1966; Ainley et al. 1997; Gray and Hamer 2001), which could be explained by the presence of migrant species in spring and fall that can mimic shearwater radar signatures (Appendix B of the Project HCP). Flight profiles of the shearwater-like radar targets at Na Pua Makani also suggest that some of the shearwater-like targets are not Newell's shearwaters, as flight heights observed at Na Pua Makani varied seasonally (Sanzenbacher and Cooper 2013 [Appendix B of the Project HCP]). Variation in flight height by season is most likely a result of seasonal changes in the composition of species that make up the shearwater-like targets. These observations indicate that the measured passage rate of shearwater-like targets at Na Pua Makani is higher than the passage rate of actual Newell's shearwaters, which ultimately results in a conservative estimate of take.

Pre-construction radar studies at other northern Oahu wind projects support that radar results provide a conservative picture of use in the area, and results from post-construction mortality monitoring efforts at these projects support that the risk to Newell's shearwaters on Oahu is low. No Newell's shearwaters were confirmed during radar surveys at the Kahuku or Kawailoa wind projects, and summer passage rates of shearwater-like targets at the two projects were comparable to the summer passage rate documented at Na Pua Makani (Day and Cooper 2008; Cooper et al. 2009). In each case, fall passage rates were higher than during the expected summer peak period. Fall passage rates at Kawailoa were more than twice the summer rates, and contamination of their fall radar data by non-shearwater mimics was highlighted as a likely cause (Cooper et al. 2009). Post-construction mortality monitoring efforts on Oahu wind projects during one peak breeding season at Kawailoa and two peak breeding seasons at Kahuku have not documented a single Newell's shearwater fatality, nor have any been found at operational wind facilities on Maui, where the species is known to breed (Wood and Bily 2008; A. Nadig, USFWS, pers. com., 2014).

In assessing the risk of interactions with wind energy facilities, the term "avoidance rate" is defined as the probability that an individual bird that nears the airspace of a turbine is able to avoid colliding with it. Behavioral studies of Hawaiian procellariids (shearwaters and petrels) are few. Due to small sample sizes, the similarity of flight characteristics, and similar evolutionary environments, avoidance information for these taxa are best considered as a group. Evidence suggests that Hawaiian petrels and Newell's shearwaters have very high avoidance rates of structures, perhaps greater than 99 percent (Sanzenbacher and Cooper 2013), but collisions with power lines remain a concern especially on Kauai. Swift (2004) documented only one collision of a Hawaiian petrel with a fence line in 1,539 passes. Although observed avoidance rates are high, collisions with power lines remain a concern on Kauai, which is likely driven by the large population of breeding birds in combination with the parallel orientation of power lines relative to the coast line and the presence of power lines that are in strong relief relative to the surrounding topography and vegetation (Griesemer and Holmes 2011).

Given the strong likelihood that some of the shearwater-like targets are not Newell's shearwaters and evidence that Hawaiian procellariids' avoidance is close to 99 percent, 99 percent avoidance is used to assess risk for Newell's shearwaters at Project turbines (Table 4.11-4). NPMPP has also proposed to implement low wind speed curtailment during March–November to reduce Hawaiian hoary bat fatalities. This minimization measure is not taken into account in the estimate of direct take for Newell's shearwaters, increasing the conservatism of the direct take estimate. Furthermore, this risk analysis assumes that turbines are spinning 24 hours per day year round, which is a highly conservative assumption given that turbines typically produce power approximately 40 percent of the time (pers. com., NPMPP, 2013).

The likelihood for Newell's shearwaters to collide with other Project components is negligible as shearwaters are known to demonstrate a high level of avoidance behavior. These components include construction cranes, the permanent met tower, transmission lines, and vehicles, if driven at night. Construction equipment would be present for relatively short periods and is highly visible. There are no known Newell's shearwater breeding colonies on Oahu and passage rates of potential Newell's shearwaters during Project nocturnal radar surveys were very low. Additionally, although nighttime construction lighting could attract Newell's shearwaters, if present, any potential impact will be minimized by using shielded lights (unless essential for safety reasons). In addition, a biological monitor will be present during any nighttime construction. Vehicles on the Project site would typically avoid times when Newell's shearwaters would be expected to transit the site. Collectively, based on the information above, risk of take associated with these Project activities or collision associated with these Project components is considered negligible.

Indirect Take

The potential for indirect take of Newell's shearwaters exists if birds transit the site while flying to or from an undiscovered nesting colony (i.e., if an adult were to be killed while incubating an egg or rearing a chick). However, not all direct take of adults flying to or from a potential nesting colony would result in the loss of young because not all adults are breeders; during the spring and summer, nonbreeding individuals also attend breeding colonies (Ainley et al. 1997).

In general, indirect take can be estimated by applying average measures of reproductive effort and success to estimates of direct take. Using the approach in Table 4.11-5, the estimated indirect take over the 21-year permit term of the Project is 2 Newell's shearwater chicks/eggs. Adjustments to this estimate to account for uncertainty are described in Total Take and Authorized Take Request for ITP and ITL, below.

Table 4.11-5. Indirect Take Estimates for Newell's Shearwaters

Component	Value	Rationale
A. Direct take of adults	4	Conservatively assume all direct take are birds that could reproduce. From Table 4.11-4.
B. Proportion of birds attending a colony that are part of a breeding pair	0.80	Conservatively assume a high proportion of birds attending a colony breed (Telfer 1986; Ainley et al. 2001; Griesemer and Holmes 2011).
C. Proportion of breeding pairs that fledge young	0.60	Conservatively assume a high rate of breeding success given that any potential colony on Oahu is unmanaged and subject to potential predation (Telfer 1986; Ainley et al. 1995; Griesemer and Holmes 2011).

Table 4.11-5. Indirect Take Estimates for Newell's Shearwaters (continued)

Component	Value	Rationale
D. Number of young per pair	1	Ainley et al. 1997
E. Parental contribution	1	Assume both pair members are required to successfully raise young (Ainley et al. 1997).
F. Calculated estimated indirect take (chicks or eggs)	1.92	Calculated as A * B * C * D * E
G. Estimated Indirect Take	2	

Total Take and Authorized Take Request for ITP and ITL

Based on the assumptions and analysis above, the combined estimated direct and indirect take for a 21-year permit term is presented in Table 4.11-6. The calculated estimate is increased in the authorized take request to account for uncertainty in the estimation of take.

Table 4.11-6. Total Take Estimates for Newell's Shearwaters for 21-year Permit Term

Description	Value	Rationale
A. Estimated direct take (adults/fledged young)	1.95	Row D from Table 4.11-4
B. Estimated indirect take (chicks/eggs)	1.92	Row F from Table 4.11-5
Authorized Take Request		
Adults/fledged young	**4**	**Increased to account for uncertainty**
Chicks/eggs	**2**	

Potential Population-level Effects

Should the maximum requested take of 4 adult/fledgling Newell's shearwaters occur, it should not have a population-level impact, as it would represent an increase in the mortality rate of less than 0.01 percent of the population distributed over the 21-year permit term. However, requested take is based on numerous conservative assumptions, and this impact does not take into consideration Project mitigation that should serve to reduce take and, as a result, any population-level impact. Mitigation measures the Project has committed to (Section 2.5.2) will provide a net benefit, and this provides an additional level of assurance that no population level effects should result from Project construction and operation.

Hawaiian Goose

Direct Take

The most likely potential source of direct Hawaiian goose take is collision associated with an operational turbine, as has been documented at operational wind facilities on Maui (pers. com., USFWS, 2013). To assess the potential for direct take, we considered the potential changes in Hawaiian goose populations in the vicinity of the Project over the permit term, potential use of the wind farm site by Hawaiian geese, and the potential for collision of Hawaiian geese with Project turbines.

Although prior to the winter of 2013/2014 Hawaiian geese did not previously occur on Oahu, in March 2014 two translocated adult geese and three goslings were documented at James Campbell NWR, which is less than 1 mile from the wind farm site. The adults settled on Oahu and nested following dispersal after being translocated from Kauai to Hawaii. Two of the three goslings

fledged, but the adult male is assumed to have died in 2015 (pers. com., A. Nadig, USFWS, 2015). There is potential for this population to grow through future reproduction and the arrival of additional birds. Plans to continue translocation efforts from Kauai to Maui and the island of Hawaii until 2016, combined with the USFWS's intention to manage a population of Hawaiian geese on Oahu, suggest it is likely that additional Hawaiian geese will be present in future years (pers. com., A. Nadig, USFWS, 2015).

Several assumptions were identified to provide a basis for estimating take of the Hawaiian goose because it is not known whether geese will survive on Oahu and how quickly any such population would grow. These include the assumptions that an adult pair of Hawaiian geese will arrive in both 2015 and 2016 and that two key life history parameters, survival (80 percent annual survival of all age classes) and reproduction (50 percent of adult pairs produce 3 young each year) occur. Assuming that USFWS management efforts on the refuge will control predators, the Hawaiian goose is likely to successfully reproduce, and survival and reproductive rates are based on the species life history information. Using this information, we estimate the combined effect of periodic arrival of translocated birds and on-island reproduction will result in a population of approximately 15 resident Hawaiian geese along the north shore of Oahu during the first 10 years of the permit term. The success of management of this population in the form of predator control around nesting areas will likely determine the long-term trajectory of the population, but assuming ongoing and successful active management and the same life history parameters, we estimate a population of approximately 50 Hawaiian geese could be resident on the north shore of Oahu by the end of the 21-year permit term.

These birds are likely to use James Campbell NWR, surrounding wetland areas, golf courses, and other areas where short grass or vegetation provide opportunities to forage. To facilitate required post-construction monitoring efforts at some operational wind projects, vegetated areas beneath turbines are regularly maintained, and these may attract the Hawaiian goose. Therefore, it is likely that Hawaiian geese in the vicinity will fly through the wind farm site as well as potentially use the post-construction monitoring plots for foraging.

During the first approximately 9 years of operation at the 20-turbine Kaheawa I Wind Project on Maui, 21 Hawaiian goose fatalities were found, or 0.11 fatalities per turbine per year. However, the population of Hawaiian geese is currently much higher on Maui than on Oahu, with a flock of more than 100 currently resident in the vicinity of the Kaheawa I Wind Project (pers. com., A. Nadig, USFWS, 2014). Therefore, take at the Project is likely to be substantially lower than that observed on Maui. Assuming risk of collision is a function of population in the vicinity and assuming the population will grow over time, direct take for the Project would result in increasing per-turbine fatalities per year. Because the estimated population on Oahu, given the conservative assumptions described above, would be approximately 50 Hawaiian geese at the end of the permit term, it is assumed the fatality rate at the end of the permit term would be approximately half that currently found at Kaheawa I Wind Project (Table 4.11-7). Adjustments to this estimate to account for uncertainty are described in Total Take and Authorized Take Request for ITP and ITL, below.

Table 4.11-7. Direct Take Estimates for Hawaiian Goose[1/]

Component Interaction	Value	Rationale
A: Number of turbines	9	
B:Annual per turbine fatality rate at Kaheawa I Wind Project	0.11	Calculated as 21 fatalities/9.33 years/20 turbines
C: Permit Term	21 years	
D: Direct take at turbines (years 1–5)	0.35	Calculated as A*B*(7/100)*5; assumes average population of Hawaiian geese at the Project is 7 for years 1 – 5 compared to a population at Kaheawa Pastures I of 100
E: Direct take at turbines (years 6–10)	0.64	Calculated as A*B*(13/100)*5; assumes average population of Hawaiian geese at the Project is 13 for years 6 – 10 compared to a population at Kaheawa Pastures I of 100
F: Direct take at turbines (years 11–15)	1.09	Calculated as A*B*(22/100)*5; assumes average population of Hawaiian geese at the Project is 22 for years 11 – 15 compared to a population at Kaheawa Pastures I of 100
G: Direct take at turbines (years 16–21)	2.38	Calculated as A*B*(40/100)*6; assumes average population of Hawaiian geese at the Project is 40 for years 16 – 21 compared to a population at Kaheawa Pastures I of 100
H: Estimate of direct take	4.46	Calculated as D + E + F + G

1/ Risk estimates were based on the assumption that risk is proportionate to population size. This estimate assumes that annual fatality per turbine was 0.11 when the population size equals 100 geese locally, as found at Kaheawa Pastures I, and population increases in the vicinity of the Project from the current population of 3 birds to approximately 50 birds over the permit term. Population values represent 5- or 6-year averages of the population model for each period analyzed.

Indirect Take

Hawaiian goose biology suggests they are not likely to collide with turbines and associated structures when they are breeding, as they are unlikely to fly during this period; therefore, the potential for indirect take of the Hawaiian goose is low. The Hawaiian goose is extremely territorial during the breeding season. Males strongly defend nesting territories while the females are incubating, and both parents attend and defend goslings until they fledge (Banko et al. 1999). Finally, adults molt and are flightless during the last 4 to 6 weeks of the breeding season (USFWS 2004). All of these factors suggest there is a low likelihood that the fatality of an adult Hawaiian goose would result in the indirect take of dependent young or eggs. Nevertheless, take of the Hawaiian goose has occurred during the peak breeding months (October–March) at Kaheawa I Wind Project (pers. com., USFWS, 2013), and it is possible that some of these birds were caring for young.

Hu (1998) found that the average pair of Hawaiian geese produced 0.30 fledglings annually. Applying this information with other assumptions, we present estimates of indirect take for the Hawaiian goose in Table 4.11-8. Adjustments to this estimate to account for uncertainty are described in Total Take and Authorized Take Request for ITP and ITL, below.

Table 4.11-8. Indirect Take Estimates for Hawaiian Goose

Component Interaction	Value	Rationale
A: Estimate of direct take	4.46	Row H from Table 4.11-7
B:Average number of fledglings per nesting pair	0.30	Hu (1998)
C: Proportion of pairs likely to nest	0.60	Banko (1988)
D: Parental contribution	1	Conservatively assumes both adults are required to fledge young
E: Estimate of indirect take of equivalent fledged young	0.80	Calculated as A*B*C*D

Total Take and Authorized Take Request for ITP and ITL

Based on the assumptions and analysis above, the combined estimated direct and indirect take for a 21-year permit term is presented in Table 4.11-9. Given the numerous conservative assumptions used regarding the establishment and success of a Hawaiian goose population in the Project vicinity and the associated risk of collision, the estimated take is rounded up to determine the Authorized Take Request.

Table 4.11-9. Total Take Estimates for Hawaiian Goose for 21-year Permit Term

Description	Value	Rationale
A: Estimated direct take (adults/fledged young)	4.46	Row H from Table 4.11-7
B: Estimated indirect take (equivalent fledged young)	0.80	Row E from Table 4.11-8
D: Estimated take (equivalent adults/fledged young)	5.26	Calculated as A + B
Authorized Take Request		
Authorized Take Request	**6**	**Rounded up**

Potential Population-level Effects

Should the maximum requested take of 6 Hawaiian geese occur, it should not have a population-level impact, as it would represent an increase in mortality rate of less than 0.3 percent of the population distributed over the 21-year permit term. Furthermore, requested take is based on numerous conservative assumptions. Potential Project impacts should not have population level effects as the state population is growing (USFWS 2004).

Waterbirds (Hawaiian Duck, Hawaiian Stilt, Hawaiian Coot, Hawaiian Moorhen)

Direct Take

Direct take of Hawaiian duck, Hawaiian stilt, Hawaiian coot, and Hawaiian moorhen is anticipated to be low because of the lack of habitat, absence of waterbirds observed during the Project biological surveys, and the ability of the taxa to avoid collisions. Direct take of Hawaiian duck is also anticipated to be low because of the absence of non-hybrid Hawaiian ducks on Oahu; however, plans by DOFAW to reintroduce the species to Oahu could result in the species' presence late in the permit term. Direct take for each of these four waterbird species could occur as a result of collision with the turbines. The potential for take resulting with collision with turbines is described in more detail below.

Overall, waterbirds are expected to have a low frequency of transiting the wind farm site because of their limited presence in the Project vicinity and demonstrated avoidance behavior. Hawaiian stilts, Hawaiian coots, and Hawaiian moorhens were not detected at any time during the 1 year of avian point count surveys in the wind farm site, although they were observed at the nearby James Campbell NWR (Hobdy 2013a; Tetra Tech 2014b). Only Hawaiian duck-mallard hybrids are currently documented on Oahu and were observed during avian point count surveys at the nearby James Campbell NWR (Browne et al. 1993, Fowler et al. 2009, Tetra Tech 2014b). As a group, waterbirds have shown high avoidance of obstacles, including turbines and other objects (Erickson et al. 2002; Jain 2005; Johnson and Erickson 2011), suggesting waterbirds have a low risk of collision with Project turbines. This avoidance behavior is consistent with Hawaiian waterbird behavior, because no Hawaiian ducks (or hybrids), Hawaiian stilts, Hawaiian coots, or Hawaiian moorhens have been detected as fatalities at existing wind facilities in the Hawaiian Islands (USFWS, pers. comm. 2014).

As identified above, due to the low expected frequency of waterbirds transiting the Project and the ability of waterbirds to detect and avoid obstacles, the risk of collision with other Project components is considered negligible. Project components such as construction equipment, the met tower, and the O&M building are stationary or slow-moving, and are more visible and affect a much smaller portion of the airspace in the wind farm site than turbines. Project transmission lines will be marked to increase visibility according to Avian Power Line Interaction Committee standards, which will make any risk of collision with this Project component negligible. Additionally, there is no waterbird habitat in the Project; therefore, the potential for vehicles to kill waterbirds at the Project is negligible.

Taking all of these factors in to consideration, the estimated direct take over the 21-year permit term of the Project is one Hawaiian duck, one Hawaiian stilt, one Hawaiian coot, and one Hawaiian moorhen. Adjustments to this estimate to account for uncertainty are described in Total Take and Authorized Take Request for ITP and ITL, below.

Indirect Take

Indirect take of listed waterbirds could occur if adults with eggs or dependent young occur as a fatality due to the Project. However, such indirect take is unlikely. Hawaiian waterbirds are only likely to move among wetlands after young are independent, from fall to early spring, which are generally non-breeding periods (Nagata 1983; Engilis and Pratt 1993; Reed et al. 1998a; Pratt and Brisbin 2002). All Hawaiian waterbirds are precocial, but dependence on adults for brooding, food, and/or protection ranges from a few weeks to several months, during which the adult providing care is unlikely to move among wetlands. Taking this information into account, the potential for indirect take is considered negligible.

Total Take and Authorized Take Request for ITP and ITL

Based on the assumptions and analysis above, the combined estimated direct and indirect take for a 21-year permit term is presented in Table 4.11-10. In recognition of the uncertainty surrounding the prediction of take and the estimation of actual mortality, take estimates for Hawaiian duck,

Table 4.11-10. Total Take Estimates for Hawaiian Waterbirds for 21-year Permit Term

Description	Species	Adults	Rationale
A: Total estimated take (adults)	Hawaiian duck	1	No current population on Oahu; anticipated low frequency of transit and high avoidance should a population be established; indirect take assumed to be zero
B: Total estimated take (adults)	Hawaiian stilt	1	Low frequency of transit, high avoidance; indirect take assumed to be zero
C: Total estimated take (adults)	Hawaiian coot	1	Low frequency of transit, high avoidance; indirect take assumed to be zero
D: Total estimated take (adults)	Hawaiian moorhen	1	Low frequency of transit, high avoidance; indirect take assumed to be zero
Authorized Take Request			
Authorized Take Request	**Hawaiian duck**	**4**	**Increased to account for uncertainty and expected mitigation benefit**
	Hawaiian stilt	**4**	
	Hawaiian coot	**8**	
	Hawaiian moorhen	**8**	

Hawaiian stilt, Hawaiian coot, and Hawaiian moorhen were increased for the authorized take request. Furthermore, as the estimated benefit of the described mitigation for Hawaiian coot and Hawaiian moorhen are substantially higher for these species than for the Hawaiian duck and Hawaiian stilt, the authorized take request is increased to reflect this difference (Section 4.11.3.2).

Potential Population-level Effects

Should the maximum requested take of 4 Hawaiian ducks, 4 Hawaiian stilts, 8 Hawaiian coots, or 8 Hawaiian moorhens take place over the 21-year permit term, it should not have a population-level impact on the respective populations. Assuming the species most likely to have a population-level effect is that with the smallest current population and the largest take, we evaluated the requested take in the context of the Hawaiian moorhen. USFWS (2011e) estimates that DOFAW bi-annual surveys may underestimate Hawaiian moorhen presence by two to three times. Assuming half of the population is missed during surveys, the statewide population is conservatively 600 birds. Thus, the maximum estimated take could represent 1.3 percent of the population distributed over the 21-year permit term. Taking into account the mitigation described in Section 2.5.2, this estimated mortality should not have a population-level effect on the Hawaiian moorhen. Furthermore, given that the Project should have no population-level effect on the Hawaiian moorhen, the more robust populations of Hawaiian duck, Hawaiian stilt, and Hawaiian coot should also not experience population-level effects.

Hawaiian Short-eared Owl

Direct Take

Direct take of Hawaiian short-eared owl could occur as a result of collision with the turbines. However, turbine collision associated fatalities are likely to be low for two reasons. First, Hawaiian short-eared owls are expected to use the wind farm site only as irregular visitors. Second, given the low likelihood of breeding in the area and that high flights are typically used only as pre-breeding

display flights, Hawaiian short-eared owls using the area are unlikely to fly within the rotor swept area (Wiggins et al. 2006).

No Hawaiian short-eared owl fatalities have been documented at operational wind farms on Oahu (pers. com., USFWS, 2013). This may be due to the low density of Hawaiian short-eared owls on Oahu, where the subspecies is rare (Klavitter 2009; Pyle and Pyle 2009). Conversely, owl fatalities have occurred at the operational Kaheawa Pastures I Wind Farm on Maui where Hawaiian short-eared owls were detected regularly during preconstruction surveys (Kaheawa Wind Power, LLC 2006), and where the species is much more common than on Oahu (Klavitter 2009; Pyle and Pyle 2009). This information suggests the risk of Hawaiian short-eared owl collision with turbines may be related to owl density and/or breeding activity, which is either very low or does not exist on the Project.

No Hawaiian short-eared owls were detected during Project surveys within or in the vicinity of the wind farm site. However, a single observation from the Kahuku Wind Project during pre-construction radar surveys (Day and Cooper 2008) indicates the species may occur as an irregular visitor to the wind farm site. Based on the rarity of observations of the species during pre-construction survey efforts at the Project and the Kahuku Wind Project (SWCA 2010; Tetra Tech 2014b), it is unlikely that the Hawaiian short-eared owl breeds in the wind farm site. The low frequency of use of the wind farm site by Hawaiian short-eared owls and the low likelihood of the presence of breeding pairs suggest the risk of collision for Hawaiian short-eared owls with turbines is low. In addition, NPMPP has proposed to implement low wind speed curtailment during March–November to reduce Hawaiian hoary bat fatalities. This minimization measure should further reduce the potential for a collision of a Hawaiian short-eared owl because although Hawaiian short-eared owls are largely diurnal they are also sometimes active at night.

The risk of collision with other Project components is considered negligible due to the avoidance and minimization measures proposed, the low potential for the owl to use the wind farm site, and the owl's highly maneuverable flight (Wiggins et al. 2006). A 25 mph (40 kph) speed limit during the day and 10 mph (16 kph) speed limit at night will minimize the risk of Hawaiian short-eared owls colliding with Project vehicles. The selection of an unguyed, free-standing met tower maximizes the ability of owls to detect the structure and avoid collision and the markings of Project transmission lines to increase visibility minimizes the potential for owls to collide with this Project component. The low frequency of use of the area by Hawaiian short-eared owls and their estimated ability to detect and avoid Project components during typical foraging activities makes the risk of collision with Project construction equipment negligible.

Taking all of these factors into consideration, the estimated direct take over the 21-year permit term of the Project is one Hawaiian short-eared owl. Adjustments to this estimate to account for uncertainty are described in Total Take and Authorized Take Request for ITL, below.

Indirect Take

The direct take of a Hawaiian short-eared owl during the breeding season may result in the indirect loss of dependent chick(s) or egg(s). Although results of Project biological surveys and pre-

construction survey at the Kahuku Wind Project suggest Hawaiian short-eared owl use the area as irregular visitors rather than residents and local breeders, there is the potential for Hawaiian short-eared owls to breed somewhere in the vicinity of the Project and to occasionally transit the wind farm site or use it for foraging while breeding.

Life history information and the calculation for indirect take for the Hawaiian short-eared owls are presented in Table 4.11-11. Information includes the potential for a Hawaiian short-eared owl to be nesting, the likelihood of nesting failure should a nesting bird be taken, and the number of eggs in a clutch. Conservatively, the calculation assumes that any direct take would be of an adult bird. Adjustments to this estimate to account for uncertainty are described in Total Take and Authorized Take Request for ITL, below.

Table 4.11-11. Indirect Take Estimates for Hawaiian Short-eared Owls

Component	Value	Rationale
A: Direct take of adults	4	Conservatively assume all direct take are adult birds that could reproduce.
B: Proportion of year likely to be caring for young/eggs	0.17	Nest once per year with no peak period and young are dependent for approximately 2 months (Mitchell et al. 2005). Calculated as 2 months/12 months.
C. Average clutch size	5.6	Murray 1976 (for North America). Limited data suggests island populations may have smaller clutches.
D: Parental contribution	1	Assume both pair members are required to successfully raise young. Male provisions female and young and defends nest while female incubates and broods (Wiggins et al. 2006).
E: Total estimated indirect take (chicks or eggs)	3.81	Calculated as A * B * C * D
F. Estimated Indirect Take	4	

Total Take and Authorized Take Request for ITL

Based on the assumptions and analysis above, the combined estimated direct and indirect take for a 21-year permit term is presented in Table 4.11-12. In recognition of the uncertainty surrounding the prediction of take and the estimation of actual mortality, take estimates for Hawaiian short-eared owl were increased for the authorized take request.

Table 4.11-12. Total Take Estimates for Hawaiian Short-eared Owl for 21-year Permit Term

Description	Value	Rationale
A: Estimated direct take (adults/fledged young)	1	Section 4.11.3.1, Hawaiian short-eared owl
B: Estimated indirect take (chicks/eggs)	0.93	Row E from Table 4.11-11
Authorized Take Request		
Adults/fledged young	**4**	**Increased to account for uncertainty**
Chicks/eggs	**4**	

Potential Population-level Effects

No population estimates are available for Hawaiian short-eared owls on Oahu, or even more broadly, in the Hawaiian Islands. Due to the lack of systematic monitoring on Oahu, it is difficult to assess the effect that take of Hawaiian short-eared owls resulting from the Project may have on the local population of this species, but anecdotal observations suggest the Oahu population is low and any take may be of concern. Nevertheless, population-level impacts are not anticipated because the requested take is 4 adult owls and 4 chicks or eggs over 21 years, which is low.

4.11.3.2 Direct and Indirect Effects of the HCP Conservation Measures

Impacts of Avoidance and Minimization Measures

The avoidance and minimization measures proposed under the Project HCP are designed to reduce the risk of incidental take to threatened and endangered species. Specific avoidance and minimization measures were taken into account in the analysis of overall estimated take of threatened and endangered species. These are described in detail in Section 2.5 of this EIS. These measures include:

- Below-ground installation of Project electrical collection system;
- Temporal application of low wind speed curtailment;
- The use of a biological monitor for required night time construction;
- Marking the above-ground transmission line to improve visibility and follow Avian Protection Plan Guidelines (APLIC 2012);
- Avoiding use of barbed wire on perimeter fences; and
- Lighting restrictions.

As part of the avoidance and minimization measures, NPMPP will develop post-construction monitoring plots beneath Project wind turbines to facilitate the estimation of fatalities associated with the Project and inform adaptive management practices to adjust Project operations with the goal of minimizing, to the extent practicable, overall Project take (Section 2.5). The low-growing vegetation required in these plots has the potential to attract the Hawaiian goose and increase its risk of collision with Project turbines. However, as described in the avoidance and minimization measures, NPMPP will work with USFWS and DOFAW to minimize this risk through the selection and appropriate management of post-construction monitoring plot vegetation. The effect of this increased risk was accounted for in the estimation of overall take of the Hawaiian goose.

Impacts of HCP Mitigation

As described in Section 2.5.2, under the HCP, mitigation activities are proposed in the Hamakua Marsh and Poamoho Ridge mitigation areas and in the James Campbell NWR, in addition to funding new research and management for the Newell's shearwater and Hawaiian short-eared owl. These activities are intended to directly benefit the Covered Species through research and management or protect and enhance native habitats for the Covered Species, achieving a net benefit and offsetting the effects of estimated overall Project take.

Fence installation at the Hamakua Marsh would result in a temporary local disturbance to waterbirds due to worker and vehicle noise and ground disturbance. This impact is expected to be negligible because the area is currently disturbed by a variety of anthropogenic activities. The resulting fence and associated public outreach would reduce human disturbance to listed waterbirds, listed waterbird deaths resulting from vehicle collisions, and predation/disturbance by dogs.

At Poamoho Ridge, the removal of feral pigs and reduction in invasive plant species could result in a temporary, local disturbance to Hawaiian hoary bats due to worker and equipment noise,

helicopter noise, ground disturbance, and removal of invasive trees that could be used by Hawaiian hoary bats roost trees. Impacts associated with disturbance are expected to be negligible. Potential impacts to Hawaiian hoary bat roosting habitat would be minimized through the selection of vegetation control methods and the timing of activities; these measures will be described in the Poamoho Management Plan, the development of which will be funded by as a mitigation measure by NPMPP. Overall, the effects of potentially disturbing activities and potential impacts to Hawaiian hoary bat roosting habitat are designed to achieve improvement to Hawaiian hoary bat habitat and result in a net benefit for the Hawaiian hoary bat from the action.

As discussed in Chapter 2, the environmental effects of fencing for Hawaiian goose mitigation in the James Campbell NWR have been evaluated under the NEPA Environmental Assessment for the James Campbell NWR Comprehensive Conservation Plan (USFWS 2011a). These activities would have no significant adverse impacts on the environmental resources and would ultimately protect, maintain, and enhance habitat for endangered species and resources of concern (USFWS 2011a). Ultimately, mitigation activities would have beneficial effects to the Covered Species as well as numerous species of MBTA-protected waterbird, shorebird, and waterfowl species that occur there.

Overall, HCP conservation measures are expected to provide net benefits to the Covered Species. Any temporary impacts are considered negligible.

4.11.3.3 Mitigation for Unavoidable Impacts

Mitigation for unavoidable impacts to threatened and endangered species is provided under the Project HCP and discussed above and described in Sections 2.5.1 and 2.5.2. These avoidance and minimization measures and species-specific mitigation activities were designed to provide a net benefit to the Covered Species.

Additional BMPs listed in Table 2-6, which will be implemented by NPMPP, will minimize impacts to threatened and endangered species. These measures include:

- Prepare and implement a TESC Plan which would help prevent erosion.
- Restore disturbed areas to pre-existing grades and revegetate these areas with non-invasive resident species.
- Vehicle operators transporting materials to the Project site from off-site will be required to follow protocols for removing soils and plant material from vehicles and equipment prior to entry onto the site.
- An FMP will be implemented during construction and operations.

No additional avoidance, minimization, or mitigation measures are required.

4.11.3.4 Cumulative Effects

The analysis area for cumulative effects for threatened and endangered species encompasses the Island of Oahu to capture other operating wind farms on Oahu that specifically address, and could impact, the same population of species that are the focus of the Na Pua Makani HCP. The following discussion addresses cumulative impacts under Alternative 2 (including the Modified Proposed

Action Option) to each Covered Species. Past, present, and reasonably foreseeable actions that overlap in space and time with the impacts of the Project are identified in Table 4.2-2 and described below where appropriate.

At the State level (beyond the extent of the cumulative effects analysis area), the Na Pua Makani Project is one of many projects that have the potential to impact threatened and endangered species on a range-wide basis. In addition to the projects listed in Table 4.2-2, other commercial wind projects in Hawaii include Auwahi (Maui), Kaheawa I and II (Maui), Pakini Nui (Hawaii Island), and Hawi (Hawaii Island); other proposed commercial wind projects include Kauai Wind Power (Kauai). These projects also have the potential to result in incidental take of listed species and are implementing HCPs, developing HCPs, or in consultation with USFWS regarding approaches to managing the risk of incidental take associated with the project. It is anticipated that due to the State's RPS objectives, wind energy development in Hawaii will continue. Further, rapid population growth and real estate development have occurred on the islands of Oahu, Maui, and Kauai, which are expected to continue. Risk of seabirds becoming disoriented by human light sources, loss of nesting or roosting habitat, pesticide use, increased obstacles that could pose collision risks, and increased predation may also result from this development. It is assumed that future development projects will be conducted in compliance with all applicable local, State, and Federal environmental regulations; however, projects involving the development of HCPs are among the few that will implement measures to offset take of listed species.

Hawaiian Hoary Bat

The Hawaiian hoary bat is listed as endangered at the Federal and State level. As described in Section 3.9 and above, there remains much uncertainty related to the distribution, abundance, and range-wide trends of the Hawaiian hoary bat. Therefore, it is difficult to assess the significance of individual projects or cumulative impacts to the Oahu population as a whole. On Oahu, past development and land use have resulted in the loss of roosting habitat through the conversion of forest to agriculture and development. Ongoing impacts such as wildfire and development have the potential to result in further habitat loss.

The Project, existing operational wind farms on Oahu, and two proposed development projects have the potential to result in the incidental take of the Hawaiian hoary bat. The Project may cause the incidental take of this species through collisions or other interactions with wind turbines, which will be mitigated for through a combination of habitat protection/restoration at Poamoho Ridge and research. These restoration and research efforts are designed to result in a net benefit to the Hawaiian hoary bat. Incidental take also has the potential to occur in association with the operational Kahuku and Kawailoa wind projects (collisions) and with the proposed Envision Laie development project and Turtle Bay resort expansion (removal of habitat). The primary component of mitigation under the Kahuku HCP and the Kawailoa HCP are bat habitat restoration and research. Restoration efforts are expected to increase survival and reproductive success of bats commensurate with the authorized take levels such that a net benefit is achieved. Furthermore, it is assumed that the proposed Envision Laie development and Turtle Bay resort expansion would mitigate for any impacts to Hawaiian hoary bat roosting habitat. For these reasons, Alternative 2

(including the Modified Proposed Action Option) in combination with past, present, and reasonably foreseeable projects would not result in significant adverse cumulative effects to the Hawaiian hoary bat.

Newell's Shearwater

Newell's shearwater is listed as threatened at the Federal and State level. As described in Section 3.9, while suitable breeding habitat is present on the island, no Newell's shearwater breeding colonies have been identified to date on Oahu. On Oahu, past development (resulting in light disorientation and collision) and impacts from non-native mammals have likely dramatically reduced or eliminated the population of breeding birds and presence of nesting colonies on the island. Increasing development has the potential to further impact any residual population.

The Project, existing operational wind farms on Oahu, and two proposed development projects have the potential to result in the incidental take of the Newell's shearwater. The Project has the potential to result in the incidental take of this species through collisions with wind turbines, though at a low level. Potential take will be fully mitigated for through contributions to a National Fish and Wildlife Foundation fund, as recommended by the USFWS and DOFAW (Tetra Tech 2014c). Incidental take also has the potential to occur in association with the operational Kahuku and Kawailoa wind projects (collisions) and with the proposed Envision Laie development project and Turtle Bay resort expansion (collisions, light disorientation). The primary component of mitigation under the Kahuku HCP and the Kawailoa HCP are colony management at the Makamaka'ole site on West Maui and predator reduction at a colony on Kauai, respectively. Colony management efforts and predator control efforts are expected to increase survival and reproductive success of Newell's shearwater commensurate with the authorized take levels such that a net benefit is achieved. Furthermore, it is assumed that the proposed Envision Laie development and Turtle Bay resort expansion would mitigate for any impacts to Newell's shearwaters. For these reasons, Alternative 2 (including the Modified Proposed Action Option), in combination with past, present, and reasonably foreseeable projects, would result not result in significant adverse cumulative effects to Newell's shearwater.

Hawaiian Goose

Hawaiian goose is listed as endangered at the Federal and State level. As described in Section 3.9, the Hawaiian goose is a recent arrival on the island, the population level is very low, and the future of the population is uncertain. On Oahu, past development, land use, and impacts from non-native mammals extirpated the original population. Increasing development, ongoing changes in land use, and the effects of non-native mammals have the potential to alter the trajectory of the current incipient population.

The Project, existing operational wind farms on Oahu, and two proposed development projects have the potential to result in the incidental take of the Hawaiian goose. The Project has the potential to result in the incidental take of this species through collisions with wind turbines, though the extent of this risk is a function of how the population changes over time. Potential take will be mitigated for through contributions to fund habitat management at James Campbell NWR, as

recommended by the USFWS and DOFAW (Tetra Tech 2014c). Incidental take also has the potential to occur in association with the operational Kahuku and Kawailoa wind projects (collisions) and with the proposed Envision Laie development project and Turtle Bay resort expansion (vehicle collisions, predation). The Kahuku and Kawailoa HCPs do not include mitigation for the potential take of the Hawaiian goose, and the species is not included on their ITPs and ITLs, as the arrival of the species on Oahu was not anticipated at the time of their preparation. It is assumed that the Kahuku and Kawailoa wind projects will work with USFWS and DOFAW to amend their HCPs to provide mitigation measures such that these projects would fully mitigate any permitted incidental take. Furthermore, it is assumed that the proposed Envision Laie development and Turtle Bay resort expansion would mitigate for any impacts to the Hawaiian goose. For these reasons, Alternative 2 (including the Modified Proposed Action Option), in combination with past, present, and reasonably foreseeable projects, would not result in significant adverse cumulative effects to the Hawaiian goose.

Waterbirds (Hawaiian Duck, Hawaiian Stilt, Hawaiian Coot, Hawaiian Moorhen, and Hawaiian Duck)

The Hawaiian duck, Hawaiian stilt, Hawaiian coot, and Hawaiian moorhen are all listed as endangered at the Federal and State level. As described in Section 3.9, significant loss of wetland habitat range-wide has contributed to the decline of all four waterbird species. Introduced predators also continue to be a major ongoing cause of waterbird mortality and nest failure.

The Project, existing operational wind farms on Oahu, and two proposed development projects have the potential to result in the incidental take of endangered Hawaiian waterbirds. The wind farm site does not include suitable habitat for waterbirds and has the potential for a low level of incidental take of this species due to collisions. This will be mitigated for through habitat fencing, public education, and monitoring at the Hamakua Marsh site. Incidental take also has the potential to occur in association with the operational Kahuku and Kawailoa wind projects (collisions) and with the proposed Envision Laie development project and Turtle Bay resort expansion (collisions with powerlines). The primary component of mitigation under the Kahuku HCP and the Kawailoa HCP are predator control/vegetation maintenance at the Kawainui/Hamakua Marsh complex and a combination of predator control, weed control, and monitoring at Ukoa Pond, respectively. It is assumed that if mitigation measures outlined in these HCPs are implemented, they would result in a net benefit to endangered Hawaiian waterbirds. Furthermore, it is assumed that the proposed Envision Laie development and Turtle Bay resort expansion would mitigate for any impacts to Newell's shearwaters. For these reasons, Alternative 2 (including the Modified Proposed Action Option), in combination with past, present, and reasonably foreseeable projects, would not result in significant adverse cumulative effects to the Hawaiian duck, Hawaiian stilt, Hawaiian coot, or Hawaiian moorhen.

Hawaiian Short-eared Owl

The Oahu population of the Hawaiian short-eared owl is listed as endangered by the State of Hawaii. As discussed in Section 3.9, this species is currently rare on Oahu, and has been and continues to be impacted by loss and degradation of habitat, predation by introduced mammals,

pesticide poisoning, disease, food shortages, and vehicle collisions. At the same time, the Hawaiian short-eared owl persists in modified landscapes, suggesting an ability to cope with some human development.

The Project, existing operational wind farms on Oahu, and two proposed development projects have the potential to result in the incidental take of the Hawaiian short-eared owl. The Project has the potential to result in the incidental take of this species through collisions with wind turbines, though at a low level. This will be mitigated for through funding of research and management support. Incidental take also has the potential to occur in association with the operational Kahuku and Kawailoa wind projects (collisions) and with the proposed Envision Laie development project and Turtle Bay resort expansion (conversion of foraging habitat). The primary component of mitigation under the Kahuku HCP and Kawailoa HCPs is funding for research and management. It is assumed that if mitigation measures outlined in these HCPs are implemented, they would result in a net benefit to the Hawaiian short-eared owl. Furthermore, it is assumed that the proposed Envision Laie development and Turtle Bay resort expansion would mitigate for any impacts to Hawaiian short-eared owls. For these reasons, Alternative 2 (including the Modified Proposed Action Option), in combination with past, present, and reasonably foreseeable projects, would not result in a significant adverse cumulative effects to the Hawaiian short-eared owl.

4.11.3.5 Summary

Potential adverse effects to threatened and endangered species associated with Alternative 2 (including the Modified Proposed Action Option) include the potential for collision with Project structures, and temporary disturbance associated with implementation of HCP mitigation. HCP mitigation measures would benefit threatened and endangered species over the long term through the protection (fence installation or maintenance) and/or enhancement (invasive plant species control and feral pig removal) of native ecosystems, reduction in predation pressure (predator control), and/or through research and management. With implementation of the Project HCP, direct, indirect, and cumulative effects of Alternative 2 (including the Modified Proposed Action Option) on Hawaiian hoary bats, Newell's shearwater, Hawaiian goose, Hawaiian duck, Hawaiian stilt, Hawaiian coot, Hawaiian moorhen and Hawaiian short-eared owl would be negligible due to the net benefit provided by the species-specific mitigation measures.

4.11.4 Alternative 3—Larger Generation Facility (Up to 12 Turbine Project)

4.11.4.1 Direct and Indirect Impacts of Construction and Operation of the Project

Under Alternative 3, direct and indirect effects on threatened and endangered species would be similar to those described under Alternative 2. However, Alternative 3 would include the construction and operation of additional wind turbines, and construction and use of associated use of additional access roads and electrical collection lines (all other Project facilities would be the same; Table 2-1), Alternative 3 would result in the construction of up to 12 turbines. Implementation of avoidance and minimization measures and standard BMPs, as described under the Proposed Action, would minimize any adverse impacts to threatened and endangered species.

The additional turbines would result in an increased risk of take from collision. For Newell's shearwater, Hawaiian goose, Hawaiian duck, Hawaiian stilt, Hawaiian coot, Hawaiian moorhen, and Hawaiian short-eared owl, the increase in risk is expected to be low. As discussed above under Alternative 2/2a, these species either have strong avoidance ability, lack of habitat in the wind farm site, or would only transit the wind farm site infrequently. For the Hawaiian hoary bat, the likelihood of take from collisions would increase, and as take of this species is expected to be more frequent than the other Covered Species, the increased associated take with Alternative 3 is expected to be higher than that estimated for other Covered Species.

As the HCP currently applies only to the Proposed Action, Alternative 2/2a, final take requests related to Alternative 3 have not been made for any of the Covered Species. Take requests and associated mitigation would be developed as part of future consultation with the USFWS and DOFAW prior to the construction of additional turbines if Alternative 3 were to move forward.

4.11.4.2 Direct and Indirect Impacts of the HCP Conservation Measures

Impacts of Avoidance and Minimization Measures

The avoidance and minimization measures proposed under a Project HCP implemented under Alternative 3 would be the same as described under Alternative 2/2a. Any additional avoidance and minimization measures identified during future consultations with USFWS and DOFAW prior to the construction of additional turbines under Alternative 3 would be implemented as appropriate.

Impacts of HCP Mitigation

Impacts of HCP mitigation under Alternative 3 would be the same as described under the Proposed Action/Modified Proposed Action Option. Prior to the construction of the additional turbines proposed under Alternative 3, NPMPP would reopen consultation with the USFWS and DOFAW to assess the potential impacts of the additional turbines to listed species and develop appropriate mitigation measures. The impacts of these mitigation measures, both adverse and beneficial, to threatened and endangered species would be evaluated under a separate environmental analysis at that time.

4.11.4.3 Mitigation for Unavoidable Impacts

Mitigation for unavoidable impacts under Alternative 3 would be the same as described under the Proposed Action/Modified Proposed Action Option (Section 4.11.3.3).

4.11.4.4 Cumulative Effects

Cumulative impacts of Alternative 3 would be the same as under Alternative 2/2a. Take from Alternative 3 would be mitigated for through measures identified in consultation with USFWS and DOFAW, and past, present, and reasonably foreseeable projects are assumed to mitigate for potential impacts to threatened and endangered species. Therefore, Alternative 3 in combination with past, present, and reasonably foreseeable projects would result in negligible cumulative effects to each of the Covered Species. Because there would likely be a delay in time of up to 3 years before

additional turbines would be built under Alternative 3, new projects and developments in the area will be assessed and reviewed to determine if there are additional cumulative impacts from future unknown projects during the additional associated environmental review.

4.11.4.5 Summary

Potential adverse effects to threatened and endangered species associated with Alternative 3 include the potential for collision with Project structures and temporary disturbance associated with implementation of HCP mitigation. HCP mitigation measures would benefit threatened and endangered species over the long term through the protection (fence installation or maintenance) and/or enhancement (invasive plant species control and feral pig removal) of native ecosystems, reduction in predation pressure (predator control), and/or through research and management. With implementation of the current Project HCP, direct, indirect, and cumulative effects of construction and operation of the first up to 10 turbines under Alternative 3 on Hawaiian hoary bats, Newell's shearwater, Hawaiian goose, Hawaiian stilt, Hawaiian coot, Hawaiian moorhen, Hawaiian duck, and Hawaiian short-eared owl would be negligible due to the net benefit provided by the species-specific mitigation measures. It is anticipated that effects related to the construction and operation of the additional 2 to 4 turbines would also be negligible, as the associated mitigation would be required to result in a net benefit to the species.

4.11.5 Conclusion

Table 4.11-13 summarizes potential impacts to threatened and endangered species resources from the alternatives considered in this analysis.

Table 4.11-13. Summary of Potential Impacts to Threatened and Endangered Species

Species	Impact Issues	No Action Alternative	Alternative 2 – Proposed Action	Alternative 2a – Modified Proposed Action Option	Alternative 3
Hawaiian hoary bat	Incidental Take	No Impact	Negligible	Negligible	Negligible
	Habitat Impacts	No Impact	Negligible	Negligible	Negligible
Newell's shearwater	Incidental Take	No Impact	Negligible	Negligible	Negligible
	Habitat Impacts	No Impact	No Impact	No Impact	No Impact
Hawaiian goose	Incidental Take	No Impact	Negligible	Negligible	Negligible
	Habitat Impacts	No Impact	Negligible	Negligible	Negligible
Hawaiian duck	Incidental Take	No Impact	Negligible	Negligible	Negligible
	Habitat Impacts	No Impact	No Impact	No Impact	No Impact
Hawaiian stilt	Incidental Take	No Impact	Negligible	Negligible	Negligible
	Habitat Impacts	No Impact	No Impact	No Impact	No Impact
Hawaiian coot	Incidental Take	No Impact	Negligible	Negligible	Negligible
	Habitat Impacts	No Impact	No Impact	No Impact	No Impact
Hawaiian moorhen	Incidental Take	No Impact	Negligible	Negligible	Negligible
	Habitat Impacts	No Impact	No Impact	No Impact	No Impact
Hawaiian short-eared owl	Incidental Take	No Impact	Negligible	Negligible	Negligible
	Habitat Impacts	No Impact	No Impact	No Impact	No Impact

4.12 Socioeconomics

4.12.1 Impact Criteria

The following analysis considers potential impacts to population, employment and income, housing, property values, public services, and tax revenues. The potential socioeconomic impacts of the Project are assessed using data derived from the DOE National Renewable Energy Laboratory's Jobs and Economic Development Impacts (JEDI) Wind model (National Renewable Energy Laboratory 2014). The JEDI Wind model allows the user to identify potential impacts assuming general wind industry averages. Impacts are assessed based on the magnitude or intensity, duration, geographic extent, and context of the potential effect. These general impact criteria are summarized in Table 4.12-1.

Table 4.12-1. Impact Criteria for Socioeconomic Resources

Type of Effect	Impact Component	Effects Summary		
Effects on Socioeconomic Resources	Magnitude or Intensity	**High:** Changes in socioeconomic conditions (such as employment, population, or tourism levels) exceed normal limits and trends or greater than 10% increase or decrease.	**Medium:** Changes in socioeconomic conditions are generally within normal limits and trends, or between 5% to 10% increase or decrease.	**Low:** Changes in socioeconomic conditions are generally below normal limits and trends, or <5% increase or decrease.
	Duration	**Permanent:** Changes in socioeconomic conditions persist after the actions that caused the impacts cease.	**Long-term:** Changes in socioeconomic conditions extend up to the operating life of the Project and would return to pre-activity levels sometime after actions causing impacts were to cease.	**Temporary:** Changes in socioeconomic conditions last less than 1 year or the period of project construction.
	Geographic Extent	**Extended:** Potential impacts extend beyond the region, potentially island- or state-wide.	**Regional:** Potential effects extend to the broader region (Koolauloa District).	**Local:** Potential impacts are primarily limited to communities in the immediate vicinity of the Project.
	Context	**Unique:** Potential impacts are to social and economic resources that are unique to the area.	**Important:** Potential impacts are to social and economic resources that are important to the area.	**Common:** Potential impacts are to social and economic resources that are common to the area,

4.12.2 Impacts Common to All Action Alternatives

A number of comments received during the public scoping period and original Draft EIS public comment period for this Project were concerned with potential effects on various socioeconomic conditions. Several of these comments are common to all action alternatives and are addressed in the following sections. Other public comments related to socioeconomics are addressed below by alternative, as appropriate.

4.12.2.1 Property Values

Several comments expressed concern that the proposed Project would negatively affect property values and the salability of homes located near the Project site. These types of concerns are often raised when a new wind facility is proposed. Typical concerns related to the potential impact of wind power facilities on residential property values include scenic vista stigma and nuisance stigma (Hoen et al. 2009). Scenic vista stigma is the concern that a home may be devalued because of the view of a wind energy facility and the potential impact of that view on an otherwise scenic vista. Nuisance stigma refers to the potential impact of other factors, such as sound and shadow flicker on residential property values.

Recent studies addressing the potential impact of wind projects on property values have tended to rely on analysis of property sales data and statistical analysis, rather than surveys of real estate professionals. Most of these studies found no evidence that the presence of an operating wind facility affected residential property values (Canning and Simmons 2010; Carter 2011; Hinman 2010; Laposa and Mueller 2010; Magnusson and Gittell 2012). One large-scale study identified some evidence that post-announcement reductions in price occurred prior to actual construction, but faded following the completion of construction (Hoen et al. 2011). One detailed study (Heintzelman and Tuttle 2012) found overall mixed results, with two of the three wind facilities studied affecting property values, while the other one did not. Where effects did exist, this study found that they tended to increase the closer a property was to the nearest wind turbine. One other study (Sunak and Madlener 2012) also found some support for negative effects in proximity to wind turbines, with effects varying based on relative location. Most of these studies concluded that more research is required to more fully understand the impacts of wind facility development on property values.

Potential visual impacts associated with the Project are assessed in Section 4.16 – Visual Resources. Action alternatives 2, 2a, and 3 are situated on ridge tops above residential communities and have the potential to result in visual impacts to these areas. The visual resources analysis uses a number of representative viewpoints to assess the existing environment and visual impacts of the Project. A number of these viewpoints address impacts to residential viewers in a number of nearby residential locations, including the Kahuku community (Viewpoint 04), Kahuku Sugar Mill Historical Site (KOP 05), and the Kahuku Community Hospital and Medical Center (Viewpoint 17). Viewer sensitivity was generally classified as moderate to high in these locations. Visual impact intensity was rated moderate in these locations, primarily due to the influence of the existing Kahuku Wind Farm (see Section 4.16 – Visual Resources).

Views were also assessed from coastal residences in Laie, near Laie Point (Viewpoint 15), approximately 2.3 miles from the wind farm site. Scenic values in this location are high, but impact intensity from this location was classified as moderate due to the distance from the Project. Other potentially affected residential properties not included in the visual resource assessment include several individual residences located immediately east of proposed turbine on the DLNR side, with the closest residence located approximately 814 feet (248 meters) from the closest proposed turbine location.

4.12.2.2 Homeowners' Insurance Rates

One comment received during scoping asked whether the NPMPP was aware of past wind development projects affecting home insurance rates in nearby communities. NPMPP has indicated that they are not aware of this effect, and Tetra Tech is not aware of studies or other documentation that has identified this as a potential impact.

4.12.2.3 Businesses

Concern was expressed during scoping that the Project would result in a loss of business in the Kahuku area. The comment did not identify a specific business or economic sector, but likely relates to tourism, given the importance of that sector to the local economy. Tourism accounted for 26 percent of the employed labor force in Kahuku in 2012 (Table 3.10-3). Impacts to recreation and tourism are assessed in Section 4.15 – Recreation. The recreation and tourism analysis concluded that the impact of the Project on nearby recreation and tourism resources would be negligible to minor under action alternatives 2, 2a, and 3. Therefore, the Project is not expected to have adverse impacts on tourism-related businesses.

It may also be noted that some local businesses would likely benefit from Project-related construction expenditures, as well as spending by construction workers temporarily relocating to the vicinity of the Project for the duration of their employment. These potential small but positive impacts to local businesses are discussed further by alternative, below.

4.12.2.4 Residential Solar Energy or Photovoltaic System Installation

Several comments expressed concern that the Project would adversely affect the ability of homeowners to install rooftop photovoltaic (PV) systems because the Project use capacity on transmission lines. HECO confirmed in public meetings with the community and a letter to NPMPP dated June 5, 2014, that the construction and operation of the Project is not expected to affect the ability of homeowners to install rooftop PV systems. This is the result of the fact that the existing wind projects on the North Shore of Oahu and this Project connect to HECO's high-voltage transmission lines and system and residential homes connect to HECO's low-voltage distribution lines and system, which are separate from the high-voltage lines. HECO has now adopted the PV Circuit Hosting Capacity Analysis method that identifies distribution circuit capacity to safely and reliably interconnect distributed generation resources. PV Circuit Hosting Capacity provides information to all parties as to the amount of rooftop PV that may be added to each specific distribution circuit (R. Shiro, personal comm., 2015).

4.12.2.5 Electricity Rates

A number of comments on the original Draft EIS were made regarding the impact the Project would have directly to electricity rates. Based on the most recent 2014 Renewable Portfolio Standard Status Report, approximately 80 percent of Hawaii's energy is currently derived from fossil fuels, and approximately 20 percent comes from renewable sources (HECO et al. 2014). The cost of electricity for the consumers/residents of Hawaii is the blended average cost of all sources (e.g., oil,

wind, solar, etc.) and current rates reflect that high cost from burning oil. Over time, as the proportion of energy coming from renewable sources increases, the average cost of electricity is expected to decrease (HECO 2016).

4.12.3 Alternative 1—No Action

4.12.3.1 Direct and Indirect Effects

Under Alternative 1, the Project would not be constructed, an ITP would not be issued by the USFWS, and the HCP conservation measures would not be implemented. Therefore, Alternative 1 would have no direct or indirect adverse socioeconomic impacts. However, Alternative 1 would also not have the positive socioeconomic impacts associated with employment or tax revenues that would occur during construction and operation of the Project.

4.12.3.2 Cumulative Effects

Under Alternative 1, the Project would not be constructed, an ITP would not be issued by the USFWS, and the HCP conservation measures would not be implemented. Therefore, there would be no effect on socioeconomic resources. Thus, Alternative 1 would not contribute to cumulative effects on socioeconomic resources.

4.12.3.3 Summary

Alternative 1 would have no direct, indirect, or cumulative effects on socioeconomic resources as no action would be undertaken.

4.12.4 Alternative 2—8 to 10 Turbine Project

4.12.4.1 Direct and Indirect Impacts of Construction and Operation of the Project

Construction

Construction of the Project under this alternative is expected to result in total direct employment of 43 full-time equivalent jobs. Full-time equivalent jobs are employment estimates based on 12 months (2,080 hours) employment. These numbers do not translate into individual workers who may be employed for shorter periods. Total construction earnings would be approximately $3 million. These estimates, developed using the JEDI Wind model, is broadly comparable to the estimate developed for the 30-MW Kahuku Wind Power project Environmental Assessment, which anticipated that an average of 15 to 20 people would be employed per day for the duration of construction, with an expected maximum level of 40 employees (U.S. DOE 2010). Construction would involve general construction and more specialized installation of electrical equipment and wind turbine components.

Local workers would be employed where possible, including workers from nearby communities and the greater Honolulu urbanized area, approximately 1 hour's drive from the wind farm site. Other workers would likely temporarily relocate to the analysis area for the duration of their

employment. Very few, if any, of the non-local workers employed during the construction phase of the Project would be expected to be accompanied by family members or permanently relocate to the analysis area. A worst case scenario, assuming 90 percent of the peak workforce were to temporarily relocate from elsewhere, would result in a temporary population gain of approximately 38 people, equivalent to 0.2 percent and 1.5 percent of the 2012 populations of the Koolauloa District and Kahuku, respectively (see Table 3.10-1). This is a small share of the total number annual visitors to the region. Additionally, the temporary addition of these workers is not expected to affect the levels of service provided by existing law and fire protection personnel or existing levels of health care and medical services. This impact would be localized and temporary.

Review of the housing resources in the wind farm site suggests that limited housing options exist for construction workers in the vicinity of the Project, with the majority of temporary accommodation oriented towards tourism. More temporary housing options are available further from the site, especially in the urbanized Honolulu area about 1 hour's drive away, and became available with the development of a new hotel near the Polynesian Cultural Center located south of the Project in the Laie community. The temporary relocation of construction workers is not expected to reduce the available supply of temporary housing for other tourists and other visitors.

Alternative 2 would have a minor, positive impact on the local economy during construction through the local procurement of materials and equipment and spending by construction workers. These direct expenditures would generate economic activity in other parts of the economy through what is known as the *multiplier* effect, with direct spending generating indirect and induced economic impacts. Indirect impacts consist of spending on goods and services by industries that produce the items purchased as part of the Project. Induced impacts include expenditures made by the households of workers involved either directly or indirectly in the construction process.

The Project would have a total expected installed cost of approximately $97 million, including equipment costs (turbines, blades, towers), balance of materials (concrete, rebar, transformers, electrical connection equipment), construction labor, and other development costs (engineering, financing, and legal services, easement costs) based on filings made with the Public Utilities Commission. Equipment costs are the largest estimated cost component accounting for about 70 percent of the estimated total. The equipment would all be purchased outside the region and likely imported from outside the state. Local purchases would likely include portions of the balance of materials, including fuel for vehicles and construction equipment, some equipment rentals, and other incidental materials and supplies. Local purchases, employment of local residents, and the temporary relocation of construction workers to the wind farm site would have minor, but positive impacts on local businesses.

The proposed facility would generate general excise tax (GET) and ~~sales~~ use tax revenues, with the majority of the project components, materials, and construction-related services expected to be subject at the state-level to either GET or use tax of 4 percent, with an additional tax of 0.5 percent levied by Honolulu County. Local purchases by construction workers and others employed directly and indirectly by the Project would also generate ~~sales tax~~GET revenue.

Operation and Maintenance Impacts

Estimates developed using the JEDI Wind model indicate that O&M of the proposed facility would employ two full-time workers; however, the Kahuku Wind Project employs four or five regular full-time employees to operate that facility, which is comparable in size to the Project. There may be four additional full- or part-time employees as a result of requirements to implement the HCP or otherwise (meaning an anticipated total of three to six full-time employees). This estimated change in population would not be expected to affect demand for housing or the provision of community services in the wind farm site. Operation and maintenance of the facility would have a minor positive impact on the local economy through the local procurement of materials and equipment and spending by workers.

Local O&M expenditures would generate state and local GET and use tax revenues. In 2009, the Honolulu City Council created a real property tax exemption for alternative energy improvements, including new wind facilities. As a result, the proposed facility would most likely be exempt from real property taxation for 25 years once a claim for exemption is approved (Revised Order of Honolulu [ROH] Section 8-10-15).

Alternative 2 would provide a clean source of renewable energy to Oahu and assist HECO in meeting its RPS requirements by increasing the portion of Oahu's energy derived from renewable energy sources. Energy generated from the facility would provide power as available and would be used to substitute other energy sources. The population of the analysis area is not expected to increase because of increased energy availability; therefore, Alternative 2 would not be considered growth inducing.

4.12.4.2 Direct and Indirect Effects of the HCP Conservation Measures

Impacts of Avoidance and Minimization Measures

The avoidance and minimization measures proposed under the Project HCP would have no effect on socioeconomic resources.

Impacts of HCP Mitigation

Implementation of the proposed HCP conservation measures would have limited, localized impacts in the mitigation areas and would be expected to have negligible to very limited, localized impacts on socioeconomic conditions in the Wahiawa District (associated with activities in the Poamoho Ridge Mitigation Area) and Koolaupoko Districts (associated with activities in the Hamakua Marsh Mitigation Area). These impacts would be in the form of local short- or long-term employment opportunities associated with implementation of mitigation activities. Overall, mitigation measures would have a minor beneficial effect on the socioeconomics within the analysis area.

4.12.4.3 Mitigation for Unavoidable Impacts

No mitigation is proposed to address socioeconomic impacts. NPMPP continues its outreach efforts with affected stakeholders to define its Community Benefits Package. This may include honoring

the commitment of the prior developer to pay $10,000 per wind turbine per year over the life of the project to the Kahuku Community. This translates into $80,000 to $100,000 per year over a 20- to 25-year project life or the equivalent of approximately $2,000,000 of direct economic benefits to the Kahuku Community. It is anticipated that Project funds would be administered by a board of local community members who would make decisions as to the use of the proceeds and which activities, programs, groups, and events would be sponsored. Additionally, over the course of the last 12 months, NPMPP has made several revisions to the proposed site plan for the Project eliminating or re-locating five wind turbines that were previously closer to the Kahuku Community.

4.12.4.4 Cumulative Effects

The cumulative effects analysis area for socioeconomic resources is the Koolauloa and Koolaupoko Districts. Ongoing and reasonably foreseeable projects in the analysis area for socioeconomics include the ongoing residential and commercial development associated with BYU, which broke ground in 2011, the proposed Turtle Bay Resort expansion, which is expected to occur sometime between 2015 and 2025, residential development associated with the Envision Laie Project, which is generally anticipated to occur prior to 2019, and ongoing restoration work at the Hamakua Marsh and Poamoho Ridge mitigation areas. In addition, transportation safety improvements for the Kamehameha Highway are anticipated sometime between 2015 and 2020 (see Table 4.2-2).

Construction of one or more of these projects could potentially coincide in time with the Project. Like the Project, these ongoing and reasonably foreseeable projects would employ construction workers. Residential and commercial construction includes more commonly available construction specialties than wind facility development and the share of workers from within the Koolauloa District and elsewhere in Honolulu County would likely be higher for these projects than for the proposed Project. Construction workers accounted for approximately 11 percent of the employed labor force in the Koolauloa District in 2012 and 7 percent in Honolulu County, with about 1,000 construction workers residing in the Koolauloa District and 31,000 county-wide (Table 3.10-3). Additional employment opportunities and funding associated with HCP mitigation would make a very minor short-term contribution to employment associated with ongoing restoration work at the Hamakua Marsh and Poamoho Ridge mitigation areas.

The other ongoing and reasonably foreseeable projects would have positive impacts on the local economy during construction through the local procurement of materials and equipment, as well as spending by construction workers. Procurement and other expenditures would also generate state and county GET and use tax revenues. The contribution of Alternative 2 to cumulative effects to local economic activity during construction is considered minor. This would also be the case during operation of the Project. Direct and indirect effects from Alternative 2 on community services and housing are also expected to be minor, localized, and temporary. Therefore, the contribution of Alternative 2 to cumulative effects on socioeconomic resources would be minor.

4.12.4.5 Summary

Construction of Alternative 2 would likely result in less than 40 workers temporarily relocating to the wind farm site. The impact of this temporary population gain would be minor and would not be expected to affect the availability of temporary housing resources or the provision of community services. Construction-related expenditures and spending by construction workers would result in a minor, beneficial impact to the local economy. These expenditures would also generate GET and use tax revenues. Operation of the Project would have similar, but much smaller impacts. Implementation of HCP conservation measures may result in a small number of additional employment opportunities, resulting in a minor, beneficial impact to the local economy. Effects to socioeconomic resources would generally be considered minor, to moderate because they would be of low intensity (changes in socioeconomic conditions are generally below normal limits and trends, or less than 5 percent increase or decrease); there would be both temporary and long-term impacts beneficial impacts; and with the exception of tax revenues, impacts would be generally local in nature. However, impacts associated with property values would be expected to vary by location (See Section 4.12.2.1).

4.12.4.6 Alternative 2a - Modified Proposed Action Option

Direct, indirect, and cumulative effects on socioeconomic conditions from the Modified Proposed Action Option would be the same as those described under the Proposed Action. There may be a decrease in the total expected installation cost of the Modified Proposed Action Option due to the fewer number of turbines compared to the Proposed Action, and therefore, a slight reduction in GET and tax revenues for Project components; however, these reductions would be negligible. The Community Benefits Package offered to the Kahuku Community by NPMPP would also be slightly reduced as it would be calculated on a per turbine basis.

4.12.5 Alternative 3 – Larger Generation Facility (Up to 12 Turbine Project)

4.12.5.1 Direct and Indirect Effects of Construction and Operation of the Project

Construction Impacts

As discussed in Chapter 2, Alternative 3 would involve construction of the first 8 to 10 turbines as early as the second quarter of 2016. There would be a lag of at least 3 years between the construction of the first set of turbines and the additional 2 to 4 turbines proposed under this alternative. Effects during the first phase of construction for this alternative would be the same as those described for Alternative 2. The second phase of the alternative, the installation of an additional 2 to 4 turbines, would have similar but proportionately smaller effects than the first phase.

Estimates developed using the JEDI Wind model suggest the second phase of the Project could result in total employment of 34 full-time equivalent jobs, with total construction earnings of $2.4 million. Total estimated installed cost for the second phase would be $34.1 million. Local purchases,

employment of local residents, and the temporary relocation of construction workers to the wind farm site would have additional minor but positive impacts on local businesses.

The second phase of Alternative 3 would generate additional GET and ~~sales~~ use tax revenues, with the majority of the Project components, materials, and construction-related services expected to be subject at the state-level to either GET or use tax of 4 percent, with an additional tax of 0.5 percent levied by Honolulu County. Local purchases by construction workers and others employed directly and indirectly by the Project would also generate additional ~~sales tax~~GET revenue.

Operation and Maintenance Impacts

Impacts to socioeconomic resources from O&M activities would be similar to those described under Alternative 2. The addition of 2 to 4 additional turbines under this alternative would increase the size of the permanent workforce with the addition of one or two additional full-time workers. Operation and maintenance of the facility would have a minor, positive impact on the local economy through the local procurement of materials and equipment and spending by workers.

4.12.5.2 Direct and Indirect Effects of the HCP Conservation Measures

Impacts of Avoidance and Minimization Measures

The avoidance and minimization measures proposed under the Project HCP would have no effect on socioeconomic resources.

Impacts of HCP Mitigation

Impacts of the HCP mitigation measures under Alternative 3 would be the same as described under Alternative 2. Prior to the construction of the additional turbines proposed under Alternative 3, NPMPP would reopen consultation with the USFWS and DOFAW to assess the potential impacts of the additional turbines to listed species and develop appropriate mitigation measures. The impacts of these mitigation measures to socioeconomic resources would be evaluated under a separate environmental analysis at that time.

4.12.5.3 Mitigation for Unavoidable Impacts

No mitigation is proposed to address socioeconomic impacts. NPMPP continues its outreach efforts with affected stakeholders to define its Community Benefits Package (see Section 4.12.4.3 for a description).

4.12.5.4 Cumulative Effects

Cumulative effects to socioeconomic resources under Alternative 3 would be similar to those described under Alternative 2. The Project proposed under Alternative 3 would have the potential to coincide with the same ongoing and reasonably foreseeable projects identified for Alternative 2. Therefore, when viewed in conjunction with past, present, and foreseeable projects in the analysis area, the contribution of Alternative 3 to cumulative effects on socioeconomic resources would be minor. Because there will likely be a delay in time of up to 3 years before additional turbines would

be built under Alternative 3, new projects and developments in the area will be assessed and reviewed to determine if there are additional cumulative impacts from future unknown projects.

4.12.5.5 Summary

Construction of the first phase of Alternative 3 would have similar effects as Alternative 2, summarized above. Construction of Alternative 3 would likely result in fewer than 40 workers temporarily relocating to the wind farm site during the first phase of construction and up to 34 workers during the second phase. The impact of this temporary population gain would be minor and would not be expected to affect the availability of temporary housing resources or the provision of community services. Construction-related expenditures and spending by construction workers would result in a minor positive impact to the local economy. These expenditures would also generate GET and use tax revenues. These impacts would be minor, temporary, and with the exception of tax revenues, generally local in nature. Operation of the Project would have similar, but much smaller impacts. Effects to socioeconomic resources under Alternative 3 would generally be considered minor because they would be of low intensity (changes in socioeconomic conditions are generally below normal limits and trends, or a less than 5 percent increase or decrease); there would be both temporary and long-term impacts beneficial impacts; and with the exception of tax revenues, impacts would be generally local in nature. However, impacts associated with property values would be expected to vary by location (see Section 4.12.2.1).

4.12.6 Conclusion

Potential socioeconomic concerns raised during scoping included potential adverse impacts to residential property values and potential impacts to the ability of homeowners to install rooftop PV systems. A majority of recent studies suggest that wind facilities do not have adverse impacts on nearby residential property values. In the smaller number of cases where some impact has been identified, impacts have tended to increase the closer a property is to the nearest wind turbine. Impacts also tend to be influenced by the existing landscape, with the presence of other manmade infrastructure like the existing Kahuku wind facility, likely to reduce these potential impacts. Construction and operation of the Project is not expected to affect the ability of homeowners to install rooftop PV systems on their homes.

Construction of the Project and implementation of HCP conservation measures under alternatives 2, 2a, and 3 would result in a small, temporary increase in population that would not be expected to affect the availability of temporary housing resources or the provision of community services. Construction-related expenditures and spending by construction workers under Alternatives 2 (including the Modified Proposed Action Option) and 3 would result in a small, positive impact to the local economy. These expenditures would also generate GET and use tax revenues. Operation of the Project would have similar, but much smaller impacts.

Alternatives 2 (including the Modified Proposed Action Option) and 3 would provide a clean, renewable source of energy to Oahu. In doing so, the Project would contribute to energy self-sufficiency by increasing the ratio of indigenous to imported energy use. As a source of renewable

energy, the Project would increase energy security for the State and reduce reliance on fossil-fuel based energy production, thereby reducing greenhouse gas emissions associated with the state's energy supply. The Project would also generate electricity at a cost that is approximately half the cost of generating electricity by burning fossil fuels, and HECO has stated in filings with the Public Utilities Commission that the Project would save the ratepayers millions of dollars over the life of the Project.

Table 4.12-2 summarizes potential impacts to socioeconomic resources from the alternatives considered in this analysis.

Table 4.12-2. Summary of Potential Impacts to Socioeconomic Resources

Impact Issues	No Action Alternative	Alternative 2 – Proposed Action	Alternative 2a – Modified Proposed Action Option	Alternative 3
Property Values	No Impact	Variable	Variable	Variable
Homeowner's Insurance Rates	No Impact	Negligible	Negligible	Negligible
Businesses	No Impact	Minor	Minor	Minor
Residential Solar Energy/ Photovoltaic System Installation	No Impact	Negligible	Negligible	Negligible
Population	No Impact	Minor	Minor	Minor
Demand on Housing	No Impact	Minor	Minor	Minor
Employment/Income	No Impact	Minor	Minor	Minor

4.13 Historic, Archaeological, and Cultural Resources

4.13.1 Impact Criteria

The impacts on historic, archaeological, and cultural resources were assessed by identifying archaeological resources in areas of potential effect (APE) and determining potential direct and indirect impacts on these resources. The significance of impacts on historically significant cultural resources under the National Historic Preservation Act (NHPA) is based on the criteria of adverse effect in Title 36 CFR Part 800, the regulations implementing Section 106 of the NHPA (see Section 3.1.1.1). Assessment of effects involving Native Hawaiian or other traditional community, cultural, or religious practices or resources also requires consultation with the affected group.

Impacts on historic, archaeological, and cultural resources (i.e., historic structures, archeological sites, and traditional cultural practices) are typically considered permanent as these resources are finite and disturbance of them, particularly archaeological sites, cannot be reversed. Impacts to cultural resources that are eligible for listing on the National Register of Historic Places (NRHP) or Hawaii Register of Historic Places (HRHP) would be considered significant under NEPA/HEPA if they result in adverse effects. However, impacts on historic landscapes or the viewsheds of historic or other significant areas can be temporary if projects do not permanently impact associated resources and are removed at a future date.

Impact criteria for determining effects on historic, archaeological, and cultural resources within the APE from the Project are described further in Table 4.13-1 below.

Table 4.13-1. Impact Criteria for Cultural and Archaeological Resource

Type of Effect	Impact Component	Effects of Summary		
Effects on Historic, Cultural and Archaeological Resources	Magnitude or Intensity	**High:** Loss of integrity for eligibility to the NRHP or HRHP.	**Medium:** Measurable impacts to integrity not sufficient to affect National or Hawaii Register eligibility.	**Low:** No detectable changes in integrity.
	Duration	**Permanent:** Chronic effects; resource would not be anticipated to return to previous levels.	**Long-term:** Resource integrity would be reduced but effects could be mitigated with active management.	**Temporary:** Resource integrity would be reduced but short-term mitigation would be expected to restore pre-activity levels.
	Geographic Extent	**Extended:** Affects resources with significance beyond the region or wind farm site. Significance is defined in 36 CFR 79.	**Regional:** Affects resources with significance throughout wind farm site. Significance is defined in 36 CFR 79.	**Local:** Impacts limited geographically to discrete portions of the wind farm site. Significance is defined in 36 CFR 79.
	Context	**Unique:** Affects cultural resources eligible for the National or Hawaii Register and significant at the national or state level.	**Important:** Affects cultural resources eligible for the National or Hawaii Register and significant at the local level.	**Common:** Affects cultural resources not eligible for the National or Hawaii Register, but protected by other laws.

4.13.2 Alternative 1—No Action

4.13.2.1 Direct and Indirect Effects

Under Alternative 1, the Project would not be constructed, an ITP would not be issued by the USFWS, and the HCP conservation measures would not be implemented. Therefore, Alternative 1 would have no effect to historic, archaeological, and cultural resources. As such, no mitigation measures would be required.

4.13.2.2 Cumulative Effects

Under the No Action Alternative, the Project would not be constructed, an ITP would not be issued by the USFWS, and the HCP conservation measures would not be implemented. Therefore, there would be no adverse effects to cultural resources or traditional cultural practices. Thus, Alternative 1 would not contribute to cumulative effects on historic, archaeological, and cultural resources.

4.13.2.3 Summary

Alternative 1 would have no direct, indirect, or cumulative effects on historic, archaeological, and cultural resources because no action would be undertaken.

4.13.3 Alternative 2 – 8 to 10 Turbine Project

4.13.3.1 Direct and Indirect Effects of Construction and Operation of the Project

Direct impacts on historic, archaeological, and cultural resources due to the construction of the Project could result from: vegetation clearing; grading, trenching, excavation for turbine placement or other facilities; and any other earth-moving activity that disturbs historical resources or historic properties, previously undisturbed cultural resources, or cultural resources unevaluated for NRHP or HRHP eligibility. Table 4.13-2 lists the known archaeological resources within the APE and associated significance assessments and recommended treatments.

Indirect impacts to historic, archaeological and cultural resources could result from noise, dust, and vibrations caused by earthmoving and heavy equipment, loss of community access to cultural resources, such as traditional cultural properties. These effects are discussed in detail below in the context of the Project. An Archaeological Inventory Survey (AIS) (approved by the Hawaii State Historic Preservation Division [SHPD] on December 15, 2015) and Cultural Impact Assessment (CIA) evaluating impacts to archaeological and cultural resources are included in Appendices F and G, respectively, the results of which are summarized below.

Archaeological Sites

Of the 14 archaeological sites recorded in the APE, 13 were assessed as significant for their information potential under Criterion D (Table 4.13-2). Each of these sites has either yielded or has the potential to yield information important to state and national history.

Five sites yielded the information they contain during the current AIS investigations and no further work is being recommended. Four of these sites (SIHP Nos. 50-80-02-7845, 50-80-02-7848, 50-80-02-7863, and 50-80-02-7864) are outside of the area of disturbance and would not be affected by Project construction. No further work is recommended for one site (50-80-02-7841) that has the potential to be affected by the Project. Only two (50-80-02-7845 and 50-80-02-7848) are recommended to be eligible for listing on the HRHP, and none are recommended to be eligible for listing on the NRHP.

One site (50-80-02-7844) consists of multiple components of the sugar complex of the historic Kahuku Plantation. Thirty-eight of these components were recorded in the APE. Eleven components and a portion of a twelfth are within the area of disturbance and have the potential to be affected by the Project. Data recovery in the form of historical documentation and analysis of the irrigation network is recommended for the site. A portion of one component (C39) is recommended for preservation (see below). The site is eligible for listing on the HRHP but not on the NRHP.

Table 4.13-2. Archaeological Resources within the APE

SIHP No. 50-80-02-XXXX	Component	Site Type	Site Significance	Feature Des.	Feature Type	Period	Recommendations
7840	-	Complex	Not significant	A	Alignment	Historic/ military	No Further Work
				B	Hearth		No Further Work
7841	-	Marker	D	A	Stone mound	Traditional	No Further Work
7842	-	Habitation	D	A	Platform	Traditional	Preservation
7843	-	Defensive	A, D	A	Bunker	Historic/military	Preservation
				B	Bunker		Preservation
7844	C1	Water transport	A, D	A	Ditch	Historic/sugar	Data Recovery
7844	C2	Water control	A, D	A	Concrete culvert	Historic/sugar	Data Recovery
	C3	Complex	A, D	A	Concrete foundation	Historic/sugar	Data Recovery
				B	Concrete foundation		Data Recovery
				C	Concrete foundation		Data Recovery
				D	Concrete foundation		Data Recovery
				E	Retaining wall		Data Recovery
	C4	Complex	A, D	A	Ditch	Historic/sugar	Data Recovery
				B	Ditch		Data Recovery
				C	Ditch		Data Recovery
				D	Ditch		Data Recovery
	C5	Complex	A, D	A	Valve	Historic/sugar	Data Recovery
				B	Well		Data Recovery
	C6	Complex	A, D	A	Concrete foundation	Historic/sugar	Data Recovery
				B	Concrete ditch		Data Recovery
				C	Iron pipeline		Data Recovery
	C7	Water transport	A, D	A	Pipeline	Historic/sugar	Data Recovery
	C8	Water transport	A, D	A	Soil ditch	Historic/sugar	Data Recovery
	C9	Water transport	A, D	A	Stone/concrete Ditch	Historic/sugar	Data Recovery
	C10	Water transport	A, D	A	Concrete ditch	Historic/sugar	Data Recovery
	C11	Water control	A, D	A	Storage area	Historic/sugar	Data Recovery
				B	Concrete well		Data Recovery
				C	Brick well		Data Recovery
				D	Brick well		Data Recovery
				E	Rock/Concrete wall		Data Recovery
				F	Brick well		Data Recovery
	C12	Water control	A, D	A	Pump house	Historic/sugar	Data Recovery
	C13	Storage	A, D	A	Shed	Historic	Data Recovery
				B	Concrete slab		Data Recovery
	C14	Water transport	A, D	A	Concrete ditch	Historic/sugar	Data Recovery
	C15	Water transport	A, D	A	Stone ditch	Historic/sugar	Data Recovery

Table 4.13-2. Archaeological Resources within the APE (continued)

SIHP No. 50-80-02-XXXX	Component	Site Type	Site Significance	Feature Des.	Feature Type	Period	Recommendations
7844	C16	Roadway	A, D	A	Stone retaining wall	Historic/sugar	Data Recovery
	C17	Water transport	A, D	A	Soil/concrete ditch	Historic/sugar	Data Recovery
	C18	Water transport	A, D	A	Soil ditch	Historic/sugar	Data Recovery
				B	Concrete foundation		Data Recovery
	C19	Water transport	A, D	A	Stone lined ditch	Historic/sugar	Data Recovery
				B	Stone lined ditch		Data Recovery
				C	Stone lined ditch		Data Recovery
	C20	Water transport	A, D	A	Soil ditch	Historic/sugar	Data Recovery
				B	Retaining wall		Data Recovery
				C	Retaining wall		Data Recovery
				D	Concrete ditch		Data Recovery
	C21	Water transport	A, D	A	Soil ditch	Historic/sugar	Data Recovery
				B	Concrete footing		Data Recovery
	C22	Water transport	A, D	A	Concrete ditch	Historic/sugar	Data Recovery
	C23	Water transport	A, C, D	A	Stacked stone ditch	Historic/sugar	Data Recovery
	C24	Water transport	A, D	A	Concrete ditch	Historic/sugar	Data Recovery
	C25	Water transport	A, D	A	Stone alignment	Historic/sugar	Data Recovery
	C27	Water control	A, D	A	Reservoir	Historic/sugar	Data Recovery
	C28	Water transport	A, D	A	Concrete ditch	Historic/sugar	Data Recovery
	C29	Water transport	A, D	A	Concrete ditch	Historic/sugar	Data Recovery
	C30	Water transport	A, D	A	Limestone ditch	Historic/sugar	Data Recovery
	C31	Water transport	A, D	A	Iron pipeline	Historic/sugar	Data Recovery
	C32	Water transport	A, D	A	Concrete ditch	Historic/sugar	Data Recovery
	C34	Water control	A, D	A	Pump house	Historic/sugar	Data Recovery
				B	Tank		Data Recovery
				C	Concrete ditch		Data Recovery
				D	Concrete ditch		Data Recovery
	C36	Water transport	A, D	A	Limestone ditch	Historic/sugar	Data Recovery
	C37	Water transport	A, D	A	Stacked stone ditch	Historic/sugar	Data Recovery
	C38	Water transport	A, D	A	Concrete ditch	Historic/sugar	Data Recovery
	C39	Water transport	A, D	A	Aqueduct	Historic/sugar	Data Recovery
				B	Concrete ditch		Data Recovery
				C	Soil ditch		Data Recovery
				D	Limestone retaining wall		Data Recovery
				E	Concrete ditch		Data Recovery

Table 4.13-2. Archaeological Resources within the APE (continued)

SIHP No. 50-80-02-XXXX	Component	Site Type	Site Significance	Feature Des.	Feature Type	Period	Recommendations
7844	C40	Water transport	A, D	A	Soil ditch	Historic/sugar	Data Recovery
	C41	Water transport	A, D	A	Concrete ditch	Historic/sugar	Data Recovery
7845	-	Agriculture	D	A	Terrace	Historic	No Further Work
7846	-	Agriculture	D	A	Stone terrace	Traditional	Preservation
7847	-	Agriculture	D	A	Terrace	Traditional	Preservation
7848	-	Agriculture	D	A	Terraced soil furrows	Historic	No Further Work
				B	Terrace		No Further Work
				C	Terraced soil furrows		No Further Work
				D	Terraced soil furrows		No Further Work
7863	-		D	A	Modified outcrop	Traditional	No Further Work
7864	-		D	A	Stone terrace	Traditional	No Further Work
7865	-	Agriculture	D	A	Terrace	Traditional	Preservation
				B	Terrace		Preservation
7866	-	Habitation	D	A	Artifact scatter	Historic	Data Recovery
7867	-	Habitation	D	A	Cave	Traditional	Data Recovery

Two additional site (50-80-02-7866 and 50-80-02-7867) still have the potential to yield important information of the history of the area (see below for a description of each). Site 50-80-02-7866 is located outside the area of disturbance, while Site 50-80-02-7867 is located within the area where Project construction will occur. Data recovery excavations have been recommended for these two sites prior to Project construction. Artifact collections and excavations in these sites will provide important information on historic and traditional activities that took place in this area and the chronology of settlement. Once this information has been collected, no additional work will be necessary; however, these site will be eligible for listing on the HRHP.

Six sites (50-80-02-7842, 50-80-02-7843, 50-80-02-7844 (in part), 50-80-02-7846, 50-80-02-7847, and 50-80-02-7865) are recommended for preservation based on their significance (see below for a description of each). These sites appear to be eligible for listing on the HRHP. Site 50-80-02-7843 also appears eligible for listing on the NRHP. All of these sites are outside of the area of disturbance, except Component C39 of Site 50-80-02-7844. Features A (an aqueduct) and B (an adjoining ditch) of this component also are recommended for preservation. Feature A is to be preserved in its entirety, while only the portion of Feature B that is adjacent to Feature A is recommended for preservation.

Two of the 14 archaeological sites within the APE have also been assessed as significant under Criterion A, indicating association with important historical events. The significance of Site 50-80-02-7843 is based on its association with World War II. The significance of Site 50-80-02-7844 is based on its association with the Kahuku Plantation, one of the early sugar plantations in Hawaii and a dominant economic and social force on the north shore of Oahu.

The following provides descriptions of Sites 50-80-02-7844, 50-80-02-7866, and 50-80-02-7867 that are recommended for data recovery. Data recovery is recommended to retrieve important information that will add to the knowledge about chronology, settlement, and use of this portion of the Kahuku area.

- Site 50-80-02-7844: This site is an extensive and discontinuous area containing structural remnants of the Kahuku Sugar Plantation that operated from 1890 to 1971 and was a dominant social, economic, and cultural factor for the North Shore. The site consists of 41 identified components—mostly water transport and control structures. Data recovery is recommended in the form of documentation and analysis of the water transport systems.
- Site 50-80-02-7866: This site is an approximately 2,100-square-foot (200-square-meter) area containing scattered historic artifacts (glass bottles and ceramics). The site appears to represent a dump during the historic period. Data recovery is recommended in the form of surface collection and laboratory analysis of artifacts.
- Site 50-80-02-7867: This site is a cave with a marine shell midden. Excavations previously conducted at the site have identified a subsurface cultural deposit dating between the mid-1600s and 1800s. This site is significant because it gives insight in the area of Kahuku prior to, and likely at the point of, western contact, and provides a glimpse of life before the area was transformed by the sugar plantation. Data recovery is recommended in the form of additional excavation.

The following provides a description of the six sites recommended for preservation:

- Site 50-80-02-7842: This is a traditional pre-Contact stone platform that was probably the foundation of a perishable structure used for habitation by Native Hawaiians. It is recommended for preservation because it is one of the few vestiges of traditional use of this area.
- Site 50-80-02-7843: This site consists of two World War II era concrete bunkers that were a part of the Oahu coastal defense system. They are recommended for preservation because of their association with this period of our Nation's history.
- Site 50-80-02-7844, Component C39 (features A and B): This site consists of a concrete aqueduct and an associated concrete ditch. These features were associated with the Kahuku Sugar Plantation. These features are recommended for preservation because of their construction style and association with the historic activity in the area.
- Site 50-80-02-7846: This site consists of two traditional pre-Contact agricultural features, a stone terrace and a soil terrace, that were used by Native Hawaiians for the cultivation of crops. This site is recommended for preservation because it is one of the few vestiges of traditional use of this area.
- Site 50-80-02-7847: This site consists of a single traditional pre-Contact agricultural feature, a soil terrace that was probably used by Native Hawaiians for the cultivation of crops. This site is recommended for preservation because it is one of the few vestiges of traditional use of this area.
- Site 50-80-02-7865: This site consists of a habitation terrace and a small agricultural terrace constructed and utilized during the pre-Contact period. It is recommended for preservation because of its association with traditional use of this area.

To summarize, construction of the Project has the potential to affect 13 archaeological sites assessed as significant under Criterion D (consisting primarily of features associated with historic sugar plantation activities). Five of the sites have already yielded information and are not recommended to be eligible for listing on the NRHP or HRHP (i.e., no further archaeological work is required). Five additional sites and two features of a sixth site are recommended for preservation and are potentially eligible for listing on the HRHP or NRHP. Three of the sites (50-80-02-7844, 50-80-02-7866, and 50-80-02-7867) are potentially eligible to be listed on the HRHP for their information potential, and data recovery is recommended. If not mitigated with data recovery, this would be considered an adverse effect to historic properties by SHPD. Therefore, treatments have been proposed for these three sites in the form of archaeological data recovery investigations (additional documentation, analysis, collection, and excavations) to mitigate the potential adverse effects caused by development of the Project through retrieval of the significant information. Once retrieved, the demolition of the sites has been mitigated, and there is no longer an adverse effect.

During operation, the presence of new or improved access within the wind farm site has the potential to adversely affect archeological resources by providing increased access to sites that were previously difficult to reach. This could increase the potential for vandalism and theft of

resources; however, access to the wind farm site would be controlled for safety reasons, thereby impeding unauthorized access.

Traditional Cultural Uses and Practices

The results of the CIA indicate that the proposed wind farm site and vicinity was heavily disturbed during the Plantation era for sugar cane and pineapple cultivation, which significantly decreases the likelihood of the presence of important cultural resources. Based on the ethnographic interviews conducted as part of the CIA, there does not appear to be a need for traditional access to the wind farm site for the collection of natural resources or for performing traditional cultural practices. No traditional activities associated with gathering natural resources or conducting traditional cultural practices were identified within the APE (see the CIA in Appendix G for additional information). It appears that community access to this area was not allowed during the plantation era. Given that access to this area does not appear to be needed for traditional cultural uses or practices, NPMPP does not plan to change the current status of mauka/makai access in this area.

Culturally Important Species

The results of the CIA indicate that many species of birds and bats that occur in the vicinity of the Project are recognized as culturally important. The cultural importance of these species is described in Section 3.11, and impacts of the project on these species are described in Section 4.11.3.1. There is the potential for individual birds and bats that are considered culturally important to collide with Project structures. The Project HCP includes measures to avoid, minimize, and mitigate for these impacts (see Chapter 2 for a description). These measures would reduce the risk of Project-related impacts to culturally important species.

4.13.3.2 Direct and Indirect Effects of the HCP Conservation Measures

Impacts of Avoidance and Minimization Measures

The avoidance and minimization measures proposed under the Project HCP would have no effect on cultural resources or traditional cultural practices in the analysis area. These measures will benefit culturally important species by reducing the risk of collision with Project-related structures (see Section 4.11.3.2).

Impacts of HCP Mitigation

No impacts to historic, archaeological, and cultural resources would occur in association with funding for Newell's shearwater research and management or short-eared owl research and management. The partial fence along the northeastern border of the Hamakua Marsh Mitigation Area for waterbird mitigation would be designed to avoid known historic, archaeological, and cultural resources within the Kawainui-Hamakua Marsh complex and would be consistent with the DLNR Kawainui Marsh Master Plan (DLNR 1994) and its forthcoming updates (Kawainui-Hamakua Marsh Complex Master Plan; DLNR 2014a). The Kawainui-Hamakua Marsh complex is recognized in part for its importance as a cultural resource. Waterbird mitigation would preclude trespassing into and littering within Hamakua Marsh; therefore, HCP mitigation would have a minor beneficial

effect on cultural resources within Hamakua Marsh. Funding for restoration and monitoring at the Poamoho Ridge Mitigation Area for bats would not involve ground-disturbing activities and are covered by DLNR's existing exemption from Chapter 343 environmental analysis for the Koolau Forest Watershed Protection Project (DLNR 2012), and therefore would have negligible effects to historic, archaeological, and cultural resources.

4.13.3.3 Mitigation of Unavoidable Impacts

This section describes measures that NPMPP would implement to minimize and mitigate impacts to archaeological and cultural resources within the APE. These measures are described in detail in the AIS (Appendix F) that has been approved by SHPD. A majority (78 percent) of known archaeological sites within the APE do not coincide with proposed Project facilities and therefore would be avoided, and no additional mitigation is required.

NPMPP's design engineers continue to consider construction methods and design modifications that can be implemented to avoid and minimize direct impacts to known archaeological resources that coincide with proposed Project facilities. Some of the archaeological resources that have the potential to be directly affected have been fully documented and will not require any further archeological work; other sites will require further archaeological work in the form of data recovery (mapping and excavation).

Data recovery excavations recommended at sites 50-80-02-7844, 50-80-02-7866, and 50-80-02-7867 will aid in determining the chronology of use of the area as well as provide details about the activities that took place before western contact. Data recovery will consist of further hand excavations with shovels, picks, trowels, and brushes. Soil will be collected in dust pans and all material excavated will be screened through nested 1/4- and 1/8-inch screens; cultural material will be collected and analyzed in a data recovery report. At Site 50-80-02-7867, a backhoe may be used to excavate the filled portion fronting the cave site entrance to aid in access into the cave. Additional test units will be placed in front of the caves exterior to help further clarify the context of the site. NPMPP's contractor Pacific Legacy will prepare a Data Recovery Plan, approved by SHPD, for these sites which will provide additional detail on data recovery methods.

Site 50-80-02-7844 includes two features (an aqueduct and part of a ditch) that are recommended for preservation but are located within a proposed access road. Engineers will work to microsite the Project facilities such that these features can be avoided. If avoidance is not possible, these features will be mitigated as appropriate in coordination with SHPD.

4.13.3.4 Cumulative Effects

The analysis area for cumulative effects to historic, archaeological, and cultural resources is the wind farm site. This area captures direct impacts of the Project, including cultural impacts to the surrounding communities. The Project would not result in adverse impacts to archaeological and cultural resources because standard avoidance and minimization measures have been recommended and incorporated into the Project design, and mitigation for impacted properties has been approved by SHPD. No impacts to archaeological resources or customary or traditional uses

by Native Hawaiians would occur as a result of implementing the HCP. None of the projects in Table 4.2-2 overlap with the CIAA for historic, archaeological, and cultural resources; therefore, there would be no cumulative effects.

4.13.3.5 Summary

Construction of the Project under Alternative 2 has the potential for moderate adverse impact to some cultural resources meeting Criterion D (information potential). These impacts would be mitigated through treatments, approved by SHPD, directed toward archaeological resources data recovery from these sites. One site (50-80-02-7844) meeting Criterions A (association with important events), C (high degree of workmanship), and D (information potential) will be preserved and avoided. During operation, access to the wind farm site would be controlled to avoid any indirect impacts to known archaeological resources associated with vandalism or theft. Therefore, effects to historic and archaeological resources would be of low magnitude (no change in integrity anticipated), long-term (lasting the life of the project but mitigated through active management), and localized, and effects to resources eligible for NRHP or HRHP listing would be fully mitigated through data recovery. No effects to traditional cultural uses and practices would occur under the Proposed Action. Therefore, effects to historic, archaeological, and cultural resources under Alternative 2, when avoided, minimized, and mitigated as proposed, would be minor.

4.13.3.6 Alternative 2a - Modified Proposed Action Option

Under Alternative 2a, direct, indirect, and cumulative effects on historic, archaeological, and cultural resources would be the same as those described under Alternative 2. Two archaeological sites (Sites 50-80-02-7846 and 50-80-02-7847) identified and recommended for preservation in the AIS (Appendix F) are located in proximity to the turbine and access road that would not be included in the Modified Proposed Action Option. However, both sites are outside the area of disturbance and would not be affected by Project construction under either the Modified Proposed Action Option or the Proposed Action. Implementation of mitigation measures, as described under the Proposed Action, would minimize adverse impacts to historic, archaeological, and cultural resources.

4.13.4 Alternative 3 – Larger Generation Facility (Up to 12 Turbine Project)

4.13.4.1 Direct and Indirect Effects of Construction and Operation of the Project

Archaeological Sites

Impacts to archaeological resources would be the same as described above for Alternative 2. There is one additional component of Site 50-80-02-7844 (C6) located adjacent to the proposed turbines on the Malaekahana parcel that would only be within the construction area under Alternative 3. This site component consists of a concrete foundation, concrete ditch, and iron pipe associated with historic sugar plantation activities and was assessed as significant under Criterion D. These features

are part of the historical irrigation network recommended for documentation and analysis as data recovery for Site 50-80-02-7844.

Traditional Uses and Practices

Impacts to traditional uses and practices under Alternative 3 are the same as described under Alternative 2.

Culturally Important Species

Impacts to culturally important species during construction and operation of the Project under Alternative 3 would be the same as described under Alternative 2.

4.13.4.2 Direct and Indirect Effects of the HCP Conservation Measures

Impacts of Avoidance and Minimization Measures

The avoidance and minimization measures proposed under the Project HCP would have no effect on historic, archaeological, or cultural resources in the analysis area.

Impacts of HCP Mitigation

Impacts of HCP mitigation under Alternative 3 would be the same as described under the Proposed Action. Prior to construction of the additional turbines proposed under Alternative 3, NPMPP would reopen consultation with the USFWS and DOFAW to assess the potential impacts of the additional turbines to listed species and develop appropriate mitigation measures. The impacts of these mitigation measures to historic, archaeological, and cultural resources would be evaluated under a separate environmental analysis at that time.

4.13.4.3 Mitigation of Unavoidable Impacts

Mitigation for impacts to historic, cultural, and archaeological resources under Alternative 3 would be the same as described under Alternative 2. The additional site that has the potential to be affected under Alternative 3 has been fully documented and requires no further mitigation.

4.13.4.4 Cumulative Effects

Cumulative effects under Alternative 3 would be the same as described above for Alternative 2.

4.13.4.5 Summary

For the reasons described under Alternative 2, the effects to historic and archaeological resources under Alternative 3 would be of low magnitude (no change in integrity anticipated), long term (lasting the life of the project but mitigated through active management), and localized; and effects to resources eligible for NRHP or HRHP listing would be fully mitigated through data recovery. No effects to traditional cultural uses and practices would occur under Alternative 3. Therefore, effects to historic, archaeological, and cultural resources under Alternative 3, when avoided, minimized, and mitigated as proposed, would be minor.

4.13.5 Conclusion

Table 4.13-3 summarizes potential impacts to cultural resources and traditional cultural practices from the alternatives considered in this analysis.

Table 4.13-3. Summary of Potential Impacts to Historic, Archaeological, and Cultural Resources

Impact Issues	No Action Alternative	Alternative 2 – Proposed Action	Alternative 2a – Modified Proposed Action Option	Alternative 3
Archaeological Sites	No Impact	Minor	Minor	Minor
Traditional Cultural Uses and Practices	No Impact	Negligible	Negligible	Negligible

4.14 Land Use

4.14.1 Impact Criteria

Impacts to land use were assessed based on whether the construction and operation of the Project and implementation of HCP conservation measures would be 1) compatible with existing and proposed land uses and 2) consistent with land use plans and regulations. Table 4.14-1 lists the impact criteria considered when determining the level of effect (i.e., negligible, minor, moderate, major) that the Project could have to land use. For consistency with land use plans and policies, effects are determined to be consistent or inconsistent. Based on comments on the original Draft EIS that requested an expanded discussion of agriculture, effects to agricultural uses and activities are discussed separately in Section 4.22 – Agriculture.

Table 4.14-1. Impact Criteria for Land Use

Type of Effect	Impact Component	Effects Summary		
Compatibility with existing and planned land uses.	Magnitude or Intensity	**High:** Incompatible with existing and planned uses.	NA	**Low/No Impact:** Compatible with existing and planned uses.
	Duration	**Permanent:** Existing land uses would not be able to return to previous locations and levels following Project decommissioning.	**Long term:** Existing land uses would return to pre-activity locations and levels at some point after completion of the Project.	**Temporary.** Existing land uses will be affected during the Project construction and would be expected to return to pre-activity levels at the completion of the construction.
	Geographic Extent	**Extended:** Affects land use beyond the Koolau Loa Sustainable Communities Plan area.	**Regional:** Affects land use within the Koolau Loa Sustainable Communities Plan area.	**Local:** Affects land use within the wind farm site or immediate vicinity.

Table 4.14-1. Impact Criteria for Land Use (continued)

Type of Effect	Impact Component	Effects Summary		
Compatibility with existing and planned land uses (continued).	Context	**Unique:** The affected lands are protected by legislation and have a unique role within the region.	**Important:** The affected lands are protected by legislation or are rare within the locality or region.	**Common**: The affected lands are not rare in the locality, do not fill a unique role, and are not protected by legislation.
Consistency with the Koolau Loa Sustainable Communities Plan and land use regulations	NA	**Inconsistent:** Project is not consistent with the Koolau Loa Sustainable Communities Plan and land use regulations.		**Consistent/No Impact:** The Project is consistent with the Koolau Loa Sustainable Communities Plan and land use regulations.

4.14.2 Alternative 1—No Action

4.14.2.1 Direct and Indirect Effects

Under the No Action Alternative, the Project would not be constructed, an ITP would not be issued by the USFWS, and the HCP conservation measures would not be implemented. Therefore, Alternative 1 would have no effect on land use. As such, no mitigation measures would be warranted.

4.14.2.2 Cumulative Effects

Under the No Action Alternative, the Project would not be constructed, an ITP would not be issued by the USFWS, and the HCP conservations measures would not be implemented. Therefore, there would be no effect on land use. Thus, Alternative 1 would not contribute to cumulative effects on land use.

4.14.2.3 Summary

Alternative 1 would have no direct, indirect or cumulative effects on land use as no action would be undertaken.

4.14.3 Alternative 2—8 to 10 Turbine Project

4.14.3.1 Direct and Indirect Effects of Construction and Operation of the Project

Existing and Planned land Uses

Direct Impacts

Wind energy facilities are widely recognized as being a compatible use of land with active farming. Operations of the Project would continue to allow farming activities within the wind farm site. ALISH Prime Agriculture lands and active farming operations on the Malaekahana Hui West parcel of the wind farm site would be maintained. Nonetheless, direct impacts to land use during construction of the Project would include short-term temporary disruption to existing farming

activities on the Malaekahana Hui West, LLC parcel of the wind farm site that are currently being farmed. During the construction period, up to approximately 8.2 acres (3.3 hectares) of active farmed lands would be disrupted. See Section 4.22 – Agriculture for a detailed discussion.

Of this amount, approximately 4.6 acres (1.8 hectares) of existing farmed lands would be used over the long term (for the life of the Project) for the installation of the turbines, access roads, and other Project components. This comprises approximately 3 percent of the existing farmlands within the wind farm site. However, no net loss in agriculture would occur as NPMPP would work with Malaekahana Hui West, LLC to prepare inactive agricultural lands for crop production (see Section 4.22 – Agriculture for additional information).

Upon completion of the planned operational life of the Project (if the Project is not repowered), the Project would be decommissioned and the wind farm site would be rehabilitated, thereby allowing permitted agricultural uses to return to the lands occupied by Project facilities. As a result, direct impacts to land use from Project operations are considered to be long term rather than permanent.

The Project would also be compatible with nearby existing residential, commercial, public, and other land uses, as evidenced by the existing Kahuku Wind Farm that is directly adjacent to the Project to the north. The Kahuku Wind Farm was installed in March 2011 and has co-existed in Kahuku for the past several years. In addition, the wind resources in the Kahuku area, availability of land to lease, and availability of transmission capacity makes the Project location feasible for developing a wind energy facility.

Indirect Impacts

Indirect impacts to land use during the construction of the Project would involve potential disturbance effects to existing land uses in the near vicinity of the Project. Noise from construction activity would be audible in the surrounding area at times during the construction period (noise impacts are discussed in detail in Section 4.6 – Noise). Similarly, Project construction equipment and activities and in-progress Project facilities would be visible to varying degrees within the surrounding area during the construction period (as discussed in Section 4.16 – Visual Resources). Project-related construction activities and traffic would likely cause intermittent delays or access disruptions for land uses served by key access routes in the local area (as discussed in Section 4.17 – Transportation).

The existing roadway system within the wind farm site would be modified or expanded to accommodate the facilities and operations of the Project. During Project construction, it is anticipated that there may be temporary access restrictions along existing roads to ensure the safety of farmers within the wind farm site. A Site Safety Handbook would be developed and implemented during construction which would include measures for notifying farmers of upcoming construction activities, access restrictions, and other measures to ensure safety is maintained during construction. There would be no permanent reduction in access along wind farm site roads; however, during Project operation there may be temporary, localized reductions in access in association with routine maintenance activities to ensure farmer safety. NPMPP would work with Malaekahana Hui West, LLC, to ensure that a notification system is in place to inform farmers of the

timing and location of maintenance activities, restrictions in access and alternative access routes, and other important information. Over the long term, expansion of the road system would result in a beneficial impact to farmers through expanded and improved access along the existing road system. For these reasons, the Project would be compatible with existing and future uses of lands within and surrounding the wind farm site.

Indirect impacts to nearby land uses during the operations phase of the Project would include potential impacts to nearby developed areas of Kahuku Town in relation to air quality, noise, visual, public health, and traffic considerations. For further discussion on applicable direct and indirect impacts, see Sections 4.5 – Air Quality, 4.6 – Noise, 4.16 – Visual, 4.18 – Public Health and Safety, and 4.17 – Transportation, respectively.

Land Use Plans and Regulations

The wind farm site includes lands classified as Prime and with productivity levels rated as A, B, C, D, E, and Unclassified. Under the applicable State land use regulations for Agricultural District (HRS § 205), wind energy facilities are permitted uses on agricultural lands within all of the agricultural productivity rating categories. As such, the Project is consistent with the State land use regulations. See Section 4.22 – Agriculture and Chapter 5 for additional discussion.

The Project is located within the City and County of Honolulu agricultural zoning districts AG-2 General Agricultural (AG-2) and AG-1 Restricted Agricultural (AG-1). Wind energy facilities are a permitted use within these zoning districts as a conditional use that can be approved with the issuance of a Conditional Use Permit Minor. As required, NPMPP will submit an application for a Conditional Use Permit Minor to the City and County of Honolulu in compliance with this requirement. As such, the Project would be consistent with existing City and County of Honolulu land use regulations. For additional discussion of Project consistency with land use plans and policies see Chapter 5 of this EIS.

The wind farm site is located within the boundaries of the Koolau Loa planning region of Oahu. The comprehensive plan applicable to this area is the Koolau Loa Sustainable Communities Plan, which designates the wind farm site for agricultural, military, and rural residential use (see Figure 3.12-2; City and County of Honolulu 2012). The location of the Project facilities is within the agricultural designation and permitted as a conditional use according to the agricultural zoning district. The Project is consistent with the policies of the Koolau Loa Sustainable Plan. For further discussion on compliance with the Koolau Loa Sustainable Communities Plan, see Chapter 5 of this EIS.

4.14.3.2 Direct and Indirect Effects of the HCP Conservation Measures

Impacts of Avoidance and Minimization Measures

The avoidance and minimization measures proposed under the Project HCP would have a minor effect on land use. As stated above, approximately 4.6 acres (1.8 hectares) of existing farmed lands would be impacted over the long term in association with the turbines, access roads, and other Project components. This includes plots beneath the turbines that would be maintained in low-growing crops or other vegetation to facilitate the post-construction monitoring program.

Impacts of HCP Mitigation Measures

No impacts to direct or indirect effects to land use would occur in association with funding provided for Newell's shearwater research and management and short-eared owl research and management. These activities are not part of any plans for land use development and would be implemented as part of ongoing conservation programs.

Installation of the partial fence at the Hamakua Marsh for waterbird mitigation and funding applied toward forest restoration and monitoring at Poamoho Ridge for bat mitigation would not change existing land uses in the mitigation areas. Mitigation activities would be compatible with, and would contribute to the benefits of, ongoing management and restoration efforts within the mitigation areas and would be consistent with the underlying applicable land use plans and regulations. Thus, mitigation activities would result in a negligible adverse impact on land use over the short term for the installation of the fence at Hamakua Marsh and restoration and monitoring at Poamoho Ridge. Because the waterbird and bat mitigation measures would improve habitat in the mitigation areas (inhibiting trespassing, littering and incidental mortality of waterbirds at Hamakua Marsh and restoration of native forest at Poamoho Ridge), they would be expected to have a minor beneficial impact on land use in these mitigation areas over the long term.

The HCP mitigation measures would have no indirect effect on conditions experienced on lands adjacent to the mitigation areas. The fence at Hamakua Marsh which would be evident along the Kawainui Canal and the adjacent shopping center; however, because it is intended to inhibit trespassing into, and littering within, the mitigation area, it would not adversely affect the existing use of areas adjacent to the mitigation area.

4.14.3.3 Mitigation of Unavoidable Impacts

The Proposed Action would be compatible with the existing land uses within the analysis area and would be consistent with the State and county plans and regulations. Mitigation that applies to land use includes measure such as recontouring and revegetating disturbed areas, invasive species control, measure to avoid fire risk (the Fire Management Plan), and implementation of a Site Safety Handbook. Therefore, the Proposed Action would be expected to result in a minor impact on land use. Therefore, no additional mitigation measures for land use impacts are proposed. See Chapter 5 for additional discussion on the Project's consistency with state and county plans and land use policies.

4.14.3.4 Cumulative Effects

The cumulative effects analysis area for impacts to land use is the Koolau Loa Sustainable Communities Plan area. Reasonably foreseeable future projects within the analysis area are identified in Table 4.2-2.

The Koolau Loa Sustainable Communities Plan identifies future land uses within the Koolau Loa Region. The future projects shown in Table 4.2-2 are included within the Koolau Loa Sustainable Communities Plan as planned future land uses. Any planned or future project will need to comply with applicable land use regulations and policies, and the project evaluation will need to disclose

impacts to existing and planned land uses. As a result, future cumulative impacts to land use are anticipated to be negligible or minor because land uses will change over time, but changes will need to be in compliance with the Koolau Loa Sustainable Communities Plan and the existing land use regulations and policies.

4.14.3.5 Summary

Alternative 2 would result in minor direct and indirect impacts to approximately 8.2 acres (3.3 hectares), including long-term displacement to 4.6 acres (1. 8 hectares) of existing farming activities in the wind farm site. However, it should be noted that these impacts would occur on privately owned land, the use of which, whether it be for agriculture, alternative energy development, or other uses, is up to the landowner's discretion. HCP conservation measures would result in a negligible adverse impact and a minor beneficial impact to land use within the mitigation areas. Impacts would be considered minor because although there would be some long-term impacts associated with operation of the Project, they would be of low magnitude (compatible with existing and planned land uses and/or beneficial effects), localized, and would primarily affect land uses that are common (are not rare in the locality, do not fill a unique role, and are not protected by legislation). The Proposed Action would be consistent with the Koolau Loa Sustainable Communities Plan and other land use regulations within the analysis area.

4.14.3.6 Alternative 2a - Modified Proposed Action Option

Under Alternative 2a, direct, indirect, and cumulative effects on land use would be similar to those described under Alternative 2. However, up to approximately 6.0 acres (2.4 hectares) of active farmed lands would be disrupted under the Modified Proposed Action Option, including approximately 2.7 acres (1.1 hectares) that would be disrupted long term, lasting the life of the Project (see Section 4.22 – Agriculture for a detailed discussion). This comprises approximately 2 percent of the existing farmlands within the wind farm site. Implementation of standard BMPs and other mitigation measures, as described under the Proposed Action, would minimize any adverse impacts to land use.

4.14.4 Alternative 3—Larger Generation Facility (Up to 12 Turbine Project)

4.14.4.1 Direct and Indirect Effects of Construction and Operation of the Project

Under Alternative 3, impacts to land use would be similar to those discussed above for Alternative 2. However, Alternative 3 would result in construction of 2 to 4 additional turbines resulting in up to 13.3 acres (5.4 hectares) of disruption to existing farming activities. This includes up to 9.3 acres (3.7 hectares) of long-term displacement of existing farming activities within the wind farm site, which comprises approximately 6 percent of the actively farmed agricultural lands in the wind farm site. Because there would be a lag time of at least 3 years between construction of the first 8 to 10 turbines and the additional 2 to 4 turbines under Alternative 3, the time frame of construction-related impacts associated with disruption to existing farming activities would be extended. The current Project design was modified to minimize impacts to active agriculture.

4.14.4.2 Direct and Indirect Effects of the HCP Conservation Measures

Impacts of Avoidance and Minimization Measures

The avoidance and minimization measures proposed under the Project HCP would have minor impact on land use. Under Alternative 3, up to 9.3 acres (3.7 hectares) of existing farmed lands will be permanently displaced for the installation of up to 12 turbines, access roads, and other Project components. This includes plots beneath the turbines that would be maintained in low-growing crops or other vegetation to facilitate the post-construction monitoring program.

Impacts of HCP Mitigation

Impacts of HCP mitigation under Alternative 3 would be the same as described under Alternative 2. Prior to construction of additional turbines proposed under Alternative 3, NPMPP would reopen consultation with the USFWS and DOFAW to assess the potential for impacts of the additional turbines to listed species and develop appropriate mitigation measures. The impacts of these mitigation measures to land use would be evaluated under a separate environmental analysis at that time.

4.14.4.3 Mitigation of Unavoidable Impacts

As discussed under Alternative 2, mitigation measures such as recontouring and revegetating disturbed areas, invasive species control, measure to avoid fire risk (the Fire Management Plan), and implementation of the Site Safety Handbook would minimize impacts to land use. Therefore, no additional mitigation measures for land use impacts are proposed.

4.14.4.4 Cumulative Effects

Cumulative effects to land use under Alternative 3 are the same as described under Alternative 2, with the exception that Alternative 3 would disrupt an additional 5.1 acres (2.0 hectares), which includes an additional 4.7 acres (1.9 hectares) of long-term disruption, to farming activities in the wind farm site. Total impacts to existing farming activities under Alternative 3 would be up to 13.3 acres (5.4 hectares), which includes 9.3 acres (3.7 hectares) of long-term disruption. Relocation of existing farming activities in order to continue farming operations would minimize these impacts. Therefore, when viewed in conjunction with past, present, and foreseeable future projects in the cumulative effects analysis area, the contribution of Alternative 3 to cumulative effects on land use would be minor. Because there would likely be a delay in time of up to 3 years before additional turbines would be built under Alternative 3, new projects and developments in the area will be assessed and reviewed to determine if there are additional cumulative impacts from unknown future projects. Regardless of the time lag, all future projects would need to comply with applicable land use plans, regulations, and policies.

4.14.4.5 Summary

Alternative 3 would result in minor direct and indirect impacts to land use due to displacement of 13.3 acres (5.4 hectares) of existing farming activities in the wind farm site. This includes long-term

displacement to 9.3 acres (3.7 hectares) of existing farming activities. HCP conservation measures would result in a negligible adverse impact and a minor beneficial impact to land use within the mitigation areas. Impacts under Alternative 3 would be considered minor because although there would be some long-term impacts associated with construction and operation of the Project, they would be of low magnitude (compatible with existing and planned land uses and/or beneficial effects), localized, and would primarily affect land uses that are common (are not rare in the locality, do not fill a unique role, and are not protected by legislation). Relocation of displaced farming activities to other areas of Malaekahana Hui West's lands would minimize impacts to land use. Alternative 3 would be consistent with the Koolau Loa Sustainable Communities Plan and other land use regulations within the analysis area.

4.14.5 Conclusion

Table 4.14-2 summarizes potential impacts to land use from the alternatives considered in this analysis.

Table 4.14-2. Summary of Impacts to Land Use

Impact Criteria	No Action Alternative	Alternative 2 – Proposed Action	Alternative 2a – Modified Proposed Action Option	Alternative 3
Compatibility with existing and planned land uses.	No Impact	Minor	Minor	Minor
Consistency with the Koolau Loa Sustainable Communities Plan and land use regulations.	No Impact	Consistent/No Impact	Consistent/No Impact	Consistent/No Impact

4.15 Recreation and Tourism

4.15.1 Impact Criteria

Impacts to recreation and tourism resources were assessed based on whether construction and operation of the Project construction as well as the implementation of HCP conservation measures could:

- Result in direct loss of opportunity due to the physical occupation of a recreation resource area by Project infrastructure;
- Indirectly adversely affect a nearby recreation resource due to Project-related traffic (access blocked or otherwise inhibited); or
- Substantially change the environment of a resource such that its function as a recreation resource is impaired or lost (i.e., due to Project-related noise or visual impacts).

Impact criteria for determining effects to recreation resource from the Project are described further in Table 4.15-1 below.

Table 4.15-1. Impact Criteria for Recreation and Tourism

Type of Effect	Impact Component	Effects Summary		
Effects on recreation and tourism resources	Magnitude or Intensity	**High:** Permanent loss of recreational opportunity through displacement; temporary but long-term (1-2 years) loss of opportunity through loss of access; opportunity effectively abandoned during construction period in response to indirect traffic, noise and/or visual impacts; substantial permanent reduction of visitor use in response to indirect traffic, noise and/or visual impacts on the visitor experience.	**Medium:** Temporary short-term (1-2 weeks or more) loss(es) of opportunity through access closure; opportunity effectively abandoned during parts of construction period in response to indirect traffic, noise and/or visual impacts; minor permanent reduction of visitor use in response to indirect traffic, noise and/or visual impacts.	**Low:** Intermittent, brief (1-5 days) loss(es) of opportunity through access closure; substantial reduction of visitor use during parts of construction period in response to indirect traffic, noise and/or visual impacts; some visitors may be annoyed by indirect traffic, noise and/or visual impacts, but effect on recreation experience does not result in measurable long-term reduction of visitor use.
	Duration	**Permanent:** Chronic effects; conditions of recreation and tourism resources would not be anticipated to return to previous levels.	**Long-term:** Effects would persist up to the life of the Project and would return to pre-Project conditions levels after decommissioning.	**Temporary:** Effects would not last longer than the span of one year and would be expected to return to pre-activity levels.
	Geographic Extent	**Extended:** Affects recreation and tourism resources beyond the region, potentially island-wide.	**Regional:** Affects recreation and tourism resources beyond a local area, potentially throughout the region.	**Local:** Impacts limited geographically; limited to vicinity of the Project.
	Context	**Unique:** Affects a recreation resource that is based on inherent natural resource characteristics that could not feasibly be recreated in the same place or at another location.	**Important:** Affects a recreation resource that may be common in region but has unusually high local usage, is a community focal point or is a major component of local economy.	**Common:** Affects a type of recreation resource that is commonly found in the region or based on constructed recreation facilities or infrastructure (such as typical campgrounds and playgrounds) that could feasibly be replaced.

4.15.2 Alternative 1 – No Action

4.15.2.1 Direct and Indirect Effects

Under Alternative 1, the Project would not be constructed, the USFWS would not issue an ITP, and the HCP conservation measures would not be implemented. Therefore, Alternative 1 would have no effect on recreation and tourism resources. As such, no mitigation measures would be required.

4.15.2.2 Cumulative Effects

Under the No Action Alternative, the Project would not be constructed, an ITP would not be issued by the USFWS, and the HCP conservation measures would not be implemented. Therefore, there

would be no adverse or beneficial effects on recreation and tourism resources. Thus, Alternative 1 would not contribute to cumulative effects on recreation and tourism resources.

4.15.2.3 Summary

The No Action Alternative would have no direct, indirect, or cumulative effects on recreation or tourism resources as no action would be undertaken.

4.15.3 Alternative 2 – 8 to 10 Turbine Project

4.15.3.1 Direct and Indirect Effects of Construction and Operation of the Project

Construction Impacts

Construction of the Project under Alternative 2 would not cause a direct loss of opportunity to any recreation or tourism resource in the area. No Project infrastructure would be placed within any existing recreation resource area.

Indirect impacts to recreation resources due to Project-related traffic would be would be temporary, occurring primarily during Project construction or decommissioning. All of the recreation resources near the wind farm site are accessed indirectly from the Kamehameha Highway, along which nearly all Project traffic must also travel. Movement of large loads with construction equipment or turbine components would occur at night to minimize or eliminate potential disruptions or delays. Daytime traffic would be limited to commuting traffic of the relatively small workforce and deliveries of some construction materials such as cement for foundations. While visitor travel to some recreation areas may be disrupted or delayed for brief periods, these impacts would be low, intermittent, localized and temporary (disruptions on the order of minutes, with traffic levels returning to normal following construction). Therefore, indirect impacts to recreation resources due to Project-related construction traffic would be negligible to minor.

Construction of the Project would create noise that may affect nearby recreation areas. Table 4.15-2 lists recreation areas that may be exposed to construction noise. The magnitude of the impact associated with construction noise on the closest, most affected receptors (see Section 4.6 – Noise) would be moderate; whereas for most recreation resources in the analysis area, the impact would be minor to negligible. Construction noise is temporary, and periods of particularly loud noise would be intermittent. Sound levels resulting from construction activities vary significantly depending on factors such as the type and age of equipment, the specific equipment manufacturer and model, the operations being performed, and the overall condition of the equipment and exhaust system mufflers. Sounds generated by construction activities exceeding maximum permissible noise levels would likely require a permit to be obtained from the HDOH. While the permits do not limit the sound level generated at the construction site, time restrictions may be placed on when the loudest construction activities may occur (i.e., between 7:00 a.m. and 7:00 p.m. Monday through Friday and between 9:00 a.m. and 6:00 p.m. on Saturday), thereby minimizing impacts to recreation

and tourism resources. The HDOH would require reasonable and standard practices be employed to minimize the impact of noise resulting from construction activities.

Operation and Maintenance Impacts

Project O&M activities would generate very low volumes of traffic (see Section 4.17 – Transportation). This additional traffic would result in negligible impacts to recreation and tourism resources in the analysis area.

Sound from the turbines or associated facilities during operation of the Project may be perceived as noise in nearby recreation resource areas (see Section 4.6 – Noise). Operational sound levels from the Project in nearby recreation resource areas are reported below in Table 4.15-2, along with an assessment of significance.

Under Hawaii's Community Noise Control regulation, the maximum allowable noise limit is based on the zoning of the receiving property. The lowest maximum allowable noise level applies to Class A areas, those with residential, conservation, preservation, public space or similar zoning; a higher noise level is allowed for Class B commercial or resort uses; and the highest noise limits apply to Class C agriculturally-zoned parcels (see Table 3.4-2). Of the identified recreation resources near the wind farm site, most are zoned for preservation and/or residential which make them Class A receivers; two private resources are zoned for resort or commercial use which make them Class B receivers, and five have agricultural zoning which make them Class C receivers. No zoning has been applied to the sea bird island sanctuaries; they are therefore assumed to have the most conservative noise limit. Where the zoning is split for a single resource, the lower noise limit is used to assess significance. Applicable zoning and the established noise limit based on the zoning for each resource are listed in Table 4.15-2.

Results of noise modeling indicate that Project operational noise under Alternative 2 would not exceed the State standard at any of the 31 identified recreation and tourism resources within 5 miles of the wind farm site. Operational noise levels would be below 30 dBA, and likely completely inaudible, at 26 of the recreation resources. At the five sites nearest the Project (James Campbell NWR, Malaekahana State Recreation Area, Kahuku District Park, Kahuku Golf Course and Adams Field) operational noise levels would be between 30 and 41 dBA; at this level, Project noise would potentially be noticeable, but would still be well below the most conservative State standard of 45 dBA (see Table 4.15-2). At these five nearest recreation resource areas, the modeled operational noise levels would represent an increase of no more than 3 dBA compared to baseline sound levels; an increase of this amount is considered the threshold of perceptibility, and is likely to be indistinguishable by most people. In most recreational areas, the Project noise would not cause an increase over existing sound levels. Project operational noise impacts to recreation resources would therefore be characterized as negligible, and would not be expected to cause perceptible changes in recreational use or tourism levels.

Table 4.15-2. Potential Impacts of the Proposed Action to Recreation and Tourism Resources in the Wind Farm Site under Alternative 2

GIS ID No.	Recreation Resource Name	Modeled Operational Noise Level (dBA)[1/]	Receiving Zoning Class and Zoning District	Noise Limit (dBA)[2/]	Increase over Baseline Noise (dBA)	Potential Visual Impacts
1	James Campbell NWR	<30 to 38	Class A/C (Preservation/ Agriculture)	45/70	0-2	Overall Impact: Moderate. Turbines visible with moderate contrast at 1.0 mile distance. Scenic quality in views toward ocean is high, moderate in views toward Project. Visitor numbers low, with access limited to specific tour seasons/times or by special permission; visitor attention typically focused on bird watching or environmental education activities.
2	Pupukea-Paumalu Forest Reserve	<30	Class A (Preservation)	45	0	Project not visible; no impact
3	Hauula Forest Reserve	<30	Class A (Preservation)	45	0	Overall Impact: Low Potential views of Project largely blocked by vegetation and/or terrain.
4	Kaipapau Forest Reserve	<30	Class A (Preservation)	45	0	Overall Impact: Low Potential views of Project largely blocked by vegetation and/or terrain.
5	Kihewamoku Island Sea Bird Sanctuary	<30	N/A[3/]	45	0	Overall Impact: Low Unscreened views of Project likely with moderate contrast at 1 mile viewing distance; however, few visitors with attention typically focused on resident seabirds activity rather than shoreward.
6	Mokuauia Island Sea Bird Sanctuary	<30	N/A[3/]	45	0	Overall Impact: Low Unscreened views of Project likely with moderate contrast at 1 mile viewing distance; however, few visitors with attention typically focused on resident seabirds activity rather than shoreward.
7	Pulemoku Rock Sea Bird Sanctuary	<30	N/A	45	0	Overall Impact: Low Unscreened views of Project likely with moderate contrast at 1 mile viewing distance; however, few visitors with attention typically focused on resident seabirds activity rather than shoreward.

Table 4.15-2. Potential Impacts of the Proposed Action to Recreation and Tourism Resources in the Wind Farm Site under Alternative 2 (continued)

GIS ID No.	Recreation Resource Name	Modeled Operational Noise Level (dBA)[1/]	Receiving Zoning Class and Zoning District	Noise Limit (dBA)[2/]	Increase over Baseline Noise (dBA)	Potential Visual Impacts
8	Kukuihoolua Island Sea Bird Sanctuary	<30	N/A	45	0	Overall Impact: Low Unscreened views of Project likely with moderate contrast at 1 mile viewing distance; however, few visitors with attention typically focused on resident seabirds activity rather than shoreward.
9	Mokualai Island Sea Bird Sanctuary	<30	N/A	45	0	Overall Impact: Low Unscreened views of Project likely with moderate contrast at 1 mile viewing distance; however, few visitors with attention typically focused on resident seabirds activity rather than shoreward.
10	Malaekahana State Recreation Area	<30 to 39	Class A (Preservation)	45	0-2	Overall Impact: Moderate Potential views of Project largely screened by vegetation except near entrance. Visitor attention typically focused toward ocean and beach activities rather than inland.
11	Laie Point State Wayside	<30	Class A (Preservation)	45	0	Overall impact: Moderate Unscreened views of Project likely with moderate contrast at over 2 mile viewing distance; Project similar in character to Kahuku wind farm, but more prominent. Few visitors, with attention typically focused seaward, and viewing duration typically short.
12	Laie Beach Park	<30	Class A (Preservation)	45	0	Overall Impact: Moderate Potential views of Project largely screened by vegetation except near entrance; at over 2.6 miles distant Project would be in middleground. Visitor attention typically focused toward ocean and beach activities rather than inland, and viewing duration typically short.
13	Kawela Bay Beach Park	<30	Class A (Preservation)	45	0	Project not visible; no impact

Table 4.15-2. Potential Impacts of the Proposed Action to Recreation and Tourism Resources in the Wind Farm Site under Alternative 2 (continued)

GIS ID No.	Recreation Resource Name	Modeled Operational Noise Level (dBA)[1/]	Receiving Zoning Class and Zoning District	Noise Limit (dBA)[2/]	Increase over Baseline Noise (dBA)	Potential Visual Impacts
14	Kokololio Beach Park	<30	Class A (Preservation/ Residential)	45	0	Overall Impact: Moderate Potential views of Project largely screened by vegetation except near entrance; at 3 miles distant Project would be in middleground. Visitor attention typically focused toward ocean and beach activities rather than inland, and viewing duration typically short.
15	Waialee Beach Park	<30	Class C (Agriculture)	70	0	Project not visible; no impact.
16	Hauula Beach Park	<30	Class A (Preservation)	45	0	Overall Impact: Low-Moderate Potential views of Project partially screened by vegetation and terrain; at 3.8 miles distant Project would be in middleground. Visitor attention typically focused toward ocean and beach activities rather than inland, and viewing duration typically short.
17	Sunset Beach Park	<30	Class A (Preservation)	45	0	Project not visible; no impact.
18	Sunset Point Beach Park	<30	Class A (Preservation)	45	0	Project not visible; no impact.
19	Pupukea Beach Park	<30	Class A (Preservation)	45	0	Project not visible; no impact.
20	Ehukai Beach Park	<30	Class A (Preservation)	45	0	Project not visible; no impact.
21	Kahuku District Park	38 to 41	Class A (Residential)	45	2-3	Overall Impact: Moderate High visibility of Project at close distance, with other manmade features dominating foreground views; high user numbers with attention typically focused toward sports activities on developed fields/courts and activities in community center buildings.
22	Kahuku Golf Course	30 to 38	Class C (Agriculture)	70	0-2	Overall Impact: Moderate Largely unscreened views of Project at middle-ground viewing distance, co-dominated by views of existing wind farm; visitor attention likely typically focused on open panoramic ocean view and golf game.

Table 4.15-2. Potential Impacts of the Proposed Action to Recreation and Tourism Resources in the Wind Farm Site under Alternative 2 (continued)

GIS ID No.	Recreation Resource Name	Modeled Operational Noise Level (dBA)[1/]	Receiving Zoning Class and Zoning District	Noise Limit (dBA)[2/]	Increase over Baseline Noise (dBA)	Potential Visual Impacts
23	Adams Field	36 to 37	Class A (Preservation)	45	1	Overall Impact: Low-Moderate Partially screened views of Project at close distance co-dominated by views of existing wind farm; visitor numbers likely low and primarily local residents at this undeveloped property
24	Laie Park	<30	Class A (Preservation)	45	0	Overall Impact: Low-Moderate Potential views of Project partially screened by vegetation and structures, with other manmade features dominating foreground views; at 1.4 miles Project would be in middleground. Visitor attention typically focused toward sports activities on developed fields/courts.
25	Hauula Community Park	<30	Class A (Preservation/ Residential)	45	0	Overall Impact: Moderate Potential views of Project partially screened by vegetation and structures; at over 4.25 miles Project would be in background. Visitor attention typically focused toward sports activities on developed fields/courts.
26	Sunset Beach Neighborhood Park	<30	Class A (Preservation)	45	0	Project not visible; no impact.
27	Koolau Summit Trail	<30	Class A (Preservation)	45	0	Overall Impact: Low-Moderate Potential intermittent views of Project from ridgeline at minimum 2.5 miles distance; views largely screened by overgrown vegetation; low contrast due to viewing angle; low hiker numbers with attention typically focused on route finding.

Table 4.15-2. Potential Impacts of the Proposed Action to Recreation and Tourism Resources in the Wind Farm Site under Alternative 2 (continued)

GIS ID No.	Recreation Resource Name	Modeled Operational Noise Level (dBA)[1/]	Receiving Zoning Class and Zoning District	Noise Limit (dBA)[2/]	Increase over Baseline Noise (dBA)	Potential Visual Impacts
28	Hukilau Beach Park	<30	Class A (Preservation)	45	0	Overall Impact: Low-Moderate Potential views of Project largely screened by vegetation; at 1.3 miles distant Project would be in middleground. Visitor attention typically focused toward ocean and beach activities rather than inland, and viewing duration typically short.
29	Turtle Bay Resort, Palmer and Fazio golf courses	<30	Class B/C (Resort/ Agriculture)	50/ 70	0	Overall Impact: Moderate Potential Project views partially screened by vegetation and terrain; high viewer numbers but visitor attention typically focused on golf and other resort activities.
30	Polynesian Cultural Center	<30	Class B (Community Business)	50	0	Overall Impact: Low to None Low potential Project visibility at 2.5 miles distant, with views likely blocked by vegetation and manmade features; visitor attention focused on PCC activities rather than distant views.
31	Kahuku Motocross Course	<30	Class C (Agriculture)	70	0	Project not visible; no impact.

1/ Reported noise levels are the loudest generated by the turbine models being considered for the Project. Actual sounds levels would likely be lower due to the combination of turbine models that may be selected.
2/ Noise limits as defined in HAR 11-46; these are the most conservative nighttime limits.
3/ No zoning has been applied to the sea bird island sanctuaries; they are therefore assumed to have the most conservative noise limit, equivalent to Class A receivers.

Visual impacts are primarily related to views of the turbines, but may also include visual changes due to other Project infrastructure including new and improved access roads, the substation, O&M building, or electrical collector or transmission lines. Section 4.16 – Visual Resources includes a visual impact analysis based on visual simulations of the proposed turbines. Many of the recreation resources were addressed as representative viewpoints in Section 4.16; where a recreation resource is not directly analyzed in Section 4.16, visual impact assessment results of nearby viewpoints were used to assess visual impacts at nearby recreation sites. Potential visual impacts of the Project under Alternative 2 on nearby recreation resource areas are summarized above in Table 4.15-2.

Visual analysis indicates that the Project would not be visible from 9 of the 31 recreation and tourism resources in the area. Based on screening by vegetation and/or structures, low visitor numbers, and the likely focus of users' attention drawn away from potential Project views, the overall visual impact of the Project is characterized as low to moderate at 19 of the nearby recreation areas. Based on these results, it is unlikely that the visual impact of the Project would affect recreational use or tourism at 28 of the identified resources. Only in 4 of the closest resource areas (James Campbell NWR, Kahuku District Park, Kahuku Golf Course, and Laie Point State Wayside) would the Project result in a moderate overall visual impact. However, a moderate visual impact by itself does not necessarily translate to a significant adverse impact on those resources as recreation or tourism sites; the question is whether the visual impact, in conjunction with other factors, would cause a significant change in user numbers.

At the James Campbell NWR, a visitor is likely to have views of the Project turbines, co-dominated by views of the Kahuku Wind Farm and other manmade features. However, access to the refuge is very limited so visitor numbers are already low at around 600 visitor per year, about two-thirds of whom are students in environmental education classes (USFWS 2011a), indicating that the refuge is not a significant driver of tourism in the area. In addition, the primary focus of visitors to the refuge is for bird watching, effectively reducing the importance of changes to the surrounding scenery. The Project would not adversely affect biological resources within the refuge (see Section 4.10 – Wildlife for additional discussion). Moreover, HCP mitigation (see below) would have a beneficial effect on Hawaiian geese and other birds within the refuge, thereby potentially improving opportunities for bird watching. Considering the negligible noise and traffic impacts at this location, beneficial effects associated with HCP mitigation, and the predominant nature of visitors and their activities, it is unlikely that development of the Project would affect recreational or tourism use of the James Campbell NWR.

The focus of users' attention also plays heavily in assessing likely impacts to recreational use at the Kahuku District Park and Kahuku Golf Course. At both of these locations, visitors are likely to have views of the turbines at relatively close range (see Section 4.16 – Visual Resources); views would be co-dominated by the existing Kahuku Wind Farm and by vegetation and manmade structures and other features in the foreground. However, despite a view of the turbines, users' attention is likely to be focused elsewhere. At the golf course, users' attention would likely be on the game and the open panoramic views of the ocean and shoreline. At the Kahuku District Park, the focus would be

on organized sports activities occurring on the baseball field or tennis and basketball courts, or on a wide variety of activities sponsored by the adjacent Kahuku Community Center. Views of the turbines would not interfere with either a golf game or with participating in or watching activities at the district park. Both sites appear to be well-used; the golf course is one of a small number of public courses on Oahu and draws both local residents and tourists, while the district park and community center are heavily used by area residents. Considering the negligible noise and traffic impacts at these locations, the focus of users' attention, and the existing strong demand for these resources, it is unlikely that development of the Project would affect recreational use levels at either the Kahuku Golf Course or the Kahuku District Park.

4.15.3.2 Direct and Indirect Effects of the HCP Conservation Measures

Impacts of Avoidance and Minimization Measures

The avoidance and minimization measures proposed under the Project HCP are not expected to affect recreation and tourism resources. They would not result in the direct loss of a recreation or tourism opportunity or reduce the ability of a recreation resource or tourism opportunity to function as such.

Impacts of HCP Mitigation

Impacts to recreation and tourism resources as a result of the implementing mitigation under the Project HCP would negligible. The mitigation measures would not cause a direct loss of any recreation resource area. Additionally, none of the mitigation measures would cause a noticeable increase in traffic in the vicinity of, thereby inhibiting access to, recreation or tourism resources in the analysis area (see Section 4.17 – Transportation).

With the exception of the work at Hamakua Marsh for waterbird mitigation, the mitigation measures would not cause a noise or visual impact to recreation or tourism resources in the analysis area. At Hamakua Marsh, the installation of mitigation fences would have a minor, localized noise impact during their construction, but no ongoing noise impact. The fence and signage at Hamakua Marsh would have a minor, localized visual impact, but would be designed to be as visually unobtrusive as practicable while still fulfilling its intended role of keeping waterbirds out of commercial parking lots. In terms of impacts to nearby recreation areas, however, the fences would have virtually no visual impact because it is unlikely to be visible from any site except the mitigation areas themselves. In addition, the fence and signage at Hamakua Marsh would be seen against the backdrop of existing commercial uses. Therefore, impacts to recreation and tourism resources associated with HCP mitigation would be negligible.

4.15.3.3 Mitigation for Unavoidable Impacts

NPMPP and its construction contractor would implement a number of mitigation measures to reduce or eliminate adverse impacts to recreation resources in the vicinity of the wind farm site. Traffic impacts would be addressed through the development and implementation of a construction traffic management plan to minimize disruptions for people traveling to recreation sites near the

Project. One of the primary elements of the plan would be that most construction equipment and materials, including all turbine components and other oversize loads, would be moved from the harbor to the wind farm site at night; this would avoid conflicts with daytime resident and tourist traffic. If necessary, traffic controls would be implemented to maintain traffic safety while accommodating Project, resident, and tourist traffic during the daytime. This is likely to occur only during the short time period when the Project access road is being improved at its intersection with the Kamehameha Highway; traffic levels and types during other periods are unlikely to warrant special traffic management actions. With implementation of these measures, potential impacts to recreation and tourism resources would be less than significant.

Mitigation measures listed in Table 2-6 and described in Section 4.6 – Noise to minimize noise impacts include limiting noisy activities to daytime weekdays, scheduling of construction activities to conduct noisy activities at similar times to reduce the overall frequency of those periods, using equipment with properly functioning mufflers or noise suppressors, and establishing a complaint resolution system. The implementation of these measures would minimize any potential noise-related impacts to recreation and tourism resources. Due to the nature of the Project, views of the turbines and the resulting visual impacts are difficult to mitigate, though a few specific design standards will be implemented to reduce visual impacts to the extent practicable. Turbines and towers will be painted a uniform matte white or off-white as recommended by the FAA; the use of a matte finish would inhibit reflections or glare. No signs, writing, or advertising would be permitted on the turbines. The turbines would not be lighted with the exception of synchronized red flashing lights on turbines as required to satisfy FAA marking and lighting requirements. Where lighting may be necessary elsewhere on the Project, such as at the substation or O&M building, lights would be shielded and directed downward and inward toward the facilities to prevent offsite glare. Necessary lighting would be controlled with motion sensors, timers, or similar features such that the lights are on only when needed. The implementation of these measures would minimize the potential impacts to recreation and tourism resources associated with Project visibility.

4.15.3.4 Cumulative Effects

The analysis area for cumulative effects on recreation and tourism resources includes the area within 5 miles of the wind farm site, and within 1 mile of the bat and waterbird mitigation sites. Since the Project would not directly impact any recreation resource area, the cumulative effects analysis focuses on indirect traffic, noise, and visual effects.

Project traffic is a concern only during construction, when dozens of truck trips may occur daily; operational traffic levels would be negligible. Project construction is proposed to begin in as early as the second quarter of 2016, with commercial operation commencing in 2017. There are a number of other large construction projects in the vicinity that may also be occurring in that time period that may contribute to cumulative traffic impacts (see Table 4.2-2). These include the planned expansion of Turtle Bay Resort and ongoing construction of staff and faculty housing in the Malaekahana area to accommodate a growing BYU enrollment, construction of a technology park associated with BYU, and the construction of transportation safety improvements along Kamehameha Highway. These projects, along with growth in background traffic levels from

incoming residents and increased tourism, would individually have some impacts to traffic levels; however, it is unlikely that cumulative adverse effects to recreation resources would occur.

Cumulative traffic impacts from separate projects are limited in magnitude and extent by a number of factors, such as that construction traffic is inherently temporary and the potential for major disruptions to traffic flow is intermittent. The effects of a major non-road construction project on traffic flow are generally highly localized, occurring primarily at the entrance to a project site and possibly at a few nearby intersections. In addition, major construction projects must be permitted through Honolulu County, and would require a traffic management plan to be implemented such that the effect of each project would be at most minor. Permitting through a single agency is likely to improve coordination between separate projects and help to minimize cumulative adverse impacts to recreation and tourism resources.

Cumulative noise effects would occur only at those few closest recreation resources that experience audible noise from the Project as well as from other nearby uses, in particular the adjacent Kahuku Wind Farm. However, based on the results of baseline noise monitoring (which includes the existing noise of the Kahuku Wind Farm) and operational noise modeling, the Project would contribute no more than a 3 dBA increase over existing noise levels at any recreation or tourism resource. This increase is considered the threshold of perception, and is likely to be indistinguishable by most people. Other likely future development are not considered substantial noise generators, and are unlikely to further contribute to long-term cumulative noise impacts to recreation resources in the area.

Cumulative visual effects also occur primarily at the few closest recreation resource areas that would experience views of the Project as well as other developments, in particular the Kahuku Wind Farm. However, based on existing visual conditions, screening, user numbers, and the focus of users' attention being drawn away from views of the Project or other developments by recreational activities, it is unlikely that a cumulative visual impact would result in a perceptible reduction in recreational or tourism use rates. Rather, the additional housing, commercial and resort development is likely to increase recreation and tourism use rates throughout the area.

When viewed in conjunction with past, present, and foreseeable future projects in the cumulative effects analysis area, the contribution of Alternative 2 to cumulative effects on recreation and tourism resources is considered to be negligible for most resources to, at most, moderate for a few of the closest recreation resource areas. However, the cumulative effects remain unlikely to result in a perceptible reduction in recreational or tourism use of these resources.

4.15.3.5 Summary

The Proposed Action would not directly impact any recreation or tourism resource in the vicinity. Potential indirect impacts, under this alternative, due to traffic would be negligible to minor, and would be temporary with conditions returning to normal following construction of the Project. The results of the noise analysis indicate that the effect of noise from the Proposed Action would be minor; Project operational noise would not exceed established State noise limits at any recreation resource area and would cause a barely perceptible increase in existing noise levels at only a few

resource areas. Construction noise may temporarily exceed the noise limits at the closest sites, pursuant to a HDOH permit. The results of the visual analyses indicate that the construction and operation of the Proposed Action would result in a moderate visual impact to three of the nearest sites and, at most, low to moderate visual impact at all other resource areas. However, based on the minor noise and traffic impacts, existing screening and presence of other manmade features in view, and the nature of visitors and the activities at each of these sites, it is unlikely that the overall impacts of the Project would result in a perceptible change in recreational or tourism use at any recreation resource area. Implementation of HCP conservation measures would negligible effects on recreation resources. Overall, effects on recreation and tourism resources under Alternative 2 would be considered negligible because although there would be some long-term noise and visual impacts, the intensity would be at most low (no direct or indirect loss of a recreation opportunity, moderate visual impacts but no likely change to recreation or tourism use rates), the effects would be localized, and recreation resources potentially affected are common to the area.

4.15.3.6 Alternative 2a - Modified Proposed Action Option

Under Alternative 2a, direct, indirect, and cumulative effects on recreation and tourism would be similar as those described under Alternative 2. Table 15 of the supplemental technical analysis in Appendix L summarizes impacts to recreation and tourism resources in the vicinity of the wind farm site. Implementation of mitigation measures, as described under the Proposed Action, would minimize adverse impacts to recreation and tourism resources under the Modified Proposed Action Option.

4.15.4 Alternative 3 – Larger Generation Facility (Up to 12 Turbine Project)

4.15.4.1 Direct and Indirect Effects of Construction and Operation of the Project

Construction Impacts

As with Alternative 2, Alternative 3 would not result in a direct loss of opportunity impact to any recreation or tourism resource in the analysis area. No Project infrastructure would be placed within any existing recreation resource area.

Similar to Alternative 2, impacts to recreation resources due to construction traffic under Alternative 3 would be considered negligible to minor. Most turbine components and construction equipment would be moved to the wind farm site at night, limiting daytime traffic conflicts, and a traffic management plan would be implemented to address remaining potential traffic issues. If any traffic disruptions or delays were to occur, they would be short term, localized, and intermittent, and traffic would return to normal once construction is completed. Under Alternative 3, there would be two periods of construction activity and therefore construction-related traffic, separated by several years, rather than one construction period as under Alternative 2. The amount of traffic associated with the construction of the first 8 to 10 turbines under Alternative 3 would be similar to that produced by Alternative 2, with additional traffic associated with the installation of the additional 2 to 4 turbines.

Impacts of construction noise on recreation and tourism resources under Alternative 3 would be similar to those described under Alternative 2. The amount of noise associated with the construction of the first 8 to 10 turbines under Alternative 3 would be similar to that produced by Alternative 2; however, additional short-term, localized construction noise would occur with the installation of the additional 2 to 4 turbines.

Operation and Maintenance Impacts

O&M of the Project under Alternative 3 would generate very low volumes of traffic that would result in negligible impacts to nearby recreation and tourism resources.

Indirect impacts from operational noise and visual impacts under Alternative 3 are similar to those for Alternative 2. Section 4.6 – Noise provides a predicted operational noise levels under Alternative 3, and the loudest modeled sound levels at recreation resources in the analysis area are reported in Table 4.15-3. The results of the noise modeling indicate that there are no recreation sites in which operational noise from Alternative 3 would exceed the State standard. Operational noise levels at 26 of the 31 identified recreation and tourism resources within 5 miles of the wind farm site would be below 30 dBA and virtually inaudible. Operational noise levels at the five sites nearest the Project (James Campbell NWR, Malaekahana State Recreation Area, Kahuku District Park, Kahuku Golf Course and Adams Field) would be between 30 and 42 dBA, potentially noticeable but still below the most conservative State limit of 45 dBA. The modeled operational noise levels would represent an increase of no more than 3 dBA compared to baseline sound levels in all of these areas, so would be characterized as a negligible impact; in most recreational areas the Project noise would represent no increase over existing levels. Noise from Project construction may result in temporary exceedence of the State noise limits at some of the nearest recreation areas; these would be addressed through a HDOH noise permit. Potential visual impacts of Alternative 3 on nearby recreation resource areas are also reported below in Table 4.15-3. Despite the greater number of turbines, the overall visual impacts of Alternative 3 are essentially identical to those for Alternative 2; this is because the impacts are based largely on characteristics of the recreation resource site and intervening lands rather than on the Project. Visual impact analysis indicates that the Project would not be visible from 9 of the 31 recreation and tourism resources in the area. Based on screening by vegetation and/or structures, low visitor numbers, and the likely focus of users' attention drawn away from potential Project views, the overall visual impact of the Project is characterized as low to moderate at 19 of the nearby recreation areas. Only in 3 of the closest resource areas (James Campbell NWR, Kahuku District Park, and Kahuku Golf Course) would the Project result in a moderate overall visual impact. However, considered together with the negligible noise and traffic impacts, existing screening and presence of other manmade features in view, and the nature of visitors and the activities at each of these sites, it is unlikely that views of the Project would result in a perceptible change in recreational or tourism use at any recreation resource area.

Table 4.15-3. Potential Impacts of Alternative 3 to Recreation and Tourism Resources in the Wind Farm Site

GIS ID No.	Recreation Resource Name	Modeled Operational Noise Level (dBA)[1/]	Receiving Zoning Class and Zoning District	Increase over Baseline Noise (dBA)	Potential Visual Impacts
1	James Campbell NWR	<30 to 39	Class A/C (Preservation/ Agriculture)	0-2	Overall Impact: Moderate Turbines highly visible with strong contrast at 1.0 mile distance. Scenic quality in views toward the ocean is high and moderate in views toward the Project. Visitor numbers low, with access limited to specific tour seasons/times or by special permission; visitor attention typically focused on bird watching or environmental education activities.
2	Pupukea-Paumalu Forest Reserve	<30	Class A (Preservation)	0	Project not visible; no impact
3	Hauula Forest Reserve	<30	Class A (Preservation)	0	Overall Impact: Low Potential views of Project largely blocked by vegetation and/or terrain.
4	Kaipapau Forest Reserve	<30	Class A (Preservation)	0	Overall Impact: Low Potential views of Project largely blocked by vegetation and/or terrain.
5	Kihewamoku Island Sea Bird Sanctuary	30 to 31	N/A	0	Overall Impact: Low Unscreened views of Project likely with moderate contrast at 1 mile viewing distance; however, few visitors with attention typically focused on resident seabirds activity rather than shoreward.
6	Mokuauia Island Sea Bird Sanctuary	<30	N/A	0	Overall Impact: Low Unscreened views of Project likely with moderate contrast at 1 mile viewing distance; however, few visitors with attention typically focused on resident seabirds activity rather than shoreward.
7	Pulemoku Rock Sea Bird Sanctuary	<30	N/A	0	Overall Impact: Low Unscreened views of Project likely with moderate contrast at 1 mile viewing distance; however, few visitors with attention typically focused on resident seabirds activity rather than shoreward.
8	Kukuihoolua Island Sea Bird Sanctuary	<30	N/A	0	Overall Impact: Low Unscreened views of Project likely with moderate contrast at 1 mile viewing distance; however, few visitors with attention typically focused on resident seabirds activity rather than shoreward.

Table 4.15-3. Potential Impacts of Alternative 3 to Recreation and Tourism Resources in the Wind Farm Site (continued)

GIS ID No.	Recreation Resource Name	Modeled Operational Noise Level (dBA)[1/]	Receiving Zoning Class and Zoning District	Increase over Baseline Noise (dBA)	Potential Visual Impacts
9	Mokualai Island Sea Bird Sanctuary	<30	N/A	0	Overall Impact: Low Unscreened views of Project likely with moderate contrast at 1 mile viewing distance; however, few visitors with attention typically focused on resident seabirds activity rather than shoreward.
10	Malaekahana State Recreation Area	<30 to 40	Class A (Preservation)	0-2	Overall Impact: Moderate Potential views of Project largely screened by vegetation except near entrance. Visitor attention typically focused toward ocean and beach activities rather than inland.
11	Laie Point State Wayside	<30	Class A (Preservation)	0	Overall impact: Moderate Unscreened views of Project likely with moderate contrast at over 2 mile viewing distance; Project similar in character to Kahuku wind farm. Few visitors, with attention typically focused seaward, and viewing duration typically short.
12	Laie Beach Park	<30	Class A (Preservation)	0	Overall Impact: Moderate Potential views of Project largely screened by vegetation except near entrance; at over 2.6 miles distant Project would be in middleground. Visitor attention typically focused toward ocean and beach activities rather than inland, and viewing duration typically short.
13	Kawela Bay Beach Park	<30	Class A (Preservation)	0	Project not visible; no impact
14	Kokololio Beach Park	<30	Class A (Preservation/ Residential)	0	Overall Impact: Moderate Potential views of Project largely screened by vegetation except near entrance; at 3 miles distant Project would be in middleground. Visitor attention typically focused toward ocean and beach activities rather than inland, and viewing duration typically short.
15	Waialee Beach Park	<30	Class C (Agriculture)	0	Project not visible; no impact.
16	Hauula Beach Park	<30	Class A (Preservation)	0	Overall Impact: Low-Moderate Potential views of Project partially screened by vegetation and terrain; at 3.8 miles distant Project would be in middleground. Visitor attention typically focused toward ocean and beach activities rather than inland, and viewing duration typically short.

Table 4.15-3. Potential Impacts of Alternative 3 to Recreation and Tourism Resources in the Wind Farm Site (continued)

GIS ID No.	Recreation Resource Name	Modeled Operational Noise Level (dBA)[1/]	Receiving Zoning Class and Zoning District	Increase over Baseline Noise (dBA)	Potential Visual Impacts
17	Sunset Beach Park	<30	Class A (Preservation)	0	Project not visible; no impact.
18	Sunset Point Beach Park	<30	Class A (Preservation)	0	Project not visible; no impact.
19	Pupukea Beach Park	<30	Class A (Preservation)	0	Project not visible; no impact.
20	Ehukai Beach Park	<30	Class A (Preservation)	0	Project not visible; no impact.
21	Kahuku District Park	39 to 42	Class A (Residential)	2-3	Overall Impact: Moderate High visibility of Project at close distance, with other manmade features dominating foreground views; high user numbers with attention typically focused toward sports activities on developed fields/courts and activities in community center buildings.
22	Kahuku Golf Course	31 to 39	Class C (Agriculture)	0-2	Overall Impact: Moderate Largely unscreened views of Project in middleground distance, co-dominated by views of existing wind farm; visitor attention likely typically focused on open panoramic ocean view and golf game.
23	Adams Field	37 to 38	Class A (Preservation)	1-2	Overall Impact: Low-Moderate Partially screened views of Project at close distance co-dominated by views of existing wind farm; visitor numbers likely low and primarily local residents at this undeveloped property
24	Laie Park	<30	Class A (Preservation)	0	Overall Impact: Low-Moderate Potential views of Project partially screened by vegetation and structures, with other manmade features dominating foreground views; at 1.4 miles Project would be in middleground. Visitor attention typically focused toward sports activities on developed fields/courts.
25	Hauula Community Park	<30	Class A (Preservation/ Residential)	0	Overall Impact: Moderate Potential views of Project partially screened by vegetation and structures; at over 4.25 miles Project would be in background. Visitor attention typically focused toward sports activities on developed fields/courts.

Table 4.15-3. Potential Impacts of Alternative 3 to Recreation and Tourism Resources in the Wind Farm Site (continued)

GIS ID No.	Recreation Resource Name	Modeled Operational Noise Level (dBA)[1/]	Receiving Zoning Class and Zoning District	Increase over Baseline Noise (dBA)	Potential Visual Impacts
26	Sunset Beach Neighborhood Park	<30	Class A (Preservation)	0	Project not visible; no impact.
27	Koolau Summit Trail	<30	Class A (Preservation)	0	Overall Impact: Low-Moderate Potential intermittent views of Project from ridgeline at minimum 2.5 miles distance; views largely screened by overgrown vegetation; low contrast due to viewing angle; low hiker numbers with attention typically focused on route finding.
28	Hukilau Beach Park	<30	Class A (Preservation)	0	Overall Impact: Low-Moderate Potential views of Project largely screened by vegetation; at 1.3 miles distant Project would be in middleground. Visitor attention typically focused toward ocean and beach activities rather than inland, and viewing duration typically short.
29	Turtle Bay Resort, Palmer and Fazio golf courses	<30	Class B/C (Resort/ Agriculture)	0	Overall Impact: Moderate Potential Project views partially screened by vegetation and terrain; high viewer numbers but visitor attention typically focused on golf and other resort activities.
30	Polynesian Cultural Center	<30	Class B (Community Business)	0	Overall Impact: Low to None Low potential Project visibility at 2.5 miles distant, with views likely blocked by vegetation and manmade features; visitor attention focused on PCC activities rather than distant views.
31	Kahuku Motocross Course	<30	Class C (Agriculture)	0	Project not visible; no impact.

1/ Reported noise levels are the loudest generated by the turbine models being considered for the Project. Actual sound levels would likely be lower due to the combination of turbine models that may be selected.

4.15.4.2 Direct and Indirect Effects of the HCP Conservation Measures

Impacts of Avoidance and Minimization Measures

The avoidance and minimization measures proposed under the Project HCP are not expected to affect recreation and tourism resources. They would not result in the direct loss of a recreation or tourism opportunity or reduce the ability of a recreation resource or tourism opportunity to function as such.

Impacts of HCP Mitigation

Impacts to recreation and tourism resources as a result of the implementing mitigation under the Project HCP under Alternative 3 would be the same as described under Alternative 2. Prior to construction of additional turbines proposed under Alternative 3, NPMPP would reopen consultation with the USFWS and DOFAW to assess the potential for impacts of the additional turbines to listed species and develop appropriate mitigation measures. The impacts of these mitigation measures to recreation and tourism resources would be evaluated under a separate environmental analysis at that time.

4.15.4.3 Mitigation for Unavoidable Impacts

Mitigation measures for reducing impacts to recreation and tourism resources associated with traffic, noise, and Project visibility under Alternative 3 are essentially identical to those that would be implemented for Alternative 2. The key difference is that mitigation measures to be implemented during construction would occur twice, once during the each construction phase of the Project.

4.15.4.4 Cumulative Effects

The cumulative effects to recreation and tourism resources under Alternative 3 would be similar in nature to those of Alternative 2, but would be somewhat greater in magnitude for noise and visual impacts. Cumulative traffic impacts would differ primarily in that there would be two periods of Project construction, separated by a few years. The cumulative traffic effects on recreation resources for each phase of construction would be minor for a few resource areas and negligible for most. While some disruptions to access of recreation resource areas may occur during construction of the Project and other nearby developments, they would be temporary and intermittent, highly localized, and would tend to be on the order of a few minutes at most.

Cumulative noise effects would occur only at those few closest recreation resources that experience audible noise from the Project as well as from other nearby industrial developments, in particular the adjacent Kahuku Wind Farm. However, based on the results of baseline noise monitoring (which includes the existing noise of the Kahuku Wind Farm) and operational noise modeling, the Project would contribute no more than a 3 dBA increase over existing noise levels at any recreation or tourism resource. This increase is considered the threshold of perception, and is likely to be indistinguishable by most people. Other likely future development are not considered substantial

noise generators, and are unlikely to further contribute to long-term cumulative noise impacts to recreation resources in the area. Cumulative visual effects also occur primarily at the few closest recreation resource areas that would experience views of the Project as well as other developments, in particular the Kahuku Wind Farm. However, based on existing visual conditions, screening, user numbers, and the focus of users' attention being drawn away from views of the Project or other developments by recreational activities, it is unlikely that a cumulative visual impact would result in a perceptible reduction in recreational or tourism use rates. Rather, the additional housing, commercial and resort development is likely to increase recreation and tourism use rates throughout the area.

Because there would be a delay in time of up to 3 years before additional turbines would be built under Alternative 3, new projects and developments in the area will be assessed and reviewed to determine if there are additional cumulative impacts to recreation and tourism resources from future unknown projects.

4.15.4.5 Summary

Alternative 3 would not directly impact any recreation or tourism resource in the vicinity of the Project. Potential indirect impacts due to traffic would be negligible to minor, and would be temporary with conditions returning to normal following construction of each phase of the Project. The results of the noise analysis indicate that the effect of Alternative 3 operational noise on recreation resources would be negligible; Project operational noise would not exceed established State noise limits at any nearby recreation resource area and would cause a barely perceptible increase in existing noise levels at only a few of the nearest resource areas. The results of the visual analyses indicate that the construction and operation of Alternative 3 would result in a moderate visual impact to three of the nearest sites and, at most, low to moderate visual impact at all other resource areas. However, based on the minor noise and traffic impacts, existing screening and presence of other manmade features in view, and the nature of visitors and the activities at each of these sites, it is unlikely that the overall impacts of the Project would result in a perceptible change in recreational or tourism use at any recreation resource area. Implementation of HCP conservation measures would have at most a minor impact on recreation resources near each site; in most cases there would be no impact. Overall, effects on recreation and tourism resources under Alternative 3 would be considered negligible because although there would be some long-term noise and visual impacts at individual recreation resources, the intensity would be, at most, low (no direct or indirect loss of a recreation opportunity, negligible traffic or noise impact, moderate visual impacts, and no likely change to recreation or tourism use rates), the effects would be localized, and common recreation resources would be affected.

4.15.5 Conclusion

Table 4.15-4 summarizes potential impacts to recreation and tourism resources from the alternatives considered in this analysis.

Table 4.15-4. Summary of Potential Impacts to Recreation

Impact Issues	No Action Alternative	Alternative 2 – Proposed Action	Alternative 2a – Modified Proposed Action Option	Alternative 3
Direct loss of recreation or tourism opportunity	No Impact	No Impact	No Impact	No Impact
Indirect loss of recreation or tourism opportunity due to traffic, noise, or visual impacts	No Impact	Negligible	Negligible	Negligible
Predicted impact to recreation and tourism use rates	No Impact	Negligible	Negligible	Negligible

4.16 Visual Resources

Impacts to visual resources were assessed based on the proposed Project's potential visibility and how the Project would be viewed from particular locations. Section 4.16.1 discusses the methodology and impact criteria used to assess the visual impacts. The remainder of this section addresses direct and indirect impacts, mitigation measures, and cumulative effects for the alternatives evaluated in detail.

4.16.1 Methodology

A review of plans applicable to the lands within and near the wind farm site indicated there are no formal guidelines for managing visual resources on those lands. Therefore, commonly used visual resource assessment concepts were applied to characterize the current visual environment, identify the expected change to the landscape resulting from the introduction of Project elements, and assess the level of visual impact based on expected viewer response to those changes. The following discussion summarizes the approach used in the respective steps of the visual assessment process.

4.16.1.1 Define Analysis Area

The analysis area for visual resources was defined as the area within 10 miles from the wind farm site (Figure 4.16-1). Some degree of detail would be evident where Project components are viewed at distances up to about 5 miles. Viewers more distant than about 5 miles would be able to discern overall Project shape and mass, but not individual details. Project components might be visible to some degree beyond 10 miles, but their prominence would be sufficiently reduced that the impact would likely be minor or negligible. Therefore, the impact assessment was focused on the area within 10 miles of the Project.

4.16.1.2 Conduct Viewshed Analysis

A viewshed analysis was completed to identify locations within the analysis area from which the Project would potentially be visible (Figures 4.16-2, 4.16-3, 4.16-4, and 4.16-5). Viewshed analysis for the Project was run using the preliminary Project layout and a U.S. Geological Survey digital elevation model dataset. The analysis results identify all points on the terrain surface with a direct line of sight to the tip elevation of one or more Project turbines. Because the turbines are the tallest

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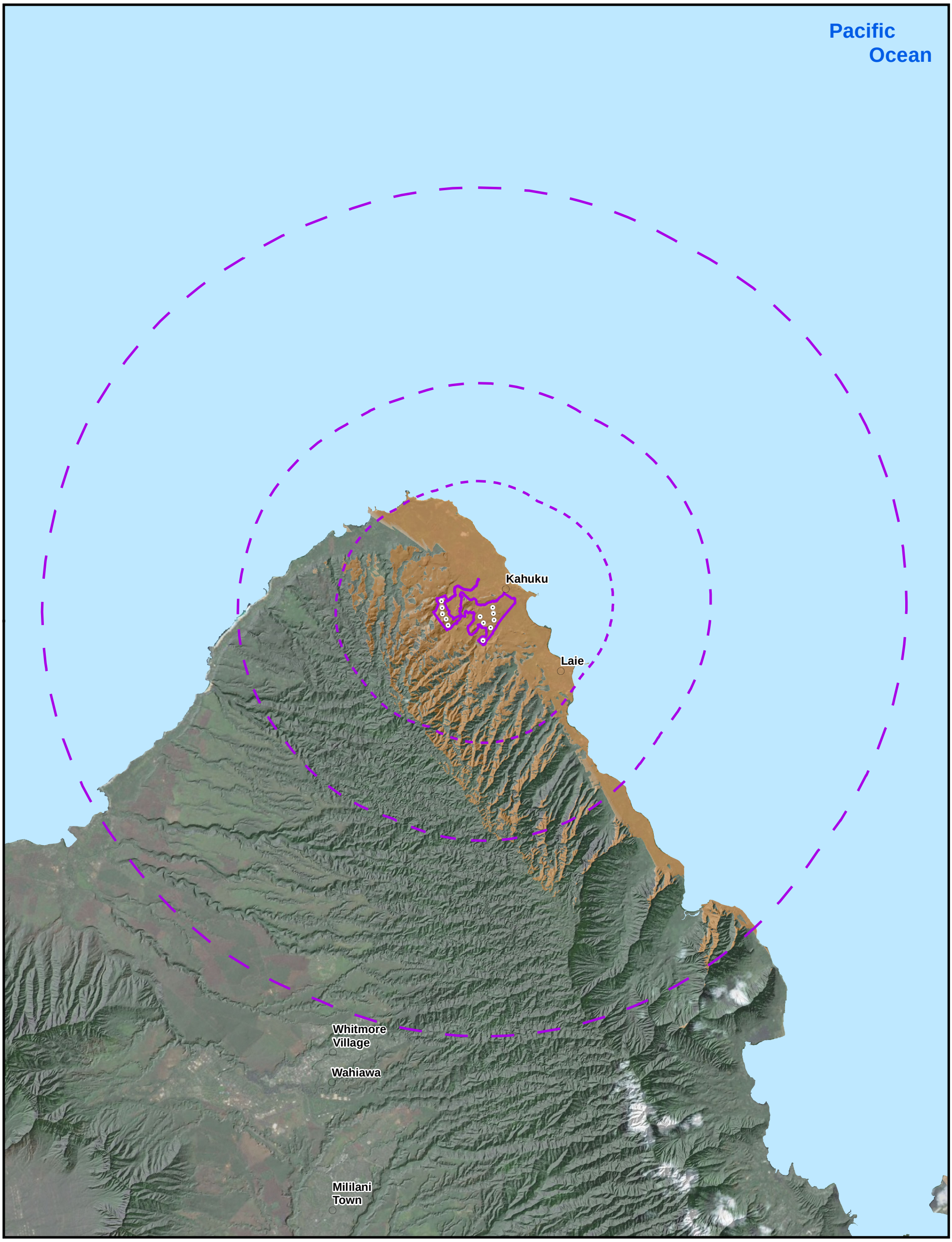


Figure 4.16-1

1:150,000 WGS84 UTM 4

0 0.5 1 2 3 4 Miles

Na Pua Makani Wind Project

Visual Resource Analysis Area

Oahu, HI

January 2016

Wind Farm Site

Potential Turbine Location

Distance Zones

2.5 miles

5 miles

10 miles

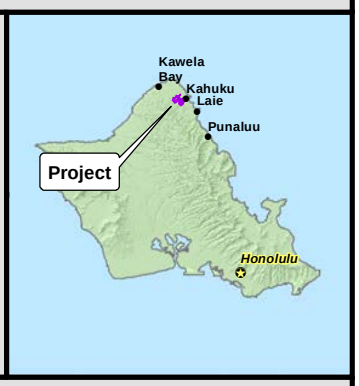
City/Town

Zones of Visual Influence *

High

Low

*Zones of visual influence calculated using a viewing height of 6 feet (1.8 meters) and a 100% maximum blade tip height of up to 512 feet (156 meters)



Data Sources Champlin: project facilities / ESRI: roads, cities, aerial imagery / Tetra Tech: zones of visual influence

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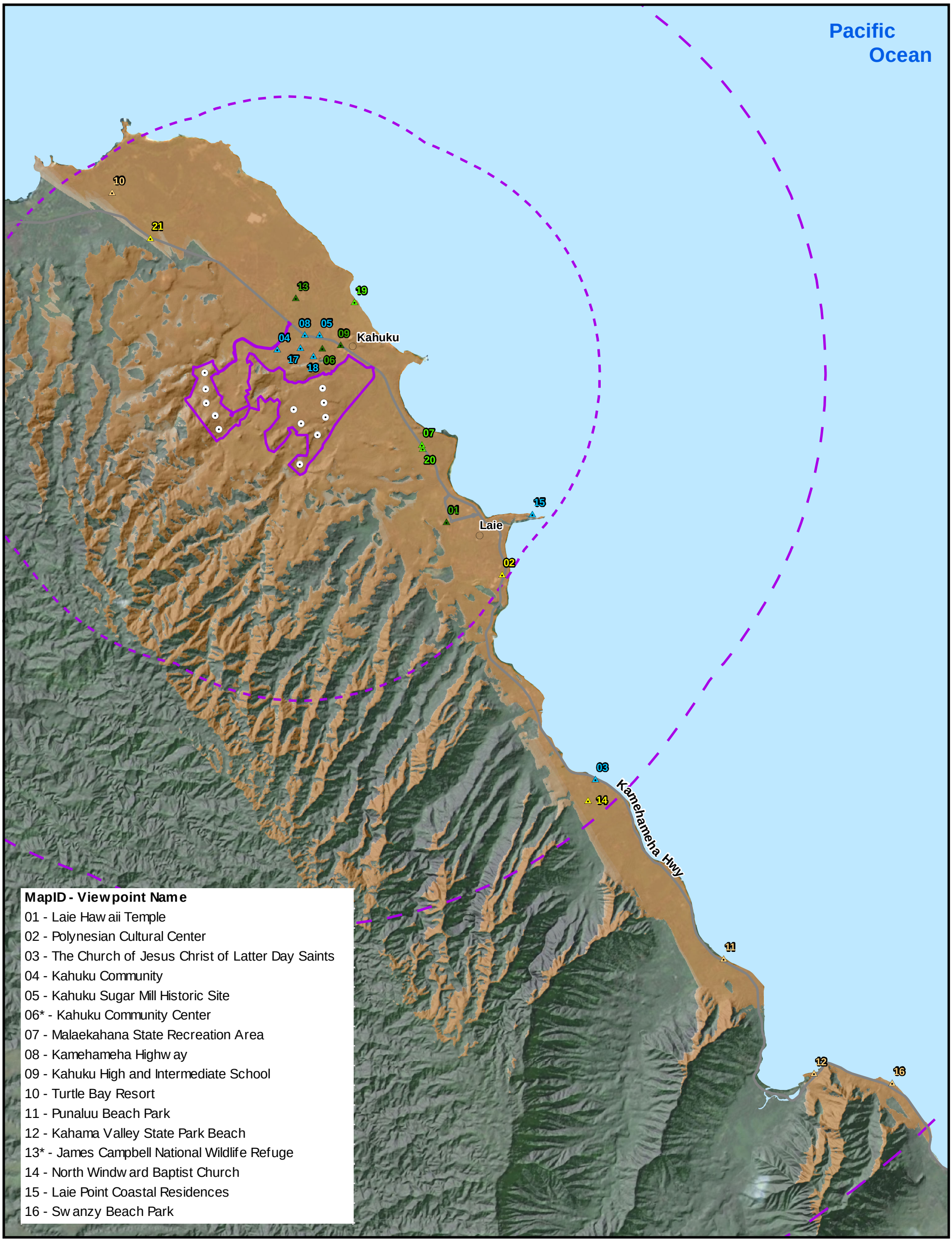


Figure 4.16-2

1:65,000 WGS84 UTM 4

0 0.5 1 2 3 4 Miles

Na Pua Makani Wind Project

Visual Resource Viewpoint Selection

Oahu, HI

January 2016

Wind Farm Site

Potential Turbine Location

Distance Zones

2.5 miles

5 miles

10 miles

City/Town

Secondary Road

Zones of Visual Influence *

High

Low

Turbine Visibility Potential

Confirmed Yes

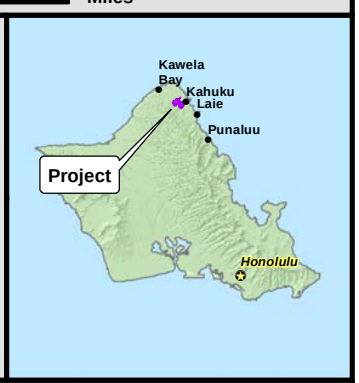
Yes

Likely

Possible

Low

*Zones of visual influence calculated using a viewing height of 6 feet (1.8 meters) and a 100% maximum blade tip height of up to 512 feet (156 meters)



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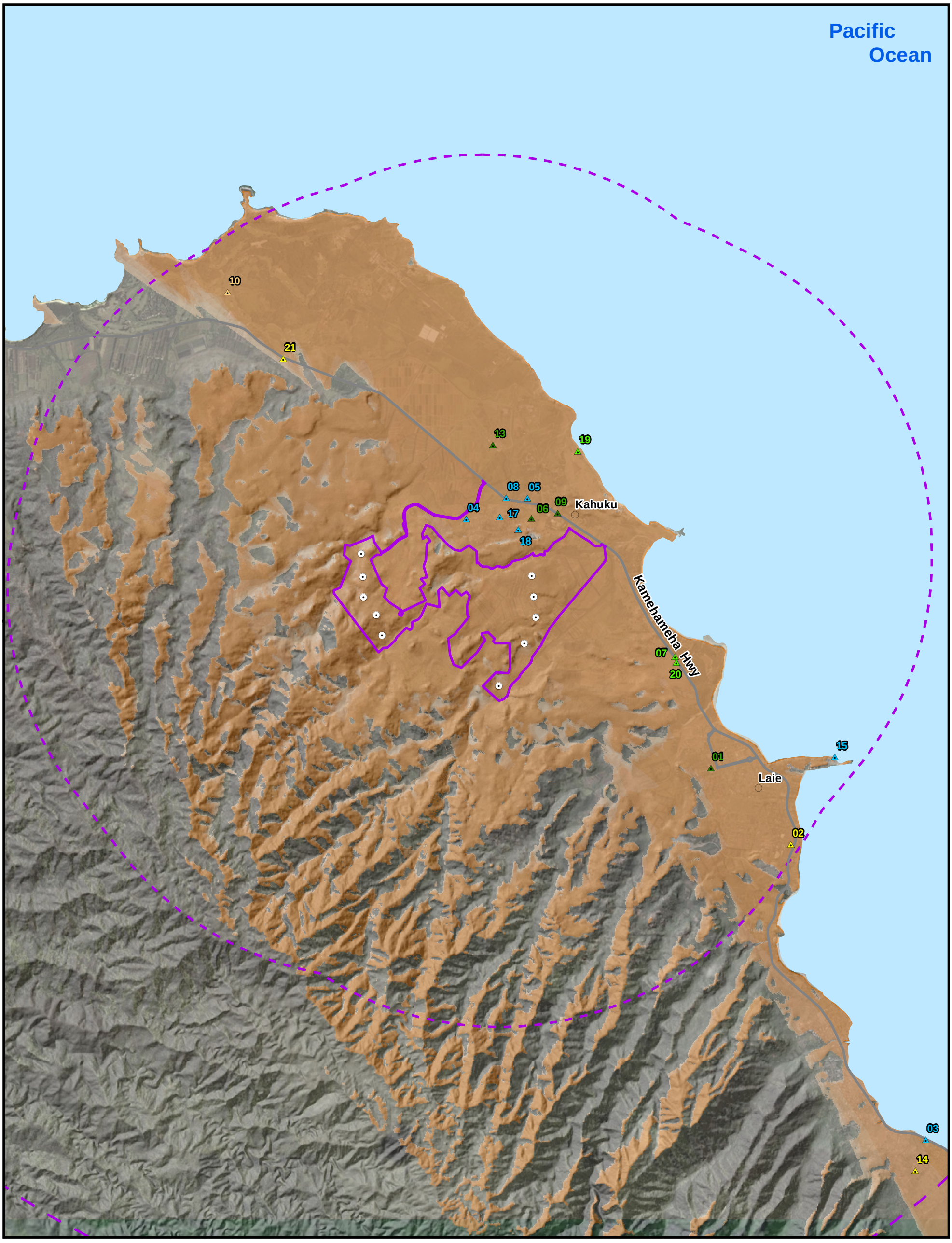


Figure 4.16-3

1:45,000 WGS84 UTM 4

0 0.25 0.5 1 1.5 2 Miles

Na Pua Makani Wind Project

Visual Resource Viewpoints within 2.5 miles of the Project Alternative 2

Oahu, HI

January 2016

Wind Farm Site

Potential Turbine Location

Distance Zones

2.5 miles

5 miles

10 miles

City/Town

Secondary Road

Zones of Visual Influence *

High

Low

Turbine Visibility Potential

Confirmed Yes

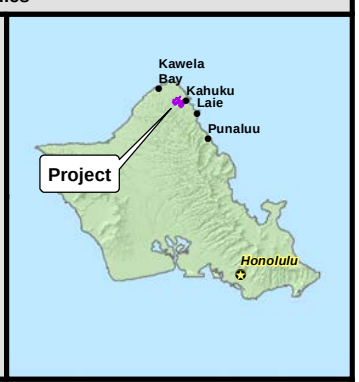
Yes

Likely

Possible

Low

*Zones of visual influence calculated using a viewing height of 6 feet (1.8 meters) and a 100% maximum blade tip height of up to 512 feet (156 meters)



Data Sources Champlin: project facilities / ESRI: roads, cities, aerial imagery / Tetra Tech: zones of visual influence

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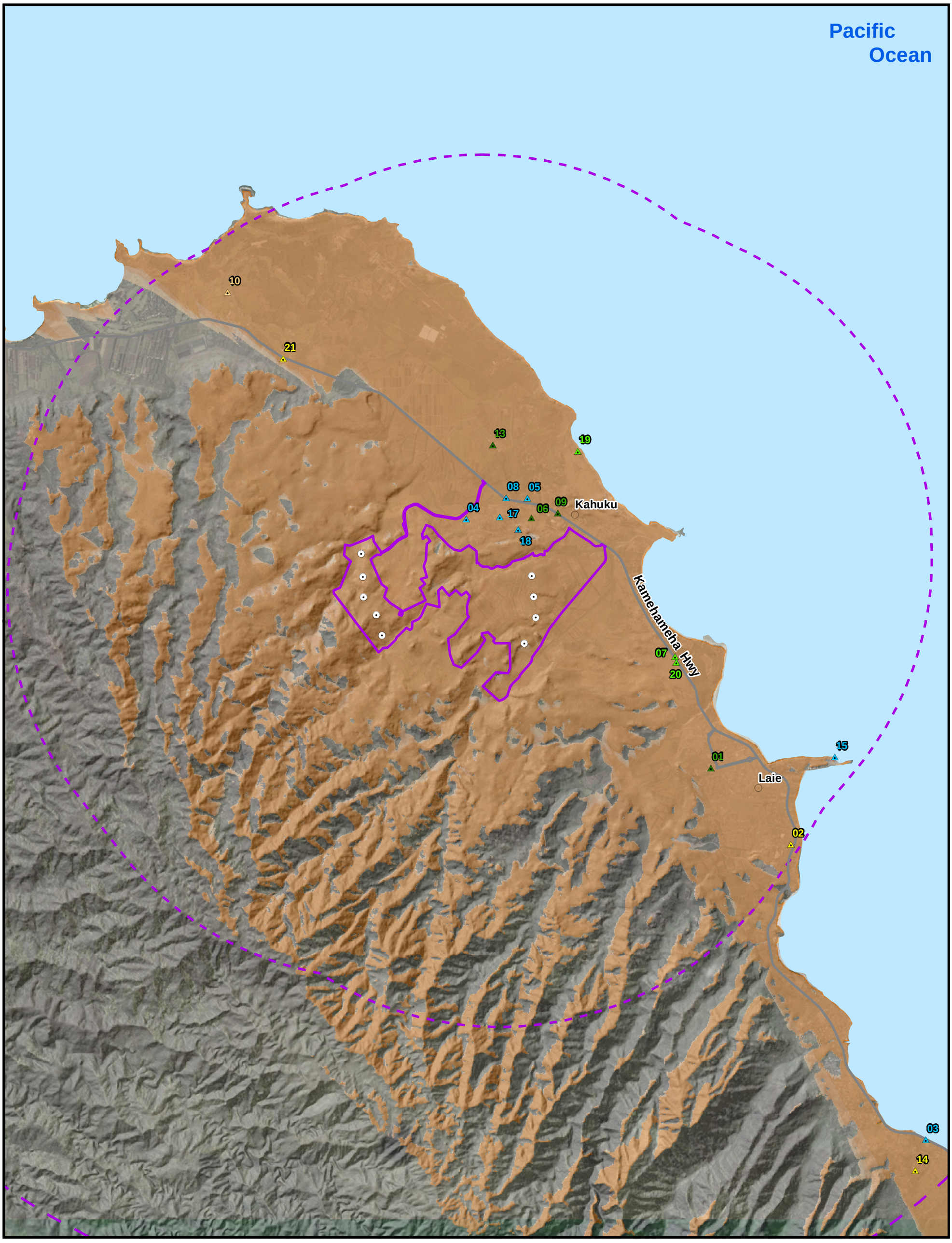


Figure 4.16-4

1:45,000 WGS84 UTM 4

0 0.25 0.5 1 1.5 2 Miles

Na Pua Makani Wind Project

Visual Resource Viewpoints within 2.5 miles of the Project Alternative 2a

Oahu, HI

January 2016

Wind Farm Site

Potential Turbine Location

Distance Zones

- 2.5 miles
- 5 miles
- 10 miles

City/Town

Secondary Road

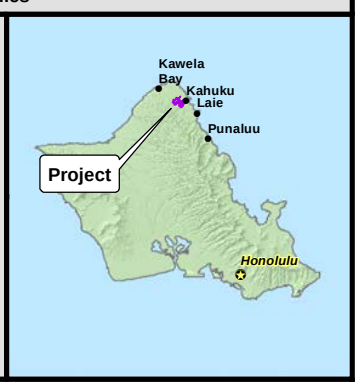
Zones of Visual Influence *

- High
- Low

Turbine Visibility Potential

- Confirmed Yes
- Yes
- Likely
- Possible
- Low

*Zones of visual influence calculated using a viewing height of 6 feet (1.8 meters) and a 100% maximum blade tip height of up to 656 feet (200 meters)



Data Sources Champlin: project facilities / ESRI: roads, cities, aerial imagery / Tetra Tech: zones of visual influence

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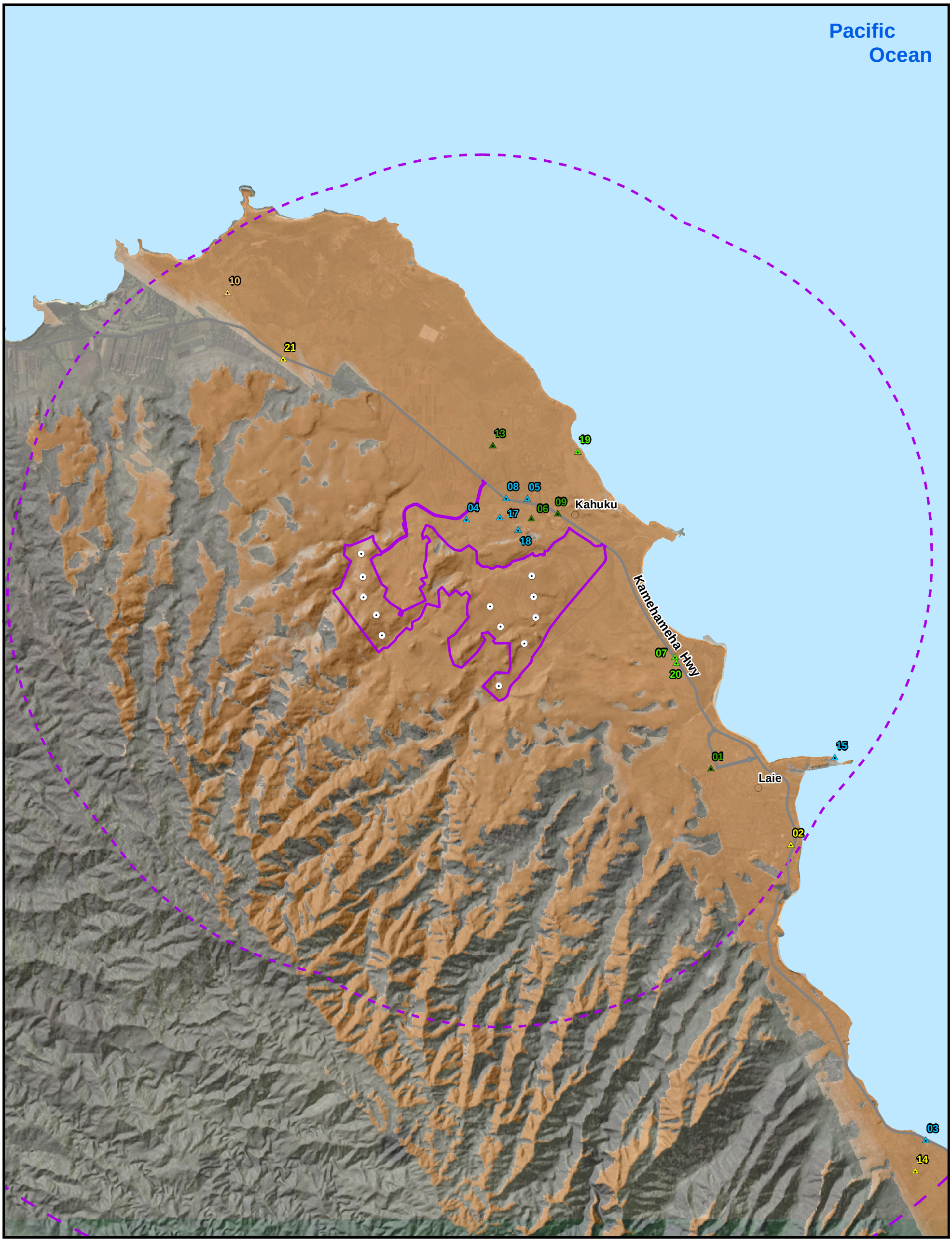


Figure 4.16-5

1:45,000 WGS84 UTM 4

0 0.25 0.5 1 1.5 2 Miles

Na Pua Makani Wind Project

Visual Resource Viewpoints within 2.5 miles of the Project Alternative 3

Oahu, HI

January 2016

Wind Farm Site

Potential Turbine Location

Distance Zones

2.5 miles

5 miles

10 miles

City/Town

Secondary Road

Zones of Visual Influence *

High

Low

Turbine Visibility Potential

Confirmed Yes

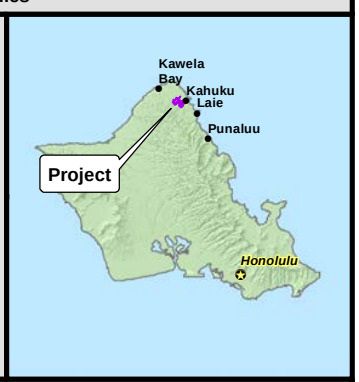
Yes

Likely

Possible

Low

*Zones of visual influence calculated using a viewing height of 6 feet (1.8 meters) and a 100% maximum blade tip height of up to 512 feet (156 meters)



Data Sources Champlin: project facilities / ESRI: roads, cities, aerial imagery / Tetra Tech: zones of visual influence

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structures of the proposed Project and are typically sited along ridges to maximize the wind resource, the turbines are generally the most prominent Project facilities and the most likely to be visible.

It should be noted that the viewshed analysis results are a conservative representation of potential Project visibility. The analysis represents line-of-sight conditions based only on topography; it does not account for factors that might obscure or block visibility from a specific location or at certain times, such as weather conditions, existing structures, or vegetation.

4.16.1.3 Select Viewpoints

A desktop study was performed to assist with the identification of viewpoints. The study consisted of reviewing aerial photographs, land use and resource plans, land use data, and the public scoping comments for the Project. The viewshed analysis was also reviewed to identify locations with potential views of the Project that would be suitable for use as viewpoints in the visual assessment. Field review of the visual resource analysis area was conducted during April 2013 and April 2014 to verify the characterization of existing visual conditions based on desktop analysis. The field review included photo-documentation of conditions at 21 specific viewpoints within the analysis area. Locations of those viewpoints are indicated in Figure 4.16-2. Table 4.16-3 summarizes information about viewpoint location, the viewer groups represented, and the distance to the Project.

Four of those 21 viewpoints were selected for the development of visual simulations of with-Project conditions, as a key element of the visual impact assessment. The four viewpoints are the Kahuku Community Center, James Campbell National Wildlife Refuge, Kahuku Golf Course and Malaekahana Bike and Pedestrian Path (Appendix J).

4.16.1.4 Assess Existing Scenic Quality

The existing visual resources of an area are defined by landscape character and scenic quality. Scenic quality is a measure of the visual appeal of a particular location. Landscape character is a descriptive means by which humans assess a landscape. When evaluating scenic quality, both natural and man-made components of the visual environment are considered as they either add to or detract from the overall landscape character within a specific setting. Scenic quality levels were established by evaluating the distinctiveness and diversity of a particular landscape setting in relation to the following scenic quality factors (BLM 1986):

- Landform
- Vegetation
- Water
- Color
- Effects of adjacent scenery
- Scarcity of the landscape
- Cultural modifications

Scenic quality levels of High, Moderate or Low were assigned to each viewpoint, based on evaluation of the existing conditions as viewed from each location. Descriptions for the respective scenic quality levels are as follows:

- *High* – Distinct visually appealing landscapes with a high degree of variety and uniqueness where landscape elements have high visual appeal.
- *Moderate* – Moderately appealing landscape with common features that may contain built features, but they are not dominant
- *Low* – Landscape is less appealing and is dominated by built features

4.16.1.5 Assess Contrast

Contrast in the landscape is determined by the differences in form, line, color, texture, scale, and landscape juxtaposition between the existing conditions and the expected conditions with a proposed action. In the context of the proposed Project, visual contrast would result from 1) landform modifications that are necessary to prepare the proposed Project site for construction, 2) the removal of vegetation to construct and maintain the wind turbines, roads, and ancillary facilities, 3) the construction of temporary and permanent access roads required to erect and maintain the wind turbines and ancillary facilities, and 4) the introduction of wind turbines and ancillary facilities into the landscape setting. Contrast levels of None, Weak, Moderate and Strong were assigned to the Project as it would likely be seen from each viewpoint based on the definitions listed below (BLM 1986):

- *None* – The contrast is not visible or is not perceived.
- *Weak* – The contrast can be seen but does not attract attention.
- *Moderate* – The contrast begins to attract attention and begins to dominate the characteristic landscape.
- *Strong* – The contrast demands attention and is dominant in the landscape.

Several environmental factors can influence the amount of visual contrast introduced by a proposed action. These environmental factors listed below are based on the U.S. Bureau of Land Management (BLM) Visual Resource Management Manual; however, the list does not include season of use, because the weather in Hawaii stays relatively the same and it does not snow (BLM 1986).

- Distance – The contrast created by a project usually is less as viewing distance increases.
- Angle of Observation – Viewing the project from different angles can greatly affect the apparent size of a project and the resulting level of visual contrast.
- Length of Time in View – The longer an action is in view, the greater the level of visual contrast.
- Relative Size or Scale – The level of visual contrast created by a project is directly related to its size and scale compared to the surrounding landscape.
- Lighting Conditions – The direction and angle of the sun affects the color, intensity, shadow, reflection, form, and texture of visual aspects of proposed project components.

- Motion – Movement from features, such as wind turbines, will draw attention to the project.
- Atmospheric Conditions – The contrast created by the project is reduced by clouds, fog or smog, and precipitation.
- Spatial Relationships – The arrangement of features on the landscape and how they blend into the landscape can reduce the contrast.
- Recovery time – The amount of time successful revegetation/reclamation is expected to have.

Contrast rating sheets were completed for each viewpoint, based on careful review of the basic design elements of form, line, color, and texture of the Project facilities expected to be visible at each location relative to the existing landscape character (Appendix J). Simulations prepared for four viewpoints provided the direct basis for evaluating contrast at those locations, and were interpreted to inform the assessment of contrast levels at the other viewpoints.

4.16.1.6 Assess Visual Quality Change

The expected change in visual quality with the Project was determined by evaluating the contrast associated with the proposed Project relative to the existing landscape conditions (scenic quality). As discussed above, the existing landscape conditions were assessed using the basic design elements of form, line, color, and texture of the existing landforms, vegetation, and man-made elements. The expected change in visual quality at each viewpoint was rated as High, Moderate, or Low. For example, a case of Strong contrast and High existing scenic quality would represent a High change in scenic quality. A Strong contrast rating at a viewpoint with Low existing scenic quality was considered a Moderate change in scenic quality.

4.16.1.7 Assess Viewer Response

The expected viewer response to the change in visual quality was assessed based on the combination of viewer expectations or sensitivity, duration of view, and use volume applicable to the viewers present at each viewpoint. Viewer expectations or sensitivity tend to vary among viewer groups based on the characteristics of the viewers and the nature of their activity; residential and recreational viewers are typically considered to be highly sensitive to change in visual quality, while potential viewers engaged in agricultural or commercial activity are focused primarily on their work and generally have low sensitivity to change in visual quality. Overall viewer response levels were rated as High, Moderate, or Low for each viewpoint. Viewpoints rated as having a High overall viewer response generally have viewers assumed to have high sensitivity, relatively long view durations, and at least a medium volume of use. A viewpoint along a highway would likely have a relatively high use volume, short view duration and moderate viewer sensitivity, and the overall viewer response would consequently be rated as Moderate.

4.16.1.8 Assess Impact Levels

Overall impact levels for visual resources were assessed by applying the impact criteria outlined in Table 4.16-1, which address the impact dimensions of magnitude or intensity, duration, geographic extent, and context, and interpreting the results on a Project-wide basis.

Ratings for impact magnitude or intensity were determined by considering the expected change in visual quality and the overall viewer response for each viewpoint. Table 4.16-2 is a matrix indicating the visual impact intensity levels based on the visual quality change and viewer response components. For example, if a viewpoint has a High rating for change in scenic quality, meaning the landscape has a uniqueness and variety, and Low rating for viewer response, than visual impact intensity would be moderate.

As discussed below in Section 4.16.3, the resulting impact intensity levels vary among the individual viewpoints, based on variability in existing scenic quality, Project visibility and contrast, and overall viewer response. The duration, extent and context characteristics are appropriately considered on a broader basis across all of the viewpoints, or at least for groups of viewpoints. As a result, the significance of the visual impacts identified was assessed on a Project-wide basis, considering the four components addressed in Table 4.16-1, rather than defining significance levels for each viewpoint.

Table 4.16-1. Impact Criteria for Visual Resources

Type of Effect	Impact Component	Effects Summary		
Changes to Visual Resource Character	Magnitude or Intensity	**High:** A high reduction of scenic quality and a high level of viewer response to visual change, or a similar scenic quality/viewer response outcome	**Moderate:** Moderate reduction of scenic quality with moderate viewer response to visual change, or a similar scenic quality/viewer response outcome	**Low:** Low reduction of scenic quality with low viewer response to change in the visual environment, or a similar scenic quality/viewer response outcome
	Duration	**Permanent:** Chronic effects; reduction in scenic quality and viewer response to the change would continue throughout the operation of the Project	**Long-term:** Reduction in scenic quality would continue beyond the construction period of the Project, but would be substantially mitigated within 5-10 years after completion of the Project and restoration/ reclamation activities	**Temporary:** Scenic quality would be noticeably reduced for a period no longer than the span of the Project construction; visual conditions would be expected to approximate pre-Project conditions at the completion of the activity
	Geographic Extent	**Extended:** Reduction of scenic quality would be experienced beyond the region, potentially island-wide	**Regional:** Reduction of scenic quality would be experienced beyond the local area (the wind farm site and adjacent community), potentially throughout northeastern Oahu	**Local:** Reduction of scenic quality would be limited to the local area (the wind farm site and adjacent community)
	Context	**Unique:** Affects scenic resources that are unique or are protected by specific legislation	**Important:** Affects scenic resources that may be common in region but have unusually strong local attachment or focus within the local community	**Common:** Affects scenic resources that are common to the region and the island, and are not protected by legislation

Table 4.16-2. Visual Impact Intensity Levels

Visual Quality Change	Overall Viewer Response		
	High	Moderate	Low
High	High	Moderate-High	Moderate
Moderate	Moderate-High	Moderate	Moderate-Low
Low	Moderate	Moderate-Low	Low
None	No Impact	No Impact	No Impact

4.16.2 Alternative 1 – No Action

4.16.2.1 Direct and Indirect Effects

Under the No Action Alternative, USFWS would not issue an ITP and the Project would not be developed and the HCP conservation measures would not be implemented. The No Action Alternative would therefore have no visual impacts. No mitigation measures would be required.

If the No Action Alternative is implemented, the demand for a wind energy facility, as described in Chapter 2, would not be met with this Project and electricity providers would need to turn to other proposals to meet energy demands. Under the No Action Alternative, visual impacts similar to those described for the proposed Project might occur due to development of new wind energy facilities or other energy related projects built to meet the increasing demand. Regardless of any actions that might be taken to increase energy supply, new sources of visual change in the landscape could also occur as a result of new or ongoing land uses.

4.16.2.2 Cumulative Effects

As indicated above, under the No Action Alternative there would be no visual impact associated with the Project. Thus, Alternative 1 would not contribute to cumulative effects to visual resources.

4.16.2.3 Summary

Alternative 1 would have no effect on visual resources because no action would be undertaken.

4.16.3 Alternative 2 –8 to 10 Turbine Project

Alternative 2 would consist of constructing and operating up to 10 wind turbines, each with a nameplate capacity of up to 3.3-MW turbines and associated infrastructure; see Chapter 2 for a detailed description.

4.16.3.1 Direct and Indirect Effects

Construction Impacts

Large trucks, cranes, mount towers, wind turbine components (i.e., nacelle, rotor, tower, and blades), and other large-scale construction equipment would be present on the Project site during construction. Specific activities would include clearing, grading, and surfacing of the sites for Project facilities; improving existing access roads and constructing new roads; constructing the turbine foundations and ancillary structures; assembling the wind turbines; trenching to bury

electrical distribution lines; and stockpiling materials and equipment in staging and parking areas. These construction elements would introduce forms, lines, colors and textures that would create contrast with the existing landscape and result in short-term impacts to visual resources. These construction activities would include the implementation of mitigation measures (e.g., dust abatement, phased construction) intended to minimize impacts to the aesthetic environment.

Operation and Maintenance Impacts

The turbines, with heights of up to 512 feet (156 meters), would be the primary source of long-term visual impact from the Project. The turbines would be much taller than existing structures in or immediately adjacent to the wind farm site. Given the height of the wind turbines, their placement on ridgelines, and the rural nature of the Project site, the turbines would be highly visible from certain viewpoints. Views of the wind turbines could not be avoided because of their size and exposed location. Visibility of the wind turbines would be blocked or partially obscured by topography in some locations, however, and could be diminished in other locations because of factors such as distance from viewers, the angle of observation, atmospheric conditions, and the presence of vegetation and/or structures. The viewshed analysis identifies the areas from which at least a portion of one or more wind turbines would potentially be visible, based on line-of-sight conditions determined by topography.

In addition to the size, form, and color of the turbines, another source of visual contrast from the operation of the Project would be the introduction of motion into a static landscape. The oscillating motion of wind turbine blades often draws the eye of potential viewers and creates more contrast than does a static structure of similar size and form.

Other Project features that would have relatively limited visual impact would be access roads, electrical collection and communication networks, substation and one permanent meteorological tower. These features would be much smaller and would generally create much less visual contrast than the turbines.

At nighttime, the substation and the turbines would be minimally lit. This would create a new light source in the wind farm site. Much like the motion of the blades during daytime operations, the blinking safety lights can draw the attention of a casual observer.

Summary of Impact Assessment for Viewpoints

Table 4.16-3 summarizes the potential visual impact of the Project for each viewpoint. The table is followed by a brief summary of the existing visual conditions and impact considerations for each viewpoint. ~~As a result of public comments on the original Draft EIS related to visual impacts, the viewpoint-specific summary has been edited for clarity and to provide more detailed explanation for the factors that were incorporated into the impact evaluation.~~ Visual quality and contrast ratings have also been updated to reflect the current turbine layout (see Chapter 2 for discussion of Project changes between the original Draft and Second Draft EIS). Visual simulations of the Project as it would appear from selected viewpoints can be found in Figures 4.16-6a, 6b, 6c, 7a, 7b, 7c, 8a, 8b, 8c, 9a, 9b, 9c, 9d, 9e, and 9f). Visual impact rating sheets are found in Appendix J.

Table 4.16-3. Alternative 2: Visual Impact Intensity for Viewpoints

Viewpoint	Viewpoint Name	Distance from Closest Wind Turbine (miles)	Viewer Group(s) Represented	Existing Scenic Quality	Contrast Rating	Change in Visual Quality	Overall Viewer Response	Impact Intensity
01	Laie Hawaii Temple	1.7	Recreational, Institutional	High	None	None	Moderate	None
02	Polynesian Cultural Center	2.5	Recreational	Moderate	None	None	Moderate	None
03	The Church of Jesus Christ of Latter Day Saints	4.8	Institutional	High	None	None	Moderate	None
04	Kahuku Residential Community	0.7	Residential	Low	Weak	Low	High	Moderate
05	Kahuku Sugar Mill Site	0.6	Commercial	Low	Weak	Low	Low-Moderate	Low
06[1/]	Kahuku Community Center	0.5	Recreational	Moderate	Moderate	Moderate	Moderate	Moderate
07	Malaekahana State Recreation Area	1.3	Recreational	Moderate	Moderate	Moderate	Moderate	Moderate
08	Kamehameha Highway near Kahuku	0.4	Highway travelers	Low	Moderate	Low	Moderate	Low-Moderate
09	Kahuku High and Intermediate School	0.5	Institutional	Low	Weak	Low	Moderate	Low-Moderate
10	Turtle Bay Resort Golf Course	2.6	Recreational	Moderate	Weak	Low	Moderate	Low-Moderate
11	Punaluu Beach Park	7.3	Recreational	High	None	None	Moderate	None
12	Ahupua'a 'o Kahama Valley State Park Beach	8.8	Recreational	High	None	None	Moderate	None
13[1/]	James Campbell National Wildlife Refuge	1.0	Recreational	Moderate	Moderate	Moderate	Moderate	Moderate
14	North Windward Baptist Church	4.9	Institutional	Moderate	None	None	Moderate	None

Table 4.16-3. Alternative 2: Visual Impact Intensity for Viewpoints (continued)

Viewpoint	Viewpoint Name	Distance from Project (miles)	Viewer Group(s) Represented	Existing Scenic Quality	Contrast Rating	Change in Visual Quality	Overall Viewer Response	Impact Intensity
15	Laie Point Coastal Residences	2.5	Residential	High	Moderate	Moderate-High	Moderate-High	Moderate-High
16	Swanzy Beach Park	9.6	Recreational	High	None	None	Moderate	None
17	Kahuku Hospital and Medical Center	0.5	Institutional	Low	Weak	Low	Moderate	Low-Moderate
18	Kahuku Elementary School	0.3	Institutional	Low	Weak	Low	Moderate	Low-Moderate
19[1/]	Kahuku Golf Course	0.7	Recreational	Moderate	Moderate	Moderate	Moderate	Moderate
20[1/,2/]	Malaekahana Bike and Pedestrian Path	1.2	Recreational	Moderate	Moderate	Moderate	Moderate	Moderate
21	Kamehameha Highway near Turtle Bay	1.2	Highway Travelers	Low	Moderate	Low	Moderate	Low-Moderate

Key:
1/ A visual simulation has been completed for the viewpoint.
2/ A nighttime visual simulation has been complete for viewpoint

Viewpoint 01 Laie Hawaii Temple. The Laie Hawaii Temple was established in 1850 as a temple of The Church of Jesus Christ of Latter-day Saints. The temple is built on a small hill on a property of 11 acres, and is located about one quarter of a mile west from the Pacific Ocean. Only church members may enter the temple and participate in sacred ceremonies, but non-Mormon visitors (generally tourists) can take public tours of the grounds and visitor center. The visitor center reportedly attracts over 100,000 people annually. The grounds contain statues, architectural columns and walkways, tropical gardens, and reflecting pools, which contribute to the aesthetic appeal of the site. External views from the compound are largely blocked by structures or screened by landscape components located on the grounds. The existing scenic quality for this viewpoint was rated as high.

The Project is located 1.7 miles to the northwest from Viewpoint 01. The viewshed analysis indicates the Project would be visible from the Laie Hawaii Temple. Onsite review indicated that most views toward the Project would be screened by vegetation or blocked by structures. Further desktop analysis indicated that portions of some turbines could be barely visible through intervening tree foliage. As a result, it is expected that the Project would not be noticeable to the casual viewer at this location. Therefore, the visual contrast was rated as none and there would be no visual impact at Viewpoint 01.

Viewpoint 02 Polynesian Cultural Center. The Polynesian Cultural Center is a "living" museum located on 42 acres of land on Palekana Street in Laie, where actors depict the everyday life and culture of tropical villages from Polynesia. The facility is owned by The Church of Jesus Christ of Latter-day Saints. The grounds are arranged as different villages where visitors can learn crafts, partake in traditional sports, and learn to cook the Polynesian way. Because views from within the facility are enclosed, the cultural center parking lot is the specific photo location for Viewpoint 02. Views from this location include the paved parking lot surface, light standards, and vehicles within the immediate foreground, and adjacent structures and street features beyond. Views beyond the foreground are effectively screened by vegetation. The scenic quality is rated as moderate, based on the enclosed views and the numerous man-made features on the landscape.

The Project is located 2.5 miles to the northwest from Viewpoint 02. The viewshed analysis indicates the Project would potentially be visible from the Polynesian Cultural Center. Onsite review indicated that views to the northwest are effectively screened by vegetation. As a result, the Project would not be visible at this location and there would be no visual impact at Viewpoint 02.

Viewpoint 03 The Church of Jesus Christ of Latter-Day Saints. Viewpoint 03 is at the Church of Jesus Christ of Latter-day Saints located in Hauula, off of Kamehameha Highway, and approximately 4.8 miles to the southeast of the Project. The entry to the church property from the highway provides panoramic views to the west, north and east that include the Pacific Ocean; although the highway, adjacent utility poles and wires, and residences along the beach are plainly visible, they do not dominate the view. Therefore, the existing scenic quality of the view from the highway is rated as high.

The viewshed analysis indicates the Project would likely be visible from Viewpoint 03. Onsite review and photography indicated that the existing Kahuku turbines, which are on essentially the same line of sight from Viewpoint 03 as is the Project, are not evident from this viewpoint. This

condition suggests that views of the Project turbines might also be blocked by terrain and/or screened by vegetation, and that visibility (if any) would be limited to turbine blades. As a result, the Project would not be noticeable to the casual viewer, the contrast with the Project is rated as none, and no visual impact is expected at Viewpoint 03.

Viewpoint 04 Kahuku Residential Community. Kahuku is a community of approximately 2,600 residents located 0.7 mile from the wind farm site. Viewpoint 04 is located in a residential area in the northwestern part of the community. The predominant visual character of the foreground views at this location is that of an urban streetscape consisting of constructed features including homes and ancillary structures, paved streets and driveways, parked vehicles, and utility poles supporting numerous overhead lines. Hilly, vegetated terrain rising above the homes is visible to the west and southwest. The upper portions of some existing wind turbines in the Kahuku Wind farm are visible above and among structures and landscaping trees, but they are not prominent. The existing scenic quality is rated as low, because relatively little of the natural landscape is seen and the constructed features dominate the view.

Viewpoint 04 represents residential viewers in the community, who are considered to have high sensitivity to visual change. The viewpoint is approximately 0.8 mile from the closest turbines in the proposed Project, resulting in high visibility. The contrast is rated as weak, however, because the Project turbines would be viewed within the context of a modified landscape that is dominated by existing constructed features that include many vertical elements. The change in visual quality would therefore be low. Viewer numbers are moderate and the views would occur for long durations; therefore, the overall viewer response is high. Based on low visual quality change and high viewer response, the visual impact intensity is considered moderate.

Viewpoint 05 Kahuku Sugar Mill Site. The Kahuku Sugar Mill was built in 1890 and produced sugar until it closed in 1971. The site of the former mill is just north of the Kamehameha Highway in Kahuku. The main mill building was demolished in 2004, and the site is now a small commercial center that includes a bank, gas station, restaurants, and medical offices. Foreground views include the commercial structures, roadways and parking lot features on the site, plus utility poles and lines and other structures adjacent to the highway. There are distant views of rolling vegetated terrain to the southwest, and the upper portions of two wind turbines in the existing Kahuku Wind Farm are visible among trees to the west. The scenic quality is considered low because the constructed features dominate the view.

Viewers at Viewpoint 05 are at the site primarily for commercial purposes, and have relatively low sensitivity to visual change. The viewpoint is approximately 0.3 mile from the proposed Project and 0.6 mile from the closest turbine, resulting in high visibility. The turbines would create weak contrast, because they would be seen within the context of an urbanized landscape that has been substantially modified. Based on the low existing scenic quality and weak contrast, the level of visual quality change is considered low. Viewer numbers are considered moderate and the view duration is relatively brief. With an overall viewer response of low to moderate, the overall visual impact intensity is low.

Viewpoint 06 Kahuku Community Center (Figure 4.16-6a). The Kahuku Community Center, located on the south side of Kamehameha Highway, is a meeting facility and sports club adjacent to the entrance to Kahuku District Park. The park contains two baseball diamonds, a soccer field, tennis and basketball courts, playground equipment and additional open space. The immediate foreground view from the community center is open to the flat, green grass fields and associated facilities of the park, including tall light standards for the sports fields. The structures of the Kahuku Elementary School (Viewpoint 18) are just beyond the park fields to the south, and the Kahuku High and Intermediate School (Viewpoint 09) complex is adjacent to the east side of the park. Residential structures frame the foreground views to the southwest and west. Rolling vegetated hills in the middleground rise above the school facilities and residential areas, with more distant mountains visible beyond. Two wind turbines in the existing Kahuku Wind Farm are visible above rooftops to the west. The existing scenic quality is rated as moderate overall; although the numerous manmade features are prominent throughout the view, their influence is balanced by the green expanse of the sports fields and the hillsides beyond the developed features.

Viewers at viewpoint 06 are primarily recreational. The Project boundary is approximately 0.3 mile from the viewpoint and the turbines would be highly visible, with the closest turbine just beyond the foreground at 0.6 mile. The Project would create a moderate degree of contrast because it would be seen in the context of numerous constructed features including large buildings, utility poles, street lights, tall fencing and parking lots in the foreground, and turbines of an existing wind project in the middleground. In particular, the tall metal light standards around the sports field provide a strong vertical element that would moderate the contrast introduced by the height and form of the Project turbines. Viewer numbers are moderate and most viewers would have relatively brief, intermittent views because they would be focused on active recreation. The overall viewer response is moderate. Based on moderate contrast and visual quality change and moderate viewer response, the visual impact intensity is considered moderate.

Viewpoint 07 Malaekahana State Recreation Area. The Malaekahana State Recreation Area is a public recreation resource situated on the east side of Kamehameha Highway between Laie and Kahuku. The recreation area is predominantly wooded and provides developed beach access. Visitors can swim, bodysurf, fish, picnic and camp in the park. Views at the entrance to the park include Kamehameha Highway, fencing along the highway, and open rolling terrain to the west with a few existing wind turbines. Views within the interior of the park are enclosed and largely screened by vegetation, particularly in the more heavily used areas along and near the beach. The existing scenic quality at the park entrance is moderate because of the presence of manmade features, while scenic quality in the interior of the park ranges from moderate to high.

Viewpoint 07 represents recreational viewers, who are considered to have a high sensitivity to visual change. The contrast as seen from the entrance area is rated as moderate because the Project would be seen behind landscape modifications in the highway corridor and adjacent to the existing Kahuku Wind Farm, and would not dominate the view. The change in visual quality at this viewing location would therefore be moderate. Viewer numbers are moderate and the views would occur for brief durations; therefore, the overall viewer response is moderate. Based on moderate visual

quality change and moderate viewer response, the visual impact intensity at the park entrance is considered moderate. The Project would likely be screened from view at the beach and other interior areas of the park.

Viewpoint 08 Kamehameha Highway near Kahuku. Kamehameha Highway is a State-designated scenic highway (Route 83) that is located along the Pacific shoreline in several sections, exhibiting highly acclaimed ocean, coastal, and Koolau views (City and County of Honolulu 2012). Two viewpoints were investigated to document representative views along the highway at points northwest and north of the Project. Viewpoint 08 is located near the western edge of Kahuku approximately 0.4 mile north of the eastern portion of the Project. (Viewpoint 21, located 1.2 miles northwest of the Project near Turtle Bay, is discussed below.) Views to the south from Viewpoint 08 toward the Project are mostly enclosed by urbanized development and landscaping in Kahuku that occupies the foreground. Views to the southwest and west are partially screened by trees and shrubs near the highway, with the upper parts of some structures visible above the roadside vegetation and rolling vegetated landscape beyond. Manmade features include structures in Kahuku, fences, sweeping conductor lines, utility poles and guardrails and associated highway features; portions of several turbines from the existing Kahuku Wind Farm are visible above the roadside vegetation to the west. The scenic quality for Viewpoint 08 is considered low because the constructed features in the surrounding views are very prominent.

Viewpoint 08 represents travelers on Kamehameha Highway. The travelers may be local residents taking short trips or tourists taking scenic drives and touring around the island. With a moderate level of sensitivity, high viewer volume, and views occurring over short durations, the overall viewer response is expected to be moderate. Although the Project turbines would be noticeable in the near middleground, the contrast is rated as moderate because the lower parts of the turbines would be blocked from view, and the upper portions would be seen within the context of a landscape that has been substantially modified by urbanized development with numerous types of constructed features, including an existing wind farm. The change in visual quality would therefore be low. Overall visual impact intensity would be moderate at most, due to moderate viewer response and low change in visual quality.

Viewpoint 09 Kahuku High and Intermediate School. Kahuku High and Intermediate School, located in Kahuku south of Kamehameha Highway, provides schooling for over 1,800 students from grades 7 to 12. The school has multiple-use recreation fields and numerous buildings on site. The visual character of the landscape surrounding the school consists primarily of manmade features, including institutional, residential and commercial buildings; roads, parking lots, and associated signage; a large, red-and-white painted communications tower; numerous utility poles with multiple sets of lines; and light standards in Kahuku District Park. Views to the distant landscape beyond the foreground are largely blocked by buildings or screened by trees in the community, although the tops of rolling vegetated hills and silhouettes of mountains can be seen in part of the background. The scenic quality is low due to the degree of landscape modification resulting from the numerous constructed features that are present throughout the view.

Institutional viewers at Viewpoint 09 include faculty and students who are considered to be moderately sensitive to visual change. The visual contrast associated with the Project was rated as weak because the partial views of Project turbines would be subordinate to the many existing constructed features. Based on the low scenic quality and weak contrast, the level of visual quality change is considered low. Viewer numbers are high and views would occur intermittently and for short durations. Therefore, the overall viewer response would be moderate and the visual impact intensity would be low to moderate.

Viewpoint 10 Turtle Bay Resort Golf Course. The Turtle Bay Resort is located on the north shore of Oahu, approximately 4 miles from Kahuku and more than 2 miles from the Project. The resort includes two golf courses, two practice facilities, restaurants, a hotel, beach cottages, villas, and miles of coast line to recreate along. The visual character of the landscape includes panoramic views from the north side of the resort to the Pacific Ocean. Views to the south and southeast from much of the resort are enclosed by forest cover, although views to the distant landscape from the golf course are more open and only partially screened by trees. Therefore, a location on the resort's Fazio Golf Course was used to represent Viewpoint 10. Views to the southeast from this location include rolling vegetated hills beyond the flat terrain of the golf course. Several vertical wind turbines in the existing Kahuku Wind Farm are partially visible rising above a low ridge. The scenic quality of the view toward the Project from Viewpoint 10 is considered to be moderate.

Guests at Turtle Bay Resort are primarily involved in recreation, including active uses such as swimming, water sports and golf and more passive uses such as sunbathing and beachcombing. Although recreational users are typically considered to have high sensitivity to visual change, the most sensitive viewers at Turtle Bay would be those along and near the beach areas where views toward the Project are enclosed. Viewers at Viewpoint 10 are primarily focused on their golf activity and are in a more developed setting, and therefore considered to be moderately sensitive to the surrounding scenery. The views from the golf course toward the Project site are partially enclosed by vegetation. The visual contrast associated with the Project was rated as weak, because the Project turbines 2.6 miles distant would be partially screened and would be seen beyond the Kahuku Wind Farm. Based on the moderate scenic quality and weak contrast, the level of visual quality change is considered low. Viewer numbers are considered moderate and the view duration is relatively brief for golfers at Viewpoint 10, and the overall viewer response is considered moderate. With a low visual quality change and moderate viewer response, the visual impact intensity would be at low to moderate.

Viewpoint 11 Punaluu Beach Park. Punaluu Beach Park is located south of Punaluu on the windward coast of Oahu, approximately 7 miles from Kahuku. The beach is narrow and flanked by wooded vegetation, and restrooms, picnic tables, and roadside parking are provided for beach users. There are open and panoramic views to the Pacific Ocean to the north and east. Views to the northwest along the curving shoreline include homes and trees along the beach and rolling vegetated mountains in the foreground and the middleground. More distant views up the coast include nearshore waters and low terrain with some development evident. The existing scenic quality at Viewpoint 11 is high.

The Project is located 7.3 miles from Viewpoint 11. The viewshed analysis indicates the Project would possibly be visible from Punaluu Beach. Onsite review indicated that views in that direction are screened by vegetation and/or blocked by terrain. Based on the observed conditions and the viewing distance, the Project would not be visible or would not be noticeable to the casual observer at this location. Therefore, there would be no visual impact at Viewpoint 11.

Viewpoint 12 Ahupua'a 'O Kahana State Park Beach. The beach area in Ahupua'a 'O Kahana State Park is adjacent to Makalil Point on Kahana Bay. There are two hiking trails that visitors can take into the forest from the beach. The beach has scattered rocks near the shoreline and is surrounded by wooded vegetation, with picnic tables for visitors. Views are predominately enclosed due to the bay being located in a cove and flanked by wooded slopes. Along the far eastern part of the beach, however, there are open northwesterly views to beachfront homes on a wooded point in the middleground, and more distant views across ocean waters to some low terrain in the background. The existing scenic quality at Viewpoint 12 is considered to be high.

The Project is located 8.8 miles from Viewpoint 12. The viewshed analysis indicates the Project would possibly be visible from the State Park beach. Onsite review indicated that views in that direction are screened by vegetation and/or blocked by terrain. (Viewing conditions at Viewpoint 12 are very similar to those for Viewpoint 11.) Based on the observed conditions and the viewing distance, the Project would not be visible or would not be noticeable to the casual observer at this location. Therefore, there would be no visual impact at Viewpoint 12.

Viewpoint 13 James Campbell NWR (Figure 4.16-7a). The James Campbell National Wildlife Refuge (NWR), located just north of Kahuku, has scattered wetland habitat for endangered Hawaiian birds, migratory shorebirds, waterfowl and seabirds. The refuge is closed to general public access, but limited guided tours are conducted during specific seasons and times. The NWR extends from the Kamehameha Highway northeast to the Pacific Ocean. Landscape views on the refuge are generally open and panoramic to the surrounding areas. The foreground views from the primary refuge access point include a flat, open lawn area, a gravel road and parking area, a stone wall, some utility poles, and shrub and long-grass vegetation beyond a woven-wire fence around the compound. Views beyond the compound are enclosed by dense mixed vegetation to the southeast, but are relatively open in other directions. Utility poles along the highway and the tops of buildings in Kahuku can be seen to the south, with low, rolling hills and mountains beyond. Middleground views to the west include a commercial facility and agricultural buildings along the highway and all of the turbines in the existing Kahuku Wind Farm. The existing scenic quality is considered moderate overall.

Viewers at Viewpoint 13 are predominately passive recreationists, with high sensitivity to visual change. User volume is considered low, because of limited public use due to sensitive wildlife concerns, and view duration is moderate. Therefore, overall viewer response is rated as moderate. With generally open views and only partial screening from vegetation, the Project would be visible at Viewpoint 13. The contrast is rated as moderate, because the Project turbines would be co-dominant with the existing wind farm. Based on moderate scenic quality and contrast, the overall

change in visual quality is considered moderate. The overall visual impact intensity would also be moderate, based on the moderate viewer response and moderate change in visual quality.

Viewpoint 14 North Windward Baptist Church. The North Windward Baptist Church is located near Hauula and adjacent to the Hauula Elementary School off the Kamehameha Highway. The grounds are comprised of multiple buildings, though some of the visible buildings may be associated with the elementary school. Views are limited to the immediate foreground by vegetation and structures. The scenic quality is considered to be moderate.

The Project is located 4.4 miles from Viewpoint 14. The viewshed analysis indicates the Project would have a low potential visibility from the North Windward Baptist Church. Onsite review indicated that views are screened by vegetation or blocked by buildings. As a result, the Project would not be visible at this location and there would be no visual impact at Viewpoint 14.

Viewpoint 15 Laie Point Coastal Residences. Viewpoint 15 represents residences near Laie Point. Residences on the north side of Laie Point have an expansive, uninterrupted view to the northwest that includes the coastline and the Pacific Ocean. The terrestrial landscape includes flat, light-colored sandy beaches and dark rock faces along the ocean, with forested rolling hills beyond the beach zone. Visible modifications to the natural landscape are relatively limited, including homes along the shoreline of the point and in Laie. The upper portions (primarily blades) of six turbines in the existing Kahuku Wind Farm are visible rising above a vegetated hill about 4 miles in the distance, but are not prominent. The overall existing scenic quality at Viewpoint 15 is considered high.

Residential viewers at Laie Point are considered to have a high sensitivity to visual change. Views to the northwest from Viewpoint 15 are open and panoramic to the Pacific Ocean and the mountains, and the Project turbines would be visible in the middleground with relatively little screening. The visual contrast associated with the Project was rated as moderate. Although vegetation and terrain would provide partial screening and the Project turbines would be visually similar to the existing wind turbines, the Project would be noticeably more prominent because all of the turbines would be visible and they would appear larger than the existing turbines. Therefore the visual quality change would be moderate to high. Viewer numbers are moderate or low, viewer sensitivity is high, and the views would occur for long durations; therefore, the overall viewer response is considered moderate to high. Based on moderate to high visual quality change and moderate to high viewer response, the visual impact intensity is considered moderate to high.

Viewpoint 16 Swanzy Beach Park. Swanzy Beach Park is a small public park facility located adjacent to Kamehameha Highway in Kaaawa on the windward side of Oahu. It is approximately 1 mile to the southeast along the coast from Kahana Valley State Park (Viewpoint 12) and has a similar view orientation toward the Project. Park features include a large grassy area, a basketball court, a pavilion with picnic tables, and nine campsites. Camping is permitted Friday through Monday only. There is a concrete walkway with a masonry wall along the inland edge of the beach, which provides limited ocean access for users to fish and swim due to the rocky substrate present. There are open and panoramic northwest views to the ocean and steep mountains, with silhouettes of rolling vegetated terrain further in the distance. Although landscape modifications are evident,

including the paved walkway and homes adjacent to the park and along the shoreline, the existing visual quality is considered high overall.

The Project is located 9 miles from Viewpoint 16. The viewshed analysis indicates the Project would potentially be visible from Swanzy Beach Park. Parts of five or six turbines in the existing Kahuku Wind farm can be detected in photos taken at Viewpoint 16 if the photos are enlarged substantially, but are not evident when the photos are viewed normally. It appears that some of the Project turbines would be blocked from view by a mountain ridge, while there would be a line of sight to several turbines located in the eastern part of the Project and somewhat closer to the viewer than the existing Kahuku turbines. Based on review of the existing conditions, it is expected that the Project turbines would not be noticed by the casual observer at Swanzy Beach Park. As a result, the visual contrast, visual quality change and visual impact intensity at Viewpoint 16 are all rated as none.

Viewpoint 17 Kahuku Community Hospital and Medical Center. The Kahuku Hospital and Medical Center is located in the northwestern part of Kahuka, a short distance to the west of Kahuku High School and Kahuku District Park. The medical center faces a residential neighborhood with numerous homes and other buildings. Other constructed features evident in outward views include fences, vertical utility poles with horizontal wires, and vehicles. In addition, the upper portions of several wind turbines in the existing Kahuku Wind farm are visible above trees and roofs to the west. The scenic quality is considered low because the manmade features dominate the views.

Viewpoint 17 represents institutional viewers including workers, patients, and visitors at the hospital, who are considered to have a moderate sensitivity to visual change. The viewpoint is approximately 0.5 mile from the proposed Project, resulting in potentially high visibility. The contrast is rated weak because views would be partially screened by vegetation and/or blocked by structures, and the visible Project turbines would be seen within a modified urban landscape. Based on the low scenic quality and weak contrast, the level of visual quality change is considered low. Viewer numbers are considered moderate, the view duration is relatively brief, and viewers have a primary viewer focus on medical center business. Therefore, the overall viewer response is considered moderate, and the visual impact intensity is low to moderate.

Viewpoint 18 Kahuku Elementary School. The Kahuku Elementary School is located near the center of Kahuku, immediately south of Kahuku District Park and west of the Kahuku High and Intermediate School. The fenced facility includes two main buildings, a playground and courtyard, and a parking lot. Views to the surrounding landscape are dominated by constructed features including houses, streets and vehicles, fencing, and utility poles with sweeping conductor lines. Views to the southeast and south are enclosed by terrain, vegetation and structures in the foreground, while views to the southwest include rolling vegetated hills and the upper part of an existing wind turbine in the distance. The existing scenic quality is considered low due to the dominance of the constructed features.

Viewpoint 18 represents institutional viewers, specifically faculty, staff and students, who are considered to have a moderate sensitivity to visual change. Although the closest Project turbine would be approximately 0.3 mile distant, the turbines would not dominate the scene because the views would be partially screened by vegetation and/or blocked by structures; because the angle of

observation is inferior, the viewer would need to look above the roof tops to see the Project. The contrast is rated as weak, based on these viewing conditions and the existing degree of landscape modification. The change in visual quality would therefore be low. Viewer numbers are high and the views would occur for short durations; therefore, the overall viewer response is moderate. Based on low visual quality change and moderate viewer response, the visual impact intensity is considered low to moderate.

Viewpoint 19 Kahuku Golf Course (Figure 4.16-8a)**.** Viewpoint 19 is located at the north end of the Kahuku Golf Course, a nine-hole municipal golf course located on the northeast side of Kahuku. The course itself is generally open, with panoramic views to the Pacific Ocean to the east. On-course views to the south and southwest include golf course features in the foreground and rolling vegetated hills backed by mountains in the middeground, while the turbines of the existing Kahuku Wind Farm are partially screened in views to the west. Landscape modifications visible from Viewpoint 19 are relatively limited, including a tall, red-and-white-painted communications tower, the wind turbines, and a mostly-screened view of some of the development in Kahuku. Based on the constructed features visible from on the course, the existing scenic quality at Viewpoint 19 is considered moderate for viewers that are facing the Project. The landscape modifications evident at this location are considerably less than what golf course users experience at the parking lot on the west edge of the course, however, which provides an elevated view of the developed uses in Kahuku and full exposure of the Kahuku Wind Farm turbines.

Viewpoint 19 represents recreational users, who are typically considered to have high sensitivity to visual change. Viewers at Viewpoint 19 are primarily focused on their golf activity and are in a more developed setting, and therefore considered to be moderately sensitive to the surrounding scenery. The visual contrast associated with the Project at this location was rated as moderate, because the Project turbines would be co-dominant with an existing wind facility. (If the contrast rating were based on the view from the parking lot, however, the contrast would be rated as weak because of the extensive landscape modification evident in that view.) Based on the moderate scenic quality and moderate contrast, the level of visual quality change is considered moderate. Viewer numbers are considered moderate and the view duration is relatively brief. The overall impact intensity is moderate, based on the moderate viewer response and visual quality change.

Viewpoint 20 Malaekahana Bike and Pedestrian Path (Figures 4.16-9a and 4.16-9d)**.** The Malaekahana Bike and Pedestrian Path is a 1.2-mile trail that connects Laie with Kahuku and is located along the west side of Kamehameha Highway. The trail passes through a mostly rural landscape. Views to the west toward the Project site are open and panoramic, with flat grassland and scattered trees in the foreground and rolling vegetated terrain backed by mountains in the middleground. Constructed features that are visible include fencing along the path and in the adjacent fields, a few scattered homes and associated outbuildings, the paved path and highway, dual rows of utility poles and lines on each side of the highway, and three turbines of the existing Kahuku Wind Farm that are largely screened by vegetation. The overall scenic quality of the view toward the Project is considered moderate.

Viewpoint 20 represents active recreational viewers, who are considered to have a high sensitivity to visual change. Viewers at this viewpoint would have a high degree of Project visibility because the turbines would be seen in the middleground with only partial screening by vegetation. The visual contrast for this viewpoint was rated as moderate, because the Project turbines would be seen within the context of the existing wind turbines and the substantially modified setting of the immediate highway corridor (not shown in the Figure 4.18-8a, but within the field of view). Viewer numbers are moderate or low and the views would occur for relatively short durations; therefore, the overall viewer response is moderate. Based on moderate visual quality change and moderate viewer response, the visual impact intensity is considered moderate.

Viewpoint 21 Kamehameha Highway near Turtle Bay. Kamehameha Highway is a State-designated scenic highway (Route 83) that is located along the Pacific shoreline in several sections, exhibiting amazing ocean, coastal, and Koolau views (City and County of Honolulu 2012). Viewpoint 21 is 1.2 miles northwest of the Project, near Turtle Bay Resort. Views to the south and southeast at this location are largely enclosed by a low ridge in the foreground and are also partially screened by vegetation. Several turbines from the existing Kahuku Wind Farm are prominent in the middle ground, rising above a low, rounded hill. Other constructed features are also noticeable, including multiple sets of utility poles and wires, a fence along the edge of the highway right-of-way, and a large, agricultural or industrial structure along the top of the ridge. The scenic quality for Viewpoint 21 is low due to the number of manmade features and the scale of the existing wind turbines dominating the view.

Travelers at Viewpoint 21 would have a moderate overall viewer response, similar to those at Viewpoint 08. The contrast is rated as moderate because the low ridge in the foreground would partially or largely block the views of the Project turbines, and the Project turbines would be seen along with turbines in an existing wind project and other landscape modifications. Based on moderate contrast and low scenic quality, the change in visual quality is low. Based on low visual quality change and moderate viewer response, the visual impact intensity is considered low to moderate.

4.16.3.2 Direct and Indirect Effects of HCP Conservation Measures

Impacts of Avoidance and Minimization Measures

The avoidance and minimization measures proposed under the Project HCP are not expected to affect the visual resources. Some avoidance and minimization measures will reduce impacts to visual resources, including below-ground installation of Project collection lines and revegetation of temporarily disturbed areas. There may be some potential for visual disturbance due to researchers and biologist moving to conduct post-construction monitoring efforts; however the disturbance would be temporary and the impact would not be significant.

Impacts of HCP Mitigation Measures

No direct or indirect impacts to visual resources would occur in association with funding provided for Newell's shearwater research and management and short-eared owl research. Depending on the measures employed, there may be minor disturbance to land due to regular visits by researchers.

Installation and maintenance of the fence at Hamakua Marsh would result in minor permanent and temporary vegetation clearing and ground disturbance along the fence perimeter. The fence would be approximately 1,555 feet (474 meters) long and 4 feet (1.2 meters) high. Proposed design criteria for the fence are outlined in the Project HCP. The fence would have a minor, localized visual impact, but would be designed to be as visually unobtrusive as practicable while still fulfilling its intended role of keeping waterbirds out of commercial parking lots.

Funding for forest restoration and monitoring at the Poamoho Ridge Mitigation Area for bat mitigation would go toward activities such as maintenance of the ungulate-proof fence installed by DLNR, feral pig control and monitoring, and invasive plant removal. Foot traffic and vehicle use associated with fence maintenance, removal and monitoring of non-native ungulates and invasive plant species, and bat monitoring may cause minor visual disturbances due to the motion and presence of humans. However, these impacts are expected to be temporary and not significant. Ultimately, forest restoration efforts would have beneficial effects on visual resources within the Poamoho Ridge Mitigation Area by increasing the diversity of the forest. No impacts to visual resources would occur in association with funding for forest restoration and monitoring at the Poamoho Ridge Mitigation Area for bat mitigation.

4.16.3.3 Mitigation for Unavoidable Impacts

To the extent possible, the Project layout will be integrated with the surrounding landscape through the use of non-reflective paints, and positioning of turbines, and collector lines and road corridors in linear routes that follow the natural contours of the landscape. Restoration efforts will be made in areas that support temporary construction. The following mitigation measures are recommended for both action alternatives to reduce the visual impact rating, based on Table 4.16-3.

- The collector lines that run between turbines and the onsite substation would be placed underground along access roads;
- Project buildings to be grouped together as much as possible;
- Project buildings that have a high level of visual intrusion should be screened by vegetation;
- Signage related to the Project should be confined to entrance gates;
- Keep construction time to a minimum;
- Remove construction debris;
- Locate construction staging and storage areas away from adjacent roads;
- Comply with all required setbacks from roads and residences;
- Use a low-reflectivity finish on project buildings to minimize visibility; and
- Navigational lights on the wind turbines should be fitted with shields so the lights are not visible from below.

There are no additional measures that could reasonably be implemented to further reduce the potential visual impacts due to the large scale of wind turbines; a certain degree of impacts is unavoidable.

4.16.3.4 Cumulative Effects

Visual impacts of the Project would occur within the context of landscape modifications associated with past, current, and expected future uses on and near the wind farm site. The area for cumulative effects analysis is the same as the analysis area for visual resources, which includes the area within 10 miles of the wind farm site as well as areas that would be disturbed by HCP conservation measures implemented in the mitigation areas. This area encompasses the areas where potential direct and indirect effects to visual resources could occur.

The Project would have an incremental effect within the context of other ongoing and foreseeable wind energy developments within the surrounding region. When construction begins on the Project, the surrounding regional landscape would already be modified by the development of other wind energy projects, including Kahuku Wind and Kawailoa Wind Farm. These three wind energy projects would result in the presence of 52 large wind turbines. In addition to the wind projects, other landscape modifications contributing to the cumulative effects associated with visual resources include existing transmission lines, telecommunications towers, tall buildings, development areas, and other tall structures. There are utility distribution lines located along the Kamehameha Highway and throughout Kahuku town, Malaekahana, and other urbanized areas. The nearest known line to the wind farm site extends along the unnamed road running southwest near the Project access road, into the Malaekahana valley. There are five registered microwave towers in the vicinity of the wind farm site. One is located in Kahuku town at the Kahuku Police Station. Two are located atop Mt. Kawela within the Army's Kahuku Training Area, approximately 3.45 miles west of Kahuku. Two privately owned towers are located near Turtle Bay Resort, about 0.5 mile from Kamehameha Highway. Other facilities with large buildings include the Kahuku Medical Center and the Kahuku Wastewater Treatment Plant.

Based upon the findings above, some cumulative impacts may be realized by the Project in conjunction with other projects. The impacts would be incremental due to their location. Therefore, the Project in combination with features associated with other actions would not result in significant cumulative visual impacts.

4.16.3.5 Summary

The Project would be most visible at viewpoints close to the wind farm site (within about 1 mile), including the Kahuku Community Center, Kahuku High and Intermediate School, Kahuku Elementary School, Kahuku Golf Course, Kahuku Hospital and Medical Center, Malaekahana Bike and Pedestrian Path near the Malaekahana State Recreation Area, along Kamehameha Highway near the entrance of the Malaekahana State Recreation Area, and James Campbell National Wildlife Refuge. Individuals most likely to experience visual impacts include recreation users, residents, and travelers on the highway. The Project would be located on ridge tops, above residential communities and recreational areas where the turbines would incrementally increase the vertical element in the landscape. The Project would not dominate, however, because there is already a substantial degree of landscape modification in most views, including an existing windfarm adjacent to the proposed Project. The Project, in relation to existing developments (residential and commercial), would co-exist on the landscape and not dominate the landscape character.

Based on consideration of the existing scenic quality, the contrast created by the Project, and the expected viewer response, the visual impact magnitude or intensity was rated as moderate or less for virtually all of the respective viewpoints evaluated. The visual impact intensity was rated as moderate-high for one location, Viewpoint 15 Laie Point Coastal Residences, because the Project would create moderate contrast in a setting with high existing visual quality. The duration of impact would be permanent, as defined in Table 4.16-1. The geographic extent of the most noticeable visual impacts would be local, although the Project would be visible beyond the local area. The Project would affect common visual resources that are not rare, unique, or protected by specific legislation. Based on collective consideration of these impact components, the visual assessment indicates that the potential visual impacts from the Project would be Moderate for Alternative 2.

4.16.3.6 Alternative 2a - Modified Proposed Action Option

Under Alternative 2a, direct, indirect, and cumulative effects on visual resources would be similar to those described under Alternative 2. The turbine layout under the Modified Proposed Action Option, however, would include nine Siemens SWT 3.3-130 turbines, with heights up 656 feet (200 meters). Although the larger turbines would create slightly more contrast at each viewpoint, the viewing context would remain the same and would continue to be a key factor in the contrast ratings assigned to the Project. The degree of increased contrast would not be sufficient to cause the Project to dominate the scene at any of the viewpoints evaluated, and would not result in a change to the contrast rating at any of the viewpoints. Implementation of mitigation measures, as described under the Proposed Action, would minimize adverse impacts to visual resources under the Modified Proposed Action Option. Visual simulations of Alternative 2a are provided in Figures 4.16-6b, 7b, 8b, 9b, and 9e. Appendix L includes visual simulations of Alternatives 2 and 2a side-by-side for comparison.

4.16.4 Alternative 3 – Larger Generation Facility (Up to 12 Turbine Project)

Alternative 3 would involve the construction and operation of a larger generation facility of up 42-MW consisting of up to 12 3.3-MW turbines and associated infrastructure.

4.16.4.1 Direct and Indirect Effects

Under Alternative 3, direct and indirect effects on visual resources would be similar to those described under Alternative 2. However, with the construction of additional wind turbines and associated access roads, Alternative 3 would potentially have 2 to 4 additional turbines compared to Alternative 2. All viewpoints were determined to have the same visual impact ratings for Alternative 3 as for Alternative 2. Although there would be an additional 2 to 4 turbines, two of the turbines would be located within a turbine corridor planned for Alternative 2 where the visual impacts would not increase but would co-exist with Alternative 2. Two turbines would potentially be located outside the existing turbine corridor and to the west; however, these turbines would not increase the overall Project impact rating of moderate. Visual simulations for Alternative 3 were created for the Kahuku Community Center, James Campbell NWR, Kahuku Golf Course, and Malaekahana Bike and Pedestrian Path (Figures 4.16-6c, 4.16-7c, 4.16-8c, 4.16-9c and 4.16-9f, respectively).

Impacts of Avoidance and Minimization Measures

As discussed for Alternative 2, the avoidance and minimization measures proposed under the Project HCP are not expected to affect visual resources in the analysis area.

Impacts of HCP Mitigation

Impacts of HCP mitigation under Alternative 3 would be the same as described under Alternative 2.

4.16.4.2 Mitigation for Unavoidable Impacts

Mitigation for unavoidable impacts under Alternative 3 would be the same as described under Alternative 2 (Section 4.16.3.3).

4.16.4.3 Cumulative Effects

While Alternative 3 would involve an additional 2 to 4 turbines, this change would not result in an identifiable difference to the cumulative effects to visual resources as described for Alternative 2.

4.16.4.4 Summary

The Project would be most visible at viewpoints close to the wind farm site (within about 1 mile), including the Kahuku Community Center, Kahuku High and Intermediate School, Kahuku Elementary School, Kahuku Golf Course, Kahuku Hospital and Medical Center, Malaekahana Bike and Pedestrian Path near the Malaekahana State Recreation Area, along Kamehameha Highway near the entrance of the Malaekahana State Recreation Area, and James Campbell National Wildlife Refuge. Individuals most likely to experience visual impacts include recreation users, residents, and travelers on the highway. The Project would be located on ridge tops, above residential communities and recreational areas where the turbines would incrementally increase the vertical element in the landscape. The Project would not dominate, however, because there is already a substantial degree of landscape modification in most views, including an existing wind farm adjacent to the proposed Project. The Project in relation to existing developments (residential and commercial) would co-exist on the landscape and not dominate the landscape character. Based on consideration of the existing scenic quality, the contrast created by the Project, and the expected viewer response, the visual impact magnitude or intensity was rated as moderate or less for virtually all of the respective viewpoints evaluated. The visual impact intensity was rated as moderate-high for one location, Viewpoint 15 Laie Point Coastal Residences, because the Project would create moderate contrast in a setting with high existing visual quality. The duration of impact would be permanent, as defined in Table 4.16-1. The geographic extent of the most noticeable visual impacts would be local, although the Project would be visible beyond the local area. The Project would affect common visual resources that are not rare, unique, or protected by specific legislation. Based on consideration of these impact components, the visual assessment indicates that the potential visual impacts from the Project would be moderate for Alternative 3.

Figure 4.16-6a: Proposed Action

Na Pua Makani
Wind Project

Visual Simulation
Kahuku Community Center

January 2016 **Oahu, HI**

Looking southwest from the Kahuku Community Center

TETRA TECH

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Figure 4.16-6b: Modified Proposed Action

Na Pua Makani
Wind Project

Visual Simulation
Kahuku Community Center

January 2016 **Oahu, HI**

Looking southwest from the Kahuku Community Center

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Figure 4.16-6c: Alternative 3

Na Pua Makani Wind Project

Visual Simulation
Kahuku Community Center

January 2016 **Oahu, HI**

Looking southwest from the Kahuku Community Center

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Figure 4.16-7a: Proposed Action

Na Pua Makani
Wind Project

Visual Simulation
James Campbell National Wildlife Refuge

January 2016 **Oahu, HI**

Looking southwest from the James Campbell National Wildlife Refuge

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Figure 4.16-7b: Modified Proposed Action

Na Pua Makani
Wind Project

Visual Simulation
James Campbell National Wildlife Refuge

January 2016 **Oahu, HI**

Looking southwest from the James Campbell National Wildlife Refuge

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Figure 4.16-7c: Alternative 3

Na Pua Makani
Wind Project

Visual Simulation
James Campbell National Wildlife Refuge

January 2016 **Oahu, HI**

Looking southwest from the James Campbell National Wildlife Refuge

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Figure 4.16-8a: Proposed Action

Na Pua Makani Wind Project

Visual Simulation
Kahuku Golf Course

January 2016 **Oahu, HI**

Looking southwest from the eastern edge of the Kahuku Golf Course

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Figure 4.16-8b: Modified Proposed Action

Na Pua Makani Wind Project

Visual Simulation
Kahuku Golf Course

January 2016 **Oahu, HI**

Looking southwest from the eastern edge of the Kahuku Golf Course

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Figure 4.16-8c: Alternative 3

Na Pua Makani
Wind Project

Visual Simulation
Kahuku Golf Course

January 2016 **Oahu, HI**

Looking southwest from the eastern edge of the Kahuku Golf Course

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Figure 4.16-9a: Proposed Action

Na Pua Makani
Wind Project

Visual Simulation
Kahuku Walking Trail

January 2016 **Oahu, HI**

Looking northwest from the walking path on the west side of Kamehameha highway, approximately 1/2 mile south of Kahuku

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Figure 4.16-9b: Modified Proposed Action

Na Pua Makani
Wind Project

Visual Simulation
Kahuku Walking Trail

January 2016 **Oahu, HI**

Looking northwest from the walking path on the west side of Kamehameha highway, approximately 1/2 mile south of Kahuku

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Figure 4.16-9c: Alternative 3

Na Pua Makani
Wind Project

Visual Simulation
Kahuku Walking Trail

January 2015 **Oahu, HI**

Looking northwest from the walking path on the west side of Kamehameha highway, approximately 1/2 mile south of Kahuku

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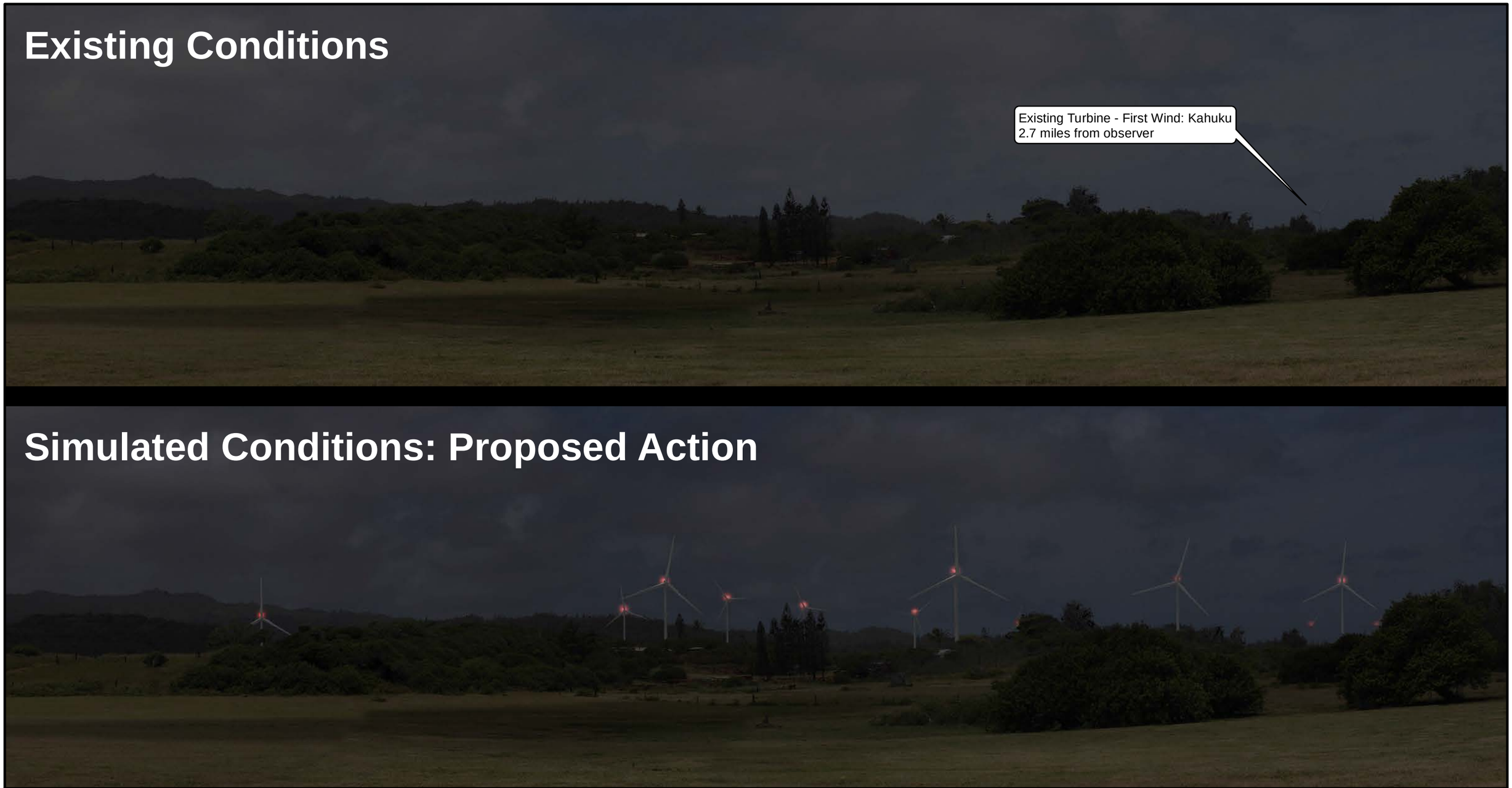

Figure 4.16-9d: Proposed Action

Na Pua Makani
Wind Project

Night Time Visual Simulation
Kahuku Walking Trail

January 2016 **Oahu, HI**

Looking northwest from the walking path on the west side of Kamehameha highway, approximately 1/2 mile south of Kahuku

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Figure 4.16-9e: Modified Proposed Action

Na Pua Makani Wind Project

Night Time Visual Simulation
Kahuku Walking Trail

January 2016 **Oahu, HI**

Looking northwest from the walking path on the west side of Kamehameha highway, approximately 1/2 mile south of Kahuku

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Figure 4.16-9f: Alternative 3

Na Pua Makani
Wind Project

Night Time Visual Simulation
Kahuku Walking Trail

January 2016 **Oahu, HI**

Looking northwest from the walking path on the west side of Kamehameha highway, approximately 1/2 mile south of Kahuku

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4.16.5 Conclusion

Table 4.16-4 summarizes potential impacts to visual resources from the alternatives considered in this analysis.

Table 4.16-4. Summary of Potential Impacts to Visual Resources

Impact Issues	No Action Alternative	Alternative 2 – Proposed Action	Alternative 2a – Modified Proposed Action Option	Alternative 3
Changes to Visual Resource Character	No Impact	Moderate	Moderate	Moderate

4.17 Transportation

4.17.1 Impact Criteria

This section analyzes potential effects on transportation infrastructure, including harbors, airports, highways, and roadways. Impacts to transportation infrastructure were evaluated by assessing the effects of Project construction and operations and maintenance activities that utilize the construction access routes as described in Section 2.4.6, and the mitigation areas.

The methods used to determine whether a Project alternative would have a significant impact on transportation infrastructure included:

- Reviewing and evaluating baseline conditions for transportation infrastructure that could potentially be affected by the Project.
- Reviewing and evaluating the Project alternatives to identify the actions' potential to effect transportation infrastructure specifically the following potential effects:
    - An increase traffic of more than 100 new peak hour trips or 500 daily trips on Kamehameha Highway;
    - Long traffic delays for substantial number of motorists;
    - Changes to traffic patterns that create hazardous situations for motorist, pedestrians, or bicyclists; and/or
    - Changes to air or marine traffic patterns that would cause substantial safety hazards.
- Impacts to the transportation infrastructure from the HCP mitigation actions were assessed based on whether the mitigation actions would increase traffic to affect traffic patterns to and from the mitigation areas. The mitigation areas include the Hamakua Marsh for water birds and the Poamoho Ridge for the Hawaiian hoary bat.

Table 4.17-1 lists the impact criteria considered when determining the level of effect (i.e., negligible, minor, moderate, major) that the Project could have to transportation. A Traffic Assessment Report conducted by Belt Collins forms the basis of analysis presented below (Belt Collins Hawaii LLC 2016b). The Traffic Assessment Report is included as Appendix B.

Table 4.17-1. Impact Criteria for Transportation

Type of Effect	Impact Component	Effects Summary		
Increase or changes in traffic volumes, traffic patterns, or safety.	Magnitude or Intensity	**High:** Increase traffic exceeding 100 new peak hour trips or 500 daily trips on Kamehameha Highway; road closures for motorist over 30 minutes; hazardous situations for motorist, pedestrians, or bicyclist; hazardous situations for air or marine traffic; substantial affect to traffic patterns to the mitigation areas.	**Medium:** Increase traffic up to 100 new peak hour trips or 500 daily trips on Kamehameha Highway; road closures for 15 minutes; effects to transportation infrastructure that require traffic solution; minimal affect to traffic patterns to the mitigation areas .	**Low:** Traffic would not increase; no road closures but traffic delays due to construction; no changes to traffic patterns that crease hazardous situations; no affect to traffic patterns to the mitigation areas.
	Duration	**Permanent:** Chronic effects; changed conditions of transportation infrastructure that would persist beyond Project decommissioning.	**Long-term:** Effects would persist up to the life of the Project, with a return to pre-Project baseline conditions after decommissioning.	**Temporary:** Effects are generally associated with construction and would not last longer than approximately 1 year, with a subsequent return to pre-activity levels.
	Geographic Extent	**Extended:** Affects transportation infrastructure for the entire island.	**Regional:** Affects transportation infrastructure to and from the wind farm site and mitigation areas.	**Local:** Impacts limited to the immediate vicinity.
	Context	**Unique:** Affects transportation infrastructure that could not feasibly be recreated in the same place or at another location.	**Important:** Affects transportation infrastructure that may be common in region but is critical to providing services locally.	**Common:** Affects transportation infrastructure that could readily be improved in the same location.

4.17.2 Alternative 1—No Action

4.17.2.1 Direct and Indirect Effects

Under Alternative 1, the Project would not be constructed, an ITP would not be issued by the USFWS, and the HCP conservation measures would not be implemented. Alternative 1 would therefore have no adverse impacts to transportation.

4.17.2.2 Cumulative Effects

Under Alternative 1, the Project would not be constructed, an ITP would not be issued by the USFWS, and the HCP conservation measures would not be implemented. Therefore, there would be no adverse or beneficial effects on transportation. Thus, the No Action Alternative would not contribute to cumulative effects on transportation.

4.17.2.3 Summary

The No Action Alternative would have no direct, indirect, or cumulative effects on transportation as no action would be undertaken.

4.17.3 Alternative 2—8 to 10 Turbine Project

4.17.3.1 Direct and Indirect Effects of Construction and Operation of the Project

Construction Impacts

Construction related traffic to build the Project would include transporting the major turbine components, hauling in cement and aggregate, miscellaneous deliveries, and construction worker traffic. As outlined in Section 2.4.6, the major turbine components, including the blade, tower, and nacelles, will be off-loaded at Kalaeloa Harbor and transported to the Project site using three proposed routes. NPMPP is required to coordinate with the Hawaii Department of Transportation, and to comply with applicable HDOT regulations regarding the transport of turbines to the project site. Due to the size and weight of these components, permits to transport these oversized and overweight loads would need to be obtained from State of Hawaii Department of Transportation (HDOT) and the City and County of Honolulu. The following are anticipated requirements of these permits:

- The roundtrips must be performed Monday through Saturday between the hours of 9:00 p.m. and 5:00 a.m.
- No oversized loads are allowed to be transported on Sundays or holidays.
- A minimum of four police escorts per load are required to help the oversized load navigate turns.
- Police escorts and/or flagpersons must provide traffic direction at the entrance to the Project Site on Kamehameha Highway during construction.

It is anticipated that up to 100 nighttime roundtrips of oversized loads would be needed extending over approximately 20 days during the construction of the Project.

Transport of the oversized components would require tree trimming, temporary traffic signal and roadway sign relocation, temporary guardrail relocation, overhead utility line adjustments, and temporary asphalt curb removal. The Traffic Assessment Report identifies potential tree trimming to a clearance height of 16.5 feet (5 meters) along Kalaeloa Boulevard, Kauhi Road, Ka Uka Boulevard, and Kamehameha Highway. Temporary traffic signal, roadway sign, guardrail, and asphalt curb removal and relocation would be required; however, these would be improved back to their existing condition after transport of the oversized loads. Additionally, the left turn onto Kamehameha Highway at Kamananui Road, the left turn onto Wilikina Drive, and the right turn at Ka Uka Boulevard would require police escorts to control traffic in order for the oversize loads to make the turns.

The Paumalu Bridge, along Kamehameha Highway near Sunset Beach, has been derated by HDOT and currently no oversized loads are permitted (see the Traffic Assessment Report in Appendix B

for additional detail). Per HDOT, use of a longer truck with more axels to spread the load when transporting turbine components to the site or a structural analysis on the bridge will be needed for further use of the bridge. HDOT began conducting repair work on Paumalu Bridge in May 2016, and anticipates lifting the weight restrictions once repairs are complete. ~~has an ongoing temporary retrofit program underway and also has completed the design of a permanent retrofit~~. NPMPP and/or its contractors will coordinate with HDOT regarding special transportation requirements associated with use of the Paumalu Bridge to ensure all requirements are met.

Other construction-related trips include cement, aggregate, and miscellaneous deliveries as well as construction worker trips. Deliveries are anticipated to occur outside of the morning and afternoon peak hour traffic times, and construction workers are expected to work between the hours of 7:00 a.m. and 3:30 p.m. Tables 4.17-2 and 4.17-3 reflect the anticipated average and maximum daytime trips during construction.

Table 4.17-2. Anticipated Average Daytime Trips

Construction Trips	Average Number of Round Trips Per Day	Morning Peak Hour Trips (7:00 a.m. to 8:00 a.m.)	Afternoon Peak Hour Trips (3:45 p.m. to 4:45 p.m.)
Cement	50	5	5
Aggregate	50	5	5
Substation	1	0	0
Building Components	2	1	0
Miscellaneous Deliveries	1	0	0
Construction Workers	40	4	4
TOTAL TRIPS	**144**	**15**	**14**
Note: Assumed 10 percent of the daytime trips would occur during the peak hours.			

Table 4.17-3. Anticipated Maximum Daytime Trips

Construction Trips	Average Number of Round Trips Per Day	Morning Peak Hour Trips (7:00 a.m. to 8:00 a.m.)	Afternoon Peak Hour Trips (3:45 p.m. to 4:45 p.m.)
Cement	50	5	5
Aggregate	50	5	5
Substation	1	0	0
Building Components	2	1	0
Miscellaneous Deliveries	1	0	0
Construction Workers	100	10	10
TOTAL TRIPS	**154**	**21**	**20**
Note: Assumed 10 percent of the daytime trips would occur during the peak hours.			

Table 4.17-4 provides a comparison of the anticipated volumes to the baseline traffic volumes in the morning and afternoon peak hours for a 24 hour period during construction.

Table 4.17-4. Percentage of Peak Project Construction Trips to Baseline Traffic

Time	Percentage
Morning Peak Hour (7:00 a.m. to 8:00 a.m.)	1.8
Afternoon Peak Hour (3:45 p.m. to 4:45 p.m.)	1.9
24 Hour	2.4

Based upon the HDOT's Best Practices for Traffic Impact Reports, a typical trigger for preparing a Traffic Impact Report is 100 or more new peak hour trips or 500 new daily trips. This trigger

assumes that this threshold could potentially adversely affect transportation infrastructure. Based upon the anticipated construction traffic trips along the existing traffic volumes on Kamehameha Highway, the mitigation measures for transport of the oversized loads, and the trigger for preparation of a Traffic Impact Report, the construction of the Project is expected to have a temporary and minor impact on transportation.

Components for five wind turbine would be transported along the Department of Agriculture Kahuku Agricultural Park interior roadway, to the DLNR-owned portion of the wind farm site. It is anticipated that 70 truckloads would be needed to transport the turbine components (e.g., base, nacelle, hub, blades, and other components). In total, including regular truck loads delivering turbine foundation equipment, construction equipment, and concrete; trucks delivering/taking away the crane, and wire trucks for the electrical collection system, 150 to 250 vehicle trips are anticipated along this road during a two to four month period. Superloads carrying turbine components would require traffic control on Kamehameha Highway at the entrance to, and along, the Kahuku Agricultural Park interior roadway. During these wind turbine component deliveries, the road may be blocked momentarily until turbine component passes through. All other traffic would be standard traffic and should not impede passing traffic or use of the Kahuku Agricultural Park interior roadway.

In regard to air and marine transportation, the delivery of materials for the Project is not anticipated to affect air and marine transportation. Materials delivered via air freight would be minimal as the cost of delivery would be expensive relative to other delivery modes. When it would be necessary, air freight forwarders are able to accommodate delivery of materials without any impacts to their operations and air infrastructure. Materials delivered via marine freight would use freight forwarders that are equipped to provide ocean delivery services. The Kalaeloa Barbers Point Harbor is able to accommodate shipping of the oversized turbine components as evidence by the past wind farms constructed in Oahu.

Operations and Maintenance Impacts

During operations and maintenance of the Project, there will be approximately three to six full-time employees on site with typical work hours of 7:00 a.m. to 5:00 p.m. and would result in six roundtrips per day. This represents an increase of less than 0.6 percent in traffic volume along Kamehameha Highway during morning and afternoon peak hours. At this low level of increase, the Project related long-term traffic is not expected to have a significant impact to transportation.

The Department of Agriculture access road into the wind farm site, the Kahuku Agricultural Park interior roadway, would be used for routine maintenance activities. It is anticipated that on average this use would be approximately 10 trucks trips per month, or one to two trips per week, and potentially up to approximately 50 truck trips per month if significant maintenance is occurring on an individual turbine. Vehicles used during operation would be pickup trucks; however, if major maintenance for a turbine is required a crane would be needed. Additional truck trips, anticipated to be approximately two truck trips per week, would also occur in association with the wildlife post-construction mortality monitoring program. Given the low amount of routine traffic

anticipated, no road closure or limits to access by Department of Agriculture lessees would be anticipated unless the use of a crane were required, in which case access would be limited to allow the crane to access the wind farm site.

4.17.3.2 Direct and Indirect Effects of the HCP Conservation Measures

Impacts of Avoidance and Minimization

The avoidance and minimization measures proposed under the Project HCP would have no effect on transportation because they would not result in an additional increase in traffic volume or affect roadways or access.

Impacts of the HCP Mitigation Measures

Funding provided for management and research activities for the Newell's shearwater, Hawaiian short-eared owl, and Hawaiian goose would have no effect on transportation. Because of the limited nature of the physical actions and the location of the mitigation sites, the installation of the partial fence at the Hamakua Marsh Mitigation Area for waterbirds and implementation of forest restoration and monitoring activities at the Poamoho Ridge Mitigation Area for bats are also expected to have negligible effects on transportation. The vehicles and vehicular trips required for implementation of mitigation measures at the mitigation areas would involve too few vehicle trips on an infrequent basis (at most on a weekly to monthly basis) to measurably affect transportation and traffic.

4.17.3.3 Mitigation for Unavoidable Impacts

The anticipated permit requirements of the HDOT and City and County of Honolulu oversized and overweight loads would minimize the potential impacts of the Project on transportation during the construction period, as shown below. These measures will be incorporated in to a traffic management plan.

- The roundtrips must be performed Monday through Saturday between the hours of 9:00 p.m. and 5:00 a.m.
- No oversized loads are allowed to be transported on Sundays or holidays.
- A minimum of four police escorts per load are required to help the oversized load navigate turns.
- Police escorts and/or flagmen must provide traffic direction at the entrance to the Project Site on Kamehameha Highway during construction.
- Prior to transport of the oversized components, a "high pole" survey will be conducted to confirm and identify any new trees or wires that need to be trimmed or raised, respectively, that were not identified in the Traffic Assessment Report.

In addition, NPMPP has agreed to provide the community with public radio announcements and community flyers on the transport schedule of the oversized loads in order for community members to plan their transportation routes and schedule.

4.17.3.4 Cumulative Effects

The cumulative effects analysis area for impacts to transportation infrastructure is the construction access route and, in particular, Kamehameha Highway. Reasonably foreseeable future projects within the analysis area are identified in Table 4.2-2.

The Koolau Loa Sustainable Communities Plan identifies future land uses within the Koolau Loa Region. The future projects shown in Table 4.2-2 are included within the Koolau Loa Sustainable Communities Plan as planned future land uses. According to the Traffic Assessment Report (Appendix B), the average regional traffic for Kahuku is expected to increase 1.23 percent annually. Table 4.17-5 reflects the future baseline traffic volume at the Malaekahana Bridge at the time of completion for Alternative 2 (2017) without the Project.

Table 4.17-5. Future Baseline Traffic Volume without the Project

Time	Future Traffic Volume (Both Directions)
Morning Peak Hour (7:00 a.m. to 8:00 a.m.)	1,150
Afternoon Peak Hour (3:45 p.m. to 4:45 p.m.)	1,063
24 Hour	12,797

It is anticipated that the regional traffic will increase by 55 trips in the morning peak hour, 51 trips in the afternoon peak hour, and 610 trips in a 24-hour period in 2017 from the existing 2013 levels. This low volume of traffic is expected to have a minor impact to Kamehameha Highway when viewed in conjunction with past, present, and foreseeable projects in the Koolau Loa Region. The contribution of six roundtrips on the transportation infrastructure would be minor to negligible impact to the already low volume of anticipated regional traffic in 2017.

4.17.3.5 Summary

The effects of Alternative 2, the Proposed Action, on transportation infrastructure would have a low level of magnitude (minor), localized and largely temporary using existing transportation infrastructure. Direct impacts during the transport of the oversize loads such as disruption to traffic flow and temporary relocation of guardrails and traffic signals are temporary until the transport of the oversized loads are completed. These direct impacts would be limited with the mitigation measures that would be required in the oversized load permits and notification to the community of transport schedule. The HCP conservation measures would also not have an effect on transportation infrastructure. Cumulative impacts are negligible as regional traffic is anticipated to increase by a low amount.

4.17.3.6 Alternative 2a - Modified Proposed Action Option

Under Alternative 2a, direct, indirect, and cumulative effects on transportation would be the same as those described under Alternative 2. It is assumed that if the largest turbine model under consideration were selected tree trimming, temporary traffic signal and traffic sign relocation, temporary guardrail relocation, overhead utility line adjustments, and temporary asphalt curb removal along the transportation route would be comparable as those identified under Alternative 2. Implementation of mitigation measures, as described under the Proposed Action, would minimize adverse impacts to transportation under the Modified Proposed Action Option.

4.17.4 Alternative 3 – Larger Generation Facility (Up to 12 Turbine Project)

4.17.4.1 Direct and Indirect Effects of Construction and Operation of the Project

Construction Impacts

In general, construction of Alternative 3 would have similar impacts as Alternative 2. Construction of an additional 2 to 4 turbines would not adversely affect existing transportation infrastructure. Prior to the construction of the additional turbines, NPMPP would need to obtain a new oversized and overweight permit from HDOT and City and County of Honolulu to transport these additional turbines and, likely, the permit requirements would be similar to Alternative 2. Namely, the turbines would need to be transported during the nighttime off-peak hours.

It is anticipated that up to 40 nighttime roundtrips of oversized loads would be needed extending over approximately 8 days during the construction of the additional turbines. The construction of the first 8 to 10 turbines would require up to 100 nighttime roundtrips of oversized loads over approximately 20 days (same as Alternative 2).

Transport of the oversized components would again require tree trimming, temporary traffic signal and traffic sign relocation, temporary guardrail relocation, overhead utility line adjustments, and temporary asphalt curb removal along the same areas as identified in Alternative 2. Also, similar to Alternative 2, the left turn onto Kamehameha Highway at Kamananui Road, the left turn onto Wilikina Drive, and the right turn at Ka Uka Boulevard would require police escorts to control traffic in order for the oversize loads to make the turns.

Other construction-related trips includes cement, aggregate, and miscellaneous deliveries as well as construction worker trips would be similar to Alternative 2. Tables 4.17-3 and 4.17-4 above reflect the same anticipated average and maximum daytime trips during construction.

Table 4.17-6 provides a comparison of the anticipated volumes to the baseline traffic volumes in the morning and afternoon peak hours for a 24-hour period during construction of these additional turbines (in 2019).

Table 4.17-6. Percentages of Peak Project Construction Trips to Baseline Traffic

Time	Percentage
Morning Peak Hour (7:00 a.m. to 8:00 a.m.)	1.8
Afternoon Peak Hour (3:45 p.m. to 4:45 p.m.)	1.8
24 Hour	2.3

At this traffic level, the construction of the additional turbines is expected to have a temporary and minor impact on transportation infrastructure. Similar to Alternative 2, the delivery of materials for the additional turbines is not anticipated to effect air and marine transportation infrastructure.

Operations and Maintenance Impacts

The operation of the Project under Alternative 3 would require the three full-time employees needed for Alternative 2, plus potentially one to two additional full-time employees to handle the

additional turbines. And as such, the installation of additional turbines would not impact transportation during long-term operations and maintenance for Alterative 3.

4.17.4.2 Direct and Indirect Impacts of the HCP Conservation Measures

The avoidance and minimization measures proposed under the Project's HCP would have no effect on transportation because they would not result in an additional increase in traffic volume or affect roadways or access.

4.17.4.3 Mitigation for Unavoidable Impacts

Mitigation measures to be implemented for Alternative 3 would be the same as described for Alternative 2. These include delivering the oversized loads during nighttime off-peak hours, utilizing police escorts to direct traffic, and notifying the community of delivery schedules.

4.17.4.4 Cumulative Effects

According the Traffic Assessment Report (Appendix B), the average regional traffic for Kahuku is expected to increase 1.23 percent annually. Table 4.17-7 reflects the future baseline traffic volume without the Project in 2019 when the additional turbines are anticipated to be constructed.

Table 4.17-7. Future Baseline Traffic Volume without the Project in 2019

Time	Future Traffic Volume (Both Directions)
Morning Peak Hour (7:00 a.m. to 8:00 a.m.)	1,178
Afternoon Peak Hour (3:45 p.m. to 4:45 p.m.)	1,089
24 Hour	13,114

It is anticipated that the regional traffic will increase by 927 trips in 2019 from the existing 2013 levels for a 24 hour period. This level of increase in traffic may trigger HDOT to request that a Traffic Impact Report be conducted prior to the construction of the additional turbines to determine the level of impact on a cumulative basis. However, the Project would not contribute to additional long-term trips as the three to six full-time employees would already be employed and their traffic trips would already be accounted for. As a result, the additional turbines would not contribute to cumulative effects on transportation to Kamehameha Highway when viewed in conjunction with past, present, and foreseeable projects in the Koolau Loa Region.

4.17.4.5 Summary

As with Alternative 2, the Proposed Action, the effects of Alternative 3 on transportation would be, at most, minor, localized, and largely temporary using already existing transportation infrastructure. However, construction of the additional 2 to 4 turbines would not occur until 2019 due to required HECO transmission line upgrades. Therefore, the effects associated with the additional 2 to 4 turbines in Alternative 3 would occur at a different time period than the effects from constructing the first 8 to 10 turbines. Direct impacts during the transport of the oversize loads such as disruption to traffic flow and temporary relocation of guardrails and traffic signals and signs are temporary until the transport of the oversized loads are completed. These direct impacts would be limited with the mitigation measures that would be required in the oversized

load permits and notification to the community of the transport schedule. The HCP conservation measures would also not have an effect on transportation infrastructure. Cumulative impacts are not anticipated because no traffic trips would be added.

4.17.5 Conclusion

No anticipated adverse impacts to transportation would rise above a minor impact level under Alternatives 1, 2 (including the Modified Proposed Action Option), or 3. Table 4.17-8 summarizes potential impacts to transportation from the alternatives considered in this analysis.

Table 4.17-8. Summary of Potential Impacts to Transportation

Impact Criteria	No Action Alternative	Alternative 2 – Proposed Action	Alternative 2a - Modified Proposed Action Option	Alternative 3
Increase traffic exceeding a 100 new peak hour trips or 500 daily trips on Kamehameha Highway	No Impact	Negligible	Negligible	Minor
Long term traffic delays for a substantial number of motorist	No Impact	Minor	Minor	Minor
Changes to traffic patterns that create hazardous situations for motorist, pedestrians, or bicyclists	No Impact	Minor	Minor	Minor
Changes to air or marine traffic patterns that would cause substantial safety hazards	No Impact	Negligible	Negligible	Negligible
Increase traffic to affect traffic patterns to and from the mitigation areas	No Impact	Negligible	Negligible	Negligible

4.18 Public Health and Safety

4.18.1 Impact Criteria

The public health and safety analysis was based on an evaluation of whether NPMPP has committed to measures to be taken during the design, construction, and operation phases of the Project including:

- Designing all aspects of the Project in accordance with applicable Federal, State, and industry codes to minimize the potential for wind or fire to affect public health and safety;
- Preparing and implementing a spill prevention, control and containment plan; notification protocols; immediate spill response procedures; hazardous material handling; and fire management plans during construction and operation; and
- Preparing and implementing plans covering routine and emergency measures to govern Project operations.

Table 4.18-1 lists the impact criteria considered when determining the level of effect (i.e., negligible, minor, moderate, major) that the Project could have to public health and safety.

Table 4.18-1. Impact Criteria for Public Health and Safety

Type of Effect	Impact Component	Effects Summary		
Effects on Public Health and Safety	Magnitude or Intensity	**High:** Above background conditions, non-compliance with or exceedence of industry standards or recommended thresholds (e.g., shadow flicker >30 hours per year).	**Medium:** Above background conditions with change noticeable but in compliance with industry standards and at levels at or below recommended thresholds.	**Low:** No change in background conditions; in compliance with all industry standards and recommended thresholds.
	Duration	**Permanent:** Potential for impacts extends beyond the lifespan of the Project.	**Long-term:** Potential for impacts lasts through the operational period of the Project.	**Temporary:** Potential impacts last for less than 1 year or the period of Project construction.
	Geographic Extent	**Extended:** Affects communities throughout the region.	**Regional:** Affects 2 or more communities in the region.	**Local:** Affects individuals in a single community.
	Context	**Unique:** Type of effect specific to alternative energy development and currently not present in the analysis area.	**Important:** Type of effect specific to alternative energy development, but already present in analysis area.	**Common:** Type of effect not specific to alternative energy development.

4.18.2 Alternative 1—No Action

4.18.2.1 Direct and Indirect Effects

Under the No Action Alternative, the Project would not be constructed, an ITP would not be issued by the USFWS, and the HCP conservation measures would not be implemented. Conditions affecting public health and safety would remain as they are under existing conditions. Therefore, no effects to public health and safety would occur under the No Action Alternative. As such, no mitigation measures would be warranted.

4.18.2.2 Cumulative Effects

Under the No Action Alternative, the Project would not be constructed, the USFWS would not issue an ITP, and the HCP conservation measures would not be implemented. Therefore, there would be no effect on public health and safety. Thus, Alternative 1 would not contribute to cumulative effects to public health and safety.

4.18.2.3 Summary

Alternative 1 would have no direct, indirect, or cumulative effects to public health and safety because no action would be undertaken.

4.18.3 Alternative 2—8 to 10 Turbine Project

4.18.3.1 Direct and Indirect Effects of Construction and Operation of the Project

Construction Impacts

Potential safety issues during construction are associated with public access to the wind farm site and accidents or injuries of construction workers. Workers and the general public could be injured from the movement of construction vehicles, equipment, and materials. A Site Safety Handbook would be prepared and implemented prior to the start of construction, which would outline measures such as establishing safety zones or setbacks from construction work areas and would identify requirements for temporary fencing around staging areas, storage yards, and excavations during construction to control and restrict public access to the construction area, as well as outline worker safety practices. All persons entering the construction areas would be required to review and adhere to the Site Safety Handbook. Safety of farmers that lease land from Malaekahana Hui West, LLC is addressed specifically in Section 4.22 – Agriculture.

Construction of the Project would result in an increased fire risk. Sparks from vehicles and construction equipment, spark-producing construction activities such as welding, and improper disposal of matches or cigarettes, for example, could start a fire. There would also be increased presence and use of petroleum products, including oils and lubricants onsite, thereby increasing the potential for fire or other medical emergency. To mitigate the risk of fire posed by the Project, NPMPP would implement a Project Fire Management Plan (FMP) during construction and operation. The FMP identifies potential fire hazards and provides pre-suppression actions that include ignition prevention, firebreaks, fuel breaks, and fuels management. A copy of the FMP is provided in Appendix C. Water tanks will be maintained onsite for emergency fire suppression during construction. Additional fire suppression measures to be implemented during construction will be developed in coordination with the City and County of Honolulu Fire Department and will be incorporated into a Site Safety Handbook. These measures may include, but are not limited to requiring vehicles to carry fire suppression equipment when onsite such as fire extinguishers, flappers, and shovels, and storing fire suppression tools at designated locations within the wind farm.

To reduce risk posed by the presence of hazardous and flammable materials, a SPCC Plan would also be developed and implemented to minimize risks to public safety during Project construction. Designated storage areas for various types of materials would be provided and would include dry containment cabinets for secured storage of hazardous and flammable materials, a containment berm for large vessels containing petroleum products, and secondary fuel containment. See Section 4.7 – Hazardous and Regulated Materials and Wastes for more information. With these measures in place, minor impacts to public health and safety in association with fire during Project construction would be expected.

Operation and Maintenance Impacts

Turbine Collapse and Blade Throw

As noted in Section 3.16, while possible and potentially dangerous, tower collapse and blade throw are very rare occurrences and often are linked to improper assembly or exceedance of design limits (AWEA 2008). Such incidents have been largely eliminated due to technological improvements and mandatory safety standards during turbine design, manufacturing, and installation. All turbines are designed with several levels of built-in safety and comply with the codes set forth by OSHA and ANSI standards. The wind turbines would also be equipped with sophisticated computer control systems to monitor variables such as wind speed and direction, air and machine temperatures, electrical voltages, currents, vibrations, blade pitch, and yaw angles. Each turbine would be connected to a central data control system. The system would allow for remote control and monitoring of individual turbines and the wind farm as a whole from both the central host computer or from a remote computer. This system would enable the emergency halting of the rotors at any time.

A concern raised during scoping and during the original Draft EIS public comment period was the likelihood of turbine collapse or blade throw as a result of high winds associated with tropical storms or hurricanes. Modern utility-scale turbines are certified according to International Electrotechnical Commission (IEC) standards (IEC 61400-1; see Section 3.16 for additional discussion), which include ratings for withstanding different levels of hurricane-strength winds and other criteria. Historical records show that on average four to five tropical storm systems develop in the central Pacific region each year and hurricanes have occurred in Hawaii in the past although infrequently (two in the last 50 years; NOAA 2013a), with most storm systems passing south of the Hawaiian Islands. The island of Oahu has never been directly hit by a hurricane (NOAA 2013a). Thus, the occurrence of hurricane-force winds is rare. Nonetheless, final selection of the turbine models for the Project would take into account Project-specific meteorological data and historic weather patterns to ensure selection of models with IEC ratings appropriate for site-specific wind conditions.

Commercial scale wind turbines are designed to standards IEC 61400. Selection of a particular model takes into account site-specific wind conditions. The wind turbine models being considered for the Project are designed to operation in wind speeds of up to 55 miles per hour and withstand 50-year occurrence gusts of 94 miles per hour. They have a built-in cut-out speed, such that when wind speeds exceed 55 miles per hour, the wind turbine stops operating. Under extreme conditions, the rotor pitch can also be changed to a neutral position (facing into the wind with blades coming to a stop). As noted above, these adjustments are made by the wind turbine controller (a computer system that runs self-diagnostic tests, starts and stops the turbine, and makes adjustments as wind speeds vary); however a built-in SCADA system allows 24 hours, 7 days per week remote control of the facility.

Implementing the measures outlined in the Site Safety Handbook and constructing and operating the turbines per industry specifications and standards would minimize the potential for tower collapse and blade throw. Additionally, members of the public would not have access to the wind

farm site, and signs would be used to discourage unauthorized access, thereby minimizing onsite safety risks. Safety of farmers leasing land from Malaekahana Hui West, LLC who would continue farming operations during Project operation is addressed specifically in Section 4.22 – Agriculture. Project wind turbines would be setback a minimum of 1,611 feet (491 meters) from the nearest residential areas (i.e., zoned residential parcels), and 814 feet (248 meters) from the nearest legal residence on Department of Agriculture land. This is meets the required county setback for the tallest wind turbine model under consideration (the distance equal to the height of the turbine). For these reasons, there is a negligible risk of impacts to public health and safety in association with turbine collapse and blade throw that would be expected.

Shadow Flicker

Shadow flicker is defined as moving blades passing between the sun and a receptor, creating alternating changes in light intensity of shadows. The spatial relationship between a wind turbine and a receptor, along with weather characteristics such as wind direction and sunshine probability, are key factors related to shadow flicker impacts. Shadow flicker becomes much less noticeable at distances beyond approximately 1,000 feet (305 meters), except at sunrise and sunset when shadows are long (NRC 2007).

As discussed in Section 3.16, there is no state or national standard that exist for frequency or duration of shadow flicker from wind turbines. However, a threshold of 30 hours per year has been widely used in the industry as a target value in the absence of formal guidelines. However, predicted shadow flicker greater than this threshold does not necessarily create a nuisance and is still well below concerns for impacts to health such as triggering epileptic seizures (Epilepsy Action 2008; see Section 3.16).

To assess potential Project shadow flicker impacts, a computerized simulation using the WindPro software package was used to determine exposure to shadows cast by the moving turbine blades for all sensitive receptors located within 1.6 miles (2.5 kilometers) of proposed wind turbine locations. A follow-up site visit was conducted in April 2013, and again in September 2015, to confirm site-specific conditions. A total of 737 receptor locations were identified within 1.6 miles (2.5 kilometers) of proposed Project turbines and are included in the analysis. These included temporary and permanent residences, outbuildings used by farmers, the Kahuku elementary school and high school, and the Kahuku medical center. For each receptor, the annual hours and minutes of shadow impact were calculated. The analysis was based on worst case conditions for shadow flicker (full sunlight and blades perpendicular to incoming sunlight) to conservatively estimate the potential amount of shadow impact hours for a year (see Appendix K for more detail on the assumptions of the shadow flicker analysis).

WindPro predicts that shadow flicker impacts would be greatest at locations within the wind farm site boundary nearer to the wind turbines. Seventeen of the 737 receptors modeled had expected shadow flicker impacts of more than 30 hours per year (Table 4.18-2; see the shadow flicker analysis in Appendix K). The maximum predicted shadow flicker impact at any receptor is 244 hours and 9 minutes per year (Receptor 647), which is approximately 5.5 percent of the potential available daylight hours. Collectively, receptors with predicted shadow flicker of more than 30

hours per year would experience shadow for 2 to 8 months of the year (theoretical maximum of 47-248 days with shadow per year), with maximum shadow flicker times per day ranging from 17 minutes to 2 hours and 20 minutes (Table 4.18-3).

Public comments on the original Draft EIS requested additional information on the location and types of receptors that are predicted to have more than 30 hours of shadow flicker. This information has been added to Tables 1, 2, and 3 in the shadow flicker analysis in Appendix K and is summarized here. Receptors 647, 609, 607, 608, 610, 743, 648, 450, 645, and 452 are agricultural structures (storage sheds and a warehouse) located within the wind farm site on land owned and leased by Malaekahana Hui West, LLC, for the wind farm. These structures are used by farmers who are leasing land from Malaekahana Hui West, LLC for agricultural crop production and who would continue to conduct day-to-day farming activities within the wind farm site during Project operation (see Section 4.22 – Agriculture for additional detail). These receptors would experience shadow flicker during 2 to 8 months of the year (theoretical maximum of 47 to 234 days with shadow per year), depending on the receptor (Table 4.18-3). The theoretical maximum shadow flicker time per day at these receptors would range from 17 minutes to 2 hours and 20 minutes per day and would occur primarily in the morning (i.e., prior to 10 a.m.) or late afternoon (i.e., after 4:30 p.m.). Therefore, shadow flicker has the potential to occur during a very small portion of an individual farmer's work day, and would not be expected to hinder farming activities.

Receptors 595, 600, 599, 602, 594, 593, and 601 are located adjacent to the wind farm site on land owned by the Department of Agriculture. These are legal residences on agriculturally zoned parcels. These receptors would experience shadow flicker during 3 to 9 months of the year (theoretical maximum of 95 to 256 days of shadow per year), depending on the receptor (Table 4.18-3). The theoretical maximum shadow flicker time per day would range from 40 minutes to 1 hour and 27 minutes per day and would occur in the mid- to late-afternoon (i.e., primarily between 4:30 p.m. to 6:00 p.m.).

It should be noted that actual exposure would depend on weather and the presence of screening, such as trees or buildings and therefore the analysis is very conservative in that it assumes that the receptors all have a direct in-line view of the incoming shadow flicker sunlight. These results indicate that the potential for shadow flicker would be almost entirely contained within the wind farm site and the amount of potential flicker extending onto adjacent areas would be relatively short in duration. Moreover, under Alternative 2, there would be no shadow flicker impacts at the Kahuku elementary school, Kahuku high school, and Kahuku medical center (zero hours of shadow flicker time). Therefore, the Proposed Action would have moderate impacts associated with shadow flicker, with minimal impacts outside of the wind farm site boundary.

Table 4.18-2. Summary of Shadow Flicker Impacts for Alternative 2

Cumulative Shadow Flicker Time (expected on an annual basis)	Number of Receptors
0 Hours	490
> 0 Hours < 10 Hours	162
≥ 10 Hours < 20 Hours	60
≥ 20 Hours < 30 Hours	8
≥ 30 Hours	17
Total	**737**

Table 4.18-3. Predicted Shadow Flicker Impacts by Sensitive Receptor for Alternative 2

Receptor[1/]	Expected Shadow Hours Per Year (hours:minutes)	Maximum Number of Days with Shadow[2/]	Maximum Shadow Hours per Day (hours:minutes)[2/]
647	244:09	234	2:20
609	123:24	248	1:03
595	122:38	230	1:07
607	121:50	148	2:07
608	107:01	167	1:33
610	90:55	181	1:01
600	85:43	256	0:49
599	69:28	172	0:57
602	61:38	213	0:40
594	57:43	104	1:12
743	55:58	186	0:59
593	52:00	95	1:27
601	51:56	140	0:48
648	49:05	95	1:01
450	46:26	67	0:28
645	43:48	83	1:27
452	32:58	47	0:17

1/ Receptors for which more than 30 hours of shadow per year is predicted.
2/ Representative of theoretical worst case; does not take into account factors that reduce or eliminate shadow flicker impacts such as estimated Project wind turbine operational time and orientation including wind speed and direction (based on site-specific wind data) and sunshine "availability" (percent of total hours available).

Fire and Fuels

During operation, potential causes of fire include lightning strike, short circuit of electrical equipment, the mechanical failure or malfunction of equipment, and the storage and use of flammable materials and equipment at the operations and maintenance building. The risk of fire associated with operation of the wind turbines is relatively low and minimized by the design features of the turbines, such as over-temperature sensors that will shut down the turbine if normal temperature limits are exceeded. In addition, undergrounding of the electrical collection system would reduce the risk of fire.

Overall, risk to public safety during a fire event would be very low due to the distance between the turbines and private property and residences. Implementation of the Project FMP and SPCC Plan, discussed above, would minimize fire risk and risk posed by presence of hazardous and flammable materials during operation of the Project. Additionally, as noted above, additional fire suppression

measures to be implemented during operation will be developed in coordination with the City and County of Honolulu Fire Department and will be incorporated into a Site Safety Handbook. These measures may include, but are not limited to requiring vehicles to carry fire suppression equipment when onsite such as fire extinguishers, flappers, and shovels, and storing fire suppression tools at designated locations within the wind farm. With these measures in place, in addition to regular maintenance of Project facilities, minor impacts to public health and safety would be expected during operation in association with fire and fuels.

Noise and Vibration

The normal operation of a wind turbine produces sound and vibration, which has resulted in concern about potential health implications associated with exposure to increased audible noise levels or to airborne vibration associated with infrasound. In an effort to determine the validity of reports of wind turbine-related health effects, 17 separate independent scientific reviews have been conducted both nationally and internationally to evaluate the best available science on this subject (Pedersen and Halmstad 2003; Leventhall 2004; Jakobsen 2005; NRC 2007; Chatham-Kent Public Health Unit 2008; Colby et al. 2009; McCunney et al. 2014; Minnesota Department of Health 2009; UK Health Protection Agency 2010a, b; CMOH 2010; NHMRC 2010; Knopper and Ollsen 2010; Bolin ant al. 2011; Fiumicelli 2011; MassDEP and MDPH 2012; OHA 2013).

To date, no scientific peer-reviewed study has demonstrated a direct causal link between people living in proximity to modern wind turbines, and the noise they emit (audible and inaudible sounds), and resulting physiological health effects (Harding and Wilkins 2008; Keith et al. 2008; Leventhall 2006; O'Neal et al. 2011; Pedersen et al. 2007, 2009, 2010; Pedersen and Larsman 2008; Pedersen and Persson 2004; Pedersen and Waye 2007, 2008; Pederson 2011; Salt and Hullar 2010; Shepherd et al. 2011; Smedley et al. 2010; van den Berg 2003). A limited number of epidemiological studies have shown that audible noise from wind turbines can be annoying to some people and associated with some reported health effects (e.g., sleep disturbance), especially when found at sound pressure levels greater than 40 dBA at night (Pedersen et al. 2009; Pedersen 2011; Pedersen and Waye 2007; Shepherd et al. 2011). However, research has shown that this annoyance appears to be more strongly related to visual cues, noise sensitivity, and attitude about the wind turbines rather than to noise itself (Knopper and Ollson 2011). That is, the level of annoyance or disturbance experienced by people hearing wind turbine noise is influenced by individuals' perceptions of other aspects of wind energy facilities, such as turbine visibility, trust, fairness and equity, and the level of community engagement during the planning process (OHA 2013). No studies have identified positive associations between wind turbine noise and long-term health impacts such as hypertension, cardiovascular disease, high blood pressure, tinnitus, headache/migraine, hearing impairment or other diseases; however, these long-term health effects may result from or be exacerbated by sleep disturbance from night-time wind turbine sound (MDEP 2012; OHA 2013).

Although there is a vast amount of information available in the form of popular literature and on the internet (e.g., Pierpont 2009; Nissenbaum 2010; Krogh et al. 2011) which suggests a causal link between the infrasound created by wind turbines and effects to the body's vestibular system (those that maintain a person's sense of balance and the stabilization of visual images) and to the internal

organs associated with vibration (referred to as "wind turbine syndrome"), these claims have not been supported by verifiable scientific evidence (Colby et al. 2009; Knopper and Ollson 2011; Ellenbogen et al. 2012). Such studies are based on self-reported data, rely on a limited number of participants, and have not involved the actual measurement of sound pressure levels; they also appear to lack objectivity as authors are also known advocates who oppose wind turbine developments (Knopper and Ollson 2011). In summary, research shows that people have complained of annoyance resulting from wind turbine sound, and there is reason to be careful in turbine siting; however, there is no evidence of any direct relationship between wind turbine sound and adverse physiological health impacts.

At the nearest noise-sensitive receptors (most residences, hospitals, schools), predicted Project operational noise levels dissipate to less than 43 dBA (see Section 4.6 – Noise for additional discussion). Additionally, based on monitored sound levels, there is no anticipated low frequency noise/infrasound impact associated with Alternative 2 (see Section 4.6 – Noise for detailed discussion). Given the current scientific evidence, the minor increase over existing noise levels may result in a noticeable change to some noise-sensitive individuals working in or living adjacent to the wind farm site; however, predicted sound levels are not expected to result in annoyance, sleep disturbance, or other health effects in the general population, and therefore would have minor adverse effects to public health.

Comments on the original Draft EIS requested additional discussion of the health impacts of wind turbines on people with autism or sensory integration issues. Hypersensitivity to sound is frequently reported in many autistic patients (Kellerman et al. 2005); however, there is a lack of research into health effects on different population groups, including those with autism, living near sources of noise from power facilities such as wind turbines (Howell et al. 2015). Despite this lack of research, the Project is not expected to have disproportionate effects to people with autism or others with noise sensitivity because the project increase in audible noise associated with Project operation would be very minor, and in most cases imperceptible. As discussed in Section 4.6.3, increases in audible sound levels at the nearest noise-sensitive receptors (most residences, hospitals, schools) are predicted to be no more than 4 dB over existing sound levels. A 3-dBA increase is generally not discernable to the average person but a 5-dBA increase is; therefore, a 4-dBA increase may be discernable to some people, but is not anticipated to be more than a minor impact. Additionally, the predictions of operational noise are intentionally conservative and the likelihood of a 3- to 4-dB increase at nearest noise-sensitive receptors would only occur outside under downwind propagation conditions and under maximum rotation operational conditions. Moving inside a structure with open or closed windows results in substantial noise attenuation not accounted for in the noise analysis (see Section 4.6 for additional discussion). Additionally, as described Section 4.6.3, low frequency noise and infrasound levels predicted under Alternative 2 are well below the threshold of human hearing and the DEFRA limits. Although predicted operational LFN/IS are higher than the ANSI S12.9 Part 4 guidelines, existing sound levels in the area are already above this threshold; therefore, as stated above, there is no anticipated low frequency noise/infrasound impact associated with Alternative 2. Therefore, no effects to people with autism or others with noise sensitivity are anticipated.

Electromagnetic Fields

Components of wind energy projects (transmission lines and wind turbines), like the energized components of electrical motors, home wiring, lighting, and all electrical appliances, produce electric and magnetic fields, commonly referred to as EMF. The EMF produced by the alternating current electrical power system in the United States has a frequency of 60 Hz, meaning that the intensity and orientation of the field changes 60 times per second. Power line fields of 60 Hz are considered to be extremely low frequency. Measurements of EMF recorded in wind farm sites have shown very low magnetic fields at the base of a wind turbine, and no detectable magnetic field at 25 feet (7.6 meters) (Windrush 2004).

The potential EMF produced by the generation and export of electricity from the wind turbines would have negligible effects on the health and safety of the public or the workers at the wind farm site. The electrical collection system would be constructed primarily underground. Aboveground portions of the electrical collection system and the transmission line would adhere to industry standards minimizing EMF exposure.

NPMPP has consulted with Comsearch, a company that identifies the potential impact of wind turbines on licensed non-Federal government microwave systems. Comsearch has developed and maintains comprehensive technical databases containing information on licensed microwave networks throughout the United States. Microwave bands that may be affected by the installation of wind turbine facilities operate over a wide frequency range (900 MHz to 23 gigahertz) and include systems that are the telecommunication backbone of the country, providing long-distance and local telephone service, backhaul for cellular and personal communication service, data interconnects for mainframe computers and the Internet, network controls for utilities and railroads, and various video services (Comsearch 2011). The Project would avoid any impacts identified by Comsearch.

Stray Voltage

When electrical systems are grounded some current flows through the earth and a small voltage develops at each point where the system is grounded. Stray voltage can occur if unbalanced neutral currents flow in the earth through ground rods, pipes, or other conducting objects in a facility (AWEA 2008). Stray voltage may come from damaged or poorly connected wiring systems, corrosion on either end of the wires, or weak or damaged insulation materials on the "hot" wire. Construction of the above ground portions of the transmission line would follow standard industry procedures including structure assembly and erection, ground wire, and conductor stringing. Operation activities would include routine monitoring, inspection, and maintenance by qualified personnel. Therefore, negligible effects to public health and safety from stray voltage are expected in association with the Proposed Action.

4.18.3.2 Direct and Indirect Effects of the HCP Conservation Measures

Impacts of Avoidance and Minimization Measures

The avoidance and minimization measures proposed under the Project HCP would have no effect on public health or safety. Project biologists or personnel onsite conducting post-construction

fatality monitoring are exposed to hazards such as tower collapse, blade throw, stray voltage, and fire (described in detail above). All personnel involved in post-construction fatality monitoring or other elements of the HCP mitigation strategy would receive safety training prior to commencing work within the wind farm site and would be required to follow the Site Safety Handbook.

Impacts of HCP Mitigation

None of the HCP mitigation measures pose a risk to public health and safety. Therefore, negligible impacts to public health and safety would be expected in association with implementation of HCP mitigation.

4.18.3.3 Mitigation for Unavoidable Impacts

Unavoidable adverse impacts to public health and safety are anticipated to be minimal. The following measures will help avoid and minimize the potential impacts to public health and safety during Project construction and operation.

- To mitigate for shadow flicker impacts, NPMPP will offer home owners for which shadow flicker is predicted to be greater than 30 hours per year reimbursement for costs up to $800 for adding awnings or blinds to windows facing the wind farm and/or landscaping/trees to block shadow flicker.
- Development and implementation of an FMP in coordination with the Honolulu County Fire Marshall and appropriate agencies. The FMP is included in Appendix C.
- Preparation, prior to commencement of any construction work, and implementation of a Site Safety Plan that would apply to all contractor and subcontractor personnel and farmers working at the site. The plan would be designed to ensure compliance with all laws, ordinances, regulations, and standards concerning health and safety. The contractor would assign a safety manager with the authority to issue a “stop work” notice when health and safety issues arise.
- Preparation and implementation of an SPCC Plan. The SPCC Plan would apply to both construction and operation if hazardous materials were stored onsite in quantities sufficient to trigger the plan requirement.
- Preparation and implementation of Hazardous Waste Management Plans, one for construction and one for operation, that comply with State and Federal hazardous waste management laws for handling, storage, and disposal.
- Compliance with all applicable local, State, and Federal safety, health, and environmental laws, ordinances, regulations, and standards for construction and operation of a wind project.

4.18.3.4 Cumulative Effects

The cumulative effects analysis area for impacts to public health and safety includes areas occupied by people where crossed by Proposed Action footprint or from which the Project is visible. The Proposed Action has been designed to incorporate measures that address the potential for wind turbine failure, minimize the risk of fire and exposure to hazardous materials, and address access-related safety issues. Many of these risks to public health and safety would be the same for any large construction project, and, therefore, would be

negligible with the implementation of proper safety measures. The Project would contribute to existing levels of noise within the analysis area associated with the highway, ongoing agricultural operations, and the natural sources (e.g., the ocean). Construction projects in the analysis area would contribute short-term, localized noise. However, none of these sources of noise would produce noise and vibration that would cause health and safety impacts. Shadow flicker resulting from the Project may contribute to the effects associated with the Kahuku wind projects if both projects are visible to individual motorists driving along the highway. Implementation of the HCP avoidance and minimization and mitigation measures would not result in adverse impacts to public health and safety, and therefore would not contribute to cumulative effects. Therefore, the direct and indirect effects of the Proposed Action in combination with past, ongoing, and reasonably foreseeable actions would not result in significant adverse cumulative impacts to public health and safety in association with noise and shadow flicker.

4.18.3.5 Summary

Under Alternative 2, effects associated with turbine collapse and blade throw, fire and fuels, EMF, and stray voltage would be minimized by implementation of mitigation measures, including adherence to industry design standards and implementation of the Site Safety Handbook and other Project plans as proposed. Effects on public health and safety associated with noise would be considered minor because although the magnitude would be medium (above background conditions with change noticeable but in compliance with industry standards) and long term (lasting the life of the Project), effects would be localized and would not comprise a new type of effect into the analysis area. Effects on public health and safety associated with shadow flicker under Alternative 2 would be considered moderate because there would be high (more than 30 hours of shadow flicker per year, above the industry recommended threshold), long-term (lasting through the life of the Project) impacts at individual receptors, but impacts would be localized (to individual receptors and limited to the wind farm site), with a majority (approximately 98 percent) of receptors predicted to experience less than 30 hours per year.

Public health and safety are common topics brought up in relation to proposed wind energy Projects. As discussed above, seventeen separate independent scientific reviews have been conducted both nationally and internationally to examine the relationship between wind turbines and possible human health effects associated with audible (the "whooshing" sound created by the rotating blades) and inaudible noise, vibration, shadow flicker, and EMF. To date, no scientific peer-reviewed study has demonstrated a direct link between people living in proximity to modern wind turbines and resulting physiological health effects. The following are a sample of conclusions drawn from these peer-reviewed scientific studies and research syntheses which summarize the best available science to date regarding public health and safety:

- "After careful consideration and deliberation of the body of evidence, [the National Health and Medical Research Council] concludes that there is currently no consistent evidence that wind farms cause adverse health effects in humans." (NHMRC 2015)
- "Cross-sectional studies, despite their inherent limitations in assessing causal links, however, have consistently shown that some people living near wind turbines are more

likely to report annoyance than those living farther away. These same studies have also shown that a person's likelihood of reporting annoyance is strongly related to their attitudes toward wind turbines, the visual aspect of the turbines, and whether they obtain economic benefit from the turbines. Our review suggests that these other risk factors play a more significant role than noise from wind turbines in people reporting annoyance." (McCunney et al. 2014)

- "while some people living near wind turbines report symptoms such as dizziness, headaches, and sleep disturbance, the scientific evidence available to date does not demonstrate a direct causal link between wind turbine noise and adverse health effects. The sound level from wind turbines at common residential setbacks is not sufficient to cause hearing impairment or other direct health effects, although some people may find it annoying." (UK Health Protection Agency 2010)
- "There is no evidence that the audible or sub-audible sounds emitted by wind turbines have any direct adverse physiological effects."(Colby 2009)
- "None of the... evidence reviewed suggests an association between noise from wind turbines and pain and stiffness, diabetes, high blood pressure, tinnitus, hearing impairment, cardiovascular disease, and headache/migraine." (MassDEP and MDPH 2012)
- "Although opposition to wind farms on aesthetic grounds is a legitimate point of view, opposition to wind farms on the basis of potential adverse health consequences is not justified by the evidence." (Chatham-Kent Public Health Unit 2011)
- "The electromagnetic fields produced by the generation and export of electricity from a wind farm do not pose a threat to public health..."(NHMRC 2010)

4.18.3.6 Alternative 2a - Modified Proposed Action Option

Under Alternative 2a, direct, indirect, and cumulative effects would be the same as those described under Alternative 2, with the exception of slightly greater shadow flicker effects at some receptors. Analysis of potential shadow flicker impacts for the Modified Proposed Action Option were calculated based on an array of nine larger-dimension turbines (see Appendix K). Results of the WindPro shadow flicker analysis indicated that 25 of the 737 receptors modeled had expected shadow flicker impacts of more than 30 hours per year under Alternative 2a (Table 4.18-4; see the shadow flicker analysis in Appendix K). This includes the 17 receptors discussed above under the Proposed Action plus two additional receptors on the Malaekahana Hui West, LLC portion of the wind farm site (farm structures; receptors 606 and 431), one additional receptor outside of the wind farm site on Department of Agriculture land (legal residences; receptor 592), and five additional receptors within the Kahuku Agriculture Park (legal residences; receptors 528, 529, 530, 531, and 532). The latter five have a predicted shadow flicker time of between 30 and 31 hours per year (Table 4.18-5).

The maximum predicted shadow flicker impact at any receptor under the Modified Proposed Action Option is 258 hours 19 minutes per year (Receptor 647), which is approximately 5.8 percent of the potential available daylight hours. The receptors with predicted shadow flicker of 30 hours or more

would experience shadow flicker during 3 to 9 months of the year (theoretical maximum of 90 to 267 days with shadow per year), depending on the receptor (Table 4.18-5). The theoretical maximum shadow flicker time per day at any of these receptor would range from 36 minutes to 2 hours and 13 minutes per day and would occur primarily in the morning (i.e., prior to 10 a.m.) or late afternoon (i.e., after 4:30 p.m.). The results of the shadow flicker analysis indicate that, like for the Proposed Action, the potential for shadow flicker associated with the Modified Proposed Action Option would be almost entirely contained within the wind farm site and the amount of potential flicker extending onto adjacent areas would be relatively short in duration. Therefore, the Modified Proposed Action Option would have moderate localized impacts associated with shadow flicker, with minimal impacts outside of the wind farm site boundary.

Table 4.18-4. Summary of Shadow Flicker impacts for Alternative 2a

Cumulative Shadow Flicker Time (expected on an annual basis)	Number of Receptors
0 Hours	537
> 0 Hours < 10 Hours	70
≥ 10 Hours < 20 Hours	75
≥ 20 Hours < 30 Hours	30
≥ 30 Hours	25
Total	**737**

Table 4.18-5. Predicted Shadow Flicker Impacts by Sensitive Receptor for Alternative 2a

Receptor[1/]	Expected Shadow Hours Per Year (hours:minutes)	Maximum Number of Days with Shadow[2]	Maximum Shadow Hours per Day (hours:minutes)[2/]
647	258:19	260	2:13
595	174:46	267	1:26
607	147:47	178	2:06
609	146:26	260	1:11
608	105:37	151	1:36
610	104:51	189	1:09
600	101:30	261	0:54
599	95:00	207	1:02
594	85:08	127	1:26
593	84:35	117	1:55
602	82:04	232	0:48
601	79:24	182	0:57
648	78:06	165	1:08
743	65:53	188	1:08
450	63:49	147	0:57
452	59:12	104	1:30
606	49:14	125	1:03
645	39:58	90	1:10
592	35:29	156	0:36
431	34:41	119	0:38
530	30:55	116	0:42
531	30:46	117	0:41
529	30:41	113	0:43

Table 4.18-5. Predicted Shadow Flicker Impacts by Sensitive Receptor for Alternative 2a (continued)

Receptor[1/]	Expected Shadow Hours Per Year (hours:minutes)	Maximum Number of Days with Shadow[2]	Maximum Shadow Hours per Day (hours:minutes)[2/]
532	30:27	118	0:40
528	30:10	110	0:43

[1/] Receptors for which more than 30 hours of shadow per year is predicted.
[2/] Representative of theoretical worst case; does not take into account factors that reduce or eliminate shadow flicker impacts such as estimated Project wind turbine operational time and orientation including wind speed and direction (based on site-specific wind data) and sunshine "availability" (percent of total hours available).

All other impacts associated with turbine collapse and blade throw, fire and fuels, noise and vibration, electromagnetic fields, and stray voltage under the Modified Proposed Action Option would be comparable to the Proposed Action. Implementation of standard BMPs and other mitigation measures, as described under the Proposed Action, would minimize any adverse impacts to public health and safety from the Modified Proposed Action Option.

4.18.4 Alternative 3 – Larger Generation Facility (Up to 12 Turbine Project)

4.18.4.1 Direct and Indirect Effects of Construction and Operation of the Project

Impacts associated with construction and operation of the Project under Alternative 3 related to public health and safety would be the same as under the Proposed Action with respect to turbine collapse and blade throw, fire risk and hazardous materials exposure, EMF, and stray voltage.

Predicted operational noise levels under Alternative 3 would fall below 44 dBA at the nearest noise-sensitive receptors (most residences, hospitals, schools) (see Section 4.6 – Noise for additional discussion). Given the current scientific evidence, the minor predicted increase over existing noise levels may result in a noticeable change to some noise-sensitive individuals working in or living adjacent to the wind farm site; however, predicted sound levels are not expected to result in annoyance, sleep disturbance or other health effects in the general population. As discussed above under Alternative 2, comments on the original Draft EIS requested additional discussion on the health impacts of wind turbines on people with autism. Using conservative estimates, increases in sound levels at the nearest noise-sensitive receptors (most residences, hospitals, schools) under Alternative 3 are predicted to be no more than 4 dB over existing sound levels. This low level of increase in sound levels is not anticipated to be more than a minor impact and would not be expected to have a disproportionate effect to noise-sensitive people.

Additionally, based on monitored sound levels, there is no anticipated low-frequency noise/infrasound impact associated with Alternative 3 (see Section 4.6 – Noise for detailed discussion). Therefore, Alternative 3 would have minor effects to public health related to noise (see discussion above under the Proposed Action).

WindPro predicts that shadow flicker impacts would be greatest at locations nearer to the wind turbines. Nineteen of the 737 receptors modeled had expected shadow flicker impacts of more than

30 hours per year (Table 4.18-6). This includes the 17 receptors discussed above under the Proposed Action plus two additional receptors on the Malaekahana Hui West, LLC portion of the wind farm site (farm structures; receptors 646 and 431). The maximum predicted shadow flicker impact at these receptors is 393 hours 10 minutes per year (Receptor 647), which is approximately 8.9 percent of the potential available daylight hours. These receptors would experience shadow flicker during 3 to 12 months of the year (theoretical maximum of 74 to 365 days with shadow per year), depending on the receptor (Table 4.18-7). The theoretical maximum shadow flicker time per day at any of these receptor would range from 36 minutes to 2 hours and 13 minutes per day and would occur primarily in the morning (i.e., prior to 10 a.m.) or late afternoon (i.e., after 4:30 p.m.). The results of the shadow flicker analysis indicate that, like for the Proposed Action, the potential for shadow flicker associated with the Alternative 3 would be almost entirely contained within the wind farm site and the amount of potential flicker extending onto adjacent areas would be relatively short in duration. Therefore, Alternative 3 would have moderate, localized impacts associated with shadow flicker.

Table 4.18-6. Summary of Shadow Flicker Impacts for Alternative 3

Cumulative Shadow Flicker Time (expected on an annual basis)	Number of Receptors
0 Hours	89
> 0 Hours < 10 Hours	162
≥ 10 Hours < 20 Hours	60
≥ 20 Hours < 30 Hours	7
≥ 30 Hours	19
Total	**737**

Table 4.18-7. Predicted Shadow Flicker Impacts by Sensitive Receptor for Alternative 3

Receptor[1/]	Expected Shadow Hours Per Year (hours:minutes)	Maximum Number of Days with Shadow[2/]	Maximum Shadow Hours per Day (hours:minutes)[2/]
647	393:10	365	3:03
648	286:46	340	3:16
607	160:05	196	2:37
608	135:29	211	2:11
609	130:46	248	1:21
595	127:13	230	1:18
645	108:39	169	1:58
610	104:16	229	1:12
600	95:38	293	1:03
599	77:03	190	1:02
602	68:30	213	0:59
646	64:56	108	1:12
594	60:34	114	1:12
743	55:58	186	0:59
450	55:19	163	0:52
593	52:00	95	1:27
601	51:57	140	0:48

Table 4.18-7. Predicted Shadow Flicker Impacts by Sensitive Receptor for Alternative 3 (continued)

Receptor[1/]	Expected Shadow Hours Per Year (hours:minutes)	Maximum Number of Days with Shadow[2/]	Maximum Shadow Hours per Day (hours:minutes)[2/]
452	32:39	74	1:12
431	31:35	132	0:34

[1/] Receptors for which more than 30 hours of shadow per year is predicted.
[2/] Representative of theoretical worst case; does not take into account factors that reduce or eliminate shadow flicker impacts such as estimated Project wind turbine operational time and orientation including wind speed and direction (based on site-specific wind data) and sunshine "availability" (percent of total hours available).

4.18.4.2 Direct and Indirect Effects of the HCP Conservation Measures

Impacts of Avoidance and Minimization Measures

The avoidance and minimization measures proposed under the Project HCP would have no effect on public health and safety.

Impacts of HCP Mitigation Measures

Impacts of HCP mitigation measures under Alternative 3 would be the same as under the Proposed Action. Prior to construction of additional turbines proposed under Alternative 3, NPMPP would reopen consultation with the USFWS and DOFAW to assess the potential for impacts of the additional turbines to listed species and develop appropriate mitigation measures. The impacts of these mitigation measures to public health and safety would be evaluated under a separate environmental analysis at that time.

4.18.4.3 Mitigation for Unavoidable Impacts

Unavoidable adverse impacts to public health and safety in association with Alternative 3 are anticipated to be minimal. Under Alternative 3, the same mitigation measures described for the Proposed Action would be implemented to avoid and minimize potential impacts to public health and safety.

4.18.4.4 Cumulative Effects

Cumulative effects under Alternative 3 would be the same as under the Proposed Action. Alternative 3 would have negligible effects related to turbine collapse and blade throw, fire risk and hazardous materials exposure, EMF, and stray voltage, and therefore would not contribute to cumulative effects associated with these impacts. Therefore, the direct and indirect effects of Alternative 3 in combination with past, ongoing, and reasonably foreseeable actions would not result in significant adverse cumulative impacts to public health and safety in association with noise and shadow flicker.

4.18.4.5 Summary

Under Alternative 3, effects associated with turbine collapse and blade throw, fire and fuels, EMF, and stray voltage would be minimized by implementation of mitigation measures, including adherence to industry design standards and implementation of the Site Safety Handbook and other Project plans as proposed. Effects on public health and safety associated with noise under Alternative 3 would be considered minor because although the magnitude would be medium (above background conditions with change noticeable but in compliance with industry standards) and long-term (lasting the life of the Project), effects would be localized and would not comprise a new type of effect within the analysis area. Effects on public health and safety associated with shadow flicker under Alternative 3 would be considered moderate because there would be high (more than 30 hours of shadow flicker per year, above the industry recommended threshold), long-term (lasting through the life of the Project) impacts at individual receptors, but impacts would be localized (to individual receptors and limited to the wind farm site), with a majority (approximately 98 percent) of receptors predicted to experience less than 30 hours per year.

4.18.5 Conclusion

Table 4.18-8 summarizes potential impacts to public health and safety from the alternatives considered in this analysis.

Table 4.18-8. Summary of Potential Impacts to Public Health and Safety

Impact Issues	No Action Alternative	Alternative 2 – Proposed Action	Alternative 2a – Modified Proposed Action Option	Alternative 3
Turbine collapse and blade throw	No Impact	Negligible	Negligible	Negligible
Shadow flicker	No Impact	Moderate	Moderate	Moderate
Fire and fuels	No Impact	Minor	Minor	Minor
Noise and vibration	No Impact	Minor/negligible	Minor/negligible	Minor/negligible
Electromagnetic fields	No Impact	Negligible	Negligible	Negligible
Stray voltage	No Impact	Negligible	Negligible	Negligible

4.19 Environmental Justice

The following analysis assesses the potential environmental justice impacts of the Project. The analysis addresses potential impacts associated with construction and operation of the Project, as well as those associated with of HCP conservation measures within the mitigation areas.

4.19.1 Impact Criteria

The proposed alternatives would be considered to have environmental justice impacts if they were to result in high and adverse human health or environmental effects that disproportionately affect minority or low income communities. According to the Hawaii Environmental Justice Initiative Report (Kahihikolo 2008, p 6-3), agencies or applicants "should consider the demographic composition of the affected area to determine whether under-represented populations (Native Hawaiian, minority, and/or low-income) will be significantly impacted by the proposed action. If impacts are identified, it needs to be determined whether there is a disproportionately high and adverse human health or environmental effect on that population." As discussed in Section 3.17, the context for environmental justice in Hawaii is based on where minority populations are concentrated in a disproportionate way within a diverse area with a high overall minority population.

A key part of environmental justice legislation is also providing opportunities for environmental justice communities to participate in the project planning process, including the environmental analysis. The surrounding the Project have been actively engaged by NPMPP and their team of outreach specialists since 2013. A summary of outreach efforts is provided in Chapter 1 of this EIS and is included in the Project record.

Based on 2000 census data, the communities of Kahuku, Laie, and the coastal area south to Kaneohe Bay were identified as minority environmental justice populations due to the disproportionate concentration of Native Hawaiians and other Pacific Islanders in these communities relative to Oahu as a whole (Oahu Metropolitan Planning Organization and Department of Planning and Permitting 2004). Review of current census data suggests this is likely still the case (see Section 3.17 – Environmental Justice). Adverse environmental impacts identified as a result of the Project have the potential to disproportionately affect these minority communities, especially Kahuku.

4.19.2 Alternative 1—No Action

4.19.2.1 Direct and Indirect Effects

Under Alternative 1, the Project would not be constructed, an ITP would not be issued by the USFWS, and the HCP conservation measures would not be implemented. Therefore, Alternative 1 would have no direct or indirect effects on environmental justice populations in the analysis area. As such, no mitigation measures would be warranted.

4.19.2.2 Cumulative Effects

Under the No Action Alternative, the Project would not be constructed, an ITP would not be issued by the USFWS, and the HCP conservation measures would not be implemented. Therefore, there would be no adverse or beneficial effects on environmental justice populations. Thus, Alternative 1 would not contribute to cumulative effects of past, present, and foreseeable effects on environmental justice populations in the analysis area.

4.19.2.3 Summary

Alternative 1 would have no direct, indirect, or cumulative effects on environmental justice populations as no action would be undertaken.

4.19.3 Alternative 2—8 to 10 Turbine Project

4.19.3.1 Direct and Indirect Effects of Construction and Operation of the Project

The public scoping process conducted for the Project in accordance with the requirements of NEPA and HEPA considered all input from persons or groups regardless of race, income status, or other social and economic characteristics. Public scoping efforts are described in Chapter 1 of this EIS. Separate NEPA and HEPA public scoping meetings were held at the Kahuku Community Center in November 2013 and January 2014, respectively. Appendix A includes all the public comments received during the public scoping period. A public meeting on the original Draft EIS was also held in Kahuku in June 2015. Appendix M includes all the comments received during the public comment period.

No high or adverse human health or environmental effects are anticipated in association with construction or operation of the Project under Alternative 2. Potential adverse effects to residents living in the communities in the vicinity of the Project, all of which have been determined to be less than significant, are discussed in Sections 4.6 – Noise, 4.12 – Socioeconomics, Section 4.13 – Cultural Resources, Section 4.16 – Visual Resources, Section 4.18 – Public Health and Safety, and Section 4.20 – Public Infrastructure and Services.

Avoidance and minimization measures for these impacts are addressed in their respective sections in this EIS. Because there are no high or adverse effects to *any* population, there would be no high or adverse effects to any minority or low income population and, therefore, no environmental justice issues resulting from this Project.

Construction and operation of the Project would result in short- and long-term socioeconomic benefits to the community through the creation of jobs and generation of tax revenues. Moreover, operation of the Project would have a long-term beneficial effect on air quality and climate change by providing a clean, renewable source of energy, offsetting the amount of CO_2 generated by combustion of fossil fuels. The Project would also contribute to the State's Clean Energy Initiative goal of 100 percent of energy from renewable sources by 2045.

Although all potential human health and environmental effects are anticipated to be less than significant, it is important to note that the location of the Project was selected among other options based on a number of criteria. These include the available wind resource, utility and interconnection and transmission capacity, land availability (quantity and zoned appropriately for wind energy development), and the potential for environmental impacts (see Chapter 2 for additional discussion). The Project was not deliberately sited near the communities of Kahuku, Laie, and the coastal area south to Kaneohe Bay because these areas were identified as minority populations based on the disproportionate concentration of Native Hawaiians and other Pacific Islanders relative to Oahu as a whole. Rather, effects to these communities, although not significant, would occur circumstantially due to the siting of the Project.

4.19.3.2 Direct and Indirect Effects of the HCP Conservation Measures

Impacts of Avoidance and Minimization Measures

The avoidance and minimization measures proposed under the Project HCP would have no effect on environmental justice.

Impacts of HCP Mitigation Measures

Implementation of the HCP conservation measures would have limited impacts at the selected sites and would, therefore, not be expected to result in environmental justice impacts.

4.19.3.3 Mitigation for Unavoidable Impacts

No environmental justice impacts are anticipated under Alternative 2; therefore, no mitigation is warranted. Mitigation for potential environmental impacts will include a Community Benefits Package between NPMPP and the community. As described by Kahihikolo (2008), such agreements may be the result of a negotiation process during which the Proponent agrees to shape the proposed Project in a certain way or provide specified community benefits. See Section 4.12 – Socioeconomics for additional discussion.

4.19.3.4 Cumulative Effects

Ongoing and reasonably foreseeable projects in the cumulative effects analysis area for environmental justice (Koolauloa District) include: the ongoing residential and commercial development associated with BYU, which broke ground in 2011; the proposed Turtle Bay Resort expansion, which is expected to occur sometime between 2015 and 2025; and residential development associated with the Envision Laie Project, which is generally anticipated to occur prior

to 2019. In addition, transportation safety improvements for the Kamehameha Highway are anticipated sometime between 2015 and 2020 (see Table 4.2-2). The contribution of Alternative 2 to cumulative effects during construction would be localized and temporary. Direct and indirect long-term noise, visual, and shadow flicker impacts from Alternative 2 would contribute to cumulative impacts to nearby residential communities and would add incrementally to the impact of the existing Kahuku wind facility in some locations.

4.19.3.5 Summary

Alternative 2 would not result in a disproportionately high and adverse effect on any minority or low income populations. Mitigation for environmental impacts will include a community benefits package agreed upon between NPMPP and the community (see Section 4.12 – Socioeconomics for additional discussion).

4.19.3.6 Alternative 2a - Modified Proposed Action Option

The direct, indirect, and cumulative effects of the Modified Proposed Action Option related to environmental justice would be the same as those described under the Proposed Action. No significant high adverse human health or environmental effects are anticipated in association with construction and operation of the Project. Therefore, there would be no disproportionate high or adverse effects to any minority or low income population. The Community Benefits Package offered to the Kahuku Community by NPMPP may be slightly reduced as it would be calculated on a per turbine basis, although under the Proposed Action an 8- or 9-turbine Project could be constructed.

4.19.4 Alternative 3—Larger Generation Facility (Up to 12 Turbine Project)

4.19.4.1 Direct and Indirect Effects of Construction and Operation of the Project

The effects of Alternative 3 related to environmental justice would be the same as those described under Alternative 2. No significant high adverse human health or environmental effects are anticipated in association with construction and operation of the Project. Therefore, there would be no disproportionate high or adverse effects to any minority or low income population.

4.19.4.2 Direct and Indirect Effects of the HCP Conservation Measures

Impacts of Avoidance and Minimization Measures

The avoidance and minimization measures proposed under the Project HCP would have no effect on environmental justice.

Impacts of HCP Mitigation Measures

Implementation of the HCP conservation measures would have limited impacts at the selected sites and would, therefore, not be expected to result in environmental justice impacts. Prior to construction of additional turbines proposed under Alternative 3, NPMPP would reopen consultation with the USFWS and DOFAW to assess the potential for impacts of the additional

turbines to listed species and develop appropriate mitigation measures. The impacts of these mitigation measures to environmental justice populations would be evaluated under a separate environmental analysis at that time.

4.19.4.3 Mitigation for Unavoidable Impacts

No environmental justice impacts are anticipated under Alternative 3; therefore, no mitigation is warranted. Mitigation for potential environmental impacts will include a Community Benefits Package between NPMPP and the community as described above for Alternative 2.

4.19.4.4 Cumulative Effects

Under Alternative 3, cumulative effects for the first phase of the Project are the same as those described for Alternative 2. Even with 2 to 4 additional turbines, the contribution of Alternative 3 to cumulative effects during construction would be minor, localized, and temporary. Direct and indirect long-term noise, visual, and shadow flicker impacts from Alternative 3 would result in moderate impacts to nearby residential communities and would add incrementally to the impact of the existing Kahuku wind facility in some locations. Because there will likely be a delay in time of up to 3 years before additional turbines would be built under Alternative 3, new projects and developments in the area will be assessed and reviewed to determine if there are additional cumulative impacts from future unknown projects.

4.19.4.5 Summary

Alternative 3 would not result in a disproportionately high and adverse effect on any minority or low income populations. Mitigation for environmental impacts will include a community benefits package agreed upon between NPMPP and the community (see Section 4.12 – Socioeconomics for additional discussion).

4.19.5 Conclusion

The communities of Kahuku, Laie, and the coastal area south to Kaneohe Bay may be considered minority environmental justice populations based on the disproportionate concentration of Native Hawaiians and Other Pacific Islanders relative to Oahu as a whole (Oahu Metropolitan Planning Organization and Department of Planning and Permitting 2004, U.S. Census Bureau 2012). Neither Alternative 2 (including the Modified Proposed Action Option), nor Alternative 3 would result in high and adverse human health or environmental impact, and therefore, neither alternative would have the potential to disproportionately impact these minority communities, especially Kahuku.

Table 4.19-1 summarizes potential impacts to environmental justice from the alternatives considered in this analysis.

Table 4.19-1. Summary of Potential Impacts to Environmental Justice

Impact Issues	No Action Alternative	Alternative 2 – Proposed Action	Alternative 2a – Modified Proposed Action Option	Alternative 3
Effects to environmental justice communities	No Impact	Negligible	Negligible	Negligible

4.20 Public Infrastructure

4.20.1 Impact Criteria

This section analyzes potential effects on public infrastructure facilities and services, including electric service, gas service, water supply, wastewater management, stormwater management, education facilities, emergency and health services, solid waste management, and telecommunications. Impacts to public services and infrastructure were evaluated by assessing the effects of Project construction and operation and maintenance activities in the vicinity of the Project, and from implementation of HCP conservation measures.

Factors considered in determining whether an alternative would have a significant impact on utilities include the extent or degree to which its implementation would:

- Interrupt or disrupt any public utility service, from physical displacement and subsequent relocation of public utility infrastructure, in a manner that would be a direct, long-term service interruption or permanent disruption of essential public utilities; and
- Require an increase in demand for public services or utilities beyond the capacity of the utility provider so that substantial expansion, additional facilities, or increased staffing levels would be necessary.

Impacts were assessed based on the magnitude of the effect, its duration, its geographic extent, and on the context of the public infrastructure resource being affected. These impact criteria are described further in Table 4.20-1.

Table 4.20-1. Impact Criteria for Public Infrastructure and Services

Type of Effect	Impact Component	Effects Summary		
Effects on public services and infrastructure	Magnitude or Intensity	**High:** Public utility service disrupted; Project triggers a large increase in demand for public services or utilities beyond the capacity of the provider so that substantial expansion, additional facilities, or increased staffing levels would be necessary	**Medium:** Public utility service disrupted; Project puts additional demands on public services or utilities but does not affect ability to provide service.	**Low:** No disruption in public utility service and additional demands on public services or utilities not measureable.

Table 4.20-1. Impact Criteria for Public Infrastructure and Services (continued)

Type of Effect	Impact Component	Effects Summary		
Effects on public services and infrastructure (continued)	Duration	**Permanent:** Chronic effects; changed conditions of infrastructure or ability to provide service would persist beyond Project decommissioning.	**Long-term:** Effects would persist up to the life of the Project, with a return to pre-Project baseline conditions after decommissioning.	**Temporary:** Effects are generally associated with construction and would not last longer than approximately 1 year, with a subsequent return to pre-activity levels.
	Geographic Extent	**Extended:** Affects services or infrastructure beyond the region or analysis area.	**Regional:** Affects services or infrastructure beyond a local area, potentially throughout the region.	**Local:** Impacts limited to the immediate vicinity of the Project.
	Context	**Unique:** NA.	**Important:** NA.	**Common:** NA

4.20.2 Alternative 1—No Action

4.20.2.1 Direct and Indirect Effects

Under Alternative 1, the Project would not be constructed, an ITP would not be issued by the USFWS, and the HCP conservation measures would not be implemented. Alternative 1 would therefore have no adverse impacts to public infrastructure and services. If the Project is not developed, it cannot contribute to the supply of renewable energy on Oahu. HECO would then be obligated to obtain sufficient renewable energy from other sources in order to meet its statutory requirement for a percentage of its electricity to be generated from renewable energy sources.

4.20.2.2 Cumulative Effects

Under Alternative 1, the Project would not be constructed, an ITP would not be issued by the USFWS, and the HCP conservation measures would not be implemented. Therefore, there would be no adverse or beneficial effects on public infrastructure and services. Thus, the No Action Alternative would not contribute to cumulative effects on public infrastructure and services.

4.20.2.3 Summary

The No Action Alternative would have no direct, indirect, or cumulative effects on public infrastructure and services because no action would be undertaken.

4.20.3 Alternative 2—8 to 10 Turbine Project

4.20.3.1 Direct and Indirect Effects of Construction and Operation of the Project

Construction Impacts

Electric Services

During construction, electricity would be required at a temporary modular office space located onsite. Electricity required for onsite facilities during construction may be provided by generators for temporary power or from a temporary or permanent distribution line if installed prior to construction start. The electric demand to operate the modular office space would be minimal. If the permanent distribution line were installed prior to construction activities, the demand on the utilities would not be significant.

Gas

There is no gas infrastructure in or near the wind farm site. Bottled gas (e.g., propane) is delivered to some customers in the area. With the implementation of a traffic management plan during construction, the potential for disruption to bottled gas delivery would be negligible.

Water Supply

The Project would not adversely impact public water supplies or public water infrastructure systems. Construction of the Project would require up to approximately 10,000 to 15,000 gallons (37,854 to 56,781 liters) per day for dust control, equipment washdown, and emergency fire suppression (see Section 4.4 – Hydrology and Water Resources). If a concrete batch plant were required, water would be delivered to the site and stored in an onsite water tank, come from existing private wells, or come from a similar source. Construction of the Project would require excavation and may require blasting, which could result in physical disturbance of existing water wells in the immediate vicinity; however, both excavation and blasting (if necessary) would be relatively shallow and would not impact the deeper aquifers typically used for potable water supplies. NPMPP will coordinate with landowners and tenants to identify the location of private wells within the wind farm site, if any, and will adjust the final layout to avoid impacting existing wells. Should an impact to an existing well prove unavoidable, NPMPP will work with the landowner to provide appropriate mitigation.

The only public water system infrastructure that potentially occurs in the wind farm site are water lines along or near the Kamehameha Highway, where they extend south out of Kahuku to serve the Malaekahana area; the specific location of the water lines is currently unknown. These could be affected by improvements to the Project access road at its intersection with the highway. NPMPP and its construction contractor will work with HWBS to identify the location of any water lines prior to beginning construction such that adverse impacts can be avoided.

Wastewater

Construction of the project would generate a minor amount of wastewater from portable toilets. The existing wastewater infrastructure in Kahuku and its treatment plant have adequate capacity to accommodate the temporary increase in sanitary wastewater during construction.

Stormwater Management

Construction of the Project would not impact existing stormwater drainage infrastructure because there is none in the wind farm site that could be affected. During the detailed design phase of the Project, the construction contractor will confirm stormwater runoff requirements and, if necessary, implement stormwater control measures such as seepage pits, drywells, and/or detention basis in order to manage stormwater onsite and avoid increasing offsite stormwater flows. Additionally, TESC Plan and a site-specific SWPPP would be prepared for the Project. These plans, which would include standard stormwater BMPs, would be implemented during construction (see Section 4.3 – Geology and Soils). Temporary ditches and culverts used to capture and convey stormwater would be installed in areas of temporary disturbance. Permanent stormwater control structures would be installed where access roads, buildings, storage areas, and parking areas are constructed.

Solid Waste Management

Solid wastes generated during construction of the Project would be taken to the City and County of Honolulu's Waimanalo Gulch landfill or the H-power facility in Kapolei; both facilities are operated by Waste Management. The City estimates that the physical capacity of the landfill would enable it to continue to receive solid wastes for at least the next 15 years (City and County of Honolulu, DES 2014), and diversion of wastes for incineration at H-power would potentially extend this lifespan. Alternatively, construction wastes could be taken to the privately-owned PVT landfill, which is authorized specifically to receive construction and demolition waste.

Waste generated during construction of the Project may include scrap metal, wood, plastic and cardboard from shipping of turbine components, and incidental waste from construction workers (e.g., food and beverage containers). The amount of waste generated is not expected to adversely impact existing waste management services or facility capacity.

Education Facilities

Project construction would not directly impact any school or educational facility in the area; however, it could indirectly impact people at the two nearest schools, the Kahuku Elementary School and the Kahuku High and Intermediate School located approximately 0.2 mile from the wind farm site. Impacts would be limited to temporary increases in traffic and/or noise during construction.

Project-related construction traffic is unlikely to adversely impact the schools or buses bringing students to school. Scheduling the movement of large and oversized loads at night would largely eliminate potential traffic conflicts. The implementation of a traffic management plan and traffic control as needed during construction would limit potential disruptions to traffic in the area, and keep delays to a minimum. The relatively small workforce needed to construct the Project would

cause only a minor, temporary increase in morning traffic that may coincide with school buses, while worker commuting in the evenings would not overlap with school bus route timing.

Construction of the Project would create noise that may affect nearby schools. Both schools are considered noise-sensitive receptors. Construction noise is temporary, and periods of particularly loud noise would be intermittent. Sounds generated by construction activities would likely require a permit, to be obtained from the HDOH, to allow the operation of construction equipment that result in exceedance of the maximum permissible at property line locations. While the permits do not limit the sound level generated at the construction site, time restrictions may be placed on when the loudest construction activities are likely to occur, i.e., between 7:00 a.m. and 7:00 p.m. Monday through Friday and between 9:00 a.m. and 6:00 p.m. on Saturday. The HDOH would require reasonable and standard practices be employed to minimize the impact of noise resulting from construction activities (see Section 4.6 – Noise).

Emergency and Health Services

Construction of the Project would have no direct impact to existing health care facilities and emergency services and is not expected to place substantial additional demands on health care or emergency services in the area. The wind farm site and vicinity are well served by a community hospital, fire and emergency medical services, and police service. Should an incident occur during construction of the Project, response times will be short. The implementation of a Site Safety Plan and observance of safe working practices during construction are expected to substantially reduce the potential for serious accidents that could place an undue burden on the local health care facilities and emergency services. Measures to limit traffic impacts during construction, such as movement of most large loads at night and the implementation of a traffic management plan, would also serve to prevent disruptions to the provision of emergency services.

The Kahuku Medical Center is considered a noise-sensitive receptor, and there is the potential for construction noise reaching its vicinity. As described above, sounds generated by construction activities would likely require a permit, to be obtained from the HDOH, to allow the operation of construction equipment that result in exceedance of the maximum permissible at property line locations.

Operation and Maintenance Impacts

Electric Service

Operation of the Project would have no adverse impact on the provision of electric service or on electricity infrastructure near the wind farm site. In order to deliver generated electricity into the distribution grid, a minor modification to HECO's 46.5-kV transmission line would occur at the point of interconnection. The Project does not appear to necessitate any modification of any existing electricity distribution lines or other infrastructure, aside from extension of distribution lines to the O&M building. Should any modifications of existing lines become necessary, NPMPP and its construction contractor will coordinate with HECO and the affected customer(s) in order to limit potential service disruptions and to design and build the modifications to appropriate standards.

With the renewable power generated by operation of the proposed facility, HECO would be able to eliminate the use of oil that would otherwise be consumed to produce conventional electric power. Reducing the proportion of its energy that comes from fossil fuel would decrease the amount of money that HECO spends on imported fuel and buffer the system from the energy cost fluctuations that can be caused by volatile oil prices.

Additionally, the Proposed Action would contribute to the goals outlined in the Hawaii's Renewable Portfolio Standards and the HCEI by increasing the percentage of the state's energy that is derived from clean, renewable sources. It also would support recently passed state statutes designed to promote energy efficiency and renewable energy sources.

Operation and maintenance of the Project would consume only small amounts of electrical power for use in the O&M building and the wind farm control system. Electricity would be supplied from existing distribution lines near these facilities. The electricity generated by the Project would far exceed the amount consumed.

Gas

Operation and maintenance of the Project under Alternative 2 would have no effect on gas service or infrastructure.

Water Supply

The O&M building would include a kitchen and bathroom(s). Water may be provided by existing sources or trucked in and stored in onsite storage tanks. The anticipated average daily water demand, assuming a staff of approximately three to six employees, would be approximately 200 gallons (757 liters) of water per day, with a maximum daily demand of 500 gallons (1,893 liters) and a peak hour demand of 100 gallons per minute (379 liters per minute). These estimates are based on HAR § 11-62, Water Systems Standards, and represent a preliminary, conservative estimate. It is anticipated that actual domestic water consumption during Project operation would be less. Because this increased demand is slight, impacts to the public water supply and distribution system would not be expected to be significant.

Stormwater Management

Operation of the Project would not generate large amounts of stormwater runoff because only a small percentage of the wind farm site would be converted to impervious surface (less than 0.1 percent of the watershed within which the Project is located; see Section 4.4 – Hydrology and Water Resources). Stormwater runoff that is generated will be managed onsite using seepage pits, drywells, and/or detention basins, to avoid increasing offsite stormwater flows. The operations and maintenance building and surrounding storage yard and parking areas would undergo routine maintenance and upkeep to minimize erosion and control stormwater runoff and drainage. Additionally, permanent stormwater control structures would be installed where access roads, buildings, storage areas, and parking areas are constructed.

Solid Waste Management

Solid wastes generated during operation of the Project would be taken to the City and County of Honolulu's Waimanalo Gulch landfill or the H-power facility in Kapolei; both facilities are operated by Waste Management. The City estimates that the physical capacity of the landfill would enable it to continue to receive solid wastes for at least the next 15 years (City and County of Honolulu, DES 2014), and diversion of wastes for incineration at H-power would potentially extend this lifespan. The amount of waste generated during operation of the Project is not expected to adversely impact existing waste management services or facility capacity.

Education Facilities

Operation of the Project would not directly impact any school or educational facility in the area. There is the potential for indirect noise and visual impacts at the Kahuku Elementary School and the Kahuku High and Intermediate School, located approximately 0.~~2~~ 3 and 0.5 mile from the wind farm site, respectively. These impacts, which would be less than significant, are addressed in detail below.

Both schools are considered noise-sensitive receptors. Noise impacts are analyzed in Section 4.6 – Noise. Worst-case modeled noise levels would be approximately 43 dBA, at Kahuku Elementary School, and 42 dBA at the Kahuku High School, which are roughly equivalent to the sound level in a quiet library and is less than the 55 dBA daytime noise limit established in Hawaii's Community Noise Control regulation (HAR 11-46). The modeled noise levels represent an increase in noise of 3 and 4 dBA above baseline levels at these two receptors, respectively, a level which is just at the threshold of human perception. This is the outdoor noise level predicted; indoor sound levels would be close to 10 dBA lower (see Section 4.6 – Noise and the Noise Impact Assessment in Appendix D for additional discussion). Thus, while the operation of the Project may be audible at the schools, the magnitude of the impact would be considered low, and it would not be sufficient to disrupt the educational function of the schools.

Visual impacts analyzed in Section 4.16 include views of Project turbines. The results of this analysis indicate that the overall impact to viewers from the schools would be moderate to low, because the Project would be visible in conjunction with many man-made elements including the adjacent Kahuku Wind Farm. Visual impacts that might be experienced at the schools could be a nuisance factor for some people at the schools, but they would not disrupt their ability to function as educational facilities.

Emergency and Health Services

Operation of the Project would have no direct impact to existing health care facilities and emergency services, and is not expected to place substantial additional demands on health care or emergency services in the area. The wind farm site and vicinity are well served by a community hospital, fire and emergency medical services, and police service; should an incident occur during operation of the Project, response times will be short. Implementation of a Site Safety Plan and observance of safe working practices during operation is expected to substantially reduce the

potential for serious accidents that could place an undue burden on the local health care facilities and emergency services.

The Kahuku Medical Center is considered a noise-sensitive receptor, and noise impacts are a concern. Noise impacts are analyzed in Section 4.6. Worst-case modeled noise levels at the hospital would be approximately 41 dBA, which is less than the 55 dBA (daytime) and 45 dBA (nighttime) noise limit established in Hawaii's Community Noise Control regulation (HAR 11-46). The modeled noise levels represent a 3-dBA increase above baseline sound levels, which is just at the threshold of human perception. This is the outdoor noise level predicted; indoor sound levels would be close to 10 dBA lower (see Section 4.6 – Noise and the Noise Impact Assessment in Appendix D for additional discussion).

Visual impacts would include views of the Project turbines. Visual impacts are analyzed in Section 4.16. The results of this analysis indicate that the overall impact of the Project would be moderate, due to distance, screening, and views of the Project in conjunction with many other man-made elements. Visual impacts that might be experienced at the hospital could be a nuisance factor for some people at the hospital, but they would not disrupt its ability to function as a community health provider.

Telecommunications

Members of the public and the military have expressed concerns over the potential that operation of the Project may interfere with telecommunications in the area. Interference with telecommunications could arise due to the location of the turbines or due to EMF associated with the turbine generators, electrical collection system, or transmission line. Wind turbines can interfere with microwave signals if placed in the line-of-sight pathway between two communicating towers. A microwave beam path study has been completed for the area surrounding the Project and one beam path has been identified that crosses the wind farm site. The locations of the proposed turbines have been adjusted to avoid interference with that beam path.

An EMF would be present anywhere electricity is generated or conducted by Project facilities; these would be 60 Hz "power frequency" alternating current fields. The presence of EMF does not inherently cause interference with telecommunications. However, if the electrical charge and current are sufficiently high, as may occur with the above ground portions of the Project's transmission line or at the Project substation, corona activity may occur which produces broadband electromagnetic radiation (EMR) that may be perceived as interference. The transmission line would be a 46-kV line, and may exhibit a very low level of corona activity and thus very low levels of EMR interference. Corona activity is known to produce EMR in the frequency spectrum from below 100 kHz to approximately 1,000 MHz, which partially overlaps with the frequencies used for AM and FM radio and some television signals. The effects are most pronounced directly underneath the line conductors, and decrease with distance from the transmission line. Moreover, EMF is not measureable beyond 25 feet (8 meters) from the base of a turbine.

In general, complaints related to corona-generated interference are infrequent. Moreover, the advent of cable and satellite television service, and the Federally-mandated conversion to digital

television broadcast in June 2009, have greatly reduced the occurrence of corona-generated interference; cable, satellite, and digital broadcast are generally not affected by corona-generated interference. Low-frequency corona-induced EMR, such as that generated by the Project, does not interact with the higher-frequency satellite signals or with wired communication network systems, while digital television receivers are equipped with systems to filter out interference. Many radio stations also broadcast in digital, further reducing the likelihood of corona-induced EMR interference.

Wireless computer network systems, cell phones, GPS units, and satellite receivers typically operate at high frequencies in the tens to hundreds of megahertz (MHz) or gigahertz (GHz). In general, the low frequency EMR that can be generated by corona activity would not interact with the much higher frequencies used by these types of communications. These systems also often use FM or digital coding of the signals so they are relatively immune to electromagnetic interference. GPS units operate in the frequency range of 1.2 to 1.6 GHz. Satellite receivers operate at frequencies of 3.4 GHz to 7 GHz and have shown no effect from transmission lines unless the receiver was trying to view the satellite through the transmission tower or conductor bundle of the transmission line (Chartier et al. 1986). Repositioning the receiver by a few feet was sufficient to eliminate the obstruction and reduced signal. Mobile phones operate in the radio frequency range of about 800 MHz to 1,900 MHz or higher. The City and County of Honolulu have utilized VHF band (30 MHz to 300 MHz) radios for emergency communications, and are currently in the process of migrating to a more secure 800 MHz system. Military communications that may be used during exercises in the Kahuku Training Area (KTA) would also operate at VHF or higher frequencies. Due to the high frequencies used by these devices, built-in modulation and processing techniques, and the typically lower-frequency corona-induced EMR, effects from interference due to operation of the Project are unlikely. Interference effects would be most pronounced directly underneath the transmission line and would rapidly decrease with increasing distance from the line. Because of the location of the line relative to the KTA, interference with military communications is highly unlikely.

4.20.3.2 Direct and Indirect Effects of the HCP Conservation Measures

Impacts of Avoidance and Minimization Measures

The avoidance and minimization measures proposed under the Project HCP would have no effect on public infrastructure and services.

Impacts of HCP Mitigation

Because of the limited nature of the physical actions and their location within the mitigation sites, the Project's HCP conservation measures are expected to have no impact on public infrastructure or on the provision of public services.

4.20.3.3 Mitigation for Unavoidable Impacts

Standard practices and procedures that would minimize the potential impacts of the Project on public infrastructure services and facilities include implementation of a traffic management and

Site Safety plans. The implementation of a construction Site Safety Plan would help to prevent serious incidents and limit the Project's demand on local health care and emergency service providers. Coordination with HBWS and HECO during final design will ensure that potential impacts to water systems and electrical distribution systems are avoided or minimized. The implementation of appropriate stormwater management methods, as will be required by the Project's NPDES permit and TESC Plan, will prevent off-site stormwater impacts and help to protect groundwater supplies. The implementation of a SWPP will further act to protect groundwater supplies. Construction and other wastes will be recycled to the extent practicable to limit the impacts to existing landfills. While no impacts to telecommunications are anticipated, NPMPP will work with affected landowners on a case-by-case basis to resolve complaints, should they arise.

4.20.3.4 Cumulative Effects

The analysis area for cumulative effects on public infrastructure and facilities includes the Proposed Action footprint and the surrounding area serviced by utility providers on Oahu. The communities surrounding the wind farm site would continue to use the existing infrastructure and services. Under Alternative 2, the Project would have negligible effect on gas service, and minor effects on electrical service, water supply, wastewater, stormwater management, solid waste, education facilities (indirectly), emergency and health services, and telecommunications. These minor impacts would be temporary and/or highly localized. With its small permanent staff, operation of the Project would place little additional long-term burden on public service providers. Ultimately, as a source of renewable wind energy the Project would contribute to the state's renewable energy portfolio, fulfilling the government mandate to increase renewable energy as a percentage of generation capability. Together with other alternative energy development on the north shore of Oahu (Table 4.2-2), the Project would make progress toward reducing Hawaii's dependence on oil imports. Therefore, when viewed in conjunction with past, present, and foreseeable projects in the cumulative effects analysis area, Alternative 2 would have beneficial cumulative impacts to public infrastructure and services by increasing the amount of renewable energy.

4.20.3.5 Summary

Alternative 2 would result in a small additional demand on electrical, water, wastewater, stormwater management, solid waste, and emergency and health services during construction and operation. There would be no direct impacts to education facilities, although indirectly these facilities as well as the Kahuku medical center could experience temporary traffic impacts (mitigated by scheduling large shipments to avoid peak hours and implementing a traffic management plan) and both temporary and long-term noise (compliant with state noise standards) and visual impacts. These impacts would not adversely impact the provision of public services or the ability of public infrastructure to continue to fulfill their intended roles. Thus, the adverse effects of the Proposed Action on public infrastructure and the provision of public services would be considered, at most, minor, because although some effects would be long term (persisting up to the life of the project), the magnitude of effects would be low (no disruption in public utility service and additional demands on public services or utilities not measureable) and localized.

4.20.3.6 Alternative 2a - Modified Proposed Action Option

Under Alternative 2a, direct, indirect, and cumulative effects on public infrastructure would be similar to those described under Alternative 2. The minor increase in demands on electrical, water, wastewater, stormwater management, solid waste, and emergency and health services during construction and operation are comparable to that described for Alternative 2. Similar to the Proposed Action, there would be no direct impacts to education facilities under Modified Proposed Action Option and the indirect noise and visual impacts would not adversely impact the provision of public services. Implementation of standard BMPs and other mitigation measures, as described under the Proposed Action, would minimize any adverse impacts to public infrastructure from the Modified Proposed Action Option.

4.20.4 Alternative 3—Larger Generation Facility (Up to 12 Turbine Project)

4.20.4.1 Direct and Indirect Effects of Construction and Operation of the Project

Construction Impacts

Construction of the first 8 to 10 turbines under Alternative 3 would have the same impacts as Alternative 2. Construction of the additional 2 to 4 turbines, which would be separated by a period of at least 3 years, would result in a separate construction period with additional, minor demands for electricity, water, wastewater services, stormwater management, solid waste services, and emergency and health services comparable to that described for Alternative 2. Average daily water demands however, would be the same as described above for Alternative 2, which would be supplied by existing sources or trucked in. Similar to Alternative 2, wastewater generated during construction would be handled by the provision of portable toilets. Implementation of a SWPPP and TESC plan during construction would be implemented to minimize stormwater runoff during construction. Project construction, under Alternative 3, is not expected to place an undue burden on local health care or emergency services, and the implementation of a traffic management plan would prevent disruption to the ability of emergency service vehicles to serve the area.

Operation and Maintenance Impacts

In general, operation of Alternative 3 would have similar impacts as Alternative 2. Operation of an additional 2 to 4 turbines would not result in substantial adverse effects to existing electrical services, water, wastewater, or stormwater infrastructure, gas delivery service, or health care and emergency services. Similar to Alternative 2, wastewater generated by the Project would be handled by an onsite septic system serving the O&M building. Stormwater would be handled onsite through the use of seepage pits, drywells, and/or detention basins, such that off-site stormwater flows would not be increased and no existing stormwater infrastructure would be affected.

Operation of the Project under Alternative 3 is not expected to place an undue burden on local health care or emergency services. Alternative 3 would have localized and at most minor impacts to telecommunications in the area, similar to Alternative 2. Potential interference effects would be most pronounced directly under the transmission line, and would rapidly decrease with increasing

distance from the line. Because of the location of the line and the substation, noticeable interference effects for the residents of Kahuku or within the KTA are unlikely to occur.

Alternative 3 would not directly affect the schools or hospital in Kahuku. These are noise-sensitive receptors that may be indirectly affected, as addressed in Section 4.6. The worst-case modeled noise level at the Kahuku Elementary School and Kahuku High and Intermediate School is 44 dBA, and would be 43 dBA at the Kahuku Medical Center. These modeled noise levels are below the 55 dBA (daytime) and 45 dBA (nightime) limit established in Hawaii's Community Noise Control regulation (HAR 46-11), and represent an increase of 4 dBA (at the schools) and 3 dBA (at the hospital), respectively. This increase is just at the threshold of human perception. This 3- to 4-dBA increase is indicative of predicted outdoor noise levels; indoor noise levels would be expected to be about 10 dBA lower (see Section 4.6 – Noise and the Noise Impact Assessment in Appendix D for additional discussion).

The turbines would be visible from the schools and hospital. While views of the turbines may be considered a nuisance by some people, the visual impact would not affect the ability of those facilities to continue to fulfill their roles as educational and health service providers.

Operation of the Project, under Alternative 3, would generate far more electricity than it would consume, and the larger generating capacity of Alternative 3 would help HECO to meet its mandatory renewable energy targets while offsetting more fossil fuel generation.

4.20.4.2 Direct and Indirect Effects of the HCP Conservation Measures

Impacts of Avoidance and Minimization Measures

The avoidance and minimization measures proposed under the Project HCP would have no effect on public infrastructure and services.

Impacts of HCP Mitigation

Impacts of HCP mitigation measures under Alternative 3 would be identical to those of Alternative 2; it is anticipated that there would be no effect to public infrastructure or the provision of public services. Prior to construction of additional turbines proposed under Alternative 3, NPMPP would reopen consultation with the USFWS and DOFAW to assess the potential for impacts of the additional turbines to listed species and develop appropriate mitigation measures. The impacts of these mitigation measures to public infrastructure or provision of public services would be evaluated under a separate environmental analysis at that time.

4.20.4.3 Mitigation for Unavoidable Impacts

Mitigation measures to be implemented for Alternative 3 would be the same as described under the Alternative 2. These include the implementation of a traffic management plan, observance of BMPs for stormwater management, and coordination with agencies prior to and during construction to avoid or minimize impacts to public infrastructure and services.

4.20.4.4 Cumulative Effects

As discussed for Alternative 2, under Alternative 3 the Project would have negligible effect on gas service, and minor effects on electrical service, water supply, wastewater, stormwater management, solid waste, education facilities (indirectly), emergency and health services, and telecommunications. These minor impacts would be temporary and/or highly localized. Alternative 3 would contribute to the state's renewable energy portfolio, fulfilling the government mandate to increase renewable energy as a percentage of generation capability. Together with other alternative energy development on the north shore of Oahu (Table 4.2-1), the Project under Alternative 3 would make progress toward reducing Hawaii's dependence on oil imports. Therefore, when viewed in conjunction with past, present, and foreseeable projects in the cumulative effects analysis area, Alternative 3 would have beneficial cumulative impacts to public infrastructure and services by increasing the amount of renewable energy.

4.20.4.5 Summary

Alternative 3 would result in a small additional demand on electrical, water, wastewater, stormwater management, solid waste, and emergency and health services during construction and operation. Construction-related impacts would occur during two separate construction periods. There would be no direct impacts to education facilities, although indirectly these facilities as well as the Kahuku medical center could experience temporary traffic impacts (mitigated by scheduling large shipments to avoid peak hours and implementing a traffic management plan) and both temporary and long-term noise (compliant with state noise standards) and visual impacts. These impacts would not adversely impact the provision of public services or the ability of public infrastructure to continue to fulfill their intended roles. Thus, the adverse effects of Alternative 3 on public infrastructure and the provision of public services would be considered at most minor, because although some effects would be long term (persisting up to the life of the project), the magnitude of effects would be low (no disruption in public utility service and additional demands on public services or utilities not measureable) and localized.

4.20.5 Conclusion

The effects of Alternatives 2 (including the Modified Proposed Action Option) and 3 related to demand on or provision of public infrastructure and services would be comparable during construction and operation, with the exception of the greater beneficial effect of Alternative 3 associated with provision of renewable energy due to the larger generating capacity of the Project. Table 4.20-2 summarizes potential impacts to public infrastructure and services from the alternatives considered in this analysis.

Table 4.20-2. Summary of Potential Impacts to Public Infrastructure and Services

Impact Issues	No Action Alternative	Alternative 2 – Proposed Action	Alternative 2a – Modified Proposed Action Option	Alternative 3
Electric service	No Impact	Minor Adverse/ Moderate Beneficial	Minor Adverse/ Moderate Beneficial	Minor Adverse/ Moderate Beneficial
Gas service	No Impact	Negligible	Negligible	Negligible
Water supply	No Impact	Negligible	Negligible	Negligible
Wastewater management	No Impact	Minor	Minor	Minor
Stormwater management	No Impact	Minor	Minor	Minor
Solid waste management	No Impact	Minor	Minor	Minor
Education facilities and emergency and health services	No Impact	Minor	Minor	Minor
Telecommunications	No Impact	Minor	Minor	Minor

4.21 Military Interests

4.21.1 Impact Criteria

Impact criteria for assessing impacts to military interests are related to the potential effects of the Project on the adjacent KTA, KLOA, and the A-311 TFTA. The analysis focused on the ability of the military to conduct training exercises in these areas. A significant impact could result if the Project:

- Resulted in a major loss of land area available to the military for training;
- Resulted in a major change in training practices or activities with a resulting adverse change in military readiness;
- Seriously degraded the function of military communications systems throughout a wide area; or
- Resulted in a serious hazard to training flight operations in the A-311 TFTA.

Impacts to military interests were assessed based on the magnitude of the effect, its duration, its geographic extent, and on the context of the resource being affected; these impact criteria are described further in Table 4.21-1.

Table 4.21-1. Impact Criteria for Military Interests

Type of Effect	Impact Component	Effects Summary		
Effects on Military Interests	Magnitude or Intensity	**High:** Loss of land area available to military for training purposes; Project causes major changes to nature or location of military training activities with a noticeable adverse change in military readiness; Project represents a serious hazard to training flight operations or a substantial reduction in navigable airspace used for training.	**Medium:** Reduction in the location or nature of military training activities and communications but no resulting change in military readiness. Moderate reduction in navigable airspace used for training.	**Low:** No change in the location or nature of military training activities or communications; moderate reduction in navigable airspace used for training.
	Duration	**Permanent:** Chronic effects; degraded conditions of military resources would persist after decommissioning.	**Long-term:** Effects would persist up to the life of the Project and would return to pre-Project conditions levels after decommissioning.	**Temporary:** Effects are generally associated with construction and would not last longer than approximately 1 year, with a subsequent return to pre-activity levels.
	Geographic Extent	**Extended:** Affects military interests or training capabilities beyond the region or analysis area.	**Regional:** Affects military interests or training capabilities beyond a local area, potentially throughout the region.	**Local:** Impacts limited to the Project footprint or the immediate vicinity.
	Context	**Unique:** Affects military training area or facilities that are based on inherent natural resource characteristics that could not feasibly be recreated in the same place or at another location.	**Important:** Affects a type of a training area or facility that is relatively uncommon in the region but could feasibly be replaced or recreated at another location.	**Common:** Affects a type of military training area that is commonly found in the region or based on facilities or infrastructure that could feasibly be replaced; affects a general-purpose training area.

4.21.2 Alternative 1 – No Action

4.21.2.1 Direct and Indirect Effects

Under the No Action Alternative, the Project would not be constructed, an ITP would not be issued by the USFWS, and the HCP conservation measures would not be implemented. Therefore, Alternative 1 would have no effect on military interests or operations in the analysis area.

4.21.2.2 Cumulative Effects

Under the No Action Alternative, the Project would not be constructed, an ITP would not be issued by the USFWS, and the HCP conservation measures would not be implemented. Therefore, there would be no effect on military interests or operations. Thus, Alternative 1 would not contribute to cumulative effects on military interests or operations in the analysis area.

4.21.2.3 Summary

Alternative 1 would have no effect on military resources because no action would be undertaken.

4.21.3 Alternative 2 – 8 to 10 Turbine Project

4.21.3.1 Direct and Indirect Effects of Construction and Operation of the Project

Construction Impacts

Construction of the Project would not directly impact any lands used by the military for training or other purposes. Additionally, construction of the Project would not occupy any land currently used by the military, and would not reduce the area of land available for training.

Operation and Maintenance Impacts

Operation and maintenance of the Project would not directly impact any lands used by the military for training or other purposes. While the wind farm site abuts the KTA, the turbines are set back by at a distance at least equal to the turbine blade tip height above ground from the property boundary, such that no direct impact would occur to the KTA even in the unlikely event of a catastrophic failure of a turbine (see Section 4.18 – Public Health and Safety).

Scoping input from military sources expressed concerns over the potential for operation of the Project to adversely affect military aviation activity and communications. In response, this EIS includes an analysis of potential indirect effects of the Project on operations within the KTA, KLOA and A-311 TFTA. Specific considerations addressed in the analysis are the potential for the Project turbines to present hazards for aviation training operations and unmanned aircraft system (UAS) use, and for Project electrical systems to interfere with military telecommunications during training activities.

Safety for helicopter operations has been expressed as the primary concern for military training operations. Of particular concern is that helicopters land and take off into the wind, which in this case, would normally be toward the proposed turbines. There are 11 designated helicopter landing zones within the KTA (U.S. Army 2010); the nearest of these is a pair of sites located approximately 2,680 feet (817 meters) southwest of the nearest turbine location on the DLNR parcel. Another relatively close landing zone is located near the CACTF; it is approximately 3,050 feet (930 meters) west of the nearest turbine location on the DLNR parcel. The remaining designated helicopter landing zones are located more than 3,470 feet (1,058 meters) from the turbines (U.S. Army 2010).

In its Advisory Circular 150/5390-2C, the FAA published guidance related to obstruction clearance for heliports. While this guidance pertains to civil facilities and is not specifically applicable to military operations, it is nevertheless instructional in determining whether the Project would pose a hazard to helicopter use in the KTA. The concern in this case is maintaining clear approach and departure routes for the designated landing zones. The approach/departure path defined in the FAA guidance starts at the edge of the final takeoff and landing area and slopes upward at 8:1 (8 units horizontal in 1 unit vertical) for a distance of 4,000 feet (1,219 meters), where the width is 500 feet (152 meters) at a height of 500 feet (152 meters) above the heliport elevation. Distance between the landing zone and a proposed turbine location, the elevation above sea level of both the landing zone and the proposed turbine location, maximum height (blade tip height above ground), and the slope of the flight path can be used to determine if a portion of the turbine may coincide with a potential approach/departure flight path or clearance plane (see below). However, unlike clearance areas for airports serving fixed-wing aircraft, the FAA allows heliport approach/departure paths to be curved, allowing them to avoid pre-existing or new obstructions and fit into tighter, often urban spaces.

Based on the FAA's heliport approach and departure clearance requirements, under Alternative 2 the turbines would not represent an obstruction to helicopter operations if the designated landing zones were treated as general aviation heliports. That is, a 512-foot-tall turbine at any of the 10 proposed turbine locations would not intersect a potential helicopter approach/departure path from any of the KTA helicopter landing zones. Therefore, it is assumed the turbines should also not represent an obstruction for military helicopter flights. The two nearest designated landing zones sit at approximately 538 feet (164 meters) and 557 feet (170 meters) above sea level, respectively. The departure clearance plane at distances of 2,680 feet (817 meters) and 3,050 feet (930 meters) from these landing zones (i.e., the distance between these helicopter landing zones and the nearest proposed turbine) would be approximately 873 feet (266 meters) and 939 feet (286 meters) above sea level at the turbine's proposed location, respectively. The proposed turbine location is situated at approximately 350 feet (93 meters) above sea level, placing the top of the blades of a 512-foot (156-meter) wind turbine at nearly 817 feet (249 meters) above sea level. This would be 56 feet (17 meters) and 122 feet (37 meters) below the level of the clearance plane from these landing zones, respectively. All other KTA landing zone clearance planes would be at least 56 feet (17 meters) higher than all of the proposed wind turbines. Therefore, the proposed wind turbines under Alternative 2 would not be considered an obstruction under FAA rules.

The turbines will be marked and lighted according to FAA guidance. The turbines will be painted a uniform white or off-white, so that they are highly visible to pilots during the daytime, and red flashing lighting will be installed on the nacelles of turbines. The lights will flash in unison so that the entire facility appears as a coherent unit to pilots flying at night. Lighting at other Project facilities will be minimal, and will be aimed downward and inward to prevent offsite or upward glare. Lighting at other Project facilities will therefore not impair pilot vision even with the use of night vision devices.

Military representatives have expressed a concern of the visibility of the wind turbines to pilots using night vision devices. Night vision devices work by gathering existing ambient visible light and infrared light and amplifying it for display on a view screen. Technologies used in the current generation of night vision devices are sensitive enough to use in near-total darkness. Moonlight, starlight, lights in Kahuku town, and cloud-reflected light from other cities on Oahu should be sufficient to make the turbines visible for night vision device users. The white coloring of the turbines would also enhance their visibility with night vision devices due to greater reflectivity and a different heat signature than most of the vegetated surroundings. While the red flashing FAA lighting is expected to be visible through night vision devices, some systems use filters to block or reduce certain wavelengths and may make those lights less visible to night pilots. The addition of infrared lighting on the turbines would improve the ability of pilots using night vision devices to identify the turbines at a safe distance, while avoiding an additional visual impact for others. Some FAA-approved lighting includes both a visible light and an infrared light for just this purpose.

The northeastern portion of the A-311 TFTA alert area overlaps the western part of the wind farm site (Figure 3.19-1). Approximately 198.1 acres (80.2 hectares) of the wind farm site lies within the 61,116-acre (24,733-hectare) TFTA, representing approximately 0.32 percent of the flight training area. Therefore, relative to the overall size of the TFTA and the amount of unencumbered air space available, the magnitude of the Project impact to the available flight training area would be considered negligible. NPMPP continues to coordinate with the Department of the Amy and Army National Guard to ensure the proposed Project will not encumber use of the TFTA for military training.

Members of the military have also expressed a concern over the impact of the Project on the use of UAS (or "drones"). As discussed in Section 3.19, locations on Oahu where Special Use Airspace (SUA) is designated and UAS flights are currently permitted are limited to the WAAF and the associated FAA-designated restricted airspace over Schofield Barracks and the adjacent Waianae Range and Makua Valley (the Restricted Areas R-3109 and R-3110), the controlled airspace of the Marine Corps Base Hawaii Kaneohe Bay (MCB Hawaii), and within the Marine Corps Training Area Bellows (DoD 2014). UAS are not currently permitted to fly in the A-311 TFTA alert area, except for transiting across it to travel between MCB Hawaii and WAAF and the Schofield Barracks/Makua Valley restricted airspace. Because UAS are not permitted to fly in the A-311 TFTA alert area except in transit, there would be no Project impacts to UAS use for training purposes.

Members of the military have also expressed concern over the impact of the Project in terms of interference with radio transmissions and GIS transmitters. Telecommunications interference issues are discussed in Section 4.20 – Public Infrastructure and Services. In general, wind turbines do not cause interference with radio frequency transmissions or satellite signals unless they are placed directly between a transmitter and a receiver. The proposed turbines would be sited outside the KTA and there are no transmitters or receivers farther to the northeast beyond the turbines; therefore it is highly unlikely that the wind turbines would interfere with communication signals.

EMF levels in the turbines are not sufficiently strong to create EMR interference. EMF along the Project transmission line could be sufficiently strong to generate corona activity, which in turn

produces broadband EMR that can be perceived as interference with some communication signals. Should corona activity occur, it would produce EMR in the frequency spectrum from below 100 kHz to approximately 1,000 MHz, which partially overlaps with the frequencies used for AM and FM radio and some television signals. The military has long used FM radios for field communications, which operate in the VHF band (30 MHz to 300 MHz); some interference with FM radio transmissions is therefore possible. The level of potential interference with communications signals is highly location-dependent. Interference effects would be most pronounced directly under the transmission line and would rapidly decrease with increasing distance from the line. Because of the location of the line approximately 0.4 mile (0.6 kilometer) outside of the KTA boundaries, it is highly unlikely that there would be any interference with military radios used during training operations.

GPS units operate in the frequency range of 1.2 to 1.6 GHz, and satellite receivers operate at frequencies of 3.4 GHz to 7 GHz. The low frequency corona-induced EMR produced by the transmission line does not interact with the much higher frequencies used for GPS or other satellite communications. In addition, these systems also often use frequency modulation or digital coding of the signals so they are relatively immune to electromagnetic interference. The Project would therefore have at most a negligible impact to GPS and satellite communications.

4.21.3.2 Direct and Indirect Effects of the HCP Conservation Measures

Impacts of Avoidance and Minimization Measures

The avoidance and minimization measures proposed under the Project HCP would have no effect on military interests or operations.

Impacts of HCP Mitigation

The provision of funding for research and management activities for Newell's shearwater and Hawaiian short-eared owl, and minor physical improvements at the Hamakua Marsh Mitigation Area for waterbirds would have no direct or indirect impacts on military interests or operations. A portion of the Poamoho Ridge Mitigation Area lies within the KLOA. Funding for forest restoration and monitoring for bat mitigation at the Poamoho Ridge Mitigation Area would go toward activities such as maintenance of the ungulate-proof fence installed by DLNR, feral pig control and monitoring, and invasive plant removal. These actions are consistent with the plan described in the Army's Integrated Natural Resource Management Plan (U.S. Army 2010), and are covered under DLNR's existing exemption from Chapter 343 environmental analysis for the Koolau Forest Watershed Protection Project, and therefore would have negligible effects on military interests and operations.

4.21.3.3 Mitigation for Unavoidable Impacts

Mitigation including compliance with FAA marking and lighting guidelines, notice to FAA, and the general layout of the Project render its impacts to military interests and operations negligible. The FAA would include notation of the new structures on civilian and military aeronautical maps and charts, as appropriate. The addition of infrared lighting to the turbines would further serve to

improve their visibility to military pilots. Additionally, NPMPP, the Department of the Army, and the Department of Defense are finalizing a Memorandum of Understanding which includes additional measures to ensure that the Project will not affect military activities. These measures include:

- Marking turbine blade tips and tower hubs to ensure visibility for aviation activities which must be visible while air crews are flying with night vision devices (e.g., "Glint" based adhesive tape and infrared capable lighting);
- Installing the electrical collection system underground to eliminate non-turbine physical obstacles as a hazard to aviation; and
- Installing infrared-capable lighting on the permanent met tower.

4.21.3.4 Cumulative Effects

The cumulative analysis area for effects on military resources includes military interests within 5 miles (8 kilometers) of the wind farm site and within 1 mile of the respective mitigation areas. Both ground-based and airborne military training activities would continue to occur within the KTA and KLOA training areas. Existing and reasonably foreseeable projects within the analysis area that could incrementally add to impacts to military interests and operations include the Kahuku Wind Farm and the Kawailoa Wind Farm. Each of these projects separately contributes negligible effects on the use of the KTA or KLOA for military training, and contributes negligible effects on the amount of airspace available in the A-311 TFTA (U.S. DOE 2010, First Wind 2011). While the Project, in combination with the Kahuku and Kawailoa Wind Farm together do limit some air training operations in the immediate vicinity of the turbines, collectively they affect approximately 1.4 percent of the total area of the TFTA and therefore cumulatively represent a negligible impact to air training. Therefore, when viewed in conjunction with past, present, and foreseeable future projects in the cumulative effects analysis area, the contribution of Alternative 2 to cumulative effects on military resources would be negligible.

4.21.3.5 Summary

Effects of the Proposed Action on military interests or the ability of the military to conduct training operations within the KTA, KLOA, or TFTA would be negligible. There would be no direct impact to lands within the KTA or KLOA and there would be a negligible impact on available flight training area within the TFTA. Project facilities are unlikely to interfere with military communications during training operations. Applying the FAA's obstruction clearance standards to the designated helicopter landing zones in the KTA indicates that none of the turbines would be considered an obstruction to takeoff and landing clearance for those landing zones. UAS use is not currently permitted in the KTA or A-311 alert area, so impacts to UAS use would not be expected. Marking and lighting of the turbines according to FAA guidance and the Memorandum of Understanding between NPMPP, the Department of the Army, and the Department of Defense would make the turbines visible to pilots during the day or night, and the use of infrared lighting would further enhance their visibility for pilots using night vision devices. Filing of notice with the FAA will put the turbines on aeronautical charts to provide warning to pilots flying in the area.

4.21.3.6 Alternative 2a - Modified Proposed Action Option

Under Alternative 2a, direct, indirect, and cumulative effects on military interests would be the same as those described under Alternative 2. As with the Proposed Action, the Modified Proposed Action Option would have no direct impacts to lands used for military training purposes including flight training, would be unlikely to interfere with military communications, and would not affect UAS use. One difference under Alternative 2a is that with the taller turbine models which would have a maximum blade tip height above ground of 656 feet (200 meters), there would be one proposed turbine on the DLNR property which, given its elevation of 415 feet (126 meters) above sea level, would coincide with a potential approach/departure clearance plane from two different helicopter landing zones in the KTA. These landing zones are located approximately 3,470 feet (1,058 meters) and 3,810 feet (1,161 meters) from the proposed turbine location, at elevations of 538 feet (164 meters) and 557 feet (170 meters) above sea level, respectively. Given the flight path trajectory, the proposed turbine would extend 99 feet (30 meters) and 37 feet (11 meters) into the approach/departure clearance plane from these landing zones, respectively. However, because the FAA allows heliport approach/departure paths to be curved, allowing them to avoid pre-existing or new obstructions, this turbine would not represent an obstruction for designated helicopter landing zones. The clearance planes from all other landing zones would be at least 76 feet (23 meters) higher than the maximum height of the turbines at this location and all other proposed turbine locations under Alternative 2a. Implementation of standard BMPs and other mitigation measures, as described under the Proposed Action, would minimize any adverse impacts to military interests from the Modified Proposed Action Option.

4.21.4 Alternative 3 – Larger Generation Facility (Up to 12 Turbine Project)

4.21.4.1 Direct and Indirect Effects of Construction and Operation of the Project

Effects of Alternative 3 on military interests and operations would be similar to those discussed above for Alternative 2. Despite the larger size of Alternative 3, the additional 2 to 4 wind turbines would not overlap with the TFTA flight training area and would be sited farther from the KTA and, therefore, would have no greater impact than the Proposed Action. As with the Proposed Action, Alternative 3 would have no direct impacts to lands used for military training purposes, would be unlikely to interfere with military communications, would not represent an obstruction for designated helicopter landing zones (minimum distances between proposed turbines and clearance planes from KTA helicopter landing zones would be the same), and would not affect UAS use. Marking and lighting of the turbines according to FAA guidance and the Memorandum of Understanding between NPMPP, the Department of the Army, and the Department of Defense would make the turbines visible to pilots during the day or night, and the use of additional infrared lighting would further enhance their visibility for night vision device users. Filing of notice with the FAA will put the turbines on aeronautical charts to provide warning to pilots flying in the area.

4.21.4.2 Direct and Indirect Effects of the HCP Conservation Measures

Impacts of Avoidance and Minimization Measures

The avoidance and minimization measures proposed under the Project HCP are not expected to affect military resources in the analysis area.

Impacts of HCP Mitigation

Impacts of HCP mitigation measures under Alternative 3 would be the same as described under the Proposed Action and would, likewise, have a negligible effect on military interests or operations. Prior to construction of additional turbines proposed under Alternative 3, NPMPP would reopen consultation with the USFWS and DOFAW to assess the potential for impacts of the additional turbines to listed species and develop appropriate mitigation measures. The impacts of these mitigation measures to military interests would be evaluated under a separate environmental analysis at that time.

4.21.4.3 Mitigation for Unavoidable Impacts

Mitigation for unavoidable impacts under Alternative 3 would be the same as described under the Proposed Action.

4.21.4.4 Cumulative Effects

The cumulative effects on military resources under Alternative 3 are the same as those described under the Proposed Action. Therefore, when viewed in conjunction with past, present, and foreseeable future projects in the cumulative effects analysis area, the contribution of Alternative 3 to cumulative effects on military resources would be negligible. Because there will likely be a delay in time of up to 3 years before additional turbines would be built under Alternative 3, new projects and developments in the area will be assessed and reviewed to determine if there are additional cumulative impacts from future unknown projects.

4.21.4.5 Summary

Effects of Alternative 3 on military interests or the ability of the military to conduct training operations within the KTA, KLOA or TFTA would be negligible. There would be no direct impact to lands within the KTA or KLOA and there would be a negligible impact on available flight training area within the TFTA. Project facilities are unlikely to interfere with military communications during training operations. Applying the FAA's obstruction clearance standards to the designated helicopter landing zones in the KTA indicates that none of the turbines would be considered an obstruction to takeoff and landing clearance for those landing zones. UAS use is not currently permitted in the KTA or A-311 alert area, so impacts to UAS use would not be expected. Marking and lighting of the turbines according to FAA guidance and the Memorandum of Understanding between NPMPP, the Department of the Army, and the Department of Defense would make the turbines visible to pilots during the day or night, and the use of infrared lighting would further

enhance their visibility for pilots using night vision devices. Filing of notice with the FAA will put the turbines on aeronautical charts to provide warning to pilots flying in the area.

4.21.5 Conclusion

Given adherence to FAA and Department of the Army/Department of Defense requirements, Alternatives 2 (including the Modified Proposed action Option) and Alternative 3 would have negligible effect to military resources. Table 4.21-2 summarizes potential impacts to military resources from the alternatives considered in this analysis.

Table 4.21-2. Summary of Potential Impacts to Military Resources

Impact Issues	No Action Alternative	Alternative 2 – Proposed Action	Alternative 2a – Modified Proposed Action Option	Alternative 3
Loss of land area available to the military for training.	No Impact	Negligible	Negligible	Negligible
Change in training practices or activities with a resulting change in military readiness	No Impact	Negligible	Negligible	Negligible
Degradation of function of military communication systems	No Impact	Negligible	Negligible	Negligible
Hazard to training flight operations in the A-311 TFTA	No Impact	Negligible	Negligible	Negligible

4.22 Agriculture

As noted in Chapter 3, public comments received on the original Draft EIS requested an expanded discussion of impacts to agriculture. Therefore, the discussion of impacts to agriculture (originally in Section 4.14 – Land Use of the original Draft EIS) has been expanded and placed in this standalone section. This section describes impacts to agricultural lands based on agricultural land use classifications (inclusive of actively farmed and fallow areas) as well as to existing agricultural uses and activities within the wind farm site. Comments specifically requested additional discussion of effects to farmers who currently and would continue to farm lands within the wind farm site during construction and operation. These topics are addressed in detail below.

4.22.1 Impact Criteria

Impacts to agriculture were assessed based on whether the construction and operation of the Project and implementation of HCP conservation measures would:

- Result in the loss of prime or unique farmland,
- Loss of land favorable for agricultural production (based on land use classifications), or
- Result in the loss of actively farmed land.

Impact criteria for determining effects on agricultural resources from the Project are described further in Table 4.22-1 below.

Table 4.22-1. Impact Criteria for Agricultural Resources

Type of Effect	Impact Component	Effects Summary		
Changes to Agricultural Resources	Magnitude or Intensity	**High:** Acute or obvious changes in agricultural resources	**Medium:** Noticeable change to agricultural resources	**Low/No Impact:** Changes to agricultural resources may or may not be measureable or noticeable
	Duration	**Permanent:** Chronic effects; agricultural resources would not be anticipated to return to previous condition	**Long-term:** Agricultural resources would be adversely affected through the life of the Project and would return to pre-activity conditions at some point after completion of the Project	**Temporary:** Agricultural resources would be adversely affected but not longer than the span of the Project construction and would be expected to return to pre-activity conditions at the completion of construction.
	Geographic Extent	**Extended:** Affects agricultural resources beyond the region and wind farm site	**Regional:** Affects agricultural resources beyond the wind farm site	**Local:** Impacts limited to the discrete portions of the wind farm site.
	Context	**Unique:** Affects unique agricultural resources or resources protected by legislation	**Important:** Affects depleted agricultural resources or resources protected by legislation	**Common:** Affects usual or ordinary agricultural resources; resources not depleted or protected by legislation

4.22.2 Alternative 1—No Action

4.22.2.1 Direct and Indirect Effects

Under the No Action Alternative, the Project would not be constructed, an ITP would not be issued by the USFWS, and the HCP conservation measures would not be implemented. Therefore, Alternative 1 would have no effect on agricultural resources or activities. As such, no mitigation measures would be warranted.

4.22.2.2 Cumulative Effects

Under the No Action Alternative, the Project would not be constructed, an ITP would not be issued by the USFWS, and the HCP conservations measures would not be implemented. Therefore, there would be no effect on agricultural resources or activities. Thus, Alternative 1 would not contribute to cumulative effects on agricultural resources or activities.

4.22.2.3 Summary

Alternative 1 would have no direct, indirect or cumulative effects on agricultural resources or activities as no action would be undertaken.

4.22.3 Alternative 2—8 to 10 Turbine Project

4.22.3.1 Direct and Indirect Effects of Construction and Operation of the Project

Construction Impacts

Impacts by Agricultural Land Classification

An overview of the agricultural land classification systems, including Land Study Bureau (LSB), Agricultural Lands of Importance to the State of Hawaii (ALISH), NRCS Land Capability, and State of Hawaii Important Agricultural Lands (IAL) classification systems that were used in the analysis of Project impacts are provided in Chapter 3. As noted in Chapter 3, these classification systems are designed to identify high quality soils and productive agricultural lands. Table 4.22-2 provides an overview of impacts that would occur within each of the agricultural land classification systems, which are indicative of Project-related impacts to high quality soils and productive agricultural lands (i.e., lands potentially favorable for agricultural production).

In total, up to approximately 36.3 acres (14.7 hectares) of land with LSB ratings of A and B (most productive soils) would be directly impacted by construction activities under Alternative 2 (12 percent of these lands within the wind farm site with LSB ratings of A and B); Table 4.22-2, see also Table 3.20-1 for acreages). Additionally, approximately 26.1 acres (10.6 hectares) of ALISH Prime Agricultural lands, as well as approximately 10.8 acres (4.4 hectares) of land classified as Other Agricultural Land would be impacted during construction of the Project under Alternative 2 (11 percent of each of these lands within the wind farm site with ALISH Prime and Other Agricultural lands, respectively). Construction under Alternative 2 would also impact approximately 5.7 acres (2.3 hectares) of land with an NRCS land capability classification of Class II (conducive to agricultural production; 12 percent of this land within the wind farm site with NRCS Class II lands). Approximately 10.3 acres (4.2 hectares) of land within the wind farm site with all three top-rated IAL criteria (potentially eligible for IAL designation), would be impacted by construction activities under Alternative 2 (5 percent of the potentially eligible IAL lands within the wind farm site). Therefore, construction under Alternative 2 would result in minor impacts to high quality soils and productive agricultural lands within the wind farm site.

Table 4.22-2. Impacts by Agricultural Land Classifications under Alternatives 2, 2a, and 3

Land Classification	Alternative 2		Alternative 2a		Alternative 3	
	Construction	Operation[1/]	Construction	Operation[1/]	Construction	Operation[1/]
LSB Agricultural Productivity Rating						
No Data	0.2	0.1	0.2	0.1	1.1	0.9
A	1.2	0.3	1.2	0.3	1.2	0.3
B	35.1	21.3	31.2	18.5	43.8	30.4
C	8.1	3.9	8.1	3.9	8.1	3.9
D	1.2	0.7	0.6	0.3	1.2	0.7
E	43.1	33.5	43.1	33.5	43.1	33.6
Total[2/]	**89.0**	**59.9**	**84.5**	**56.7**	**98.6**	**69.8**
ALISH Classification						
No Data	44.6	32.0	44.4	32.0	44.6	32.0
Other	10.8	8.8	10.8	8.8	10.8	8.8

Table 4.22-2. Impacts by Agricultural Land Classifications under Alternatives 2, 2a, and 3 (continued)

Land Classification	Alternative 2		Alternative 2a		Alternative 3	
	Construction	Operation[1/]	Construction	Operation[1/]	Construction	Operation[1/]
Prime	26.1	12.6	21.7	9.4	35.7	22.4
Unclassified	7.6	6.5	7.6	6.5	7.6	6.6
Total[2]	**89.0**	**59.9**	**84.5**	**56.7**	**98.6**	**69.8**
NRCS Land Capability Classification						
Class II	5.7	2.9	2.9	1.2	5.7	3.0
Class III	34.2	19.2	32.7	17.9	34.2	29.0
Class IV	1.7	1.3	1.6	1.3	1.7	1.3
Class VI	2.4	1.0	2.4	1.0	2.4	1.0
Class VII	37.2	28.7	37.1	28.7	37.2	28.7
Class VII	7.7	6.6	7.7	6.6	7.7	6.6
Total[2/]	**89.0**	**59.9**	**84.5**	**56.7**	**89.0**	**69.8**
Important Agricultural Lands						
Area with 3 Top-rated Criteria	10.3	4.6	8.4	3.0	17.4	11.0

[1/] Operational impacts are a subset of construction impacts
[2/] Column totals may not sum exactly due to rounding

Impacts to Agricultural Uses and Activities

Malaekahana Hui West, LLC currently leases approximately 452.7 acres (183 hectares) of land within the wind farm site to five farmers. Up to approximately 41.6 acres (16.9 hectares) of leased land would be impacted during construction of the Project; of which, approximately 25.7 acres (10.4 hectares) would be impacted over the long term (Table 4.22-3; Figure 4.22-1). Of this amount, less than 10 acres of land would be leased by NPMPP over the long term from Malaekahana Hui West, LLC for locating the Project facilities.

A subset of these leased acres are actively farmed (identified in recent aerial photos), and impacts to actively farmed areas are indicative of potential temporary or permanent reductions in agricultural production. Under Alternative 2, up to approximately 8.2 acres (3.3 hectares) of actively farmed lands, spread across three of the five lease areas, would be disrupted during construction; of this, approximately 4.6 acres (1.8 hectares) would be impacted over the long term (for the life of the Project). Table 4.22-3 provides a summary of impacts by farmer. In total, long-term impacts represent up to approximately 3 percent of actively farmed land within the wind farm site. Therefore, long-term operations under Alternative 2 would result in minor impacts to actively formed land within the wind farm site.

Table 4.22-3. Impacts to Leased Agricultural Land and Actively Farmed Land under Alternative 2

Lease Area	Existing Leased Agricultural Land Identified as Agricultural Use Area (Acres)[1/]	Existing Leased Agricultural Land Actively Farmed (Acres)[2/]	Existing Agricultural Use Area Not Actively Farmed (Acres)[1/, 3/]	Impacts to Lease Area[1/] (Acres)		Impacts to Actively Farmed Land (Acres)[2/]	
				Construction	Operation[4/]	Construction	Operation[4/]
Farmer A	10.5	3.8	6.7	0.3	0.2	–	–
Farmer B	11.4	4.2	7.2	1.8	1.1	–	–
Farmer C	14.0	4.9	9.0	2.1	1.7	1.5	1.2
Farmer D	20.5	13.7	6.8	1.4	0.7	0.6	0.4
Farmer E	190.9	134.4	56.5	36.2	22.2	6.2	3.0
Total[5/]	**452.7**	**161.0**	**86.2**	**41.6**	**25.7**	**8.2**	**4.6**

[1/] Size of leased area designated as agricultural use area is based on Real Property Tax Assessment Forms
[2/] Based on GIS delineation of aerial imagery
[3/] Acreages represent potential for replacement acres within leased agricultural lands to compensate for permanently lost actively farmed areas
[4/] Operational impacts are a subset of construction impacts
[5/] Column totals may not sum exactly due to rounding

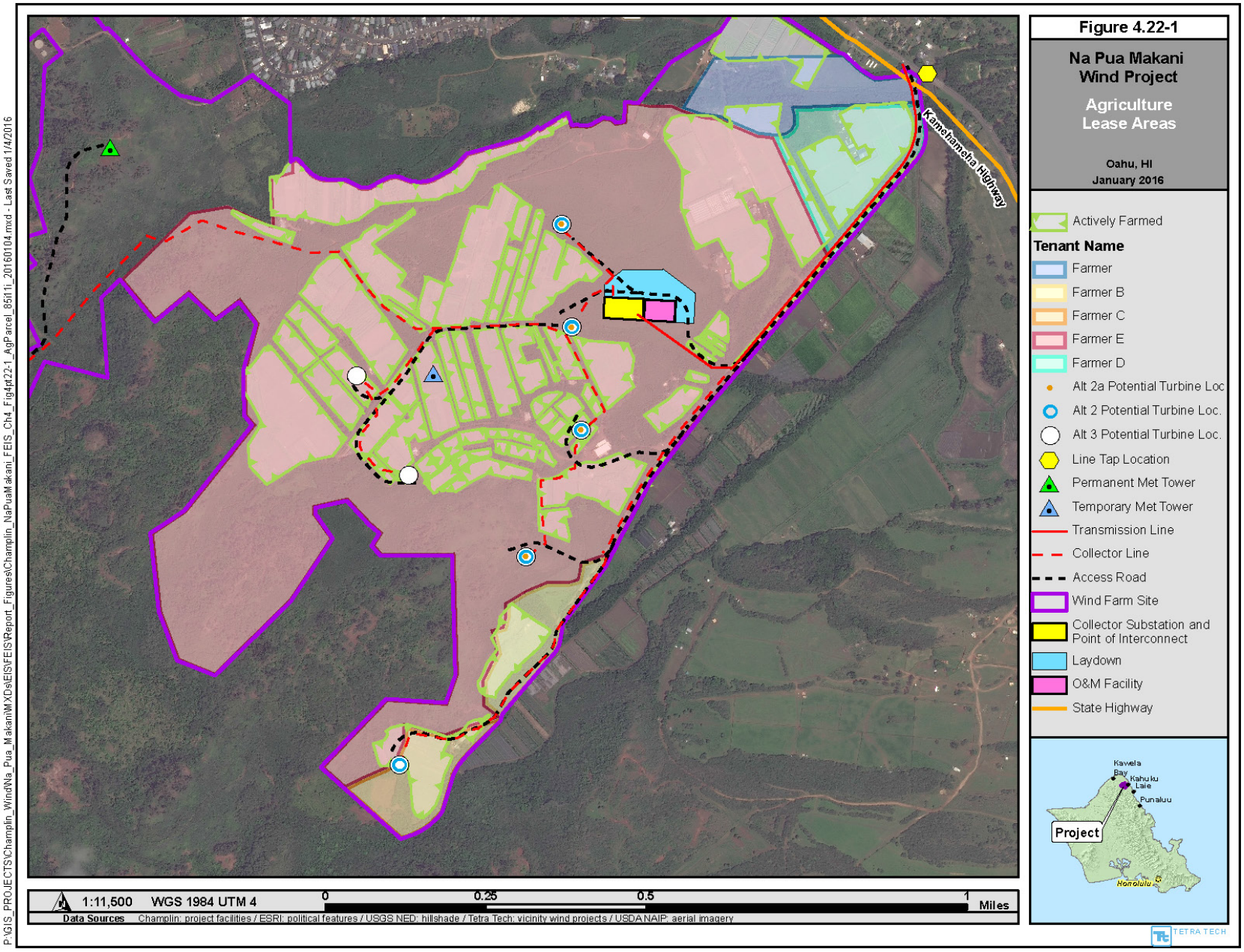
Figure 4.22-1
Na Pua Makani Wind Project
Agriculture Lease Areas
Oahu, HI
January 2016
Kamehameha Highway
Actively Farmed
Tenant Name
Farmer
Farmer B
Farmer C
Farmer E
Farmer D
Alt 2a Potential Turbine Loc
Alt 2 Potential Turbine Loc.
Alt 3 Potential Turbine Loc.
Line Tap Location
Permanent Met Tower
Temporary Met Tower
Transmission Line
Collector Line
Access Road
Wind Farm Site
Collector Substation and Point of Interconnect
Laydown
O&M Facility
State Highway
Kawela Bay
Kahuku
Laie
Punaluu
Project
Honolulu
1:11,500
WGS 1984 UTM 4
0
0.25
0.5
1
Miles
Data Sources
Champlin: project facilities / ESRI: political features / USGS NED: hillshade / Tetra Tech: vicinity wind projects / USDA NAIP: aerial imagery
TETRA TECH
P:\GIS_PROJECTS\Champlin_Wind\Na_Pua_Makani\MXDs\EIS\FEIS\Report_Figures\Champlin_NaPuaMakani_FEIS_Ch4_Fig4pt22-1_AgParcel_85i11i_20160104.mxd - Last Saved 1/4/2016

Indirect impacts during construction of the Project would include temporary disruption to existing farming activities due to reduced access to farm plots. It is anticipated that there may be temporary access restrictions along existing roads to ensure the safety of farmers within the wind farm site. General safety risks during construction are discussed in Section 4.18 – Public Health and Safety. A Site Safety Handbook would be developed and implemented during construction which would include measures for notifying farmers of upcoming construction activities, access restrictions, and other measures to ensure safety is maintained during construction. Standard construction BMPs would be implemented to reduce the potential for accidents or injuries.

Likewise, access to irrigation water may temporarily be restricted during operation if irrigation lines need to be moved or shut off during construction. If requested by Malaekahana Hui West, LLC and to avoid this indirect effect, NPMPP would work with Malaekahana Hui West, LLC, to temporarily re-route irrigation lines or provide alternative access to irrigation water to the extent possible.

To avoid impacts to individual farmers for potential lost agricultural productivity during construction, either due to direct impacts to crops or indirectly through reduced access along roads or to irrigation water, where possible NPMPP would coordinate construction activities such that the impacts on crops would be minimized. If impacts associated with agricultural productivity cannot be avoided during construction, NPMPP would compensate farmers for the season's lost crops.

Along the Department of Agriculture Kahuku Agricultural Park interior roadway, farmers leasing land may be temporarily affected during construction through access limitations or where minor road modifications could affect crops. NPMPP is currently working with the Department of Agriculture to ensure that measures are in place for notifying farmers of temporary access restrictions and will compensate these farmers for any crop losses incurred during Project construction.

Operation Impacts

Impacts by Agricultural Land Classification

The presence of permanent Project facilities would affect a small number of acres within the wind farm site classified as high-quality soils or productive agricultural lands under several agricultural land classification systems. Approximately 21.6 acres (8.7 hectares) of land with LSB ratings of A and B (most productive soils); 12.6 acres (5.1 hectares) of Prime Agricultural Land; 2.9 acres (1.2 hectares) of soils with an NRCS Class II (conducive to agricultural production) rating; and 4.6 acres (1.9 hectares) of land with all three top-rated IAL criteria (potentially eligible for IAL designation) would be impacted over the long term under Alternative 2 (Table 4.22-2). This amounts to long-term impacts to approximately 7 percent of land within the wind farm site with LSB productivity ratings of A or B; 5 percent of the Prime Agricultural Lands in the wind farm site; 6 percent of soils within the wind farm site with an NRCS Class II rating; and 2 percent of land within the wind farm site with all three top-rated IAL criteria. Therefore, the Project would have a very minor permanent impact on high-quality and productive agricultural lands within the wind farm site. Mitigation to compensate for impacts to active agricultural lands is described below.

Impacts to Agricultural Uses and Activities

Wind energy facilities are widely recognized as being a compatible use of land with active farming. Agricultural uses and activities would continue within the wind farm site during Project operation. Upon completion of the planned operational life of the Project (if the Project is not repowered), the Project would be decommissioned and the wind farm site would be rehabilitated, thereby allowing permitted agricultural uses to return to the lands occupied by Project facilities. As a result, direct impacts to existing agriculture from Project operations are considered to be long term rather than permanent.

To ensure that there is no net loss of active agricultural activities during Project operation, NPMPP would work with Malaekahana Hui West, LLC to identify suitable agricultural land within each of the three parcels leased by farmers from Malaekahana Hui West, LLC where active agricultural activities would be impacted by the Project (totaling 4.6 acres [1.8 hectares] among 3 farmers; Table 4.22-3). Within each of these lease areas, only a portion of the area identified in the Real Property Tax Assessment reports as agricultural use is actively farmed, leaving remaining acreage that could be converted to actively farmed lands. To the extent requested by Malaekahana Hui West, LLC, NPMPP would work with Malaekahana Hui West, LLC to assist farmers in preparing this non-farmed lands for agricultural production so that there would be no net loss in active agriculture.

Also, a Site Safety Handbook would be developed and implemented during operations which would include measures for notifying farmers of upcoming maintenance activities, access restrictions, natural events, and other measures to ensure safety is maintained during operations. NPMPP would work with Malaekahana Hui West, LLC to identify any additional measures such as signage which could be implemented during Project operation to keep farmers working in proximity to Project facilities apprised of safety issues. Indirect impacts to agricultural activities during the operation of the Project would include modifications or expansion of the existing roadway system within the wind farm site to accommodate Project operation. This would result in a beneficial impact to farmers through expanded and improved access along the existing road system. There would be no permanent reduction in access along wind farm sites roads; however, during Project operation there may be temporary, localized reductions in access in association with routine maintenance activities to ensure farmer safety. NPMPP would work with Malaekahana Hui West, LLC, to ensure that a notification system is in place to inform farmers of the timing and location of maintenance activities, restrictions in access and alternative access routes, and other important information.

If in the unlikely event that irrigation lines need to be permanently relocated to accommodate Project facilities, this could indirectly impact agricultural activities if access to water is reduced. However, NPMPP and Malaekahana Hui West, LLC, would provide and maintain the irrigation system to the existing and potential future farm areas; thereby avoiding this potential indirect impact.

4.22.3.2 Direct and Indirect Effects of the HCP Conservation Measures

Impacts of Avoidance and Minimization Measures

The avoidance and minimization measures proposed under the Project HCP would have a minor effect on agricultural resources. Post-construction mortality monitoring plots would coincide with approximately 170 acres (69 hectares) of leased agricultural land (lands leased by Farmer B, Farmer C, and Farmer E from Malaekahana Hui West, LLC). There would be some potential for minor ground disturbance in conjunction with routine post-construction monitoring efforts associated with surveyors traversing transects beneath the turbines. However, this impact is expected to be negligible. Within the monitoring plots there are approximately 21 acres (8 hectares) of land that are actively farmed (1 acre leased by Farmer C and 20 acres leased by Farmer E). To facilitate surveyors traversing the plots and maintain good ground visibility for detection of downed birds and bats, crops in these actively farmed areas may be replanted with crops that are compatible with monitoring activities. These might include low-growing crops without large leaves, such as onions, basil, and eggplant. Replanting of crops that would be compatible with monitoring activities is not anticipated to have a measurable impact on agricultural production due to the small amount of acreage (approximately 14 percent of the current actively farmed land within the area leased by Farmer E). Therefore, under Alternative 2, the avoidance and minimization measures proposed under the Project HCP would result in a minor impact to agricultural resources within the wind farm site.

Impacts of HCP Mitigation Measures

No direct or indirect effects to agricultural lands, uses, or activities would occur in association with funding provided for Newell's shearwater research and management and short-eared owl research and management.

The Hamakua Marsh and Poamoho Ridge HCP mitigation areas are not located in the State Agricultural Land Use District and the County agricultural zoning designation and no active agricultural activities are occurring on the mitigation areas. In addition, there are no lands classified as Prime Agricultural Lands or with LSB soil productivity ratings of A or B within the Hamakua Marsh or Poamoho Ridge mitigation areas. Therefore, installation of the partial fence at the Hamakua Marsh for waterbird mitigation and funding applied toward forest restoration and monitoring at Poamoho Ridge for bat mitigation would not impact agricultural lands, uses or activities in the mitigation areas.

4.22.3.3 Mitigation of Unavoidable Impacts

Upon reviewing aerial photography of each of the five farms within the wind farm site, suitable agricultural land exists outside the area of permanent impacts within each of the parcels leased by farmers. NPMPP would work with farmers to prepare this existing non-arable land for agricultural production (e.g., grubbing, grading, soil amendments, extend irrigation, etc.) so that there would be no net loss in active agriculture. NPMPP would also work with Malaekahana Hui West, LLC to provide and maintain the irrigation system to the existing and potential future farm areas.

NPMPP would also develop a Site Safety Handbook that would include a process for communicating with farmers to inform them of temporary restrictions on access to their farms and other safety issues. If access to actively farmed areas is prohibited for an extended period of time, NPMPP will work with Malaekahana Hui West, LLC to provide alternative access when possible. Construction of permanent structures (e.g., turbines) would occur in actively farmed areas after impacts to crops are minimized.

4.22.3.4 Cumulative Effects

The cumulative effects analysis area for impacts to agricultural resources is the Koolauloa District. This area encompasses the area where potential direct and indirect effects to agricultural resources could occur and provides context for the importance of agriculture in the region.

Portions of the wind farm site have been historically used for agriculture since the plantation era (see Section 4.13 – Historic, Archaeological, and Cultural Resources for additional detail). Ongoing agricultural uses and activities including farming of truck crops as well as operation of the agribusiness zip line facility will continue into the foreseeable future. The only other foreseeable projects in the cumulative effects analysis area with the potential to impact agricultural resources are the Envision Laie and Turtle Bay Expansion projects (see Section 4.1 for descriptions). Each of these projects could potentially impact agricultural resources in the Koolauloa District.

Alternative 2 would result in long-term displacement to 4.6 acres (1.9 hectares), of existing farming activities in the wind farm site. This is 3 percent of the actively farmed lands within the wind farm site, which would be mitigated by relocating displaced actively farmed lands within the farmers' leased parcel, and approximately 0.1 percent of existing agricultural production within the Koolauloa District (although it should be noted that this regional context includes areas of grazing and fallow lands; City and County of Honolulu, DPP 2015). Therefore, when viewed in conjunction with past, present, and foreseeable future projects in the cumulative effects analysis area, the contribution of Alternative 2 to cumulative effects on agricultural resources would be minor.

4.22.3.5 Summary

Construction and operation of the Project would impact less than12 percent and 7 percent, respectively, of the high quality soils and productive agricultural lands, based on all of the agricultural land classification system designations, within the wind farm site over the long term (life of the Project). Alternative 2 would directly impact up to approximately 8.2 acres (3.3 hectares) of actively farmed land within the wind farm site, of which 4.6 acres (1.8 hectares) acres would be displaced over the long term. Alternative 2 has the potential for short-term reductions in road access and/or access to irrigation water during construction. Due to timing of construction (minimizing impacts to crops), and/or enhancement of areas identified as agricultural use areas within individual farmer's leased plots that are not currently being farmed no net loss of agriculture would occur under Alternative 2. There would be no impact to agricultural resources or activities within the mitigation areas from HCP conservation measures.

Impacts to agriculture under Alternative 2 would be considered minor because although there would be some long-term impacts associated with operation of the Project, effects would be of low magnitude (minor loss of actively farmed lands such that changes to agricultural resources may or may not be measureable or noticeable), localized (limited to portions of the wind farm site), and a small amount of important agricultural land would be impacted. Agricultural uses and activities would continue during Project operation.

4.22.3.6 Alternative 2a - Modified Proposed Action Option

Under Alternative 2a, direct, indirect, and cumulative effects to agricultural resources would be similar to those described under Alternative 2, however the magnitude of impacts would be slightly less than under Alternative 2. Differences in impacts to agriculture under Alternative 2a are briefly discussed below. Mitigation measures would be as described under Alternative 2.

Impacts by Agricultural Land Classification

Approximately 31.4 acres (13.1 hectares) of land with LSB soil productivity ratings of A and B (most productive soils) would be temporarily impacted during construction under Alternative 2a (Table 4.22-2). Of this, 18.8 acres (7.6 hectares) of A and B rated land would be impacted over the long term, through the life of the Project under the Modified Proposed Action Option. This amounts to long-term impacts to approximately 6 percent of land with LSB productivity ratings of A or B within the wind farm site.

Up to approximately 21.7 acres (8.8 hectares) of Prime Agricultural Lands would be impacted in association with construction of Alternative 2a, including 9.4 acres (3.4 hectares) that would be impacted over the long term, through the life of the Project. This comprises approximately 4 percent of the Prime Agricultural Lands in the wind farm site.

Up to approximately 2.9 acres (1.2 hectares) of land with an NRCS Class II (conducive to agricultural production) land capability classification would be impacted under Alternative 2a; which includes 1.2 acres (0.5 hectares) of Class II lands that would be impacted over the long term. This amounts to long-term impacts to approximately 3 percent of Class II lands in the wind farm site.

Up to approximately 8.4 acres (3.4 hectares) of lands with all three top-rated IAL criteria (lands potentially eligible for IAL designation) lands would be impacted by construction activities under Alternative 2a; of which, 3.0 acres (1.2 hectares) would be impacted over the long term, through the life of the Project. This amounts to long-term impacts to approximately 1 percent of lands with all three top-rated IAL criteria within the wind farm site.

Impacts to Agricultural Uses and Activities

Up to approximately 37.2 acres (15.1 acres) of leased land would be impacted during construction of Alternative 2a, of which approximately 22.5 acres (9.1 hectares) would be impacted over the long term (Table 4.22-4). Under Alternative 2a, up to approximately 6.0 acres (2.4 hectares) of actively farmed lands, spread across two of the five lease areas, would be disrupted during construction; of this, approximately 2.7 acres (1.1 hectares) would be impacted over the long term (for the life of

the Project). Table 4.22-4 provides a summary of impacts by farmer. In total, long-term impacts represent up to approximately 2 percent of actively farmed land within the wind farm site. Measures for avoiding, minimizing, and mitigating impacts to agricultural uses and activities such that there would be no net loss of active agriculture would be the same as described under Alternative 2.

Table 4.22-4. Impacts to Leased Agricultural Land and Actively Farmed Land under Alternative 2a

Lease Area	Impacts to Lease Area[1/] (Acres)		Impacts to Actively Farmed Land (Acres)[2/]	
	Construction	Operation[3/]	Construction	Operation[3/]
Farmer A	0.3	0.2	–	–
Farmer B	0.3	0.2	–	–
Farmer C	–	–	–	–
Farmer D	1.4	0.7	0.6	0.3
Farmer E	35.3	21.5	5.4	2.4
Total[4/]	**37.3**	**22.5**	**6.0**	**2.7**

1/ Size of leased area based on Real Property Tax Assessment Forms
2/ Based on GIS delineation of aerial imagery
3/ Operational impacts are a subset of construction impacts; thus, these acres are not additive
4/ Column totals may not sum exactly due to rounding

Under the Project HCP, Alternative 2a would have fewer effects on agricultural resources than Alternative 2. In total, 108 acres (44 hectares) of land leased by farmers from Malaekahana Hui West, LLC would coincide with monitoring plots where minor ground disturbance would occur in association with surveyors traversing transects beneath the wind turbines. Within this area, 19 acres (8 hectares) is actively farmed and may be replanted with crops that are conducive to post-construction mortality monitoring activities, as described under Alternative 2.

4.22.4 Alternative 3—Larger Generation Facility (Up to 12 Turbine Project)

4.22.4.1 Direct and Indirect Effects of Construction and Operation of the Project

Construction Impacts

Under Alternative 3, impacts to agricultural resources and activities would be similar to those discussed above for Alternative 2; however, Alternative 3 would result in construction of 2 to 4 additional turbines resulting in greater impacts to agriculture than Alternative 2.

Impacts by Agricultural Land Classification

Table 4.22-2 summarizes impacts by agricultural land classification under Alternative 3. Up to approximately 45 acres (18.2 hectares) of land with LSB soil productivity ratings of A and B (most productive soils) would be impacted by construction activities under Alternative 3 (14 percent of these lands within the wind farm site with LSB soil ratings of A and B). Additionally, up to approximately 35.7 acres (14.5 hectares) of Prime Agricultural Lands and 10.8 acres (11 hectares) of Other Agricultural Lands would be impacted during construction of Alternative 3, respectively (14 percent and 11 percent, respectively, of these lands within the wind farm site with Prime and Other Agricultural lands). Approximately 5.7 acres (2.3 hectares) of land with NRCS Class II

(conducive to agricultural production) land capability classification would be impacted during construction under Alternative 3 (12 percent of these lands within the wind farm site of NRCS Class II lands). Finally, up to approximately 17.4 acres (7.1 hectares) of lands with all three top-rated IAL criteria (lands potentially eligible for IAL designation) would be impacted by construction activities under Alternative 3 (8 percent of the potentially eligible IAL lands within the wind farm site). Therefore, construction under Alternative 3 would result in minor impacts to high-quality soils and productive agricultural lands within the wind farm site.

Impacts to Agricultural Uses and Activities

Construction of Alternative 3 would temporarily impact approximately 51.4 acres of land leased to five farmers, of which approximately 35.8 acres would be impacted over the long term. Alternative 3 has the potential to affect existing agricultural production of three of the five farmers during construction and operation due to disturbance to actively farmed areas. Alternative 3 would affect up to approximately 13.3 acres (5.4 hectares) of actively farmed land, of which approximately 9.3 acres (3.7 hectares) would be displaced over the long term (Table 4.22-5). This comprises approximately 6 percent of existing actively farmed land within the wind farm site.

Impacts to farmers associated with safety, road access, and irrigation water would be the same as described under Alternative 2. Measure to avoid, minimize, and mitigate direct and indirect impacts to farmers would be the same as described under Alternative 2.

Because there would be a lag time of at least 3 years between construction of the first 8 to 10 turbines and the additional 2 to 4 turbines under Alternative 3, the time frame of construction-related impacts associated with disruption to existing farming activities would be extended.

Operation Impacts

Impacts by Agricultural Land Classification

Up to approximately 30.7 acres (12.4 hectares) of land with LSB soil productivity ratings of A and B would be impacted over the long term, through the life of the Project under Alternative 3. This amounts to long-term impacts to approximately 10 percent of land with LSB productivity ratings of A or B within the wind farm site under Alternative 3. Additionally, approximately 22.4 acres (9.0 hectares) of ALISH Prime Agricultural Lands and 6.6 acres (2.7 hectares) of Other Agricultural Lands would be impacted over the long term (9 percent and 7 percent of the Prime and Other Agricultural Lands in the wind farm site, respectively). Approximately 3.0 acres (1.2 hectares) of NRCS Class II (conducive to agricultural production) would be impacted over the long term under Alternative 3. This amounts to long-term impacts to approximately 7 percent of Class II lands in the wind farm site. Finally, approximately 11.0 acres (4.4 hectares) of potentially eligible IAL lands would be impacted over the long term under Alternative 3. This is approximately 5 percent of lands with all three top-rated IAL criteria within the wind farm site.

Impacts to Agricultural Uses and Activities

Similar to Alternative 2, NPMPP would work with Malaekahana Hui West, LLC to identify suitable agricultural land within each of the three leased parcels where active agricultural activities would

be impacted by the Project (approximately 9.3 acres [7.3 hectares] among three farmers; Table 4.22-5). Within each of the lease areas only a portion of the acres identified in the Real Property Tax Assessment Forms as agricultural use is actively farmed, leaving remaining acreage that could be converted to crops. NPMPP would work with farmers to prepare this land for agricultural production so that there would be no net loss in active agriculture under Alternative 3.

Table 4.22-5. Impacts to Leased Agricultural Land and Actively Farmed Land under Alternative 3

Lease Area	Existing Leased Agricultural Land Identified as Agricultural Use Area (Acres)[1/]	Existing Leased Agricultural Land Actively Farmed (Acres)[2/]	Existing Agricultural Use Area Not Actively Farmed (Acres)[1/, 3/]	Impacts to Lease Area[1/] (Acres)		Impacts to Actively Farmed Land (Acres)[2/]	
				Construction	Operation[4/]	Construction	Operation[4/]
Farmer A	10.5	3.8	6.7	0.3	0.2	–	–
Farmer B	11.4	4.2	7.2	1.8	1.1	–	–
Farmer C	14.0	4.9	9.0	2.1	1.7	1.5	1.2
Farmer D	20.5	13.7	6.8	1.4	0.7	0.6	0.3
Farmer E	190.9	134.4	56.5	45.8	32.1	11.2	7.7
Total[5/]	**452.7**	**161.0**	**86.2**	**51.4**	**35.8**	**13.3**	**9.3**

[1/] Size of Leased Area based on Real Property Tax Assessment Forms
[2/] Based on GIS delineation of aerial imagery
[3/] Acreages represent potential for replacement acres within leased agricultural lands to compensate for permanently lost actively farmed areas
[4/] Operational impacts are a subset of construction impacts; thus, these acres are not additive
[5/] Column totals may not sum exactly due to rounding

4.22.4.2 Direct and Indirect Effects of the HCP Conservation Measures

Impacts of Avoidance and Minimization Measures

Similar to Alternative 2, the avoidance and minimization measures proposed under the Project HCP would have a minor effect on agricultural resources under Alternative 3. An additional 2 to 4 turbines would be monitored, resulting in additional actively farmed acreage on land leased by Farmer E that would potentially need to be replanted to low-growing crops.

Impacts of HCP Mitigation

Impacts of HCP mitigation under Alternative 3 would be the same as described under Alternative 2. Prior to construction of additional turbines proposed under Alternative 3, NPMPP would reopen consultation with the USFWS and DOFAW to assess the potential for impacts of the additional turbines to listed species and develop appropriate mitigation measures. The impacts of these mitigation measures to agricultural resources would be evaluated under a separate environmental analysis at that time.

4.22.4.3 Mitigation of Unavoidable Impacts

Mitigation for unavoidable impacts under Alternative 3 would be the same as described under Alternative 2 (Section 4.22.3.3).

4.22.4.4 Cumulative Effects

Cumulative effects to agricultural resources under Alternative 3 are the same as described under Alternative 2, with the exception that Alternative 3 would result in long-term displacement to 9.3 acres (3.7 hectares) of actively farmed land within the wind farm site. This is amounts to approximately 6 percent of actively farmed land within the wind farm site and approximately 0.2 percent of areas of existing agricultural production in the Koolauloa District (although this acreage includes areas of grazing and fallow land; City and County of Honolulu, DPP 2015). Therefore, when viewed in conjunction with past, present, and foreseeable future projects in the cumulative effects analysis area, the contribution of Alternative 3 to cumulative effects on agricultural resources would be minor. Because there would likely be a delay in time of up to 3 years before additional turbines would be built under Alternative 3, new projects and developments in the area will be assessed and reviewed to determine if there are additional cumulative impacts from unknown future projects. Regardless of the time lag, all future projects would need to comply with applicable land use plans, regulations and policies.

4.22.4.5 Summary

Based on agricultural land classification system designations, construction and operation of the Project under Alternative 3 would impact less than 14 percent and 10 percent, respectively, of any of the classified high-quality soils and productive agricultural lands within the wind farm site, and less than 1 percent of these lands within the greater Koolauloa District, over the long term (life of

the Project). Alternative 3 would result in minor direct and indirect impacts to agricultural resources due to displacement of 13.3 acres (5.4 hectares) of actively farmed land in the wind farm site during construction. This includes long-term displacement to 9.3 acres (3.7 hectares) of actively farmed land.

Impacts to agriculture under Alternative 3 would be considered minor because although there would be some long-term impacts associated with operation of the Project, effects would be of low magnitude (minor loss of actively farmed lands such that changes to agricultural resources may or may not be measureable or noticeable), localized (limited to portions of the wind farm site), and a small amount of important agricultural land (Prime Agricultural Land) would be impacted. Agricultural uses and activities would continue during Project operation.

4.22.5 Conclusion

Based on the temporary, localize nature of impacts to active agriculture, Alternative 2 (including the Modified Proposed Action Option) and 3 would have a minor impact to agriculture. Long-term impacts (i.e., lasting through Project operation) to active agricultural lands would be compensated, for through the preparation of non-arable land for agricultural production (e.g., grubbing, grading, soil amendments, extend irrigation, etc.) so that there would be no net loss in active agriculture. Table 4.22-6 summarizes potential impacts to agricultural resources and activities from the alternatives considered in this analysis.

Table 4.22-6. Summary of Impacts to Agricultural Resources

Impact Criteria	No Action Alternative	Alternative 2 – Proposed Action	Alternative 2a – Modified Proposed Action Option	Alternative 3
Changes to existing agricultural lands	No Impact	Minor	Minor	Minor
Changes to agricultural uses and activities	No Impact	Minor	Minor	Minor

5.0 STATUTORY AND REGULATORY FRAMEWORK/CONSISTENCY WITH PLANS AND POLICIES

In accordance with the requirements of HAR §11-200-17, this chapter discusses the relationship of the Proposed Action to land use plans, policies, and controls. In addition, a variety of other Federal and State laws would be (or could potentially be) applicable to the Project. Following is a discussion of the key Federal, State, and local regulations and land use plans, policies, and controls. In addition, a list of permits and approvals that would be obtained for the Project is presented at the end of this chapter. This discussion pertains to the Proposed Action and Modified Proposed Action Option (see Chapter 2 for additional details).

5.1 Key Federal Statutes and Regulations

5.1.1 Federal Endangered Species Act

The ESA and its implementing regulations in Title 50 of the CFR Section 17 prohibit the take of any fish or wildlife species that is Federally listed as threatened or endangered without prior approval pursuant to either Section 7 or Section 10 of the ESA.

Section 3 of the ESA defines "take" as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or to attempt to engage in any such conduct" (16 U.S.C. § 1532 (19)). Harm, in this case, means an act that actually kills or injures a federally listed wildlife species, and "may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering" (50 CFR §17.3). To harass means to perform "an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include but are not limited to, breeding, feeding or sheltering" (50 CFR § 17.3). In addition, Section 9 of the ESA details generally prohibited acts and Section 11 provides for both civil and criminal penalties for violators regarding species federally listed as threatened or endangered.

ESA Section 7(a)(2) requires each Federal agency to ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of critical habitat (16 U.S.C. § 1536 (a)(2)). If the actions of a Federal agency are not likely to jeopardize the continued existence of any endangered or threatened species, but could adversely affect the species or result in a take, the action must be addressed under Section 7 of the ESA (16 U.S.C. § 1536 (a)(2)).

Section 10 of the ESA allows a non-Federal applicant, under certain terms and conditions, to incidentally take an ESA-listed species that would otherwise be prohibited under Section 9 of the ESA. When a non-Federal landowner wishes to proceed with an activity that is legal in all other respects, but that may result in the incidental taking of a listed species, an ITP, as defined under

Section 10 of the ESA, is required. Incidental take is defined as take that is "incidental to, and not the purpose of, the carrying out of an otherwise lawful activity" (50 CFR § 17.3). Under Section 10, a USFWS-approved HCP is required to accompany an application for an ITP to demonstrate that all reasonable and prudent efforts have been made to avoid, minimize, and mitigate for the effects of the potential incidental take.

An ITP can only be issued if the following six criteria listed in 50 CFR § 17.22(b)(2) and 50 CFR § 17.32 (b)(2) are addressed:

- All takings must be incidental;
- Impacts of such taking must be minimized and mitigated "to the maximum extent practicable;"
- There must be both adequate funding for the HCP and provisions to address "unforeseen circumstances;"
- The taking must "not appreciably reduce the likelihood of the survival and recovery of the species in the wild;"
- The applicant must ensure that additional measures required by the Secretary will be implemented; and
- Federal regulators must be assured that the HCP can and will be implemented.

Guidance for preparation and required components of an HCP is provided in the USFWS's HCP Handbook (USFWS and NMFS 1996). The USFWS and National Marine Fisheries Service (NMFS) issued an addendum to the handbook in 2000 (USFWS and NMFS 2000). Known as the Five-point Policy, this addendum provides additional guidance on:

- Establishing and stating biological goals for HCPs;
- Clarifying and expanding the use of adaptive management where there is uncertainty about the experimental design and scientific evidence with respect to the HCP's approach to conservation;
- Clarifying the purpose and means of how to undertake species and habitat monitoring;
- Providing criteria to be considered by the USFWS and NMFS in determining incidental take permit duration; and
- Expanding public participation.

The issuance of an ITP under Section 10 of the ESA is considered a Federal action under Section 7(a)(2) of the ESA; therefore, the USFWS must comply with the requirements of Section 7 which includes the preparation of a BO. A BO evaluates the impacts of the proposed action (i.e., issuance of an ITP) and establishes an overall effect determination.

In compliance with Section 10 of the ESA and HRS §195D-4(g), NPMPP has made a commitment to prepare an HCP and apply for an ITP and ITL from the USFWS and DOFAW, respectively, for the Project. The purpose of the HCP is to ensure that measures to minimize and mitigate the adverse effects of the proposed action on the Covered Species are adequate. Details of the measures included in the HCP are provided in Chapter 2 of this EIS.

5.1.2 National Environmental Policy Act

Issuance of an ITP by the USFWS is a Federal action subject to NEPA compliance. The purpose of NEPA is to promote agency analysis and public disclosure of the environmental issues surrounding a proposed Federal action. The scope of NEPA goes beyond that of the ESA by considering the impact of a Federal action on non-wildlife resources such as water quality, air quality, and cultural resources. The USFWS is preparing and providing for public review an EIS to evaluate the potential environmental impacts of issuing the ITP to NPMPP and approving the proposed Project HCP. The purpose of the EIS is to determine if ITP issuance and HCP implementation would significantly affect the quality of the human environment. After the USFWS completes their review of the EIS, they will issue a ROD. The USFWS will not issue an ITP until the NEPA process is complete.

5.1.3 Migratory Bird Treaty Act and Service's Land-based Wind Energy Guidelines

Under the MBTA, as amended (16 U.S.C. § 703-712), taking, killing or possessing migratory birds is unlawful. Birds protected under this act include most native birds, including their body parts (e.g., feathers), nests, and eggs. A list of birds protected under the MBTA implementing regulations is provided on the USFWS's Migratory Bird Program website (USFWS 2012a).

Unless permitted by regulations, under the MBTA it is unlawful to pursue, hunt, take, capture, or kill; attempt to take, capture, or kill; possess, offer to or sell, barter, purchase, deliver or cause to be shipped, exported, imported, transported, carried, or received any migratory bird, part, nest, egg, or product. The MBTA provides no inherent process for authorizing incidental take of MBTA-protected birds. All birds included in the Covered Species are protected under the MBTA (USFWS 2012a). If the HCP is approved and the USFWS issues an ITP to the Project, the terms and conditions of that ITP would constitute a special purpose permit under 50 CFR Section 21.27 for the take of the Newell's shearwater, Hawaiian stilt, Hawaiian coot, Hawaiian moorhen, Hawaiian goose, and Hawaiian short-eared owl under the MBTA. Therefore, any such take of the Covered Species would not be in violation of the MBTA. Avoidance and minimization measures proposed for the Covered Species would also avoid and minimize impacts to MBTA-protected species.

On March 23, 2012, the USFWS released their Land-Based Wind Energy Guidelines (USFWS 2012b). These voluntary guidelines provide recommended approaches for assessing and avoiding impacts to wildlife and their habitats, including migratory birds, associated with wind energy project development. The guidelines also help ensure compliance with Federal laws such as the MBTA. To avoid and minimize impacts to MBTA-protected species, design and operational features have been incorporated based on the Land-Based Wind Energy Guidelines (USFWS 2012b). The approaches described in the Project HCP for the proposed development of this Project are consistent with the intent of the guidelines.

5.1.4 Clean Water Act

The CWA (33 U.S.C. §§ 1251 to 1387) is the principal law governing protection of the nation's surface waters. The CWA provides the basic structure for regulating discharges of pollutants into

U.S. waters. U.S. Army Corp of Engineers (USACE) is directed by Congress under Section 404 of the CWA (33 U.S.C. 1344) to regulate the discharge of dredged and fill material into all waters of the U.S. (WoUS), including wetlands. A preliminary jurisdictional determination was issued by the USACE on April 6, 2015 (USACE 2015) concluding that the delineated non-wetland waters within the Project area may be WoUS requiring a Department of Army permit for any activity resulting in the discharge and/or placement of dredged or fill materials into these waters. NPMPP is coordinating with the USACE to avoid impacts to WoUS and to ensure compliance with Section 4 of the CWA.

5.1.5 Rivers and Harbors Act of 1899

The USACE is directed by Congress under Section 10 of the RHA to prevent the unauthorized obstruction or alteration of navigable WoUS. Navigable waters are defined as "subject to the ebb and flow of the tide and/or presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce" (33 CFR 325.5(c)(2)). NPMPP is coordinating with the USACE to avoid impacts to WoUS and to ensure compliance with Section 10 of the RHA.

5.1.6 National Historic Preservation Act

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

A CIA and AIS have been conducted for the Project (see Section 4.13 – Historic, Archaeological, and Cultural Resources for additional information, and Appendices F and G of this EIS). The USFWS will provide these studies to the SHPO and will continue to coordinate on cultural resources and address any potential impacts.

5.1.7 Executive Order 12898 – Environmental Justice

President Clinton issued Executive Order 12898 on Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations on February 11, 1994. Executive Order 12898 requires Federal agencies to take appropriate steps to identify and avoid disproportionately high and adverse effects of Federal actions on the health and surrounding environment of minority and low income persons and populations. All Federal programs, policies, and activities that substantially affect human health or the environment shall be conducted to ensure that the action does not exclude persons or populations from participation in, deny persons

or populations the benefits of, or subject persons or populations to discrimination under such actions because of their race, color, income level, or national origin. The Executive Order was also intended to provide minority and low-income communities with access to public information and public participation in matters relating to human health and the environment.

The EPA, working with the Enforcement Subcommittee of the National Environmental Justice Advisory Council, has developed technical guidance to ensure that environmental justice concerns are effectively identified and addressed throughout the NEPA process. The State of Hawaii has also developed its own legislation and guidance related to environmental justice. Act 294 was signed by Governor Lingle in July 2006 to define environmental justice in the unique context of Hawaii and to develop and adopt environmental justice guidance document that addresses environmental justice in all phases of the environmental review process (Kahihikolo 2008). Environmental justice is discussed further in Section 3.17 – Environmental Justice. Based on 2000 census data, the communities of Kahuku, Laie, and the coastal area south to Kaneohe Bay were identified as minority environmental justice populations due to the disproportionate concentration of Native Hawaiians and Other Pacific Islanders in these communities relative to Oahu as a whole (Oahu Metropolitan Planning Organization 2004). No high or adverse human health or environmental effects are anticipated in association with construction or operation of the Project. Potential adverse effects to residents living in these communities, all of which have been determined to be ~~less than significant~~negligible to moderate based on criteria outlined in Chapter 4 for each resource, are discussed in Sections 4.6 – Noise, 4.12 – Socioeconomics, Section 4.13 – Cultural Resources, Section 4.16 – Visual Resources, Section 4.18 – Public Health and Safety, and Section 4.20 – Public Infrastructure and Services.

5.1.8 Federal Aviation Regulations

Part 77 of the FAA Federal Aviation Regulations (14 CFR Part 77) applies to objects that may obstruct navigable airspace. Proposed projects exceeding 200 feet above ground level must file FAA Form 7460-1, Notice of Proposed Construction or Alteration with the FAA before construction. A Notice of Proposed Construction or Alteration was filed for the Project with the FAA in in March and October, 2014 and in June, 2015. The notice provided information for the FAA to conduct an aeronautical study and determination on the proposed Project of the effect on navigable airspace. This form was also made available to military representatives for their review of effects on the military tactical flight training areas. The FAA issued Determinations of No Hazard based on the filings made in 2014. Revised FAA filings have been made based on the final site plan and the final FAA determination is pending.

5.2 State Statutes and Regulations

5.2.1 HRS 195-D

HRS Section 195D-4 states that any species of aquatic life, wildlife, or land plant that has been determined to be an endangered or threatened species under the ESA shall be deemed so under this

state chapter, as well as any other indigenous species designated by DLNR as endangered or threatened by rule. The "take" of any endangered or threatened species is prohibited by both the ESA and State statute Subsection 195D-4(e). Similar to the ESA, Section 195D-2 defines "take" as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect endangered or threatened species of aquatic life or wildlife, or to cut, collect, uproot, destroy, injure, or possess endangered or threatened species of aquatic life or land plants, or to attempt to engage in any such conduct." Per HRS Subsection 195D-4(g), the Board of Land and Natural Resources (BLNR) may issue an ITL to permit take otherwise prohibited under Subsection 195D-4(e) if the take is incidental to and not the purpose of, the carrying out of an otherwise lawful activity. As part of the ITL application process, an applicant must develop, fund, and implement a DOFAW-approved HCP to minimize and mitigate the effects of the incidental take. The HCP must result in a net environmental benefit and increased likelihood that the species would survive and recover. The applicant must guarantee that adequate funding for the HCP and its mitigation measures will be provided. The required components of a State HCP are listed in Section 195D-21. HRS Section 195D-5(i) directs the DLNR to work cooperatively with Federal agencies in concurrently processing State and Federal HCPs and ITP and ITL applications.

HRS Section 195D-25 establishes the Endangered Species Recovery Committee (ESRC), an advisory committee created to review all applications and proposals for HCPs and ITLs and make recommendations to the BLNR whether or not to approve, amend, or reject the HCP or license. ESRC members include representatives of the USFWS, DOFAW, the U.S. Geological Survey Biological Resources Division (USGS-BRD), the University of Hawaii Environmental Center, and other professionals with expertise in the area of conservation biology.

As mentioned above, in compliance with Section 10 of the ESA and HRS §195D-4(g), NPMPP has made a commitment to prepare an HCP and apply for an ITP and ITL from the USFWS and DOFAW, respectively, for the Project. The purpose of the HCP is to ensure that measures to minimize and mitigate the adverse effects of the proposed action on the Covered Species are adequate. Details of the measures included in the HCP are provided in Chapter 2 of this EIS.

5.2.2 Hawaii State Environmental Policy (HRS Chapter 343)

HRS Chapter 343 establishes a system of environmental review that ensures environmental concerns are given appropriate consideration along with economic and technical considerations in the decision making process of existing planning procedures of the State and counties. The Project requires Chapter 343 environmental review as a portion is located on State-owned land. The use of State lands is a trigger for compliance with HRS Chapter 343. HRS Chapter 343-5(h) specifies that whenever an action is subject to both NEPA and Chapter 343, the OEQC and State agencies shall cooperate with Federal agencies to the fullest extent possible to reduce duplication between Federal and State requirements. This EIS is intended to satisfy the HRS Chapter 343 requirements.

5.2.3 HRS Chapter 6E

HRS Chapter 6E establishes a comprehensive historic preservation program that is intended to preserve, restore and maintain historic and cultural properties. The regulations are implemented by the SHPD, and require evaluation of any project that is funded or permitted by the State. In addition, HRS Chapter 343 includes a requirement to consider cultural practices as part of an environmental review of the effects of a proposed action; a CIA is typically prepared to address this requirement. A detailed AIS and CIA have been conducted for this Project; results are presented in Section 4.13- Historic, Archaeological and Cultural Resources. The AIS and CIA reports are included in Appendices F and G of this EIS, respectively. The AIS was approved by the SHPD on December 18, 2015; the approval letter is included in Appendix F. This EIS reflects the comments and recommendations made by SHPD. Consultation with the SHPO under the NHPA is being conducted for the NEPA compliance process (see above).

5.2.4 Hawaii State Planning Act (HRS § 226)

The Hawaii State Plan (HRS§ 226) serves as a guide for the long-range development of the State. The purpose of the plan is to:

- Identify the goals, objectives, policies, and priorities for the State;
- Provide a basis for determining priorities and allocating limited resources, such as public funds, services, human resources, land, energy, water, and other resources;
- Improve coordination of Federal, State, and county plans, policies, programs, projects, and regulatory activities; and
- To establish a system for plan formulation and program coordination to provide for an integration of all major State and county activities.

The sections of the plan that are most relevant to the Proposed Action are HRS §226-18(a) and (b), which present the objectives and policies for energy facility systems. These are listed as follows:

> *§226-18 (a) Planning for the State's facility systems with regard to energy shall be directed toward the achievement of the following objectives, giving due consideration to all:*
>
> *(1) Dependable, efficient, and economical statewide energy systems capable of supporting the needs of the people;*
>
> *(2) Increased energy self-sufficiency where the ratio of indigenous to imported energy use is increased;*
>
> *(3) Greater energy security in the face of threats to Hawaii's energy supplies and systems;*
>
> *(4) Reduction, avoidance, or sequestration of greenhouse gas emissions from energy supply and use; and*
>
> *(b) To achieve the energy objectives, it shall be the policy of this State to ensure the provision of adequate, reasonably priced, and dependable energy services to accommodate demand.*

By producing clean, renewable energy, the Project would contribute to energy self-sufficiency by increasing the ratio of indigenous to imported energy use. As a source of renewable energy, the Project would increase energy security for the State and reduce reliance on fossil-fuel based energy production, thereby reducing greenhouse gas emissions associated with the State's energy supply. The Project would also generate electricity at a cost that is approximately half the cost of generating electricity by burning fossil fuels and HECO has stated in filings with the PUC that the Project would save the ratepayers millions of dollars over the life of the Project.

In addition, sustainability guidelines and priorities of the plan that are most relevant to the Proposed Action in relation to HRS §226-108 Sustainability are listed below:

> *(2) Encouraging planning that respects and promotes living within the natural resources and limits of the State;*

The Proposed Action would help the State in meeting its sustainability goals and contribute to the State's goal of 100 percent renewable electric energy by 2045. The Project would produce clean, renewable energy from a local natural wind resource, eliminating the need to import fossil fuels. As noted above, the Project would increase energy security for the State and reduce greenhouse gas emissions.

5.2.5 State of Hawaii Land Use Law (HRS § 205)

State of Hawaii Land Use Law (HRS § 205) established the State Land Use Commission (LUC) that has the authority to designate all State lands into one of four districts: Urban, Rural, Agricultural, or Conservation. Permitted uses within each district are listed under HRS Chapter 205 and the State LUC's Administrative Rules (HAR Title 15, Chapter 15, Subchapter 3). The wind farm site is located almost entirely within lands classified as Agricultural District, with only a small portion of the wind farm site (2 acres [1 hectare]) near Kamehameha Highway falling within the State Urban District (Hawaii Office of Planning 2013). All of the Project's components are located within the State Agricultural District. Wind energy facilities are a permitted use on State Agricultural District lands.

In addition HRS § 205-4.5(a)(15) states that the wind energy facilities are a permitted use on State Agricultural District lands with the following criteria.

> *Wind energy facilities, including the appurtenances associated with the production and transmission of wind generated energy; provided that the wind energy facilities and appurtenances are compatible with agriculture uses and cause minimal adverse impact on agricultural land;*

According to City and County of Honolulu Department of Planning and Permitting, this criteria relates to the compatibility and impacts on agricultural lands rated A and B by the Land Study Bureau (LSB). As discussed in Section 3.20 – Agriculture, and Section 4.22 – Agriculture, soils classified as LSB rated A and B lands represent approximately 315 acres (45 percent) of the wind farm site. Of the 315 acres, up to approximately 21.6 acres (8.6 hectares) of land with LSB rating of A and B would be directly impacted by the operations of the wind farm under Alternative 2, the Proposed Action (or 18.8 acres [7.6 hectares] under the Modified Proposed Action Option). This

amounts to long-term impacts to approximately 7 percent of land within the wind farm site with LSB productivity ratings of A or B, or 0.6 percent of these lands within the Koolauloa District. The long-term impacts (lasting through Project operation) to active agricultural production, totaling 4.6 acres (1.8 hectares) among three farmers, would be mitigated by preparation of non-arable land for agricultural production (e.g., grubbing, grading, soil amendments, extend irrigation, etc.) so that there would be no net loss in active agriculture. Therefore, the Project would have a minor long-term impact on high-quality and productive agricultural lands within the wind farm site, and much less so within the region.

Wind energy facilities are widely recognized as being a compatible use of land with active farming. Agricultural uses and activities would continue within the wind farm site during Project operation. Upon completion of the planned operational life of the Project (if the Project is not repowered), the Project would be decommissioned and the wind farm site would be rehabilitated, thereby allowing permitted agricultural uses to return to the lands occupied by Project facilities. As a result, direct impacts to existing agriculture from Project operations are considered to be long term, rather than permanent.

To ensure that there is no net loss of active agricultural uses and activities during Project operation, NPMPP would work with Malaekahana Hui West, LLC to identify suitable agricultural land within each of the three parcels leased by farmers from Malaekahana Hui West, LLC where active agricultural activities would be impacted by the Project (totaling 4.6 acres [1.8 hectares] among three farmers; refer to Table 4.22-3). Within each of these lease areas, only a portion of the area identified in the Real Property Tax Assessment reports as agricultural use is actively farmed, leaving remaining agricultural land that could be converted to crops. To the extent requested by Malaekahana Hui West, LLC, NPMPP would work with Malaekahana Hui West, LLC to assist farmers in preparing this alternative lands for agricultural production so that there would be no net loss in active agriculture.

A State Special Use Permit may be required if the City and County of Honolulu Department of Planning and Permitting determines that the Project is not compatible with agriculture uses. However, as discussed in Section 3.20 – Agriculture, and Section 4.22 – Agriculture, construction and operation of the Project would impact less than 7 percent of LSB rated A and B lands within the wind farm site temporarily over the long term and less than 1 percent of these lands within the Koolauloa District. Alternative 2 would directly impact up to approximately 8.2 acres (3.3 hectares) of actively farmed land during construction within the wind farm site, of which 4.6 acres (1.9 hectares) would be displaced over the long term (under the Modified Proposed Action Option this would be reduced to 6.0 acres [2.4 hectares] during construction and 2.7 acres [1.1 hectares] during operation). As noted above, displaced active farm lands would be relocated to existing un-used farm lands within each farmer's lease area (see Tables 4.22-3 and 4.22-4 for a breakdown by farmer), therefore no net loss of agriculture would occur under Alternative 2 (or the Modified Proposed Action Option). As noted above, to the extent requested by Malaekahana Hui West, LLC, NPMPP would work with farmers to prepare this suitable land for agricultural production (e.g., grubbing, grading, soil amendments, extend irrigation, etc.) so that there would be no net loss in active

agriculture. NPMPP would also work with Malaekahana Hui West, LLC to provide and maintain the irrigation system to the existing and potential future farm areas. The Poamoho Ridge mitigation area is classified as Conservation District. Land uses within the State Conservation District are under the sole jurisdiction of the State and are governed by HRS Chapter 183C and HAR §13-5. The Conservation District was created to protect important natural resources essential to the preservation of the State's fragile natural ecosystems and the sustainability of the State's water supply. The purpose of the Conservation District is to conserve, protect, and preserve the important natural resources of the State through appropriate management and use to promote their long-term sustainability and the public's health, safety, and welfare (HAR §13-5-1). The Conservation District is divided into five subzones: protective, limited, resource, and general, and a "special" subzone to accommodate unique projects (HRS §183C-1). The Poamoho Ridge mitigation area is within the Protective Subzone. By protecting and enhancing Hawaiian hoary bat habitat within the Poamoho Ridge mitigation area the proposed mitigation activities under the HCP are consistent with the purpose of the Conservation District. The Hamakua marsh mitigation area is classified predominately as Urban District, with some slivers within the State Conservation District within the General, Limited, and Protective subzones within which the installation of a conservation fence is a permissible use.

5.2.6 Hawaii Coastal Zone Management Program (HRS § 205A-2)

The Hawaii Coastal Zone Management (CZM) Program (HRS § 205A-2) complies with the Federal Coastal Zone Management Act (CZMA) of 1972 (16 U.S.C. §§ 1451-1456). It is designed to protect valuable and vulnerable coastal resources. All lands of the State are considered to be within the Coastal Zone Management Area. Furthermore, the area extending inland generally a minimum of 300 feet (91 meters) from the shoreline is considered as Special Management Area (SMA) regulated to ensure permitted activities are consistent with the objectives and policies of the CZMA and SMA guidelines. Additionally, in general, the area extending from the high water mark of the shore inland to 40 feet is considered the shoreline setback area. The City and County of Honolulu has regulatory control over development within the SMA and Shoreline Setback Area of the coastal zone management area

The Project is on the inland side of Kamehameha Highway and may include a limited area at the entrance of the access road into the DLNR property adjacent to Kamehameha Highway may require grading, grubbing, and installation of a gravel surface to provide a clear and safe path. The work is anticipated to cost less than $500,000. If during detailed design it is determined that work will need to be conducted within the SMA, NPMPP will submit a SMA Minor application to the City and County of Honolulu in compliance with the SMA requirements. The Project would not include any development in the Shoreline Setback Area. Likewise, the proposed Poamoho Ridge bat mitigation area is not within the SMA. The Hamakua Marsh mitigation area is within the SMA, where activities would include installation of a conservation fence and predator control. Any action within the SMA will require a SMA permit. The Project will be contributing funds to the long-term efforts at Hamakua Marsh. As such, the entity that will be installing the fence will seek a SMA permit as

required. The proposed mitigation activities would not significantly affect coastal resources, and as such, are considered to the consistent with the CZM program.

The following is a discussion of the Project's consistency with the objectives and policies of HRS § 205A.

Recreational Resources

- Objective: *Provide coastal recreational opportunities accessible to the public.*
- Policies:

  Improve coordination and funding of coastal recreational planning and management; and;

  Provide adequate, accessible, and diverse recreational opportunities in the coastal zone management area by:

  - *Protecting coastal resources uniquely suited for recreational activities that cannot be provided in other areas;*
  - *Requiring replacement of coastal resources having significant recreational value including, but not limited to surfing sites, fishponds, and sand beaches, when such resources will be unavoidably damaged by development; or requiring reasonable monetary compensation to the State for recreation when replacement is not feasible or desirable;*
  - *Providing and managing adequate public access, consistent with conservation of natural resources, to and along shorelines with recreational value;*
  - *Providing an adequate supply of shoreline parks and other recreational facilities suitable for public recreation;*
  - *Ensuring public recreational uses of county, state, and federally owned or controlled shoreline lands and waters having recreational value consistent with public safety standards and conservation of natural resources;*
  - *Adopting water quality standards and regulating point and nonpoint sources of pollution to protect, and where feasible, restore the recreational value of coastal waters;*
  - *Developing new shoreline recreational opportunities, where appropriate, such as artificial lagoons, artificial beaches, and artificial reefs for surfing and fishing; and*
  - *Encouraging reasonable dedication of shoreline areas with recreational value for public use as part of discretionary approvals or permits by the land use commission, board of land and natural resources, and county authorities; and crediting such dedication against the requirements of section 46-6.*

Discussion: The wind farm site is partially on private lands. There is no access to the shoreline through the wind farm site, as it is bordered on the inland/mauka side by military lands. Traditional Hawaiian practices in and around the wind farm site include pig hunting and plant gathering. Based upon the ethnographic interviews conducted as part of the CIA there does not

appear to be a need for traditional mauka/makai access through the wind farm site from the shoreline for these activities. NPMPP does not plan to change the current status mauka/makai access in this area (see Section 4.13 – Historic, Archaeological, and Cultural Resources for additional discussion and the CIA in Appendix G). Best management practices, including implementation of site-specific SWPPP and TESC plan, as well as avoidance of streams within the wind farm site, would minimize any water quality-related impacts to coastal waters downstream of the Project. Section 4.4 – Hydrology and Water Resources addresses potential impacts related to water quality in more detail.

Historic Resources

- Objective: *Protect, preserve, and, where desirable, restore those natural and manmade historic and prehistoric resources in the coastal zone management area that are significant in Hawaiian and American history and culture.*
- Policies:

  Identify and analyze significant archaeological resources;

  Maximize information retention through preservation of remains and artifacts or salvage operations; and

  Support state goals for protection, restoration, interpretation and display of historic resources.

Discussion: An AIS and CIA are included in Appendices F and G, respectively. Section 4.13 – Historic, Archaeological, and Cultural Resources addresses issues and potential impacts to cultural resources in more detail. The AIS was approved by the SHPD on December 8, 2015; the approval letter is included in Appendix F. This EIS reflects the comments and recommendations made by the SHPD.

Scenic and Open Space Resources

- Objective: *Protect, preserve, and, where desirable, restore or improve the quality of coastal scenic and open space resources*.
- Policies:

  Identify valued scenic resources in the coastal zone management areas;

  Ensure that new developments are compatible with their visual environment by designing and locating such developments to minimize the alteration of natural landforms and existing public views to and along the shoreline;

  Preserve, maintain and where desirable, improve and restore shoreline open space and scenic resources; and

  Encourage those developments that are not coastal dependent to locate in inland areas.

Discussion: The Project is located inland; not within the coastal land area. A visual analysis (Section 4.16 – Visual Resources and Appendix J) was conducted to assess the potential effect of the Proposed Action on the North Shore's scenic resources. Consideration was taken with regard to

maximizing the distance of associated Project components from Kamehameha Highway and sensitive viewpoints (see Section 4.16 – Visual Resources for additional detail). To the extent possible, visual impacts will be minimized by undergrounding the electrical collection system. Although the Project is expected to have a visual impact, the Project is located adjacent to an existing wind farm and in an area with existing development and alternative energy sources such as wind are an integral part of meeting the State's and City and County of Honolulu's renewable energy goals. The Project would not change the open space character of the wind farm site or surrounding area in that existing agricultural uses and activities and other uses of the wind farm site would continue during Project operation. The Project would not result in a change in Land Use Designation. Section 4.16 – Visual Resources addresses issues and potential impacts to open space in more detail.

Coastal Ecosystems

- Objective: *Protect valuable coastal ecosystems, including reefs, from disruption and minimize adverse impacts on all coastal ecosystems*.
- Policies:

  Exercise an overall conservation ethic, and practice stewardship in the protection, use, and development of marine and coastal resources;

  Improve the technical basis for natural resource management;

  Preserve valuable coastal ecosystems, including reefs, of significant biological or economic importance;

  Minimize disruption or degradation of coastal water ecosystems by effective regulation of stream diversions, channelization, and similar land and water uses, recognizing competing water needs; and

  Promote water quantity and quality planning and management practices that reflect the tolerance of fresh water and marine ecosystems and maintain and enhance water quality through the development and implementation of point and nonpoint source water pollution control measures;

Discussion: The Project would not have an adverse impact on coastal ecosystems. There is no fringing reef along the coastline. Best management practices, including implementation of site-specific SWPPP and TESC, SPCC, and HMWMP plans, as well as conducting construction activities outside of the ordinary high water mark of all streams, would avoid or minimize any potential water quality-related impacts to coastal waters downstream of the Project. Section 4.4 – Hydrology and Water Resources addresses potential impacts related to surface water and stormwater runoff. Section 4.7 – Hazardous and Regulated Materials and Wastes, and Section 4.18 – Public Health and Safety address potential impacts and mitigation measures related to point and nonpoint source pollution hazards.

Economic Uses

- Objective: Provide public or private facilities and improvements important to the state's economy in suitable locations.
- Policies:

  Concentrate coastal dependent development in appropriate areas;

  Ensure that coastal dependent development such as harbors and ports, visitor industry facilities and energy generating facilities are located, designed, and constructed to minimize adverse social, visual, and environmental impacts in the coastal zone management area;

  Direct the location and expansion of coastal dependent developments to areas presently designated and used for such developments and permit reasonable long-term growth at such areas, and permit coastal dependent development outside of presently designated areas when:

  - *Use of presently designated locations is not feasible;*
  - *Adverse environmental effects are minimized; and*
  - *The development is important to the State's economy.*

Discussion: The Project is not located within the SMA or the coastal areas of the Coastal Zone Management Area. The Project would help to meet the need for renewable energy generation in a location where the wind energy resource is good, land is available, and transmission capacity is available. The Project would also generate electricity at a cost that is approximately half the cost of generating electricity by burning fossil fuels and HECO has stated in filings with the PUC that the Project would save the ratepayers millions of dollars over the life of the Project.

The Project would potentially have minor beneficial socioeconomic impacts on local businesses, population demand on housing and employment and income because, in the long-term, the Project would employ three to six full-time employees. At most, moderate visual impacts are anticipated. Section 4.12 – Socioeconomic Resources and Section 4.16 – Visual Resources address issues and potential impacts related to social and visual impacts in the coastal zone management area, respectively. Potential impacts to biological resources are discussed in Sections 4.9 – Vegetation and 4.10 – Wildlife. There are no listed plants within the wind farm site. The wind farm site does not contain suitable habitat for listed species, although listed birds and bats could transit through (see Section 4.10 – Wildlife). Avoidance and minimization measures would reduce the likelihood of bird (including MBTA species) collisions with turbines or seabird attraction to Project lighting.

Coastal Hazards

- Objective: Reduce hazard to life and property from tsunami, storm waves, stream flooding, erosion, subsidence, and pollution.
- Policies:

  Develop and communicate adequate information about storm wave, tsunami, flood, erosion, subsidence, and point and nonpoint source pollution hazards;

Control development in areas subject to storm wave, tsunami, flood, erosion, hurricane, wind, subsidence, and point and nonpoint source pollution hazards;

Ensure that developments comply with requirements of the Federal Flood Insurance Program; and

Prevent coastal flooding from inland projects.

Discussion: Only a small portion of the wind farm site, along the northeastern edge near Kamehameha Highway, is within the tsunami evacuation zone. The probability of impacts to the Project resulting from tsunamis is low. A small segment of the wind farm site lies within zones designated by FEMA as special flood hazard, or high risk areas. Implementation of stormwater control measures would minimize the potential for flood events. In the event of a flood event, the site construction safety manager would be responsible for implementing the appropriate procedures in accordance with the Site Safety Handbook to ensure the safety of staff. Best management practices, including implementation of SWPPP, SPCC, TESC, and HMWMP plans would also reduce the potential for flood, as well as reduce erosion and pollution hazards.

Section 4.4 – Hydrology and Water, Section 4.7 – Hazardous and Regulated Materials and Wastes, Section 4.8 – Natural Hazards, and Section 4.18 – Public Health and Safety address potential impacts and mitigation measures related to coastal hazards including erosion, subsidence, flooding and point and nonpoint source pollution hazards.

Managing Development

- Objective: Improve the development review process, communication, and public participation in the management of coastal resources and hazards.
- Policies:

  Use, implement, and enforce existing law effectively to the maximum extent possible in managing present and future coastal zone development;

  Facilitate timely processing of applications for development permits and resolve overlapping or conflicting permit requirements; and

  Communicate the potential short and long-term impacts of proposed significant coastal developments early in their life cycle and in terms understandable to the public to facilitate public participation in the planning and review process.

Discussion: Throughout the planning process, NPMPP has actively engaged government regulators, stakeholders, community groups, and individuals. The processing of this EIS facilitated the review process and public participation.

Public Participation

- Objective: Stimulate public awareness, education, and participation in coastal management.
- Policies:

  Promote public involvement in coastal zone management processes;

Disseminate information on coastal management issues by means of educational materials, published reports, staff contact, and public workshops for persons and organizations concerned with coastal issues, developments, and government activities; and

Organize workshops, policy dialogues, and site-specific mediations to respond to coastal issues and conflicts.

Discussion: Throughout the planning process, NPMPP has actively engagement the public. Section 7– Consulted Parties discusses the public involvement activities related to the proposed Project.

Beach Protection

- Objective: Protect beaches for public use and recreation.
- Policies:

Locate new structures inland from the shoreline setback to conserve open space, minimize interference with natural shoreline processes, and minimize loss of improvements due to erosion;

Prohibit construction of private erosion-protection structures seaward of the shoreline, except when they result in improved aesthetic and engineering solutions to erosion at the sites and do not interfere with existing recreational and waterline activities;

Minimize the construction of public erosion-protection structures seaward of the shoreline;

Prohibit private property owners from creating a public nuisance by inducing or cultivating the private property owner's vegetation in a beach transit corridor; and

Prohibit private property owners from creating a public nuisance by allowing the private property owner's unmaintained vegetation to interfere or encroach upon a beach transit corridor.

Discussion: The Project is not located within a beach or a coastal land area. It is set inland. Nonetheless, best management practices would be implemented to avoid and minimize impacts to stormwater runoff that may affect beach processes. These BMPs include:

- Preparation and implementation of a TESC Plan which would include standard stormwater BMPs such as building during the summer months when rainfall potential is low, using silt fences or hay bales to prevent eroded soil from being transported off-site, and contouring to minimize impacts to site drainage and to prevent runoff from entering surface water.
- Siting Project access roads to follow natural contours and minimize sidehill cuts to the extent possible to minimize the potential for erosion and impacts to site drainage patterns.
- Construction of a retention basin at the onsite substation to avoid erosion and eliminate the possibility of degrading downstream waters.
- Using ditches and culverts and other erosion controls to capture and convey stormwater in areas of temporary disturbance.

- Restoration of disturbed areas, with the exception of areas where permanent surface recontouring is required, to pre-existing grades and revegetation of these areas.
- Installation of permanent stormwater control structures to prevent erosion where access roads, buildings, storage areas, and parking areas are constructed.
- Preparation of an SPCC Plan.
- Preparation and implementation of a site-specific SWPPP.

Marine Resources

- Objective: Promote the protection, use, and development of marine and coastal resources to assure their sustainability.
- Policies:

  Ensure that the use and development of marine and coastal resources are ecologically and environmentally sound and economically beneficial;

  Coordinate the management of marine and coastal resources and activities to improve effectiveness and efficiency;

  Assert and articulate the interests of the State as a partner with federal agencies in the sound management of ocean resources within the United States exclusive economic zone;

  Promote research, study, and understanding of ocean processes, marine life, and other ocean resources to acquire and inventory information necessary to understand how ocean development activities relate to and impact upon ocean and coastal resources; and

  Encourage research and development of new, innovative technologies for exploring, using, or protecting marine and coastal resources.

Discussion: No impacts to marine resources are anticipated from the Project. Section 4.4–Hydrology and Water Resources addresses potential impacts related to surface water and stormwater runoff.

5.2.7 Kawai Nui-Hamakua Marsh Complex Master Plan (1994, update draft plan 2014)

The goals and objectives for resource management within the Kawai Nui-Hamakua marsh complex are guided by the Resource Management Plan for Kawai Marsh prepared by the State Department of Planning and Economic Development (Department of Planning and Economic Development 1983). This plan is currently being updated. The overall goal of resource management within the marsh complex is to "protect, enhance, and use the natural, cultural, and economic resources of Kawai Nui marsh consistent with the greatest public good." Applicable objectives include:

- *Protect, maintain, and enhance wildlife species, their habitats, and related ecological systems.*
- *Protect waterbird species and enhance their habitat.*
- *Protect identified stream, estuarine, and terrestrial wildlife and fish and enhance their habitat.*

Discussion: Fencing an approximately 1,555-foot (474-meter) stretch of fence along the border of the Hamakua portion of the marsh complex to create a boundary between the adjacent shopping center and the edge of marsh, and conducting predator control in this area for waterbird mitigation would enhance waterbird habitat and will also protect waterbird species.

5.3 Local Regulations

5.3.1 City and County of Honolulu General Plan

The City and County of Honolulu guides and directs land use and growth through a three-tier system of objectives, policies, planning principles, guidelines, and regulations. The General Plan (Department of General Planning, City and County of Honolulu 1992, amended in 2002) forms the first tier of this system and is the guiding document for long-range development of the Island of Oahu. The General Plan describes general conditions to be sought over the 20-year planning horizon and outlines policies to help direct attainment of the plan's objectives. An update to the General Plan is currently underway that will look at the critical issues of growth, development, and quality of life that island residents are most concerned about, including regional population, economic health, affordable housing, and sustainability.

The General Plan includes a list of county-wide goals, objectives, policies, and implementing actions related to the following themes:

- Population;
- Economic Activity;
- Natural Environment;
- Housing;
- Transportation;
- Energy;
- Physical Development and Urban Design;
- Public Safety;
- Health and Education;
- Culture and Recreation; and
- Government Operations and Fiscal Management.

Discussion: Specific General Plan goals and policies applicable to the Proposed Action are discussed in detail below.

<u>*Natural Environment*</u>

- Objective A – To protect and preserve the natural environment
  - *Policy 1 – Protect Oahu's natural environment, especially the shoreline, valleys, and ridges from incompatible development.*
  - *Policy 7 – Protect the natural environment from damaging levels of air, water, and noise pollution.*

- *Policy 8 – Protect plants, birds, and other animals that are unique to the State of Hawaii and the Island of Oahu.*

- Objective B – To preserve and enhance the natural monuments and scenic views of Oahu for the benefit of both residents and visitors.
  - *Policy 1 – Protect the Island's well-known resources: its mountains and craters; forests and watershed areas; marshes, rivers, and streams; shoreline, fishponds, and bays; and reefs and offshore islands.*
  - *Policy 2 – Protect Oahu's scenic views, especially those seen from highly developed and heavily traveled areas.*
  - *Policy 3 – Locate roads, highways, and other public facilities and utilities in areas where they will least obstruct important views of the mountains and the sea.*

Discussion: Environmental due diligence conducted to date includes comprehensive biological surveys of the wind farm site to identify native habitats, wetlands and streams, and threatened and endangered species. The Project does not coincide with any natural reserves or other sensitive areas. As described in Section 3.2 – Hydrology and Water Resources, natural gulches, streams, and drainages were identified and have been excluded from the Project footprint. As described in Sections 3.2 – Hydrology and Water Resources, 3.3 – Air Quality and Climate, and 3.4 - Noise, the Proposed Action would be in compliance with Federal, State, and local regulations pertaining to water quality, air quality, and noise, respectively.

Measures to avoid and minimize impacts to vegetation, wildlife, and threatened and endangered species, as well as wildlife species of cultural importance, are identified in Sections 4.7, 4.8, and 4.9, respectively. However, because incidental take of listed wildlife species is not completely avoidable, NPMPP has prepared an HCP that outlines mitigation measures for these impacts (described in detail in Chapter 2 and analyzed in this EIS). Mitigation measures proposed for the Hamakua marsh and Poamoho mitigation areas would benefit the natural environment on Oahu.

A visual analysis (Appendix J) was conducted to assess the potential effect of the Proposed Action on the North Shore's scenic resources. Consideration was taken with regard to maximizing the distance of associated Project components from Kamehameha Highway and sensitive viewpoints (see Section 4.16 – Visual Resources for additional detail). To the extent possible, visual impacts will be minimized by undergrounding the electrical collection system. Although the Project is expected to have a visual impact, alternative energy sources such as wind are an integral part of meeting the State's and City and County of Honolulu's renewable energy goals.

Energy

- Objective A – To maintain an adequate, dependable, and economical supply of energy for Oahu residents.
  - *Policy 3 – Support programs and projects which contribute to the attainment of energy self-efficiency on Oahu.*

- Objective D – To Develop and apply new, locally available energy resources.
  - *Policy 1 – Support and participate in research, development, demonstration, and commercialization aimed at producing new, economical, and environmentally sound energy supplies from :*
    - *Solar insolation;*
    - *Biomass energy conversion;*
    - *Wind energy conversion;*
    - *Geothermal energy; and*
    - *Ocean thermal* energy conversion.

Discussion: The nature of the Proposed Action meets the County General Plan's energy objectives and policies as stated above.

Public Safety

- Objective B – To protect the people of Oahu and their property against natural disasters and other emergencies, traffic and fire hazards, and unsafe conditions.
  - *Policy 7 – adequate fire protection and effective fire prevention programs.*

Discussion: A Fire Management Plan (Appendix B) has been prepared for the Project. Engineering design measures, O&M activities, and fuels management practices outlined in the plan would minimize the fire risk posed by the Project to acceptable levels (also see Sections 4.7 – Hazardous and Regulated Materials and Wastes and 4.18 – Public Health and Safety for additional information).

5.3.2 Sustainable Communities Plans

The second tier of the land use planning and management system is formed by the Development Plans (DPs). The City and County of Honolulu is divided into eight regional areas. Each area is guided by DPs or Sustainable Community Plans (SCPs) required by City Charter and administered by the Department of Planning and Permitting (DPP). The plans are intended to help guide public policy, investment, and decision-making through the 2020 planning horizon (City and County of Honolulu 2012).

The wind farm site is located within the boundaries of the Koolau Loa SCP (City and County of Honolulu, DPP 2012), which extends from Waialee in the northwest to Kaoio Point in the southeast. This region includes the communities of Kahuku, Laie, Hauula, Punaluu, Kahana, and Kaaawa. The wind farm site is designated for agricultural, military, and rural residential use (City and County of Honolulu, DPP 2012). The Project components are predominately designated within agricultural use, with one wind turbine proposed only under Alternative 3 straddling agricultural and military use designations. Wind energy facilities are permitted uses with the State agricultural designation and the City and County of Honolulu agricultural designation with an approved CUPm (see discussion below). In addition, discussion with the military regarding the adjacent Kahuku Training

Area and the Tactical Flight Training Area is ongoing (see Chapter 4 for conditions of a pending MOU between NPMPP and the Department of Defense).

Guidelines and Policies relating to the Project within the Koolau Loa SCP are as follows:

- *Mountain Areas and Trails: Avoid the establishment of utility corridors and other uses that would disturb areas with high concentration of native and endangered species.*

Discussion: The Project requires compliance with the Federal ESA and MBTA, and the State HRS 196-D which prohibits the "take" of any endangered or threatened species (see Section 5.1.1, 5.1.3, and 5.2.1, respectively and Section 4.9 – Vegetation, Section 4.10 – Wildlife, and Section 4.11 – Threatened and Endangered Species. Prior to NPMPP's proposal of the Project, other locations on Oahu and the North Shore with sufficient wind resource and potential for interconnection with the HECO grid were considered but eliminated (see Section 2.3.4 – Alternative Project Location on Oahu). One of the reason for eliminating potential project sites was "land use restrictions, environmental concerns, and potential environmental impacts (e.g., proximity to wildlife refuges or other natural areas) made the location not feasible." The proposed wind farm site met siting criteria including, but not limited to, minimizing adverse impacts to native and endangered species. The proposed Project is not located within any natural reserves or other sensitive biological areas.

Measures to avoid and minimize impacts to vegetation, wildlife, and threatened and endangered species are identified in Sections 4.9, 4.10, and 4.11, respectively. However, because incidental take of listed wildlife species is unavoidable, NPMPP has prepared an HCP that outlines mitigation measures of these impacts (described in detailed in Section 2 and analyzed in this EIS). Section 2.5.1 outlines onsite mitigation measures including but not limited to:

- The three Project met towers were fitted with bird flight diverters and/or white poly tape (1 inch [2.5 centimeters]) to increase visibility and, as a result, the likelihood of avoidance by Covered Species.
- The Project plans to install an un-guyed, free-standing permanent met tower to maximize the detectability of all features of the structure for birds and bats and minimize the risk of collision. This permanent tower would replace one temporary guyed met tower, and the remaining temporary met towers would be removed before the commercial operation date.
- The majority of the wind farm site is sited in disturbed agricultural habitat, which minimizes impacts to most native species.
- The wind farm site does not have suitable listed waterbird breeding or foraging habitat thereby minimizing Hawaiian stilt, Hawaiian coot, and Hawaiian moorhen use of the wind farm site and minimizing potential Project impacts to these species.
- To minimize potential impacts to wildlife, onsite lighting at the O&M building and substation will be shielded and/or directed downward, triggered by a motion detector, and fitted with non-white light bulbs. Lighting is only expected to be used when workers are at the site at night. Most O&M activities are expected to occur during daylight hours. Nighttime activities during construction are addressed in the General Project Development Measures below.

- Flashing red lights on the nacelle have been shown not to be attractive to birds and will be used in accordance with FAA requirements.
- The collection line will be placed below ground to the maximum extent practicable, thereby reducing the risk of collision of the Covered Species.
- New above-ground portions of the power lines associated with the Project will use line marking devices to improve visibility to birds and follow Avian Protection Plan Guidelines (APLIC 2012).

The HCP offsite mitigation measures propose research funding, and improvements to Hamakua marsh and Poamoho mitigation areas. These measures would benefit the natural environment on Oahu, providing a net benefit to Covered Species. HCP measures to avoid and minimize as well as provide a net benefit to endangered species would do the same for other native species.

- *Agriculture: Protect and preserve the agricultural lands from conversion to uses that are primarily residential, industrial, or commercial in purpose.*

Discussion: As discussed in Section 3.20 – and 4.22 - Agriculture, construction and operation of the Project would impact less than 7 percent of LSB rated A and B lands within the wind farm site over the long-term, and less that 1 percent within the Koolauloa District. Alternative 2 would directly impact up to approximately 8.2 acres of actively farmed land during construction within the wind farm site, of which 4.6 acres would be temporarily displaced over the long term. Under the Proposed Action Option this would be reduced to 6.0 acres (2.4 hectares) during construction and 2.7 acres (1.1 hectares) during operations. This displaced active farm land would be relocated to existing unused farm land within each farmer's lease area on the Malaekahana Hui West, LLC property; therefore, no net loss of agriculture would occur under Alternative 2 or the Modified Proposed Action Option. To the extent requested by Malaekahana Hui West, LLC, NPMPP would work with farmers to prepare this suitable land for agricultural production (e.g., grubbing, grading, soil amendments, extend irrigation, etc.) so that there would be no net loss in active agriculture. NPMPP would also work with Malaekahana Hui West, LLC to provide and maintain the irrigation system to the existing and potential future farm areas.

- *Agriculture: Allow recreational or educational programs or other activities which provide supplemental income necessary to sustain the primary agricultural activity, as long as they are compatible with the character of the rural agricultural area and are accessory to the primary agricultural use of the site.*

Discussion: As discussed in Section 3.20 – Agriculture, and Section 4.22 - Agriculture, construction and operation of the Project would impact less than 7 percent of LSB rated A and B lands within the wind farm site over the long term. Alternative 2 would directly impact up to approximately 8.2 acres of actively farmed land during construction within the wind farm site, of which 4.6 acres would be temporary displaced over the long term. Under the Proposed Action Option this would be reduced to 6.0 acres (2.4 hectares) during construction and 2.7 acres (1.1 hectares) during operations. This temporary displaced active farm lands would be relocated to existing uncultivated farm lands within each individual farmer's lease area, therefore no net loss of

agriculture would occur under Alternative 2. NPMPP would work with farmers to prepare this suitable land for agricultural production (e.g., grubbing, grading, soil amendments, extend irrigation, etc.) so that there would be no net loss in active agriculture.

In 2008, the Board of the Agriculture withdrew the portion of the wind farm site that is owned by the State DLNR from the Kahuku Agricultural Park as the lands were not used for the intended farming purposes because the area acted as a buffer between the Kahuku Agricultural Park, the military training area, and the existing Kahuku Wind Farm. Additionally, these lands are steep with no road access and no water infrastructure and are therefore not conducive to farming in this area. As such, the Board of Agriculture returned the lands to the DLNR Land Division for other economic uses.

- *Electrical Systems: Locate and design system elements such as renewable energy facilities (e.g. wind and solar), electrical sub-stations, communication sites, and transmission lines, including consideration of underground transmission lines, to avoid or mitigate visual impacts on scenic and natural resources, as well as public safety considerations.*

Discussion: As discussed in Section 2.1 – Alternative Development and Screening Criteria, there were five criteria that were used to select the Project site that would meet the Project purpose and need. The five criteria are 1) good wind resource, 2) access to adequate and available transmission capacity, 3) land availability where wind energy development is a permitted use, 4) site conditions such as topography, and 5) potential impacts including visual impacts and meeting setback requirements for safety reasons. These criteria eliminated other sites from being considered as discussed in Section 2.3.4 – Alternative Project Location on Oahu. Prior to NPMPP's acquisition of the Project, other locations on Oahu were considered but eliminated for several reasons with one being that the land use restrictions, environmental concerns and potential environmental impacts (e.g., proximately to wildlife refuges or other natural areas) made the location not feasible. At least some visual impact from a utility-scale wind farm is unavoidable no matter where a project is located on Oahu. Although the Project is expected to have a visual impact, alternative energy sources such as wind are an integral part of meeting the State's renewable energy goals.

- *Electrical Systems: Encourage the development and use of renewable energy sources and energy conservation measures.*

Discussion: The purpose of the Project is to provide clean, renewable wind energy for the island of Oahu. The implementation of the Project would be consistent with this SCP policy.

The Hamakua Marsh mitigation area is within the region guided by the Koolaupoko SCP, which encompasses the windward coastal and valley areas of Oahu from Makapuu Point to Kaoio Point, bounded by the Koolau mountain range and the ocean. This region includes the rural communities of Kahaluu, Waiahole-Waikane, Kualoa, and Waimanalo and the urban fringe communities of Kaneohe and Kailua (City and County of Honolulu, DPP 2000). The Hamakua Marsh mitigation area is within the Open Space/Preservation designated area.

Specific Koolaupoko SCP guidelines applicable to the Hamakua Marsh mitigation area are discussed in detail below. Guidelines relating to wildlife preserves in Koolaupoko SCP are as follows:

- *Prohibit encroachment or intensification of residential or other urban uses near wildlife sanctuaries and nature parks.*
- *Wildlife preserve management plans should emphasize conservation and restoration of native plans, birds, fish and invertebrates. Private landowners should be encouraged to investigate the various State and Federal programs that provide incentives for landowners to manage their lands for the benefit of the wildlife.*

Installation of fencing at the Hamakua Marsh for waterbird mitigation under the HCP is intended to minimize the presences of waterbirds in the adjacent parking lot, limit the access of dogs to the area, and control illegal trash dumping. The fencing will provide an improvement to the waterbird species.

The Poamoho Ridge bat mitigation area is within the region guided by the Central Oahu SCP, which encompasses central areas of Oahu bounded by Koolau and the Waianae mountain ranges on the east and west ends, respectively. This region includes the towns of Wahiawa, Mililani, and Waipahu (City and County of Honolulu, DPP 2002). The Poamoho Ridge mitigation area is within the Open Space/Preservation designated area.

A guideline relating to protecting endangered species and their habitats in the Central Oahu SCP is as follows:

- *Identifying and protecting endangered species habitats and other important ecological zones from threats such as fire, weeds, feral animals, and human activity.*

This mitigation area has been identify as areas to protect the Hawaiian hoary bat; therefore, these areas and the mitigation activities associated with them are consistent with the Central Oahu SCP.

5.3.3 City and County of Honolulu Zoning

The wind farm site is zoned AG-2 General Agricultural and AG-1 Restricted Agricultural by the City and County of Honolulu. Wind energy facilities are a permitted use within these zoning districts with a CUPm. As such, NPMPP will submit an application for a CUPm to the City and County of Honolulu in compliance with the requirements.

The Project is consistent with the City and County of Honolulu zoning requirements. The Project conforms to the AG-1 and AG-2 zoning district as the Project is consistent with the intent of the Agricultural district. No change in zoning would occur or be requested as a result of the Project. The wind farm site is suitable for a wind generating facility considering the size, shape, location, topography, infrastructure, and natural features. The Project would not alter the character of the surrounding area that would limit agricultural uses. Finally, the Project would contribute to the general welfare of the community by providing renewable energy generation. The Project will also comply with the development standards as outlined in the Land Use Ordinance.

The Project is also in compliance with setback requirements for the wind turbines heights and noise standards. The maximum height of the tallest turbine would be up to 656 feet (200 meters) above ground level (refer to Table 2-2). Smaller turbine models (i.e., those with shorter hub

heights) would be considered for turbine locations nearest the TMK boundaries to ensure compliance with City and County of Honolulu setback requirements. Figure 5-1 shows the compliance of the Project with these setback requirements (Note that Figure 5-1 shows all 12 turbine locations, including those included under Alternative 3). Through community consultation during early planning for the Project, the local community voiced concerns about appropriate setbacks for the wind turbines. In response, the original layout of the wind turbines was altered several times to remove four turbines from Cross Hill and relocate at least one other turbine closest to the community. This change increased the distance from the turbines to the Kahuku Mauka Village and the Kahuku Elementary School.

The Hamakua Marsh mitigation area is a mix of several classifications of the City and County of Honolulu zoning districts, including P-2 General Preservation, P-1 Restricted Preservation, R-10 / R-5 / R-7.5 Residential, and B-1 / B-2 / BMX-3 Neighborhood Business, Community Business, Community Business Mixed Use.

The existing use of the Hamakua Marsh mitigation area will continue as a waterbird sanctuary. The Project intends to fund fencing of the Hamakua Marsh to protect the waterbirds as well as a deterrent to illegal dumping. The fencing will provide a net benefit to the area. The fencing activity is an allowed action with the various zoning districts listed above.

The Poamoho Ridge bat mitigation area is within the City and County of Honolulu P-1 Restricted Preservation zoning district. The existing use of the Poamoho Ridge area will continue as a forest reserve. The Project intends to fund conservation activities including fence installation, native forest restoration, and bat research, which will be carried out by DOFAW. These activities will provide a net benefit to the area. Within the P-1 Restricted Preservation District, all uses, structures, and development standards shall be governed by the appropriate State agencies. As such, the conservation activities are an allowed action within the P-1 Restricted Preservation zoning district.

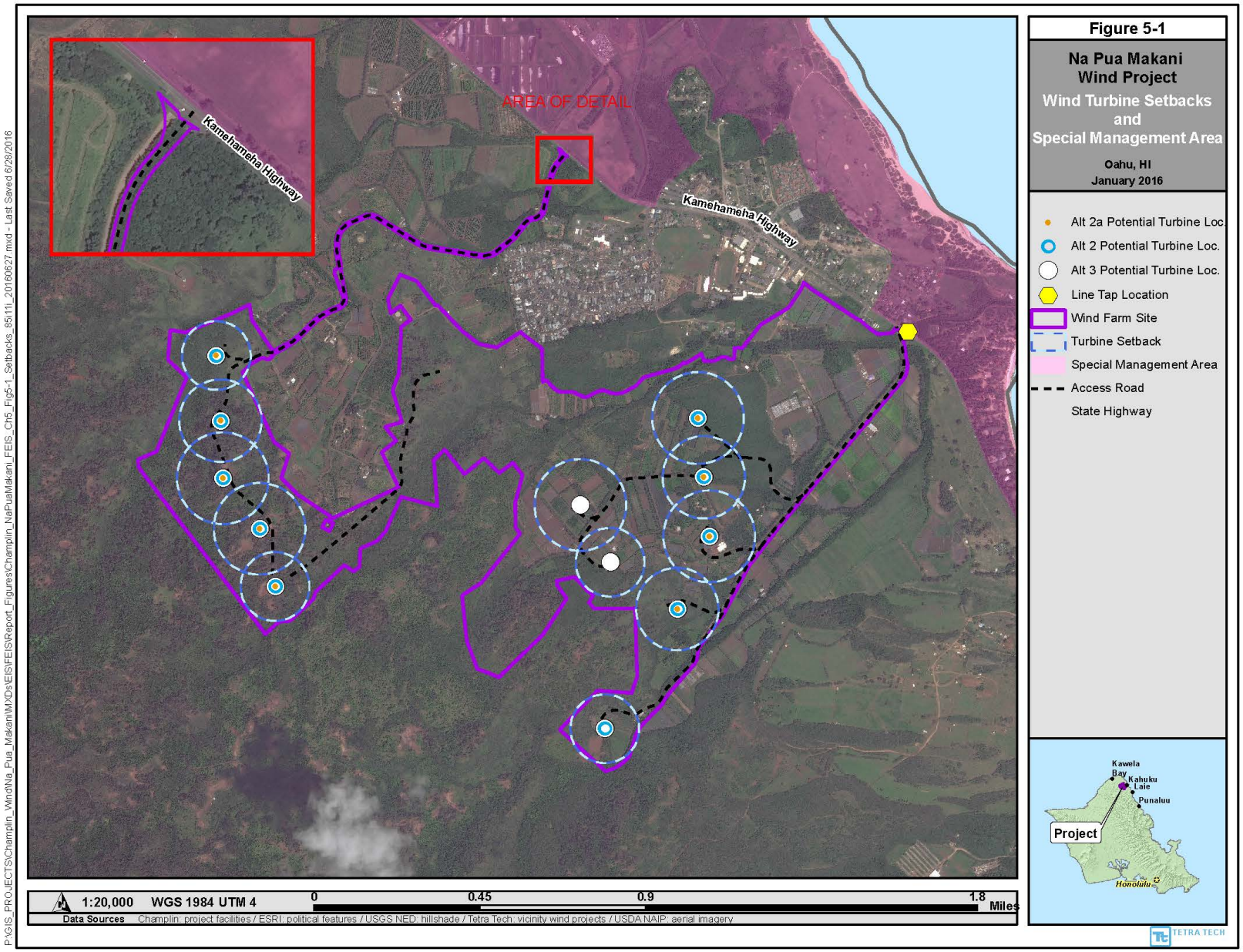
Figure 5-1
Na Pua Makani Wind Project
Wind Turbine Setbacks and Special Management Area
Oahu, HI
January 2016
AREA OF DETAIL
Kamehameha Highway
Kamehameha Highway
Alt 2a Potential Turbine Loc.
Alt 2 Potential Turbine Loc.
Alt 3 Potential Turbine Loc.
Line Tap Location
Wind Farm Site
Turbine Setback
Special Management Area
Access Road
State Highway
Kawela Bay
Kahuku
Laie
Punaluu
Project
Honolulu
1:20,000
WGS 1984 UTM 4
0
0.45
0.9
1.8
Miles
Data Sources
Champlin: project facilities / ESRI: political features / USGS NED: hillshade / Tetra Tech: vicinity wind projects / USDA NAIP: aerial imagery
TETRA TECH
P:\GIS_PROJECTS\Champlin_Wind\Na_Pua_Makani\MXDs\EIS\FEIS\Report_Figures\Champlin_NaPuaMakani_FEIS_Ch5_Fig5-1_Setbacks_85111i_20160627.mxd - Last Saved 6/28/2016

5.3.4 City and County of Honolulu Special Management Area

The City and County of Honolulu has regulatory authority over development within the SMA. The Revised Ordinances of Honolulu (ROH) Chapter 25 Special Management Area ensures that activities within the SMA are consistent with objectives and policies of the SMA guidelines. Although the Project is outside of the SMA, during transport of the turbines a limited area at the entrance of the access road into the DLNR property adjacent to Kamehameha Highway may require grading, grubbing, and installation of a gravel surface to provide a clear and safe path. The work is anticipated to cost less than $500,000. If during detailed design it is determined that work will need to be conducted within the SMA, NPMPP will submit a SMA Minor application to the City and County of Honolulu in compliance with the SMA requirements.

5.4 Other Applicable Regulations

In addition to the regulations discussed above, there are numerous other Federal, State, and local regulations that apply to the Project, some of which require permits or authorizations from authorizing agencies. Table 5-1 summarizes these regulations, their relevance to the Project, and permits or authorizations required where applicable.

Table 5-1. Applicable Federal, State, and Local Statutes, Regulations, Permits, and Authorizations Required for the Na Pua Makani Wind Project

Agency	Permit/Approval	Status
Federal		
USFWS	National Environmental Policy Act (NEPA) Compliance	Joint Federal/State DEIS published in 2015; NEPA-only FEIS to be published in 2016
USFWS	Incidental Take Permit and Habitat Conservation Plan(Endangered Species Act, Section 10(a)(1)(B))	Ongoing consultation (initiated in 2013); Joint Federal/State draft HCP published in 2015 concurrently with the DEIS; Final HCP will be published in 2016.
Federal Aviation Administration (FAA)	49 U.S.C. § 44718; 14 CFR Part 77; Objects Affecting Navigable Airspace; Determination of No Hazard and Notice of Proposed Construction or Alteration	Determination of No Hazard information provided to the FAA 03/04/2014 and 10/17/2014; revised FAA filings made based on the final site plan (final determination pending). Application for Notice of Proposed Construction or Alteration submitted.
Hawai'i State Historic Preservation Division	National Historic Preservation Act Section 106 Compliance	~~Ongoing;~~ USFWS consultation with SHPD ~~initiated July 2014~~complete
U.S. Army Corps of Engineers (USACE)	Clean Water Act Section 401, 402, 404 approval	To be completed as necessary
State		
State of Hawaii, DLNR	Chapter 343/Hawaii Environmental Policy Act (HEPA) Compliance	Joint Federal/State DEIS published in 2015; Second Draft EIS published in 2016
State of Hawaii, Department of Health, Clean Water	Clean Water Act Compliance (Sections 401 / 402 / 404)	To be completed as necessary

Table 5-2. Applicable Federal, State, and Local Statutes, Regulations, Permits, and Authorizations Required for the Na Pua Makani Wind Project (continued)

Agency	Permit/Approval	Status
State of Hawaii, Commission on Water Resource Management	Stream Channel Alteration Permit (SCAP)	To be completed as necessary
State of Hawaii, DLNR DOFAW	Incidental Take License/Habitat Conservation Plan (HRS Chapter 195-D)	Ongoing consultation (initiated in 2013); Joint Federal/State draft HCP published concurrently with the DEIS; Final HCP will be published in 2016.
State of Hawaii, Department of Transportation	Use and Occupancy Agreement	To be completed
State of Hawaii, Department of Transportation	Lane Use Permit for Construction Work	To be completed
State of Hawaii, Department of Transportation	Parking Permit	To be completed as necessary
State of Hawaii, Department of Transportation and City & County of Honolulu, Department of Transportation Services	Oversized and Overweight Moving Permits	To be completed
State of Hawaii, Department of Health	Noise Permit	To be completed
State of Hawaii, Department of Health	Air Quality Permit	To be completed
State of Hawaii, Department of Agriculture	Long-term non-exclusive easement for use of Kahuku Agricultural Park interior roadway	Approved, subject to terms and conditions
Hawaii Public Utility Commission	Power Purchase Agreement	Approved
City & County of Honolulu	Conditional Use Permit Minor	To be completed
City & County of Honolulu	Special Management Area Use Permit Minor	To be completed as necessary
Various Agencies	Construction-related Permits	To be completed

6.0 OTHER HRS 343 REQUIREMENTS

The content requirements for a HEPA EIS are defined in HAR § 11-200-17. Most of these components are addressed in the previous chapters. This chapter addresses additional components required under HRS Chapter 343 including a discussion of short-term uses of the environment versus long-term productivity, irreversible and irretrievable commitment of resources, unavoidable adverse impacts, rationale for proceeding, unresolved issues, and connected actions.

6.1 Relationship between Short-Term Uses and Long-Term Productivity

HAR §11-200-17(J) requires that an EIS include a discussion of the relationship between short-term uses of the human environment and the maintenance and enhancement of long-term productivity. HAR §11-200-17(J) requires a brief discussion of the "extent to which the proposed action involves tradeoffs between short-term losses and long-term gains and losses, or vice versa, and a discussion of the extent to which the proposed action forecloses future options, narrows the range of beneficial uses of the environment, or poses long-term risks to health or safety."

Short-term tradeoffs include impacts to soil, hydrology, vegetation, wildlife, and agricultural resources in the wind farm site. The Project would result in ground disturbance, much of which would be temporary and subject to restoration activities at the end of Project construction. Ground disturbance during construction increases the potential for soil erosion and runoff. Grading and blasting (if required) have the potential to alter drainage patterns within the wind farm site and result in stormwater runoff in adjacent areas. Implementation of best management practices, including implementation of SWPPP, TESC, and SPCC plans, would minimize these impacts such that the short-term impacts to soils, surface water, and groundwater in the wind farm site would be minor.

Construction of the Project would result in removal and degradation of vegetation and vegetation communities in the wind farm site. Project construction would generally occur in existing agricultural areas or areas that consist predominantly of non-native shrubland and forest dominated by non-native weedy species. Thus, vegetation communities and wildlife habitat being impacted is of low quality. Revegetating temporarily disturbed areas and implementing measures to reduce the introduction and spread of invasive plant species will minimize impacts to vegetation communities and wildlife habitat. There is also the potential for wildlife to be killed or injured during construction of the Project. Avoidance and minimization measures included under the Project HCP would reduce the likelihood of potential construction-related impacts associated with attraction to nighttime construction lighting (seabirds) and removal of bat roosting habitat. Construction noise could also potentially disturb wildlife in the wind farm site. However, given the temporary nature of the construction period and the existing level of human activity in the wind farm site associated with agriculture, construction of the Project would not preclude wildlife from using the wind farm site.

Long-term impacts of the Project would primarily be beneficial. Operation of the Project would provide a source of electrical energy generated from an abundant, clean, local, and infinitely renewable energy source. Generation and integration of wind energy into the electric grid further reduces fossil fuel consumption, thereby reducing GHG emissions, particulate-related health effects, and other forms of pollution associated with coal or diesel fuel electric generation. The use of a local renewable resource, as compared to imported foreign fuels, also provides greater security in maintaining an energy supply and reduces state expenditures on imported fossil fuels. As proposed, the Project could provide 88,000 MWh/year of electricity to HECO's grid, enough to provide electricity to approximately 8,000 households, and is expected to do so continuously over its approximately 20-year lifespan.

The proposed Project would provide both short-term and long-term economic benefits to the State and county. Short-term beneficial economic impacts would include direct wages to local workers and secondary spending by construction workers for housing, food, and other goods and services that would further stimulate the local economy. Over the long term, the Project would provide a stable, long-term source of tax revenue for the State and county. The Project would also provide a revenue stream for the State in terms of lease payments. In addition, the power generated by the Project would be sold to HECO under a long-term, set base price contract with fixed annual escalation, providing long-term price stability for HECO consumers.

The proposed Project is compatible with the existing agricultural uses, and as such, does not preclude the present and future agricultural productivity of the wind farm site or the Kahuku area. With the exception of the short-term temporary disruption to existing farming activities and the 59.9 acres (24.2 hectares) permanent project footprint, of which 4.6 acres (1.8 hectares) are actively farmed, the Project would allow for continued agricultural uses and open space within the wind farm site. Impacts would be slightly less under the Modified Proposed Action Option (56.7 acres [22.9 hectares]) total impacts, of which 2.7 acres (1.1 hectares) are actively farmed. However, there would be no net loss of active agriculture under either Alternative 2 (including the Modified Proposed Action Option) or Alternative 3, as NPMPP would work with Malaekahana Hui West, LLC to prepare unfarmed lands within the individual farmer's lease areas where Project-related impacts would occur for agricultural production (see Section 4.22 – Agriculture for additional discussion). In addition, the use, efficiency, and productivity of agricultural operations are expected to increase on a portion of the wind farm site through the availability of new access roads. Long-term impacts of the Project would also include visual impacts that may be considered negative to some viewers; however, the visual assessment indicates that the potential visual impacts from the Project for Alternative 2 (including the Modified Proposed Action Option [Alternative 2a]) or 3 would be considered moderate.

The Project would not pose a long-term risk to health and safety of workers or residents in the vicinity. Once in operation, the Project would not cause any emissions of air, water, or soil pollutants, and the potential for release of hazardous materials during construction would be limited by the implementation of appropriate construction best management systems and practices. Wind turbines are not known to have direct or indirect health effects. The turbines are

designed and will be assembled according to robust engineering standards that are anticipated to prevent potential safety issues; proper routine maintenance over the lifetime of the Project would keep the turbines in good working order and further prevent safety issues. Tower collapse and blade throw are very rare occurrences and often are linked to improper assembly or exceedance of design limits (see Section 4.18 – Public Health and Safety). Additionally, the risk of fire from operation of the turbines is relatively low and minimized by design features. To date, no scientific peer-reviewed study has demonstrated a direct causal link between people living in proximity to modern wind turbines, and the noise they emit (audible and inaudible sounds), and resulting physiological health effects.

6.2 Irreversible and Irretrievable Commitments of Resources

Pursuant HEPA (HAR § 11-200-17(k)), an EIS must disclose the irreversible and irretrievable commitments of resources associated with the Proposed Action should it be implemented. An irreversible commitment of resources applies primarily to the loss of non-renewable resources and resources that are renewable only over a long period of time (e.g., soil productivity). Nonrenewable resources generally include biological habitat, agricultural land, mineral deposits, water, cultural resources, and some energy sources. Irretrievable commitments apply to loss of production or use of renewable resources. These opportunities are forgone for the period of the proposed action, during which the resource cannot be used. Resources that are committed irreversibly or irretrievably are those that cannot be recovered if the Project is implemented.

Construction and operations of the Project would require the use of non-renewable resources used in the manufacturing of the Project components, construction materials, and fuel consumed during the construction and operations of the Project. However, to the extent feasible, construction waste would be recycled. As Project components wear out, they could also be recycled. During decommissioning, the Project components would be salvaged and reused and the wind farm site would be returned to its original condition to the extent possible (see Section 2.2.1.9).

Relatively minor impacts would occur to primarily non-native vegetation, wildlife habitat, soils, hydrology, agricultural lands, and public services, in association with construction (e.g., ground disturbance) and operation of the Project. These impacts comprise an irreversible commitment of resources, but would be less than significant. Additionally, agricultural activities within the wind farm site would still continue with the operations of Project.

Issuance of the ITP/ITL and implementation of the HCP would authorize incidental take of the Covered Species. These impacts would occur over the 21-year term of the permit. Avoidance, minimization, and mitigation measures outlined in the HCP would reduce these biological resources impacts to below a level of significance. However, the incidental take of Covered Species would comprise a small, but irreversible, environmental change associated with implementation of any action alternative. Additionally, operations of the Project would impact some species of wildlife that are considered culturally important; however, the mitigation measures outlined in the Project HCP would reduce these impacts.

Archaeological resources within the wind farm site that have been identified for no further work or data recovery would be fully recorded with the potential for sites to be demolished. NPMPP would avoid demolishing any site unless absolutely necessary. Of the 14 identified archaeological sites within the APE, 2 would be impacted by the Project and the remaining 12 are outside of the area of direct disturbance. Of the sites documented, 5 sites are recommended for no further work, 3 sites are recommended for data recovery, and 5 sites and a portion of a 6th site are recommended for preservation based upon their significance (see the AIS in Appendix F for additional information).

6.3 Unavoidable Impacts and Rationale for Proceeding

HEPA (HAR § 11-200-17 (L)) implementing regulations require a discussion of "all probable adverse environmental effects which cannot be avoided"; this discussion is to address consequences that may be adverse in terms of consistency with goals and guidelines established by environmental laws or policies as found in the Hawaii Revised Statutes. HAR § 11-200-17 (L) further requires a discussion of "the rationale for proceeding with a proposed action, notwithstanding unavoidable effects."

6.3.1 Unavoidable Adverse Impacts

A full discussion of adverse and unavoidable environmental effects is provided in Chapter 4 of this EIS. In summary, there is a potential for adverse impacts to threatened and endangered birds and bats as well as culturally important species that cannot be avoided, although the avoidance, minimization, and mitigation measures outlined in the Project HCP would reduce these impacts.

In addition, visual impacts of the Project cannot be avoided. The Project would alter the visual resources in the Kahuku area. Overall potential visual impacts from the Project are expected to be, at most, moderate, with viewers closest to the wind farm site experiencing the greatest visual impacts.

Construction of the Project may also result in unavoidable short-term, localized impacts related to noise and air quality. However, construction-related impacts are temporary and mitigated through implementation of BMPs.

Additionally, archaeological resources within the wind farm site that have been identified for no further work or data recovery would be fully recorded with the potential for sites to be demolished. NPMPP would avoid demolishing any site unless absolutely necessary. Of the 14 identified archaeological sites within the APE, 2 would be impacted by the Project. Of the sites documented, 5 sites are recommended for no further work, 3 sites are recommended for data recovery, and 5 sites plus a portion of a 6th site are recommended for preservation based on their significance (see the AIS in Appendix F for additional information).

6.3.2 Rationale for Proceeding

NPMPP is committed to avoiding or mitigating adverse effects to the extent practical. To the extent that some adverse environmental impacts may be unavoidable, the strengths of the Project location,

the benefits of the Project, and the ability of the Project to fulfill the requirements of State energy policies are believed to outweigh those impacts.

The Project would provide clean, renewable wind energy for the island of Oahu, and would assist HECO in meeting Hawaii's RPS requirements. The Project would diversify Oahu's power supply, and contribute to the State's energy independence and security. Production of wind-generated energy would replace a portion of the State's electricity that is currently generated by burning fossil fuels, thus reducing greenhouse gas emissions and other forms of pollution that are detrimental to the environment and human health. Thus, the Project would also help to meet goals embodied in the State's Global Warming Solutions Act of 2007 and in the 2008 Hawaii Clean Energy Initiative.

The Project location is one of the strengths of this proposal. The area has excellent wind resources, as demonstrated by the nearby Kahuku and Kawailoa wind farms. The area also has well-developed electrical infrastructure that is capable of receiving the additional energy from the Project with minimal additional improvements. Because of the proximity of the wind farm site to existing electrical infrastructure, no new transmission line outside of the wind farm site would be needed, limiting the impacts of the Project. The transportation infrastructure to the area has already proven sufficient for delivery of turbine components and construction equipment, without the need for significant offsite improvements. In addition, the wind farm site does not represent valuable native habitat for rare or protected species. To the extent that development at the wind farm site would impact protected species, NPMPP would mitigate for those impacts through the protection of valuable native habitat elsewhere on the island.

As noted above, the Project would provide both short- and long-term economic benefits to the county and State. Short-term benefits would arise from increased local employment during construction and secondary spending in the local economy by construction workers. Long-term benefits include a stable, long-term source of tax revenue for the State and county, long-term revenue for the State through lease payments, and long-term energy price stability for HECO consumers. Additionally, as part of its mitigation strategies, the Project would provide long-term funding to protect critical habitat for protected species, easing the burden on government to find alternate sources of funding. The Project would also provide a community benefit fund to the local Kahuku community for the life of the Project.

While there may be alternatives to the Project that would provide similar benefits, any alternative would carry similar or greater unavoidable impacts; NPMPP believes that the Project represents the best balance of impacts and benefits of any available alternative.

6.4 Unresolved Issues

HAR 11-200-17.N calls for a discussion of issues that remain unresolved at the time of publication of the EIS, along with "a discussion of how such issues will be resolved prior to commencement of the action, or what overriding reasons there are for proceeding without resolving the problems."

In general, there are no significant issues related to the design and implementation of the Project that remain unresolved. Site constraints and other Project-related concerns have been broadly

addressed through an iterative planning and siting process, as well as focused stakeholder consultation. ~~The~~ One remaining unresolved issue relates to FAA permitting. The second unresolved issue relates to road access into the Project.

6.4.1 Federal Aviation Administration

The proposed Project's components exceed heights of 200 feet above ground, requiring approval by FAA; refer to section 5.1.8 Federal Aviation Regulations. A Notice of Proposed Construction or Alteration was filed for the Project based on the layout presented in the original Draft EIS. The FAA issued a Determinations of No Hazard based on the filings made in 2014. Revised FAA filings have been made based on the final site plan, and the final FAA determination is pending.

6.4.2 Long-term Easement for use of Kahuku Agricultural Park Interior Roadway

NPMPP is continuing to work with the Department of Agriculture to finalize the terms and conditions of their non-exclusive long-term easement for the Kahuku Agricultural Park interior roadway. The easement allows use of this roadway to access the DLNR portion of the wind farm site during Project construction and operation.

6.5 Connected Actions

In connection to the Project, HECO anticipates the need to implement system additions and modifications to integrate the Project. These system additions and modifications, which have been preliminarily identified during HECO's ongoing interconnection requirements study, include activities at the existing Koolau Substation and the existing Kawela relay station, described in detail below.

6.5.1 Koolau Substation

The existing Koolau substation is located at 45-580 Kionaole Road in Kaneohe near the H-3 Highway and Kamehameha Highway interchange, just north of the Pali Golf Course, within TMK 4-5-042:007. The existing substation site consists of 4.2 acres (1.7 hectares; Figure 6-1) owned by HECO. It is located within the General Subzone of the State Land Use Conservation District. It is zoned by the City and County of Honolulu as P-1 Restricted Preservation. The Koolau substation is not located within a Special Management Area (SMA) and is outside of the tsunami evacuation zone. It is located within the FEMA Flood Designation D, an area where flood hazard is undetermined.

Project Description

The Koolau substation retransmits incoming 138-kV power to the 46-kV substations located across the windward side of Oahu, from Kahuku to Waimanalo. The connected action for the Project at the Koolau substation involves installation of new telecommunications (telcom) equipment. The telcom equipment would be accessory to the Koolau substation as it transmits information regarding the substation to monitor and control the electric grid. Preliminary design for the new telcom

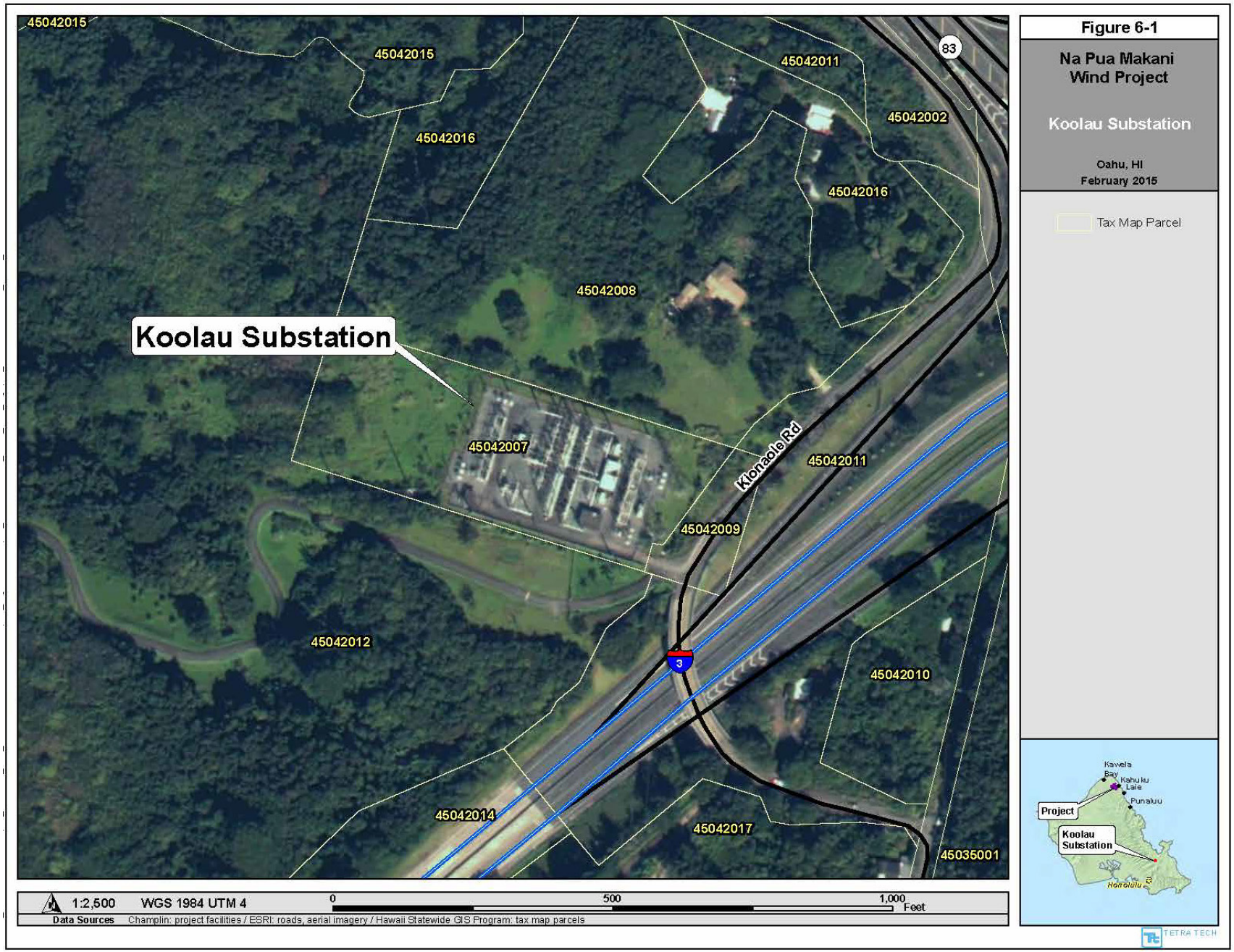
Figure 6-1
Na Pua Makani Wind Project
Koolau Substation
Oahu, HI
February 2015
Tax Map Parcel
Koolau Substation
45042015
45042015
45042016
45042011
45042002
45042016
45042008
45042007
45042011
45042009
45042012
45042010
45042014
45042017
45035001
Kionaole Rd
83
3
Kawela Bay
Kahuku
Laie
Punaluu
Project
Koolau Substation
Honolulu
1:2,500
WGS 1984 UTM 4
0
500
1,000
Feet
Data Sources
Champlin: project facilities / ESRI: roads, aerial imagery / Hawaii Statewide GIS Program: tax map parcels
TETRA TECH

equipment includes installation of a new concrete pad (approximately 8 feet by 4 feet [2.4 meters by 1.2 meters]) that would support an approximately 6-foot-tall (1.8-meter-tall) telcom cabinet. No plumbing or drainage is required. The new telcom equipment would not require any change to how the existing substation is operated and maintained.

Land Use Regulations and Permits

Lands within the State Land Use Conservation District are regulated by HRS §183C Conservation District and administered by HAR §13-5 Conservation District. The new telcom equipment is an identified use pursuant to HAR §13-5-22 *Identified Land Uses in the Protective Subzone, P-9 Structures, Accessory (B-1) Construction or placement of structures accessory to the existing facilities or uses*. This new accessory structure to the Koolau substation would require a Site Plan Approval from DLNR Office of Conservation and Coastal Lands.

In addition, the new telcom equipment is identified as an exempt action for HRS Chapter 343 pursuant to HAR §11-200-8 *Exempt Class of Action (6) Construction or placement of minor structures accessory to existing facilities*. Therefore, there is no additional requirement for environmental review under HRS Chapter 343 for the new telcom equipment.

Environmental Effects

The installation and operation of the new telcom equipment at the Koolau substation are not anticipated to result in adverse impacts. The telcom equipment would be installed within the existing boundary of the Koolau substation. Minimal site preparation would be required. The new telcom equipment would be visually consistent with the existing facility, and visual impacts are expected to be minimal because the height of the telcom equipment would be approximately 6 feet (1.8 meters) above ground. No permanent employees would be assigned to the new telcom equipment, and maintenance would be performed by existing staff, such that the operation of the equipment would not generate additional traffic or human activity at the site. Temporary noise or dust generated during construction would be negligible. Installation and operation of the new telcom equipment would not require any public services such as water or sewer systems.

6.5.2 Kawela Relay Station

The existing Kawela relay station is located within the Kahuku Training Area on TMK 5-8-002:006 in Kahuku. The Kawela relay station is south (mauka) of Kawela Bay approximately 2.2 miles (3.5 kilometers). The Kawela relay station is located on approximately 1 acre (0.4 hectare) owned by the Department of Army. It is located within the State Land Use Agricultural District and zoned by the City and County of Honolulu as AG-2 General Agricultural District. The Kawela relay station is not located in the SMA and is outside of the tsunami evacuation zone. It is located within the FEMA Flood Designations of X and D, which are beyond the 500-year flood plan and the flood hazard is undetermined, respectively.

Project Description

The Kawela relay station relays HECO telecommunications for the HECO electric grid. The connected action to the Project for the Kawela relay station involves installation of a dish on the existing 200-foot tower. No earthwork would be performed and no plumbing or drainage improvements would be required. The new dish would not require any change to how the existing Kawela relay station is operated and maintained.

Land Use Regulations and Permits

Permitted uses within the State Land Use Agricultural District are outlined in HRS §205-4.5 *Permissible uses within the agricultural districts*. The Kawela relay station is a permitted use within the State Land Use Agriculture District. Additionally, lands within the AG-2 General Agricultural zoning are regulated by the City and County of Honolulu; and the Kawela relay station is permitted as a use with an existing Conditional Use Minor Permit. The new dish will require a modification to the existing Conditional Use Minor Permit (No. 95/CUP1-106); and as such, one will be prepared and processed. Consultation with the Department of Army would need to occur because the Department of Army is the landowner of the Kawela relay station.

Environmental Effects

The installation and operation of the new dish at the Kawela relay station are not anticipated to result in adverse impacts. The dish would be installed on the existing tower. The new dish would be visually consistent with the existing facility, and therefore, visual impacts would be negligible. No permanent employees would be assigned to the new dish, and maintenance would be performed by existing staff, such that the operation of the equipment would not generate additional traffic. No significant amount of noise or dust would be created during construction, and installation and operation of the new dish would not require any public services such as water or sewer systems.

7.0 CONSULTED PARTIES

7.1 Consultation

Early coordination meetings with agencies, Kahuku Community Association, Kahuku organizations, and community members began in May 2013. The list of parties consulted before and during the development of the EISPN and Draft EIS is presented below in Table 7-1.

Table 7-1. Consulted Parties

Agency/Entity	Contact Name
U.S. Fish and Wildlife Service	Mr. Aaron Nadig Ms. Jodi Charrier Mr. Dan Clark Ms. Dawn Bruns Mr. Ian Bordenave Ms. Jenny Hoskins Mr. Ken Foote
Maui and Oahu National Wildlife Refuge Complex	Mr. David Ellis
U.S. Army Corps of Engineers, Honolulu District	Ms. Katy Damico
U.S. Department of Agriculture	Mr. Larry Yamamoto, State Conservationist Mr. Mike Johanns, Secretary of Agriculture
Marine Corps Base Hawaii	Ms. Tiffany Patrick
U.S. Army Garrison, Hawaii Department of Army, Kahuku Training Area	Mr. Daniel W. Whitney
Federal Aviation Administration	Flight Standards District Office
U.S. Legislators	Senator Brian E. Schatz Senator Mazie K. Hirono Representative Tulsi Gabbard Representative Colleen Hanabusa
State of Hawaiʻi, Department of Land and Natural Resources (DLNR)	Mr. William Aila, Chairperson (former) Ms. Suzanne Case, Chairperson (current)
State of Hawaiʻi, DLNR, Land Division	Mr. Russell Tsuji, Administrator Mr. Ian Hirokawa Ms. Malama Minn
State of Hawaiʻi, DLNR, Division of Forestry and Wildlife (DOFAW)	Ms. Afsheen Siddiqi Ms. Angela Amlin
State of Hawaiʻi, DLNR, Historic Preservation Division	Ms. Nona Neboa
State of Hawaiʻi, Department of Business, Economic Development and Tourism (DBEDT)	Mr. Mark Glick, Administrator Mr. Cameron Black Ms. Veronica Rocha
State of Hawaii, Department of Agriculture	Mr. Russell Kokubun, Chair
State of Hawaii, Office of the Governor	Governor Neil Abercrombie Mr. Bruce Coppa, Chief of Staff
State of Hawaiʻi Legislators	Senator Clayton Hee Senator Mike Gabbard Representative Chris Lee Representative Richard Fale
City and County of Honolulu, Office of the Mayor	Mayor Kirk Caldwell
City and County of Honolulu, Department of Planning and Permitting	Mr. George I. Atta, Director
City and County Legislator	Mr. Ernest Martin, Chair Mr. Reed Matsuura

Table 7-1. Consulted Parties (continued)

Agency/Entity	Contact Name
Landowner	Mr. Aaron Campbell
Community Groups	Kahuku Community Association Laie Community Association Hau ula Community Association Koolauloa Neighborhood Board North Shore Neighborhood Board Koolauloa Community Health and Wellness Center Turtle Bay Resort Kahuku Medical Center Keep North Shore Country Laie Hawaii Temple Kahuku Elderly EAH Housing North Shore Community Land Trust Sunset Beach Community Defend Oahu Coalition Kahuku High and Intermediate School Kahuku Elementary School Laie Elementary School Kamehameha Preschool Kahuku

7.2 EISPN Distribution

The parties listed below in Table 7-2 were provided a copy of the EISPN for review during the 30-day public comment period that ended on January 22, 2014, following the notice of availability published in the OEQC's *Environmental Notice* on December 23, 2013. They also received the republished EISPN for review during the second public comment period that ended on December 8, 2014, after a second notice of availability was published in OEQC's *Environmental Notice* on November 8, 2014.

Table 7-2. EISPN Distribution List

Name	Organization
Ernest Y.W. Lau	Board of Water Supply
Chris Takashige, P.E.	City and County of Honolulu
Lori M.K. Kahikina	City and County of Honolulu
Michele K. Nekota	City and County of Honolulu
George I. Atta, FAICP, LEED AP, CEI	City and County of Honolulu
Michael D. Formby	City and County of Honolulu
Manuel P. Neves	City and County of Honolulu
Sophie Cocke	Civil Beat Honolulu
Carolyn Unser	First Wind
	Hawaii State Library (Honolulu), Hawaii Documents Center
Kaiulani Shinsato	Hawaiian Electric Company
	Kahuku Public Library
Rachel James	Office of Congresswoman Tulsi Gabbard
Vandeth Sek	Office of Congresswoman Tulsi Gabbard
Kamanaʻopono Crabbe	Office of Hawaiian Affairs
Russell Kokubun	State of Hawaii
Richard Lim	State of Hawaii

Table 7-2. EISPN Distribution List (continued)

Name	Organization
Linda M. Rosen, M.D., M.P.H.	State of Hawaii
Jobie Masagatani	State of Hawaii
Ford Fuchigami	State of Hawaii, Department of Transportation
Cameron Black	State of Hawaii, Department of Business, Economic Development & Tourism
Mark Glick	State of Hawaii, Department of Business, Economic Development & Tourism
Russell Y. Tsuji	State of Hawaii, Department of Land and Natural Resources
Christine Clarke	U.S. Department of Agriculture, Natural Resources Conservation Service
George Young	U.S. Department of Army, U.S. Army Engineer District, Honolulu, Regulatory Branch
Carl Borgstrom	U.S. Department of Energy, Office of NEPA Policy & Compliance
Wayne Nastri	U.S. Environmental Protection Agency, Region 9
Tulsi Gabbard	United States Representative
Colleen Hanabusa	United States Representative
Mazie K. Hirono	United States Senator
Brian E. Schatz	United States Senator
	University of Hawaii at Manoa
Crystal Bikle	
Joseph Bruey	
Aaron Campbell	
Susan Carstenn	
Paul Conry	
Kent Fonoimoana	
Al Gardnor	
Carl Hubbell	
Thomas P. Navaez	
Kamilla Sporsheim	
Kurt Tsue	
Alan Yonan	

7.3 Comments Received on EISPN

During the initial public scoping period, three public scoping meetings were held at Kahuku Community Center—the first on November 13, 2013, the second on January 10, 2014, and the third on November 19, 2014. In addition to the public meetings, a media advisory was sent out prior to each meeting (see Appendix A). The parties listed in Table 7-3 provided comments on the EISPN either in writing or verbally, at one of the public meetings. Copies of the comment letters and responses are included in Appendix A. Summaries of the oral testimonies given at the public meetings and the individual responses are also included in Appendix A.

Table 7-3. EISPN Comments

Name	Organization
Kent Fonoimoana	Board Member Kahuku Community Association, Board Member Koolauloa Neighborhood Board #28
Ernest Y. W. Lau	Board of Water Supply
Melissa Primacio	Chair, Kahuku Community Association
Chris Takashige, P.E.	City and County of Honolulu, Department of Design and Construction
Ross S. Sasamura, P.E.	City and County of Honolulu, Department of Facility Maintenance
Michele K. Nekota	City and County of Honolulu, Department of Parks and Recreation
George I. Atta, FAICP, LEED AP, CEI	City and County of Honolulu, Department of Planning and Permitting
Louis M. Kealoha	City and County of Honolulu, Police Department
Michael D. Formby	City and County of Honolulu, Department of Transportation Services
Tim Vandeveer	Co-Chair, Defend Oahu Coalition
Daniel Whitney	Colonel, U.S. Army Installation Management Command, Pacific Region Headquarters United States Garrison, Hawaii
Henry Curtis	Executive Director, Life of the Land
Gordon Wong	Federal Aviation Administration, Honolulu Airports District
Casey Willis	Infinity Wind Power
DeeDee Letts	Koolauloa Neighborhood Board
Scott Sysum	National Older Worker Career Center, Energy Specialist, U.S. EPA Region IX, Environmental Review Office
Dean H. Seki	State of Hawaii, Department of Accounting and General Services
Marvin Manuel	State of Hawaii, Department of Hawaiian Home Lands
Herman Tuiolosega	State of Hawaii, Office of Environmental Quality Control
Leo R. Asuncion	State of Hawaii, Office of Planning
Alec Wong	State of Hawaii, Department of Health, Clean Water Branch
Susan Lebo	State of Hawaii, Department of Land and Natural Resources, State Historic Preservation Division
Steve Molmen	State of Hawaii, Department of Land and Natural Resources, Land Division
Russel Tsuji	State of Hawaii, Department of Land and Natural Resources, Land Division
Ford N. Fuchigami	State of Hawaii, Department of Transportation
Lauren A	
Ann Allred	
Andrea Anixt	
Ghia Borges	
Harry Brown	
Rebecca Carlson	
Aaron Curtis	
Maria Feagai	
Karen Gallagher	
Al Gardnor	
Fred Geibelt	
Carter Griffin	
Larissa Hekau	
Angela Huntemer	
Choon James	
Mary Kamauoha	
Merania Kekaula	
Kealoha Mercurio	

Table 7-3. EISPN Comments (continued)

Name	Organization
Delsa Moe	
Joshua Noga	
Aliitasi Ponder	
Tasi Ponder	
Makaiau Ralph	
Suzanne Reed	
Tanoai Reed	
Ben Shafer	
Theone Taala	
Vasa Taualii	
Cindy Tutor	

7.4 Comments Received on the Original Draft EIS and the Second Draft EIS

The original Draft EIS was published in the OEQC's *The Environmental Notice* on June 8, 2015, and a Notice of Availability of the Draft EIS was published on June 12, 2015 in the Federal Register by USFWS (80 FR 33535-33537) and also on the same date by the USEPA (80 FR 33519) in accordance with requirements set forth under HEPA (HRS § 343-3) and NEPA (40 CFR 1506.6) implementing regulations. Public comments were accepted during the 45-day and 60-day State and Federal public comment periods, respectively. A public open house meeting was held during the comment periods on June 23, 2015, in Kahuku. The Second Draft EIS was published in the OEQC's *The Environmental Notice* on April 23, 2016. Public comments were accepted during an additional 45-day public comment period from April 23 to June 7, 2016. A public open house meeting was held on May 25, 2016, at the Kahuku Community Center in Kahuku.

The parties listed in Table 7-4 provided comments, either in writing or verbally, during the public comment periods. Copies of the comment letters and responses are included in Appendix M. Oral testimonies given at the public meeting and the individual responses are also included in Appendix M.

Table 7-4. Original Draft EIS and Second Draft EIS Comments

Name	Organization
Kathleen Goforth	U.S. Environmental Protection Agency
Bruce Petersen	U.S. Department of Agriculture, Natural Resource Conservation Service
Leo Asuncion	State of Hawaii, Office of Planning
Alec Wong	State of Hawaii, Department of Health, Clean Water Branch
Laura Leialoha Phillips McIntyre	State of Hawaii, Department of Health
Scott Enright	State of Hawaii, Department of Agriculture
Brooke Wilson	Pacific Resource Partnership
Kent Fonoimoana and various other commenters	Kahuku Community Association
Douglas Murdock	State of Hawaii Department of Accounting and General Services
Heidi Meeker	State of Hawaii Department of Education
Marvin Kaleo Manuel	State of Hawaii Department of Hawaiian Homelands
Barry Cheung	State of Hawaii Department of Land and Natural Resources, Land Division

Table 7-4. Original Draft EIS Comments (continued)

Name	Organization
Lauren Yasaka	State of Hawaii Department of Land and Natural Resources, Office of Conservation and Coastal Lands
Alton Miyasaka	State of Hawaii Department of Land and Natural Resources, Division of Aquatic Resources
Daniel Quinn	State of Hawaii Department of Land and Natural Resources, Division of State Parks
Cody Chang	State of Hawaii Department of Land and Natural Resources, Engineering Division
Scott Glenn	State of Hawaii Office of Environmental Quality Control
Tyler Dos Santos-Tam	Hawaii Construction Alliance
Sherry Menor-McNamara	Chamber of Commerce
Louis Kealoha	City and County of Honolulu Police Department
Socrates D. Bratakos	City and County of Honolulu Fire Department
Michael Formby	City and County of Honolulu Department of Transportation Services
George Atta	City and County of Honolulu Department of Planning and Permitting
Ross Sasamura, PE	City and County of Honolulu Department of Facility Maintenance
Robert J. Kroning	City and County of Honolulu Department of Design and Construction
Ernest Lau	City and County of Honolulu Board of Water Supply
Richard Wallsgrove	Blue Planet
Michael Hutchins	American Bird Conservancy
Kent Fonoimoana	Makani Pono ‘o Kahuku
Billy Long	
Daniel Aemslvong	
Hudson Lote	
Daniel Aemslvong	
Samuel Midallia	
Emmett Nothnagle	
Michaela Primacio	
Dr. Don Sand	
Nainoa Soren	
Abraham Ueda	
Unknown	
Unknown	
Dino Vendiola	
Stacy Ako	
Mona Wago	
Stacy Ako	
Kainaiu Werner	
Kekoa Werner	
Timmy Wescot	
Aisa Wily	
Andrea Anixt	
Dana Woolsey	
Mana Feagai	
George Wallace	
Melissa Primacio	

Table 7-4. Original Draft EIS Comments (continued)

Name	Organization
Steve Anderson	
Ghia Borges	
Nakia Mae'ole	
Vasaloloa Taualii	
Jon Barlow	
Mitch Dmohowski	
Detreck Abraham	
Lorraine Aho	
Bob Comeau	
Lexie Latu	
Penni Latu	
Simplicio Caban	
Roxanne Latu	
Gillian Yamagata	
John Primacio	
Ben Rabanal	
Tom Narvaez	
Cheryl Wago	
Wade Wago	
Bob Uyeda	
Keawe Rillamas	
Phyllis Moses	
Samson Chun	
James Moses	
Kealohilani Fotu	
Tukuafu Fotu	
Debi Lee	
Chris Wilson	
Joshua Mendez	
Katrina Comeau	
Matthew Comeau	
Robert Comeau	
Seamus Fitzgerald	
Jon Hipa	
Jolene Kanahele	
Shawn Keliiki	
Cindy Tutor	
Sara M. Johnson	
Mibi Harp	
Daniel Johnson	
Lee Harp	
John Keliiliki	
Charlene Keliiliki	
Joe Kalili	
Frederick Lawrence	
Sandy Budlong	
Sterling Carvalho	

Table 7-4. Original Draft EIS Comments (continued)

Name	Organization
Jacob Primacio	
Junior Primacio	
Sara Calley	
Victoria Tito	
Sione Fotu	
Spencer Colburn	
Kamalei Pasa	
Steve Hoag	
Keoki Wallace	
Senator Gil Riviere	
Lorraine Toseik	
Matt Toseik	

7.5 Other Outreach Efforts

NPMPP has undertaken a comprehensive local public affairs strategy for the development of the Project. Taking into account the diversity of the population as well as the Project's overall size, scope, and potential impact, it has been imperative to engage in community outreach and education through a variety of methods. In addition to the public meetings discussed above, the NPMPP has conducted well over a hundred small group meetings with State and County Agencies, legislators, organizations, and individuals. Additionally, a Web page has been developed (http://napuamakaniwind.com) that features general Project information. A brochure has been created containing information regarding the proposed Project's energy output, a timeline, a map of the area, and a detailed outline of how wind energy works. This brochure has been distributed to interested parties at stakeholder meetings as well as larger community events. Informational post-cards and monthly newsletters have also been distributed to keep the community up to date on the status of the Project. A Facebook page was created that provides up-to-date information on the Project and other community-interest information.

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APPENDIX A
SCOPING REPORT

Scoping Report

Na Pua Makani Wind Farm Project

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January 2015

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1.0 INTRODUCTION

This report summarizes the public scoping process for the Environmental Impact Statement (EIS) being undertaken jointly by the U.S. Fish and Wildlife Service (USFWS) and the Hawaii Department of Land and Natural Resources (DLNR) to evaluate the environmental impacts associated with the proposed Na Pua Makani Wind Project (Project) and Habitat Conservation Plan (HCP). This document is a public record of the scoping activities conducted for the Project EIS.

Na Pua Makani Power Partners, LLC (NPMPP), a wholly owned subsidiary of Champlin Hawaii Wind Holdings, LLC, proposes to construct and operate the Project near the town of Kahuku on the island of Oahu, Hawaii. The Project is proposed to begin construction in the fourth quarter of 2015 and begin commercial operation by December 2016. Refer to Section 1.1 for a more detailed description of the proposed Project.

The Project would consist of up to 10 wind turbine generators and associated infrastructures. Because the proposed Project could potentially impact species listed under the Federal Endangered Species Act (ESA), NPMPP is preparing a joint Federal and State HCP)to accompany its application for an ITP from the USFWS under Section 10(a)(1)(b) of the ESA, and an Incidental Take License (ITL) from the Hawaii Department of Land and Natural Resources (DLNR) Division of Forestry and Wildlife (DOFAW) under Hawaii Revised Statute (HRS) Section 195D. The purpose of the HCP is to ensure that measures to minimize and mitigate the adverse effects of the applicant's proposed action on the Covered Species are adequate. USFWS published a Notice of Intent (NOI) in the *Federal Register* on November 5, 2013 announcing the preparation of joint federal and state EIS. An EIS Preparation Notice (EISPN) was published in the State Office of Environmental Quality Control's (OEQC's) *The Environmental Notice* on December 23, 2013. Subsequently, this EISPN was withdrawn due to the addition of a second access point into the Project which added new Tax Map Key (TMK) parcels that were not included in the original EISPN, as well as other modifications in the proposed Project design. A new EISPN was published on November 8, 2014. Copies of both the NOI and the both versions of the EISPN are provided in Appendix A.

Publication of the NOI in the Federal Register initiated a 30-day public scoping period during which time agencies and the public could submit comments on the Project. Publication of the EISPN initiated a separate 30-day scoping period during which comments could also be submitted. A second 30-day State scoping period was initiated in association with republication of the EISPN. Public meetings were held during each of the three scoping periods.

All comments received during the federal and state scoping periods, including public review and comment on the EISPN and NOI, are consolidated in this report in order to identify environmental issues and/or concerns that the USFWS, DLNR, and NPMPP should consider during the draft EIS process. These comments were received by mail, e-mail, and through testimony recorded at the two public scoping meetings held November 13, 2013 and January 10, 2014 in Kahuku, Hawaii. No public testimony was submitted during the November 19, 2014 public meeting

The National Environmental Policy Act (NEPA) and the Hawaii Environmental Policy Act (HEPA) provide that there shall be an early and open process for determining the scope of issues to be addressed in the EIS and for identifying the significant issues related to a proposed action. The purpose of this scoping process, including the scoping meetings, was to allow the public, and specifically the impacted communities, to provide comment on what the EIS should study, including a reasonable range of alternatives. This information will then be used to assist resource specialists in data collection and analysis for the development of the draft EIS.

Supporting documentation for this summary report is provided in the following appendices:

- Appendix A – includes a copy of the NOI published in the *Federal Register* on November 5, 2013 and a copy of the EISPN published in *The Environmental Notice* on December 23, 2013 and a copy of the EISPN published on November 8, 2014.
- Appendix B – includes local newspaper scoping meeting notification publication information.
- Appendix C – includes transcripts from the public scoping meetings.
- Appendix D – contains the comments received during the scoping periods of November 5, 2013 to December 5, 2013; December 23, 2013 to January 22, 2014; and November 8, 2014 to December 7, 2014 and the corresponding comment response letters, as required under HEPA.

1.1 Project Description

The proposed Project includes portions of two parcels (Tax Map Key [TMK] 5-6-008:006 and 5-6-006:018) located in the Koolauloa District, west of the town of Kahuku in the City and County of Honolulu. These parcels will be leased from the DLNR (approximately 234 acres (95 hectares) and from the Malaekahana Hui West, LLC (approximately 452 acres (183 hectares). Additional parcels would be used to access the Project (TMK 5-6-006: 047, 051, 055, and 5-6-005:018) for which NPMPP would utilize temporary entry permits or licenses or easements. The leased area plus the State-owned access is hereafter referred to as the "wind farm site," consisting of approximately 707 acres (286 hectares). The proposed Project is located almost entirely within the State agricultural land use district with only a small portion of the wind farm site (2 acres [1 hectare]) near Kamehameha Highway falling within the State urban land use district. All of the proposed Project facilities are located within the State agricultural land use district. The proposed Project is located within Honolulu County agricultural zoning districts: General Agricultural and Restricted Agricultural. The Project, is accessible via local roads off of Kamehameha Highway, and is located east of the existing Kahuku Wind Farm.

The proposed Project would consist of up to 10 wind turbines each with a nameplate generating capacity of up to 3.3 megawatts (MW). NPMPP is currently considering turbine models from leading turbine manufacturers including Siemens, Vestas, and GE. The turbine array could include a combination of models from a single manufacturer ranging in generating capacity and dimensions. Turbine models being considered range in hub height from approximately 262 feet (80 meters) to 302 feet (92 meters) with rotor diameters ranging from 328 feet (100 meters) to 384 feet (117 meters), resulting in a maximum height at the top of the blade of up to 512 feet (156 meters) above

ground level. NPMPP would select the most appropriate turbines for the site-specific conditions of the wind farm site prior to construction.

The Project would also include permanent facilities including access roads, overhead and underground transmission and collector lines, an onsite substation, and an operation and maintenance (O&M) building and associated storage yard and parking area. Temporary wind turbine assembly lay down areas would also be used during construction. The Project is expected to produce approximately 88,000 megawatt hours (MWh) of electricity generation per year (assuming an installed capacity of up to approximately 25 MW). The energy generated by the Project would connect to an onsite substation and feed into the Hawaii Electric Company's (HECO's) grid. The Project supports the objectives of the Hawaii Clean Energy Initiative as well as HECO's compliance with the requirements of the Renewable Portfolio Standard.

A joint federal and state HCP is being prepared in anticipation of seeking an ITP from the USFWS, and an ITL from the DLNR, DOFAW. The issuance of an ITP triggers the need for environmental compliance under NEPA. The USFWS is the lead agency under NEPA. The USFWS will use this EIS in whether or not to approve the HCP and issue an ITP for the Project. Due to the Project's need to obtain a commercial lease from the DLNR Land Division authorizing commercial operation of a wind project on State of Hawaii lands and use of State-owned lands, Hawaii Revised Statutes (HRS) Chapter 343 review is required and DLNR Land Division is the Accepting Authority for the HEPA environmental review. The USFWS and DLNR Land Division have determined that a joint state and federal EIS will be prepared as a single document that is consistent with both NEPA and HRS Chapter 343 regulations.

Three alternatives are being considered and analyzed in the EIS. They include:

- Alternative 1 – No Action
- Alternative 2 (Proposed Action) – Wind Project of up to 10 Turbines
- Alternative 3 – Larger Generation Wind Project (up to 12 Turbines)

Public comment received during the public scoping period helped inform the identification of alternatives. The EIS will identify and disclose direct, indirect, and cumulative impacts for all resource issues by alternative, including the no action alternative.

1.2 History of the Project and Public Involvement

In 2009, Oahu Wind Partners, LLC (OWP) proposed to construct and operate a 25 MW wind farm, also called Na Pua Makani, on the DLNR owned portion of the current Project site. The OWP wind project did not move forward and a Chapter 343 analysis was not completed. NPMPP's proposed Project is a new project separate from OWP's 2009 proposed project.

In May 2013, NPMPP began holding community meetings, small focus group meetings with stakeholders, and individual meetings with community leaders and legislators to discuss the proposed Project and engage the public in the Project's planning and design. Key stakeholders before whom NPMPP has presented the Project include the Kahuku Community Association, Koolauloa Neighborhood Board, and Laie Community Association.

2.0 SCOPING MECHANISMS

The following section describes the mechanisms used to solicit and capture public comment in accordance to Council on Environmental Quality guidance (40 CFR 1501.7), HRS Chapter 343, and USFWS guidelines (550 FW 2.3).

2.1 Scoping Announcements and Meeting Notices

The USFWS published an NOI in the *Federal Register* on November 5, 2013 announcing the preparation of joint federal and state EIS, the date for a public scoping meeting, and the invitation to submit comments on the scope of issues to be addressed in the EIS. The publication of the NOI commenced a 30-day federal scoping period (November 5 through December 5, 2013). A copy of the NOI is included in Appendix A.

A public meeting notice for the November 13, 2013 NEPA public scoping meeting was published in the *Honolulu Star-Advertiser* on Thursday, November 7, 2013 (see Appendix B). A press release was also issued by the USFWS on November 5, 2013 and meeting invitation letters were mailed to the stakeholders on the Project mailing list. Flyers advertising the meeting were posted in the Kahuku community prior to the meeting. These notices are available in the Project record.

An EISPN was published in the OEQC's *The Environmental Notice* on December 23, 2013 which included a copy of the USFWS NOI. The publication of the EISPN commenced a 30-day state scoping period (December 23, 2013 through January 22, 2014). A second 30-day State scoping period (November 8, 2014 to December 7, 2014) was initiated in association with republication of the EISPN on November 8, 2014. Public meetings were held during each scoping period. A copy of both the December 23, 2013 and November 8, 2014 published EISPNs are included in Appendix A.

To provide notice of the public scoping meeting for the HEPA (state) process, NPMPP issued legal notices that were published in the *Honololu Star-Advertiser* on Thursday, January 2, 2014 for the first HEPA scoping meeting (January 10, 2014) and on November 8, 2014 for the second HEPA scoping meeting (November 19, 2014). Copies of each published legal notice are included in Appendix B. In addition, invitation letters were mailed to the stakeholders on the Project mailing list. Flyers advertising the January 10, 2014 HEPA scoping meeting were posted in the Kahuku community prior to the meeting. These notices are available in the Project record.

2.2 Public Scoping Meetings

The NEPA scoping meeting was held in November 2013 and the HEPA scoping meetings were held in January 2014 and November 2014. All comments received were addressed individually in accordance with Chapter 343 requirements (see Section 3.0 for additional discussion). Public scoping meeting dates and locations are summarized in Table 1. Transcripts for the public meetings are included in Appendix C.

Table 1. Scoping Meetings, Dates, Locations, and Attendance

Meeting Location	Date	Time	Estimated Attendance
Kahuku Community Center 56-576 Kamehameha Hwy Kahuku, HI 96731	November 13, 2013	5:30 PM to 9:00 PM	35
Kahuku Community Center 56-576 Kamehameha Hwy Kahuku, HI 96731	January 10, 2014	6:30 PM to 8:00 PM	19
Kahuku Community Center 56-576 Kamehameha Hwy Kahuku, HI 96731	November 19, 2014	6:00 PM to 7:30 PM	0

The November 13, 2013 scoping meeting was held by the USFWS and included both informal as well as formal components. Attendees were welcomed at the entrance and asked to sign in. Thirty-five attendees signed in. The meeting commenced with an informal open house so that attendees could review meeting handouts and the display boards, as well as speak one-on-one with representatives from the USFWS and NPMPP. The display boards included an overview of the objectives of the scoping meeting, an overview of the Project, a description of the species covered in the HCP, a process chart explaining the NEPA and HEPA process and opportunities for public comment, and instructions on how to submit comments. After the open house portion of the meeting, a PowerPoint presentation was given that included an introduction to the NEPA process, an overview of the Project, HCP, and the scoping period, and information on next steps and how to provide comment. A public comment period followed the formal presentation. At the close of the public comment period, an informal question and answer period occurred. Nine people provided oral testimony. Although comment forms were available at the meeting so that attendees could submit written comments during the meeting or mail them in at a later date, no written comments were submitted. Supporting information for the November 13, 2013 public scoping meetings, including the PowerPoint presentation, display boards, sign-in sheets, a sample comment form, and the meeting transcript are included in the Project record. A meeting transcript is included in Appendix C.

The January 10, 2014 meeting held by NPMPP for the HEPA scoping process included both informal and formal components. Attendees were welcomed at the entrance and asked to sign in. Nineteen attendees signed in. After an informal open house where attendees could review meeting handouts and display boards, formal introductions began. NPMPP and Tetra Tech gave presentations on the Project and EIS process and timeline. After this, attendees were invited to provide public comments. At the close of the public comment period, an informal question and answer session occurred. Ten people provided oral testimony. Comment forms were available at the meeting so that attendees could submit written comments during the meeting or mail them in at a later date. Two written comments were received. Supporting information for the HEPA scoping meeting is included in the Project record. A meeting transcript is included in Appendix C.

The November 19, 2014 public scoping meeting consisted of an open house with display boards highlighting changes in the Project since the previous scoping meeting. There were no attendees at this meeting.

3.0 SUMMARY OF COMMENTS RECEIVED

Public scoping comments were received via:

- Oral discussion or testimony at the public scoping meetings.
- Written comments received by the USFWS via e-mail.
- Written comments received by Tetra Tech via email, the postal service or hand-delivery.

There were a total of 34 submissions during the federal scoping period, 40 submissions during the first state scoping period, and 11 submissions during the second state scoping period. A submission is defined as the entirety of a written or oral entry. Comments are defined as discrete concepts conveyed in submissions. The complete text of each received submission is included in the Administrative Record for the EIS and in Appendix D. Each comment submission (during both the NEPA and HEPA scoping periods) was replied to with a formal response letter from NPMPP, per HRS Chapter 343. Response letters were sent to commenter's whose submissions included contact information.

Each submission was read and analyzed for substantive comments. Substantive comments were assigned to an issue category and given an issue code. Each issue code had a summary statement drafted. The issue categories, issue codes, and summary statements are listed in Table 2. The public comment submissions generated 522 coded comments, sorted into 21 issue categories and 55 issue codes with accompanying summary statements.

Among the scoping comments received, some issues were raised more frequently than others. A key purpose of scoping is to "determine the scope and the significant issues to be analyzed in depth in the environmental impact statement (40 CFR 1501.7). Significant issues can be raised by just a few comments or by many commenters. It is the significance of the issue and not the frequency of the comment that determines how it should be addressed in the EIS.

Table 2. Issue Category Codes

Issue Category	Issue Code	Summary Statement	Number of Comments[1/]
Comment Acknowledged	ACK	Comments that were received and noted, including general comments, expressions of opinion, and comments that do not fall within the scope of analysis for this EIS.	131
		Total Comment Acknowledged Comments	**131**
Air Quality	AIR 1	Air quality impacts (criteria pollutants) and greenhouse gases resulting from construction and operation of the Project, and how impacts will be calculated and mitigated.	7
	AIR 2	Impacts to meteorology (at the meso-scale and micro-scale) resulting from the Project.	1
	AIR 3	Impacts related to climate change should be identified and analyzed.	3
		Total Air Quality Comments	**11**
Alternatives	ALT 1	Would like to see alternative energy solutions analyzed, including solar, geothermal, personal photovoltaic systems, and geothermal as part of the alternatives analysis.	11
	ALT 2	An alternate location for the Project should be analyzed (e.g. moving turbines further inland, different location on Oahu) due to the current Project's close proximity to the community and schools.	19
	ALT 3	The alternatives analysis should include a reasonable range of alternatives, and should describe how alternatives were developed and also how they were eliminated from further analysis.	7
		Total Alternatives Comments	37
Cultural Resources	CUL 1	Protection of Native Hawaiian cultural sites and burial grounds, and preservation of culturally-significant lands.	2
	CUL 2	Native Hawaiian land access and gathering rights being restricted as a result of the Project.	4
	CUL 3	Proper consultation is conducted between the USFWS and Native Hawaiian people and mitigation measures are developed for potential impacts to cultural resources.	2
		Total Cultural Comments	8
Data	DAT 1	Recommended specific studies and reports to be reviewed for inclusion in the EIS, or made data requests related to specific issues for inclusion in the EIS.	23
	DAT 2	Recommended visual simulations of the Project be included in the EIS.	3
		Total Data Comments	26
Direct, Indirect, and Cumulative Impacts	DSC 1	Direct, indirect, and cumulative impacts to public health, visual resources, and socioeconomics for communities nearby.	5
	DSC 2	Direct, indirect, and cumulative impacts to aquatic and terrestrial ecosystems, habitat, native plants, wildlife, bat, and avian species.	4
	DSC 3	The EIS should utilize a clear methodology for analyzing direct, indirect, and cumulative impacts; proposed mitigation measures should be identified and analyzed; and past, present, and future actions should be analyzed as part of the cumulative impact analysis.	10

Table 3. Issue Category Codes (continued)

Issue Category	Issue Code	Summary Statement	Number of Comments[1/]
Direct, Indirect, and Cumulative Impacts	DSC 4	Cumulative impacts associated with power generation of the Project when combined with other nearby wind farms, and whether the power being produced is more than is needed.	2
		Total Direct, Indirect, and Cumulative Impacts Comments	21
Environmental Justice	ENJ 1	The EIS should address any disproportionate adverse impacts to minority and low-income populations, and should reflect coordination with those affected populations.	3
		Total Environmental Justice Comments	3
Public Health and Safety	HAS 1	Health impacts resulting from noise (infrasound and audible) such as headaches, loss of sleep, and lack of concentration as well as health impacts resulting from shadow flicker that may affect community members who live within close proximity to the Project should be discussed and analyzed.	39
	HAS 2	Safety impacts to community members related to wind turbine mechanical issues, such as blade throw or turbine collapse should be discussed and analyzed.	15
	HAS 3	Fire hazards associated with the Project's construction and operation including facility electrical failure and the identification of appropriate safety measure to address fire preparedness and emergency response.	13
		Total Public Health and Safety Comments	**67**
Natural and Man-Made Hazards	HAZ 1	The threat of natural disasters, including hurricanes, tsunamis, and earthquakes, and how these events could in turn threaten the health and safety of nearby communities through the collapse of turbine towers or blade throw should be discussed and analyzed.	13
	HAZ 2	Hazardous wastes, chemicals, and pesticides that will be produced or used by the Project, and how they will be stored, disposed of, and managed.	3
		Total Natural and Man-Made Hazards Comments	**16**
Land Use	LAN 1	The existing condition of the land and land uses within the wind farm site.	5
	LAN 2	The status and value of agricultural lands within the wind farm site.	3
	LAN 3	Potential negative impacts to U.S. Army training facilities located adjacent to the wind farm site.	3
	LAN 4	Potential impacts to agriculture and how any impacts may be mitigated.	1
		Total Land Use Comments	**12**
Mitigation	MIT 1	Would like to see mitigation measures included in the analysis to reduce impacts to biological resources such as ecosystems, habitat, native plants, wildlife, bird and avian species.	3
	MIT 2	Would like to see mitigation measures and BMPs related to water resources, including water quality, landscape irrigation, and stormwater management.	9
	MIT 3	Would like to see mitigation measures designed to minimize traffic impacts during construction.	1
	MIT 4	Would like to see mitigation measures constructed to use less hazardous materials during construction and operation.	1

Table 4. Issue Category Codes

Issue Category	Issue Code	Summary Statement	Number of Comments[1/]
	MIT 5	Suggested a specific mitigation measure for inclusion in the impact analysis in the EIS.	2
		Total Mitigation Comments	**16**
Noise	NOI 1	Noise from the wind turbines associated with construction and operation of the Project impacting sensitive receptors.	5
		Total Noise Comments	**5**
Proposed Project	PRO 1	The proposed locations for the wind turbines are too close to residences and schools, and potential impacts should be analyzed. The EIS should show distances from the closest turbines to the elementary and high schools, the community boundary, and nearest residences.	30
	PRO 2	Power generation – specifically, what the overall capacity and daily production of the Project will be, transmission line upgrades that might be needed, how much electricity will go into the HECO grid, and how much of that electricity will stay in local communities.	8
	PRO 3	Would like to see more detail on the Proposed Action and Project components (in text and represented graphically), including: wind turbine components, specifications, and materials needed for construction of turbines; turbine upgrades (if needed); the locations of turbines, collection lines, and point of interconnection; access road construction and maintenance; plans for turbine operations and maintenance; and plans for decommissioning and site restoration.	29
	PRO 4	Clarification on the purpose and need of the Project, including how the Project would fit into the larger energy market that it would serve.	6
		Total Proposed Project Comments	**73**
Recreation and Tourism	REC 1	Potential decreases in tourism to the area could occur as a result of the change to the visual landscape from the Project.	3
		Total Recreation and Tourism Comments	**3**
Regulatory	REG 1	Compliance with both the NEPA and HEPA processes for public scoping and outreach, that community members and agencies have been adequately consulted during scoping, and will continue to be consulted with during the entire planning process.	12
	REG 2	The City and County of Honolulu setback distance regarding proximity of wind turbines to residences is insufficient and must be updated to reflect safe distances.	13
	REG 3	The Project must be in compliance with all federal, state, and county regulations, plans, and policies, including obtaining applicable federal, state, and county permits.	60
	REG 4	Would like to see the development of a scientifically-supportable Habitat Conservation Plan (HCP), and a description of how the HCP will be implemented.	3

Table 5. Issue Category Codes

Issue Category	Issue Code	Summary Statement	Number of Comments[1/]
		Total Regulatory Comments	**88**
Socioeconomics	SOC 1	Concerned about the details of the community benefits package.	13
	SOC 2	How the Project would affect homeowners' ability to install photovoltaic systems.	8
	SOC 3	Concern that the Project would impact the quality of life for nearby communities.	9
	SOC 4	How would the Project contribute to a savings on the electrical bills of local residents, and how soon once the Project is operational could residents begin to see any potential savings.	19
	SOC 5	Concern that the Project would lower property values and make it harder for homeowners to sell homes that are in close proximity to the turbines.	4
	SOC 6	Short- and long-term socioeconomic impacts to the community resulting from the Project.	14
		Total Socioeconomics Comments	**67**
Transportation and Traffic	TRA 1	Short- and long-term traffic impacts to the community, and what mitigation measures could be used to decrease impacts during construction.	2
		Total Transportation and Traffic Comments	**2**
Vegetation and Wetlands	VEG 1	Potential impacts to Native plant communities located within the wind farm site, and how any impacts would be mitigated.	1
	VEG 2	The EIS should include measures to monitor and control invasive plant species and noxious weeds.	1
		Total Vegetation and Wetlands Comments	**2**
Visual Resources	VIS 1	Wind turbines impact the scenic beauty of the wind farm site, and steps should be taken to minimize visual impacts.	22
		Total Visual Resources Comments	**22**
Water Resources	WAT 1	Water resources impacts including water sources for the Project, sediment run-off, and potential effects to coastal zones should all be analyzed in the EIS.	10
		Total Water Resources Comments	**10**
Wildlife (including Threatened and Endangered Species)	WIL 1	Avian and bat impacts, including potential cumulative impacts resulting from existing and future wind projects should be discussed and analyzed. Comprehensive pre-construction and post-construction mortality monitoring surveys should be conducted.	15
	WIL 2	Critical fish habitat within the wind farm site and potential impacts should be disclosed.	1
	WIL 3	Direct, indirect, and cumulative impacts to native wildlife species and habitat, as well as mitigation measures, should be identified.	13
		Total Wildlife (including Threatened and Endangered Species) Comments	**29**

[1/] Note: Some comments received multiple codes.

4.0 NEXT STEPS IN THE PLANNING PROCESS

This section is intended to be a very broad overview of the next steps in the joint NEPA/HEPA process.

4.1 Develop Alternatives

The comments received inform the identification of a reasonable range of alternatives that meet the purpose and need of the Project to be examined in the EIS. Pertinent input from the scoping process will be incorporated into the range of potential alternatives. This ensures that a full spectrum of positions expressed by participants in the scoping process has been considered, in accord with NEPA. Alternatives that were eliminated from further consideration and are not brought forward for formal analysis in the EIS will be identified, along with justification for elimination.

4.2 Describe the Affected Environment

Available environmental information associated with the identified issue categories will be reviewed and summarized. The summary will include available scientific research and pertinent studies and surveys required for areas that would be potentially impacted by the viable alternatives. This information will be presented in the Affected Environment chapter of the EIS.

4.3 Assess Environmental Consequences of Alternatives

The potential environmental consequences of alternatives carried forward for analysis will be evaluated, including direct, indirect, and cumulative effects. NEPA compliance associated with federal, state, and local agency permits will be identified and incorporated into the analysis of potential effects. This step will be conducted after the range of alternatives is identified.

4.4 Issue the Draft EIS

A Draft EIS will be prepared and made available for review by the public and local, state, and federal agencies. The Draft EIS will be available for a 90-day review after the Notice of Availability has been published in the Federal Register. The public hearings will offer another opportunity for public comment on the Draft EIS. A public meeting will be held during the public comment period.

4.5 Issue the Final EIS and Record of Decision

After analyzing public comments received on the Draft EIS, the document will be revised to create a Final EIS. The Final EIS will include the comments submitted on the Draft EIS, including changes made to the EIS in response to comments. This step will include public notice of document availability, the distribution of the document, and a 30-day comment/waiting period on the final document. The issuance of a Record of Decision will conclude the EIS process under NEPA. The selected alternative will be identified, as well as the USFWS/DLNR rationale for their conclusions

regarding the environmental effects and appropriate mitigation measures for the proposed Project. Acceptance of the Final EIS by the DLRN Land Division will complete the HEPA process.

5.0 CONTACTS

Lead Agencies

U.S. Fish and Wildlife Service
Aaron Nadig
Pacific Islands Fish and Wildlife Office
300 Ala Moana Blvd., Room 3-122, Box 50088
Honolulu, HI 96850
Tel: 808-792-9466

Department of Land and Natural Resources/Land Division
Russell Tsuji
1151 Punchbowl Street
Honolulu, HI 96813
Tel: 808-587-0414

Project e-mail: *NaPuaMakanihcp@fws.gov*

APPENDIX A
NOTICE OF INTENT AND ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE

- Public comments; and
- Adjourn.

Members of the public who wish to participate in the November 20, 2013, public meeting (which will be held by webinar) should register at the following Web site by November 19, 2013: *https://www1.gotomeeting.com/register/774101625.* Upon your registration, instructions on how to join the meeting will be sent to your email address. The webinar is limited to 100 participants.

Written comments may be sent to the Designated Federal Official listed in the **FOR FURTHER INFORMATION CONTACT** section above. To review all related material on the Commission's work, please refer to *http://www.doi.gov/cobell/commission/index.cfm.* All meetings are open to the public.

Dated: October 30, 2013.

Kevin K. Washburn,

Assistant Secretary—Indian Affairs.

[FR Doc. 2013–26369 Filed 11–4–13; 8:45 am]

BILLING CODE 4310–W7–P

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

[FWS–R1–ES–2013–N213; FXES11120100000–134–FF01E00000]

Notice of Intent To Prepare a Draft Environmental Impact Statement on a Proposed Incidental Take Permit for the Na Pua Makani Project, Kahuku, Hawaii

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Notice of intent; announcement of public scoping meeting; request for comments.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), intend to conduct public scoping under the National Environmental Policy Act (NEPA) to gather information to prepare a draft environmental impact statement (DEIS) related to an incidental take permit (ITP) application that Champlin Hawaii Wind Holdings, LLC (Champlin) intends to submit to the Service pursuant to the requirements of section 10(a)(1)(B) of the Endangered Species Act of 1973, as amended (ESA). The proposed permit would authorize the incidental take of listed species caused by the construction and operation of Champlin's proposed Na Pua Makani Project (Project) near Kahuku, Hawaii, for production of wind-generated electrical energy on the island of Oahu. In accordance with ESA requirements for an ITP, Champlin is preparing a habitat conservation plan (HCP) to minimize and mitigate the impacts of take of the covered species likely to be caused by the Project. The DEIS will address the impacts of, and alternatives to, issuance of the ITP and implementation of the HCP to determine if these actions may significantly affect the human environment. This notice initiates the public scoping period for the DEIS during which we invite other agencies and the public to attend a public meeting and submit oral and written comments that provide suggestions and information on the scope of issues and alternatives that should addressed in the DEIS.

DATES: A public scoping meeting will be held on November 13, 2013, from 5:30 p.m. to 9:00 p.m. at the Kahuku Village Association Community Center, 56576 Kamehameha Highway, Kahuku, Hawaii 96731. The public is invited to provide oral and written comments at this meeting related to our preparation of a DEIS for this proposed permit action. To ensure consideration of written comments, please send your written comments on or before December 5, 2013.

ADDRESSES: Comments concerning the issuance of the ITP, the development of the Na Pua Makani HCP and the preparation of the associated DEIS should be identified as such, and may be submitted by one of the following methods:

- *Email: NaPuaMakanihcp@fws.gov.* Include ''Na Pua Makani HCP and DEIS'' in the subject line of the message;
- *U.S. Mail:* Loyal Mehrhoff, Field Supervisor, U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, 300 Ala Moana Boulevard, Room 3–122, Honolulu, Hawaii 96850;
- *In-Person Drop-off, Viewing, or Pickup:* Written comments will be accepted at the public meeting on November 13, 2013, or can be dropped off during regular business hours at the above address on or before December 5, 2013; or
- Written comments can also be faxed (*Fax:* (808) 792–9581, Attn.: Loyal Mehrhoff) to the Service on or before December 5, 2013.

FOR FURTHER INFORMATION CONTACT: Mr. Loyal Mehrhoff or Aaron Nadig, U.S. Fish and Wildlife Service (see **ADDRESSES** above); by telephone (808) 792–9400; or by email at *NaPuaMakanihcp@fws.gov.* If you use a telecommunications device for the deaf, please call the Federal Information Relay Service at (800) 877–8339.

SUPPLEMENTARY INFORMATION:

Reasonable Accommodation

Persons needing reasonable accommodations to attend and participate in the public meeting should contact Loyal Mehrhoff or Aaron Nadig (see **FOR FURTHER INFORMATION CONTACT** above). Please note that the meeting location is accessible to wheelchair users. To allow sufficient time to process requests, please call no later than 1 week in advance of the meeting.

Background

Section 9 of the ESA and the implementing regulations for the ESA in the Code of Federal Regulations (CFR) at 50 CFR part 17 prohibit the ''take'' of fish or wildlife species listed as endangered or threatened. Take of listed fish or wildlife is defined under the ESA as ''to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct'' (16 U.S.C. 1532). The term ''harass'' is defined in the regulations as ''an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering'' (50 CFR 17.3). The term ''harm'' is defined in the regulations as ''an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, and sheltering'' (50 CFR 17.3).

Under limited circumstances, we issue permits to authorize incidental take—i.e., take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Regulations governing ITPs for threatened and endangered species are found at 50 CFR 17.32 and 17.22, respectively. In addition to meeting other criteria, an ITP must not jeopardize the continued existence of federally listed threatened or endangered species. Section 10(a)(1)(B) of the ESA contains provisions for issuing such ITPs to non-Federal entities for the take of endangered and threatened species, provided the permit and related conservation plan meet the following criteria: (1) The taking will be incidental; (2) the applicant will, to the maximum extent practicable, minimize and mitigate the impact of such taking; (3) the applicant ensures that adequate funding for the plan will be provided; (4) the taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild;

and (5) the applicant will carry out any other measures that the Service may require as being necessary or appropriate for the purposes of the HCP.

NEPA (42 U.S.C. 4321 *et seq.*) requires that Federal agencies conduct an environmental analysis of their proposed actions to determine if the actions may significantly affect the human environment. Under NEPA, a reasonable range of alternatives to a proposed project is developed and considered in the Service's environmental review. Alternatives considered for analysis in an EIS for an HCP may include, but are not limited to: Variations in the scope of covered activities; variations in the location, amount, and type of conservation activities; variations in permit duration; or a combination of these elements.

Proposed Action

Champlin's proposed Project would be located on private and public lands near the town of Kahuku, County of Honolulu, on the island of Oahu, Hawaii. The proposed Project would provide up to 45 megawatt capacity of renewable wind-generated electrical energy to the island of Oahu. A portion of the Project would be located on State of Hawaii lands managed by the Department of Land and Natural Resources (DLNR). The proposed Project's location is adjacent to the existing Kahuku Wind Farm. The Project would be completed in two phases. Phase 1 is anticipated to include approximately eight turbines and phase 2 is anticipated to include approximately six turbines. Supporting infrastructure for the proposed Project may include access roads, wind turbine assembly lay down areas, overhead and underground transmission and collector lines, and may also include an on-site substation and an operations and maintenance building.

Champlin proposes to develop an HCP as part of their application for an ITP under section 10(a)(1)(B) of the ESA. The proposed HCP will cover potential take of the federally-listed species discussed below that is incidental to activities associated with the construction, operation, maintenance, and decommissioning of the Project. The HCP will include measures to minimize and mitigate impacts to covered species and their habitats.

The proposed Federal action would be the issuance of an ITP to Champlin to authorize incidental take of the covered species, subject to compliance with and implementation of Champlin's HCP for the Project. We anticipate Champlin to request ITP coverage for a period of 20 years.

Covered Species

Champlin intends to seek incidental take coverage for the following five federally-listed threatened and endangered species:

- Newell's shearwater (*Puffinus auricularis newelli*)—Threatened;
- Hawaiian coot (*Fulica americana alai*)—Endangered;
- Hawaiian common moorhen (*Gallinula chloropus sandvicensis*)—Endangered;
- Hawaiian stilt (*Himantopus mexicanus knudseni*)—Endangered; and
- Hawaiian hoary bat (*Lasiurus cinereus semotus*)—Endangered.

The following State-listed endangered species may also be included as a covered species in Champlin's proposed HCP:

- pueo or Hawaiian short-eared owl (*Asio flammeus sandwichensis*).

The final list of covered species may include the above listed species, a subset, or additional species, based on the outcome of the planning process.

Public Scoping

The primary purpose of the scoping process is for the public to assist the Service in developing a DEIS for this proposed ITP action by identifying important issues and alternatives related to Champlin's proposed Project, to provide the public with a general understanding of the background of the proposed HCP and activities it would cover, and an overview of the NEPA process. In order to ensure that we identify a range of issues and alternatives related to the proposed ITP action, we invite comments and suggestions from all interested parties.

The scoping meeting will be held on November 13, 2013, from 5:30 p.m. to 9:00 p.m. at the Kahuku Village Association Community Center, 56576 Kamehameha Highway, Kahuku, Hawaii 96731. The meeting format will consist of an initial open house from 5:30 p.m. to 6:15 p.m. The open house format will provide an opportunity to learn about the proposed action, permit area, and the covered species. The open house will be followed by a formal presentation from 6:15 p.m. to 6:45 p.m. of the proposed action and a summary of the NEPA process, followed by an opportunity for oral comments from the public from 6:45 p.m. to 9:00 p.m. We will accept oral and written comments at the public meeting. A court reporter and an interpreter will be present if deemed necessary. You may also submit your comments and materials by one of the methods listed in the **ADDRESSES** section. Once the DEIS and draft HCP are complete and made available for review, there will be additional opportunity for public comment on the content of these documents through an additional public hearing and comment period.

Public Comments

We request data, comments, new information, or suggestions from the public, other concerned governmental agencies, the scientific community, native Hawaiian organizations, industry, or any other interested party on this notice. We and the applicant will consider these comments in developing the DEIS and the draft HCP related to the proposed Project. We particularly seek comments on the following:

1. The direct, indirect, and cumulative effects that implementation of any reasonable alternative to the proposed Project could have on endangered or threatened species and other unlisted species and their habitats;
2. Other reasonable alternatives to the proposed permit action for issuance of an ITP for the proposed Project or that avoid the need for an ITP that should be considered and their associated effects;
3. Relevant biological data and additional information concerning the proposed covered species;
4. Current or planned activities in the subject area and their possible impacts on the proposed covered species;
5. The presence of archaeological sites, buildings and structures, historic events, sacred and traditional areas, and other historic preservation concerns;
6. The scope of covered activities, including potential avoidance, minimization, and mitigation measures for incidental take of the proposed covered species;
7. Appropriate monitoring and adaptive management provisions that should be included in the HCP; and
8. Identification of any other environmental issues that should be considered with regard to the proposed Project and permit action.

Public Availability of Comments

Comments and materials we receive in response to this notice and at the public meeting, as well as supporting documentation we use in preparing the DEIS under NEPA, will become part of the public record and will be available for public inspection by appointment, during normal business hours, at the Service's Pacific Islands Fish and Wildlife Office (see **ADDRESSES** above). Before including your address, phone number, email address, or other personal identifying information in your comment(s), you should be aware that

your entire comment(s)—including your personal identifying information—may be made publicly available at any time. While you can ask us in your comment(s) to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

Environmental Review and Next Steps

The Service will conduct an environmental review to analyze the proposed action, along with other alternatives considered and the associated impacts of each for the development of the DEIS. The DEIS will include an analysis of impacts on each covered species and the range of alternatives to be addressed. The DEIS is expected to provide biological descriptions of the affected species and habitats, as well as the effects of the alternatives on other resources, such as vegetation, wetlands, wildlife, geology and soils, air quality, water resources, water quality, cultural resources, land use, recreation, water use, the local economy, and environmental justice. Following completion of the environmental review, the Service will publish a notice of availability and request for public comments on the DEIS, Champlin's permit application, and the draft HCP. The DEIS and draft HCP are expected to be completed and available to the public in 2014.

Authority

The environmental review of this project will be conducted in accordance with the requirements of the NEPA of 1969, as amended (42 U.S.C. 4321 *et seq.*), Council on Environmental Quality Regulations (40 CFR Parts 1500—1508), other applicable Federal laws and regulations, and applicable policies and procedures of the Service. This notice is being furnished in accordance with 40 CFR 1501.7 of the NEPA regulations to obtain suggestions and information from other agencies and the public on the scope of issues and alternatives to be addressed in the DEIS.

Dated: October 18, 2013.

Richard R. Hannan,

Deputy Regional Director, Pacific Region, U.S. Fish and Wildlife Service, Portland, Oregon.

[FR Doc. 2013–26465 Filed 11–4–13; 8:45 am]

BILLING CODE 4310–55–P

DEPARTMENT OF THE INTERIOR

Bureau of Land Management

[LLCON00000 L10200000.DF0000 LXSS080C0000]

Notice of Public Meeting, Northwest Colorado Resource Advisory Council Meeting

AGENCY: Bureau of Land Management, Interior.

ACTION: Notice of public meeting.

SUMMARY: In accordance with the Federal Land Policy and Management Act and the Federal Advisory Committee Act of 1972, the U.S. Department of the Interior, Bureau of Land Management (BLM) Northwest Colorado Resource Advisory Council (RAC) will meet as indicated below.

DATES: The Northwest Colorado RAC scheduled a meeting from 10 a.m. to 3:00 p.m., Dec. 5, 2013, with a public comment period regarding matters on the agenda at 11:15 a.m. A specific agenda will be available before the meeting at *www.blm.gov/co/st/en/BLM_Resources/racs/nwrac.html.*

ADDRESSES: The meeting will be held at the Colorado River Valley Field Office, 2300 River Frontage Road, Silt, CO 81652.

FOR FURTHER INFORMATION CONTACT: David Boyd, Public Affairs Specialist, see address above; (970) 876–9008. Persons who use a telecommunications device for the deaf (TDD) may call the Federal Information Relay Service (FIRS) at 1–800–877–8339 to contact the above individual during normal business hours. The FIRS is available 24 hours a day, seven days a week, to leave a message or question with the above individual. You will receive a reply during normal business hours.

SUPPLEMENTARY INFORMATION: The Northwest Colorado RAC advises the Secretary of the Interior, through the BLM, on a variety of public land issues in northwestern Colorado.

Topics of discussion during Northwest Colorado RAC meetings may include the BLM National Sage-Grouse Conservation Strategy, working group reports, recreation, fire management, land use planning, invasive species management, energy and minerals management, travel management, wilderness, wild horse herd management, land exchange proposals, cultural resource management and other issues as appropriate.

These meetings are open to the public. The public may present written comments to the RACs. Each formal RAC meeting will also have time, as identified above, allocated for hearing public comments. Depending on the number of people wishing to comment and time available, the time for individual oral comments may be limited.

Dated: October 22, 2013.

John Mehlhoff,

BLM Colorado Acting State Director.

[FR Doc. 2013–25539 Filed 11–4–13; 8:45 am]

BILLING CODE 4310–JB–P

DEPARTMENT OF THE INTERIOR

Bureau of Land Management

[LLMTL07000–L1420000–BJ0000–LXSIHRRB0000]

Notice of Filing of Plats of Survey; Montana

AGENCY: Bureau of Land Management, Interior.

ACTION: Notice of filing of plats of survey.

SUMMARY: The Bureau of Land Management (BLM) will file the plat of survey of the lands described below in the BLM Montana State Office, Billings, Montana, on December 5, 2013.

DATES: Protests of the survey must be filed before December 5, 2013 to be considered.

ADDRESSES: Protests of the survey should be sent to the Branch of Cadastral Survey, Bureau of Land Management, 5001 Southgate Drive, Billings, Montana 59101–4669.

FOR FURTHER INFORMATION CONTACT: Josh Alexander, Supervisory Cadastral Surveyor, Branch of Cadastral Survey, Bureau of Land Management, 5001 Southgate Drive, Billings, Montana 59101–4669, telephone (406) 896–5123 or (406) 896–5009, *jalexand@blm.gov.* Persons who use a telecommunications device for the deaf (TDD) may call the Federal Information Relay Service (FIRS) at 1–800–877–8339 to contact the above individual during normal business hours. The FIRS is available 24 hours a day, 7 days a week, to leave a message or question with the above individual. You will receive a reply during normal business hours.

SUPPLEMENTARY INFORMATION: This survey was executed at the request of the BLM Lewistown Field Office, and was necessary to determine federal interest lands.

The lands we surveyed are:

Principal Meridian, Montana

T. 25 N., R. 19 E.

The plat, in one sheet, representing the dependent resurvey of a portion of

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

WILLIAM J. AILA, JR.
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

ESTHER KIA'AINA
FIRST DEPUTY

WILLIAM M. TAM
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

December 2, 2013

OFC. OF ENVIRONMENTAL QUALITY CONTROL
'13 DEC 10 P12:20
RECEIVED

Director
Office of Environmental Quality Control
Department of Health, State of Hawaii
235 S. Beretania Street, Room 702
Honolulu, Hawai'i 96813

FILE COPY
DEC 2 3 2013

Dear Director:

Under the provisions of Act 172, Session Laws of Hawaii 2012, the Department of Land and Natural Resources has determined at the outset that an environmental impact statement is required for the Na Pua Makani Wind Project being proposed by Champlin Hawaii Wind Holdings, LLC situated at TMK (1) 5-6-008:006 and TMK (1) 5-6-006:018, in the Koolauloa District in the City and County of Honolulu, on the island of Oahu. A completed Bulletin Publication Form and a summary of the proposed action are enclosed (with a copy of the same sent via electronic mail to oeqc@doh.hawaii.gov).

Pursuant to the requirements of Section 11-200-3, Hawaii Administrative Rules, and Section 11-200-15, Hawaii Administrative Rules, we request that you publish a public notice of this statutory determination in the next available periodic bulletin (Environmental Notice) for the public to submit comments to Champlin Hawaii Wind Holdings, LLC with copies of the approving agency during a thirty-day public comment period.

If there are any questions, please contact Ms. Leilani Pulmano at (808) 983-1233 or Ms. Brita Woeck at (425) 482-7645.

Very Truly Yours,

William J. Aila, Jr.
Chairperson

Copy: Champlin Hawaii Wind Holdings, LLC

Enclosures: (1) Completed OEQC Publication form
(2) Summary description of action in electronic format

APPLICANT ACTIONS
SECTION 343-5(C), HRS
PUBLICATION FORM (JANUARY 2013 REVISION)

RECEIVED
'13 DEC 10 P12:20
OFC. OF ENVIRONMENTAL QUALITY CONTROL

Project Name: Na Pua Makani Wind Project

Island: Oahu

District: Koolauloa

TMK: 5-6-008:006, 5-6-006:018

Permits: Possible permits include:

1. Incidental Take Permit from the U.S. Fish and Wildlife Service
2. Incidental Take License from the State Department of Land and Natural Resources /Division of Forestry and Wildlife
3. Conditional Use Permit – Minor from City & County of Honolulu
4. National Pollution Discharge Elimination System Construction Permit from State Department of Health
5. Public Utilities Commission Approval
6. Federal Aviation Administration Clearance
7. Lease for or easement right from State Department of Land and Natural Resources for use of state land
8. Permit to Move Oversized/Overweight Load from State Department of Transportation and City & County of Honolulu
9. Community Noise Permit for Construction Activities from State Department of Health
10. Construction and Building permits from City & County of Honolulu

Approving Agency:
Board of Land and Natural Resources
Contact: William J. Aila, Jr., Chairperson, Department of Land and Natural Resources, Kalanimoku Building,1151 Punchbowl Street, Honolulu, Hawaii 96813; (808) 587-0400

Applicant:
Champlin Hawaii Wind Holdings, LLC
Contact: Mike Cutbirth; 2020 Alameda Padre Serra, Suite 123, Santa Barbara, CA 93103; (805) 568-0300

Consultant:
Tetra Tech, Inc
Contact: Brita Woeck, Tetra Tech, Inc., 737 Bishop St., Suite 2340, Mauka Tower, Honolulu, HI 96813; (808) 441-6600

Status (check one only):

__DEA-AFNSI — Submit the approving agency notice of determination/transmittal on agency letterhead, a hard copy of DEA, a completed OEQC publication form, along with an electronic word processing summary and a PDF copy (you may send both summary and PDF to oeqchawaii@doh.hawaii.gov; a 30-day comment period ensues upon publication in the periodic bulletin.

__FEA-FONSI — Submit the approving agency notice of determination/transmittal on agency letterhead, a hard copy of the FEA, an OEQC publication form, along with an electronic word processing summary and a PDF copy (send both summary and PDF to oeqchawaii@doh.hawaii.gov; no comment period ensues upon publication in the periodic bulletin.

__FEA-EISPN — Submit the approving agency notice of determination/transmittal on agency letterhead, a hard copy of the FEA, an OEQC publication form, along with an electronic word processing summary and

	PDF copy (you may send both summary and PDF to oeqchawaii@doh.hawaii.gov; a 30-day consultation period ensues upon publication in the periodic bulletin.
X Act 172-12 EISPN	Submit the approving agency notice of determination on agency letterhead, an OEQC publication form, and an electronic word processing summary (you may send the summary to oeqchawaii@doh.hawaii.gov. NO environmental assessment is required and a 30-day consultation period upon publication in the periodic bulletin.
__DEIS	The applicant simultaneously transmits to both the OEQC and the approving agency, a hard copy of the DEIS, a completed OEQC publication form, a distribution list, along with an electronic word processing summary and PDF copy of the DEIS (you may send both the summary and PDF to oeqc@doh.hawaii.gov); a 45-day comment period ensues upon publication in the periodic bulletin.
__FEIS	The applicant simultaneously transmits to both the OEQC and the approving agency, a hard copy of the FEIS, a completed OEQC publication form, a distribution list, along with an electronic word processing summary and PDF copy of the FEIS (you may send both the summary and PDF to oeqc@doh.hawaii.gov); no comment period ensues upon publication in the periodic bulletin.
__ Section 11-200-23 Determination	The approving agency simultaneous transmits its determination of acceptance or nonacceptance (pursuant to Section 11-200-23, HAR) of the FEIS to both OEQC and the applicant. No comment period ensues upon publication in the periodic bulletin.
__Statutory hammer Acceptance	The approving agency simultaneously transmits its notice to both the applicant and the OEQC that it failed to timely make a determination on the acceptance or nonacceptance of the applicant's FEIS under Section 343-5(c), HRS, and that the applicant's FEIS is deemed accepted as a matter of law.
__Section 11-200-27 Determination	The approving agency simultaneously transmits its notice to both the applicant and the OEQC that it has reviewed (pursuant to Section 11-200-27, HAR) the previously accepted FEIS and determines that a supplemental EIS is not required. No EA is required and no comment period ensues upon publication in the periodic bulletin.
__Withdrawal (explain)	

Summary (Provide proposed action and purpose/need in less than 200 words. Please keep the summary brief and on this one page):

Champlin Hawaii Wind Holdings, LLC (Applicant) proposes to construct the Na Pua Makani Wind Project (Project) near Kahuku, Hawaii to provide up to 45 megawatts (MW) capacity of clean, renewable, wind energy to the Island of Oahu. The Project will be completed in two phases, resulting in the construction of up to 15 turbines. A portion of the Project is located on state lands, which triggers a Hawaii Revised Statutes (HRS) Chapter 343 review. A joint federal and state Habitat Conservation Plan is being prepared in anticipation of seeking an Incidental Take Permit (ITP) from the U.S. Fish and Wildlife Service (Service), and an Incidental Take License from the State Department of Land and Natural Resources (DLNR), Division of Forestry and Wildlife. The issuance of an ITP triggers the need for environmental compliance under the National Environmental Policy Act (NEPA). The Service and DLNR have determined that an Environmental Impact Statement (EIS) is warranted. By issuing this notice, the State process under HRS Chapter 343 and the federal process under NEPA will be aligned, and the EIS will be put forth as a single document that meets the requirements of both regulations.

Environmental Impact Statement Preparation Notice for the Proposed Na Pua Makani Wind Project, Kahuku, HI
Notice of Intent to Prepare an Environmental Impact Statement for the proposed Na Pua Makani Wind Project.

APPLICANT:
Champlin Hawaii Wind Holdings, LLC; Address: 2020 Alameda Padre Serra, Suite 123, Santa Barbara, CA 93103; Contact: Mike Cutbirth

ACCEPTING AUTHORITY:
Department of Land and Natural Resources/Land Division; Address: 1151 Punchbowl Street, Honolulu, HI 96813; Contact: Russell Tsuji, Administrator, (808) 587-0414

BRIEF DESCRIPTION OF PROPOSED ACTION:
Champlin Hawaii Wind Holdings, LLC (Applicant) has prepared this Environmental Impact Statement Preparation Notice (EISPN) pursuant to the State of Hawaii (State) Environmental review process, as required and defined by Chapter 343, Hawaii Revised Statutes (HRS) and Title 11, Chapter 200, Hawaii Administrative Rules (HAR), and Act 172-12. The purpose of this EISPN is to initiate the EIS scoping process under Chapter 343 and provide an opportunity for comment by reviewing agencies and the public to ensure the environmental concerns are given appropriate consideration in the decision making process along with economic and technical considerations.

The Na Pua Makani Wind Project (Project) is proposed as an up to 45 megawatt (MW) wind energy project located on public and private lands in Kahuku, Hawaii, adjacent to the existing Kahuku Wind Project. A portion of the Project site is located on land that is designated by the State of Hawaii as an agricultural district and is zoned by the City & County of Honolulu as AG-1 Restricted Agricultural District and AG-2 General Agricultural District. The portion of the Project located on public land is being leased from the Department of Land and Natural Resources (DLNR), who has been identified as the Accepting Authority for the purposes of complying with the Chapter 343 environmental review. The other portion of the Project is located on private land owned by Malaekahana Hui West LLC and is designated by the State of Hawaii as an agricultural district and is zoned by the City & County of Honolulu as AG-1. The location of the Project is indicated in Figure 1.

The Project will be completed in two phases, resulting in the construction of up to 15 turbines. Supporting infrastructure for the proposed Project currently includes met towers, access roads, wind turbine assembly lay down areas, overhead and underground transmission and collector lines, and may also include an on-site substation, and an operations and maintenance building. Construction of the Project is anticipated to begin in 2015.

The following describes the potential Project components. Note that dimensions, acreages, and other measures are subject to change based on refinement of the Project design and will be fully described in the draft joint National Environmental Policy Act/Hawaii Environmental Policy Act EIS.

Wind Turbines
The Applicant is currently considering 3.0 MW wind turbines but will select the most appropriate model based on the latest technology available. The Siemens 3.0-108 model meets current Project design criteria and will be used to analyze potential Project impacts. It has a hub height of 262 feet (ft; 80 meters [m]) and a rotor diameter of 354 ft (108 m); as a result, the maximum height to the top of the blade is 440 ft (134 m). Each turbine would be transported from the Honolulu Harbor via highways and assembled on site on a constructed foundation. After construction, a portion of the turbine pad area would be revegetated to minimize erosion, and a portion would be graveled to allow for operations and maintenance requirements and facilitate monitoring efforts.

Met towers
The Project would include at least one permanent lattice-frame (no guy wires) met towers. The tower would support weather instruments that measure and record weather data to measure performance and guide Project operation. The met tower would be approximately 262 ft (80 m) tall with base dimensions approximately 22 ft by 22 ft (7 m by 7 m) and reducing down to approximately 2 ft by 2 ft (1 m by 1 m) for the top 42 ft (13 m).

Access Roads
Internal access roads used for the Project will include portions of an existing road network plus the addition of new roads. Phase I may include 3.3 mi (5.4 km) of road and Phase II may include 1.2 mi (1.9 km) of road, depending on the final turbine layout. Existing roads would be improved, as needed, and expanded to meet construction and maintenance activity requirements.

Construction staging and equipment laydown area, operation and maintenance facility
This area would serve a variety of storage and support functions. During construction the area would be used as temporary storage and laydown area, refueling location, and waste collection area. It would also serve to provide

temporary parking, office space, and sanitary facilities. The permanent operations and maintenance building, storage, and parking area would be constructed in the same area, and these facilities would be used throughout the life of the Project.

Electrical Collection and Interconnect System

Power produced by the turbines would be collected through an electrical collection system. This would feed into an electrical substation, which steps-up the voltage and transmits the power to the point of interconnect with the island's general transmission system via a generator-tie line. To the extent practicable the collection system would be installed underground. Length below ground for the electrical collection system would be approximately 2.4 mi (3.9 km) for Phase I and approximately 1.7 mi (2.7 km) for Phase II.

The interconnection substation will be protected by a perimeter fence and would include the substation pad and below-grade electrical infrastructure. During construction, the substation area would be cleared and graded, and the substation pad would be compacted with well-graded material. Foundations would be installed for the components as required.

The generator-tie line will consist of an above ground power line mounted on monopoles. Pole dimensions, spacing, and locations will be determined based on detailed engineering that will take into account factors such as existing access, environmental constraints, and cost. Approximately 1.0 mi (1.6 km) of generator-tie line would be required for Phase II. Phase II would require reconductoring upgrades to approximately 20.5 mi (33 km) of existing overhead transmission line along the eastern shore of Oahu between the point of interconnect and the Waihee substation to support the increased load anticipated from the Project. This process would include a replacement of the electrical wires and reuse or replacement of existing power poles.

SUPPLEMENTARY INFORMATION

In 2009, Oahu Wind Partners, LLC (OWP) proposed to construct and operate a 25 MW wind farm, also called Na Pua Makani, on the DLNR-owned parcel. OWP prepared a draft Environmental Assessment (DEA) which was published in the OEQC Environmental Notice on September 8, 2009 for public comment. The OWP wind project did not move forward and the Chapter 343 analysis was not completed. Champlin's Na Pua Makani Project is a new project.

The U.S. Fish and Wildlife Service (Service), with the DLNR, intend to prepare a joint EIS to address the potential impacts associated with the construction, operation, maintenance, and decommissioning of the Project on state and private lands, and will also address the impacts of issuance of an Incidental Take Permit (ITP) under the federal Endangered Species Act of 1973, as amended, and an Incidental Take License (ITL) under the HRS Chapter 195D, and implementation of the associated joint Habitat Conservation Plan (HCP) prepared by the Applicant. The joint EIS will be prepared to comply with the requirements of the National Environmental Policy Act and the Hawaii Environmental Policy Act, and all necessary permits and approvals from other local, state, and federal agencies. The joint National Environmental Policy Act/Hawaii Environmental Policy Act EIS will describe the existing conditions and the potential environmental effects of the Project on resources of the physical, biological, and social environment.

The proposed joint HCP will cover potential take of federally-listed species that is incidental to activities associated with the construction, operation, maintenance, and decommissioning of the Project, and will include measures necessary to minimize and mitigate impacts to covered species and their habitats to the maximum extent practicable. We anticipate that the following five federally-listed endangered species will be included as covered species in the Applicant's proposed HCP:

- 'a'o or Newell's shearwater (*Puffinus auricularis newelli*);
- ōpe'ape'a or Hawaiian hoary bat (*Lasiurus cinereus semotus*);
- 'alae ke'oke'o or Hawaiian coot (*Fulica alai*);
- 'alae 'ula or Hawaiian common moorhen (*Hawaiian moorhen; Gallinula chloropus sandvicensis*); and
- ae'o or Hawaiian black-necked stilt (*Hawaiian stilt; Himantopus mexicanus knudseni*).

For these covered species, the Applicant would seek an ITP/ITL.

The following state-listed endangered species will also be included as a covered species in the Applicant's proposed HCP.

- pueo or Hawaiian short-eared owl (*Asio flammeus sandwichensis*).

The final list of covered species may include all of the above listed species, a subset, or additional species, based on the outcome of the planning process.

DATES:

- All comments on this notice will be considered if received between December 23, 2013, and January 22, 2014.
- A public scoping meeting will be held on January 10, 2014, at 6:30 p.m.in Kahuku, HI.

COMMENTS:
The primary purpose of this EISPN is to initiate the EIS scoping process under Chapter 343 and provide an opportunity for comment by reviewing agencies and the public to ensure the environmental concerns are given appropriate consideration in the decision making process along with economic and technical considerations. We request comments, suggestions, and data from all interested parties to ensure that a reasonable range of alternatives is presented and that all potentially significant issues are identified in the EIS. We will fully consider all comments received during the comment period. Comments and materials we receive will become part of the public record and will be available for public inspection, by appointment, during regular business hours.

We request data, comments, new information, or suggestions from the public, other concerned governmental agencies, the scientific community, native Hawaiian organizations, industry, or any other interested party on this notice. We will consider these comments in developing a draft EIS. We particularly seek comments on the following:

- The direct, indirect, and cumulative effects that implementation of any reasonable alternative could have on the biological, physical, social, and cultural environments;
- Other reasonable alternatives for consideration, and their associated effects;
- Relevant biological data and additional information concerning the proposed covered species;
- Current or planned activities in the subject area and their possible impacts on the biological, physical, social, and cultural environments;
- The presence of archaeological sites, buildings and structures, historic events, sacred and traditional areas, and other historic preservation concerns, which are required to be considered in project planning by the National Historic Preservation Act;
- Covered activities, including potential avoidance, minimization, and mitigation measures;
- Monitoring and adaptive management provisions; and
- Identification of any other environmental issues that should be considered with regard to the proposed Project and permit action.

Because this is a joint National Environmental Policy Act/Hawaii Environmental Policy Act document, all comments submitted in response to the USFWS Notice of Intent to Prepare an EIS and HCP issued in the Federal Register on November 5, 2013 (78 FR 214) and all comments subsequently submitted in response to this EISPN will be fully considered. Comments may be resubmitted in response to this notice; however, this is not required or necessary. A Draft EIS and Draft HCP will be published subsequently with a comment period to follow. Notice of these drafts will be made simultaneously in both the Federal Register and OEQC Bulletin.

ADDRESSES:
Please provide your email address with your electronic and written comments if possible. Electronic inquiries and comments are preferred and may be sent to: NaPuaMakanihcp@fws.gov.

All written inquiries and comments may be sent to: Mike Cutbirth, C/O Tetra Tech, Inc., 737 Bishop St., Suite 2340, Mauka Tower, Honolulu, HI 96813

A public scoping meeting will be held at Kahuku Village Association Community Center, 56576 Kamehameha Highway, Kahuku, Hawaii 96731.

FOR FURTHER INFORMATION CONTACT:
Brita Woeck, Tetra Tech, Inc., 737 Bishop St., Suite 2340, Mauka Tower, Honolulu, HI 96813; (808) 441-6600

DETERMINATION AND REASONS SUPPORTING DETERMINATION:
Pursuant to Section 11-200-12 of the Hawai‘i Administrative Rules, 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 listed significance criteria. Each of these significance criteria are presented below, and are discussed in the context of the proposed project.

Subparagraph B of HAR § 11-200-12 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

Based on the established significance criteria, the description of the proposed project provided above, and input received from the local community during preliminary outreach efforts it is anticipated that the proposed action may result in a significant impact to the human and/or natural environment. Therefore, under the provisions of Act 172 (12), the DLNR has determined from the outset that an EIS is required for the Na Pua Makani wind project.

Background

Existing Conditions

The Project lies on 685 ac (277 ha) of land in Kahuku, Oahu. The operational Kahuku Wind Power facility abuts the Project area to the northwest (Figure 1). It is surrounded by agricultural farm lands to the north; residential housing, community infrastructure, and agricultural farm lands to the east; a mixture of agricultural farm lands and undeveloped forest lands to the south; and undeveloped forest lands to the west. James Campbell National Wildlife Refuge (JCNWR) is approximately 0.75 miles to the north and Malaekahana State Recreation area is 0.1 miles to the east.

The Project area consists of steep, dissected ridges surrounding gently sloping valleys (Hobdy 2013). Elevations range from approximately 3 ft (1 m) above mean sea level (amsl) on the northern edge to 614 ft (187 m) amsl on the southern edge. Soils include Kaena Stony Clay, 12 – 20% slopes, Paumalu Badlands Complex which is highly dissected and steep, and with coral outcrops at elevations below 100 ft amsl (30 m; Foote et al. 1972, Hobdy 2013).

The Project area is located within the 7.1 square mi (18.5 square km) Malaekahana Stream watershed. There are three streams within the Project boundary include: `Ohi`a Stream on the northern border; Kea`aulu Stream which runs through the middle of the Project, and Malaekahana Stream is on the southern border. A preliminary wetlands/waters assessment was completed in June 2013, indicating that these streams qualify as Jurisdictional Waters of the U.S. (Hobdy 2013a). Should impacts to these streams be unavoidable, they may be subject to jurisdiction under Section 404 of the Clean Water Act.

The vegetation within the Project area is dominated by a mixture of aggressive non-native weedy species that took over following the abandonment of sugar cane (*Saccharum officinarum*) agriculture. Several common native species occupy some of the ridge tops. The most abundant species in the Project area is the common ironwood (*Casuarina equisetifolia*). Native species are largely intermixed with non-native species with the exception of a few ridge tops where the native `ulei (*Osteomeles anthyllidifolia*), forms large monotypic patches. Other common native species included `uhaloa (*Waltheria indica*) and `akia (*Wikstroemia oahuensis*). A general biological survey of the Project area was completed in June 2013 (Hobdy 2013b). No threatened, endangered, candidate, or proposed plant species were detected.

A preliminary archeological assessment, consisting of archival and background research and a brief field inspection of the Project area, was conducted in 2013 (Pacific Legacy 2013). The results of this assessment indicate that there appears to be a very low probability of encountering any significant cultural resources within the Project area, and that there is a low likelihood that the Project area contains potentially significant archaeological remains that would preclude wind farm development (Pacific Legacy 2013).

Community Outreach

Community outreach has included attendance at several Kahuku Community Association (KCA) Board meetings, KCA General membership meetings, meetings with individual stakeholders, meetings with organizations within Kahuku and Laie and distribution of a project fact sheet. A scoping meeting for the National Environmental Policy Act process was

held on November 13, 2013, at the Kahuku Community Center. The Applicant continues to engage the agencies, the public, and other stakeholders.

National Environmental Policy Act/Hawaii Environmental Policy Act EIS

The following issues will be addressed in the EIS:

Physical Environment

- Soils/Geology
- Water Quality
- Air quality/Climate

Biological Environment

- Wildlife
- Vegetation
- Threatened and Endangered Species

Social Environment

- Visual Resources
- Noise
- Health Impacts
- Traffic/Transportation
- Archaeological and Cultural Resources
- Socioeconomics/Environmental Justice

The following are additional studies that will be completed as part of the EIS:

- In compliance with the requirements of HAR § 13-276-4, a more detailed Archaeological Inventory Assessment, entailing a summary of the traditional and historic activities and uses of the area and field work (pedestrian survey of previously unsurveyed areas, selected backhoe trenching, and hand excavation of test units) will be completed for the project and submitted to the State Historic Preservation District (SHPD) for approval. The AIS will be incorporated into the EIS.
- Pursuant to HRS Chapter 6E, a cultural impact assessment will be conducted to identify the effects of the Project on the cultural practices of the community and State.
- Visual simulation analyses will be completed to demonstrate the visibility of the proposed turbines and other Project components.
- A noise analysis will be completed to compare the predicted noise levels associated with the turbines and the associated facilities to the applicable noise standards.
-

References

Foote, D.E., E.L. Hill, S. Nakamura, and F. Stephens. 1972. Soil survey of the islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii. US Department of Agriculture. Washington, D.C.: U.S. Government Printing Office.

Hobdy, R. 2013a. Wetlands and Waters of the U.S. Assessment and Determination for the Na Pua Makani Wind Project, Kahuku, Ko`olauloa, Oahu, Hawaii, Kokomo, Maui. Na Pua Makani Power, LLC.

Hobdy, R. 2013b. Biological resources survey Na Pua Makani Wind Project, Kahuku, Ko`olauloa, Oahu, Hawaii. Kokomo, Maui. Na Pua Makani Power, LLC.

Pacific Legacy. 2013. Archaeological Assessment for the Proposed Na Pua Makani Wind Farm in the lands of Kahuku, Island of Oahu. Prepared for Champlin/GEI Wind Holdings, LLC.

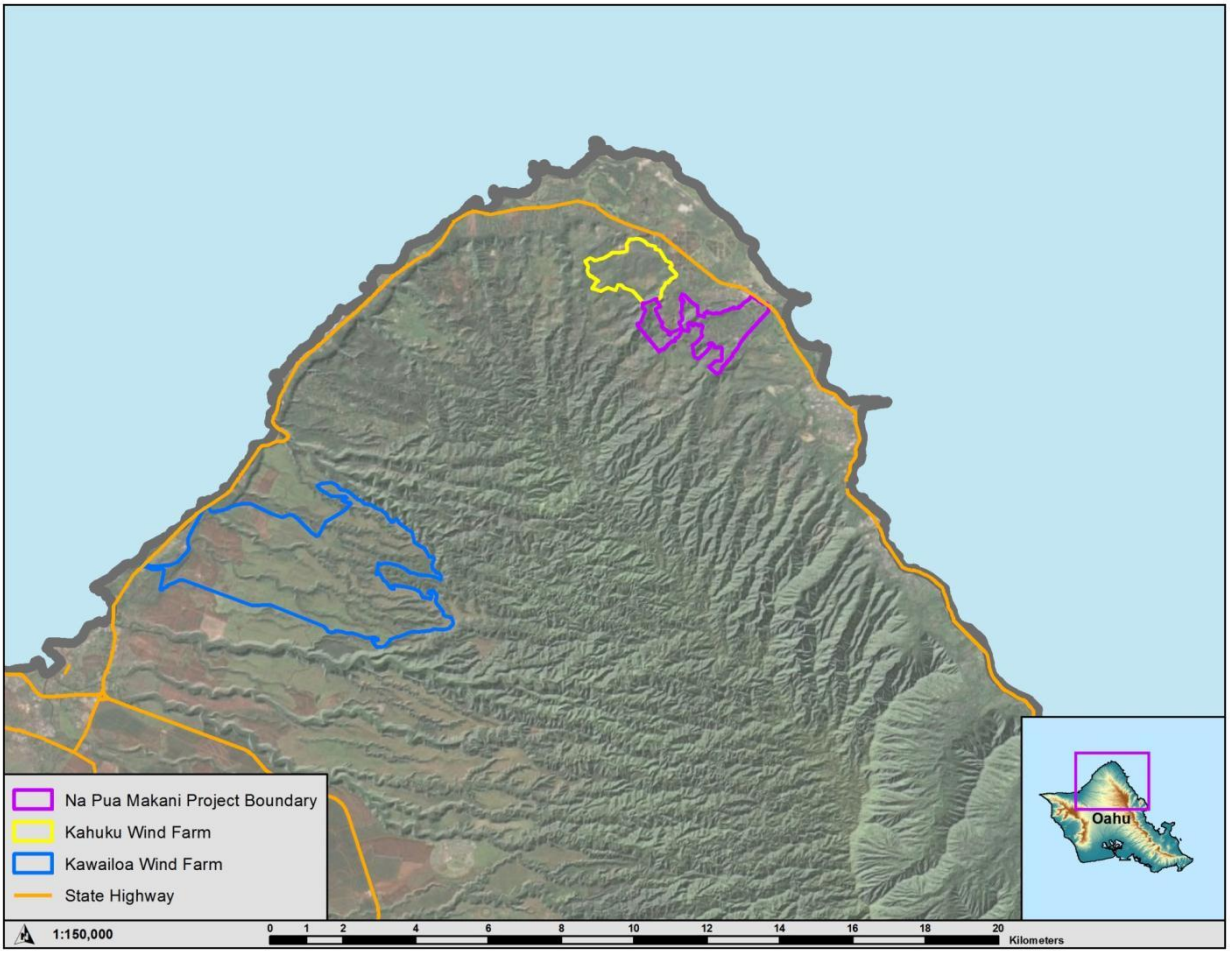

Figure 1. Napua Makani Project Vicinity Map

APPENDIX B
PUBLIC MEETING NOTICES

NOTICE OF PUBLIC SCOPING MEETING

Notice is hereby given that the
U.S. FISH & WILDLIFE SERVICE
will conduct a Public Scoping Meeting
for the
PROPOSED NA PUA MAKANI WIND PROJECT
Kahuku, Island of Oahu

Date: Wednesday, November 13, 2013
Time: 5:30 pm to 9:00 pm
Location: Kahuku Community Center
56-576 Kamehameha Hwy
Kahuku, HI 96731

The U.S. Fish and Wildlife Service (Service) is conducting a public scoping meeting associated with Champlin Hawaii Wind Holdings, LLC's (Champlin) proposed Na Pua Makani Wind Project located near the town of Kahuku, City and County of Honolulu, on the island of Oahu, Hawaii.

The Service is gathering information to prepare a draft environmental impact statement (EIS) to analyze the potential impacts of the issuance of an incidental take permit (ITP) under the Endangered Species Act (ESA). The ITP would authorize the incidental take of listed species caused by the construction and operation of the proposed project. In accordance with requirements of the ESA for an ITP, Champlin is preparing a habitat conservation plan to minimize and mitigate the impacts of take of listed species likely to be caused by the proposed project.

The proposed project would be located on State of Hawaii (Department of Land and Natural Resources) and leased private lands, located adjacent to the existing Kahuku Wind Farm. The proposed project will provide up to 45 megawatt capacity of renewable wind-generated electricity to the island of Oahu. Supporting infrastructure for the proposed project currently includes access roads, wind turbine assembly lay down areas, overhead and underground transmission and collector lines, and may also include an on-site substation, and an operations and maintenance building.

The scoping meeting provides an opportunity to express your views and offers information on the scope of issues and alternatives that should be addressed in the EIS. Comments concerning the preparation of the EIS should be identified as such, and may be submitted in person at the public scoping meeting or by one of the following methods:

- Email: NaPuaMakanihcp@fws.gov. Include "Na Pua Makani HCP and EIS" in the subject line of the message;
- U.S. Mail: Loyal Mehrhoff, Field Supervisor, U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, 300 Ala Moana Boulevard, Room 3-122, Honolulu, Hawaii 96850;
- In-Person Drop-off, Viewing, or Pickup: Written comments will be accepted at the public scoping meeting on November 13, 2013, or can be dropped off during regular business hours at the above address; or
- Fax: (808) 792-9581, Attn.: Loyal Mehrhoff.

For more information regarding the meeting, please contact Mr. Loyal Mehrhoff or Aaron Nadig, U.S. Fish and Wildlife Service (see address above); by telephone (808) 792-9400; or by email at NaPuaMakanihcp@fws.gov.

Persons needing reasonable accommodations to attend and participate in the public meeting should contact Loyal Mehrhoff or Aaron Nadig (see contact information above). Please note that the meeting location is accessible to wheelchair users. To allow sufficient time to process requests, please call no later than one week in advance of the meeting.
(SA573428 11/7/13)

Na Pua Makani Wind Project

Public Meeting

The public is invited to attend an informational meeting concerning the preparation of the Environmental Impact Statement for the proposed Na Pua Makani Wind Project located in Kahuku, Oahu

Friday, Jan. 10, 2014 at 6:30 pm to 8:00 pm
Kahuku Community Center, 56-576 Kamehameha Hwy
Kahuku, Hawaii 96731

NOTICE OF PUBLIC SCOPING MEETING

Notice is hereby given that
CHAMPLIN HAWAII WIND HOLDINGS, LLC
will conduct a Public Scoping Meeting
for the
PROPOSED NA PUA MAKANI WIND PROJECT
Kahuku, Island of Oahu

Date: Friday, January 10, 2014
Time: 6:30 pm to 8:00 pm
Location: Kahuku Community Center
56-576 Kamehameha Hwy
Kahuku, HI 96731

Champlin Hawaii Wind Holdings, LLC (Champlin) is conducting a second public scoping meeting associated with the proposed Na Pua Makani Wind Project located near the town of Kahuku, City and County of Honolulu, on the island of Oahu, Hawaii.

Champlin is gathering information to prepare a draft environmental impact statement (EIS) to analyze the potential impacts caused by the proposed project.

The proposed project would be located on State of Hawaii (Department of Land and Natural Resources) and leased private lands, located adjacent to the existing Kahuku Wind Farm. The proposed project will provide up to 45 megawatt capacity of renewable wind-generated electricity to the island of Oahu. Supporting infrastructure for the proposed project currently includes access roads, wind turbine assembly lay down areas, overhead and underground transmission and collector lines, and may also include an on-site substation, and an operations and maintenance building.

The scoping meeting provides an opportunity to express your views and offers information on the scope of issues and alternatives that should be addressed in the EIS. Comments concerning the preparation of the EIS should be identified as such, and may be submitted in person at the public scoping meeting or by one of the following methods:

- Email: NaPuaMakanihcp@fws.gov. Include "Na Pua Makani HCP and EIS" in the subject line of the message;
- U.S. Mail: Mike Cutbirth, c/o Tetra Tech 737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
- In-Person Drop-off, Viewing, or Pickup: Written comments will be accepted at the public scoping meeting on January 10, 2014, or can be dropped off during regular business hours at the above address; or
- Fax: (808) 836-1689, Attn.: Mike Cutbirth.

For more information regarding the meeting, please contact Tessa Munekiyo Ng at (808) 983-1233.

Persons needing reasonable accommodations to attend and participate in the public meeting should contact Tessa Munekiyo Ng at (808) 983-1233. Please note that the meeting location is accessible to wheelchair users. To allow sufficient time to process requests, please call no later than one week in advance of the meeting.
(SA589087 1/2/14)

APPENDIX C
MEETING TRANSCRIPTS

1 NEPA PUBLIC SCOPING MEETING

ORIGINAL

2

3 NA PUA MAKANI WIND PROJECT

4 IN RE: Habitat Conservation Plan

5 IN RE: Environmenal Impact Statement

6

7

8 PLACE: Kahuku Community Building

9 56-576 Kamehameha Highway

10 Kahuku, Hawaii

11 DATE: November 13, 2013

12 TIME: 5:30 p.m.

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21 Reported by: Kathryn Plizga,

22 Hawaii CSR No. 497

23

24

25

1 APPEARANCES:

2 FOR THE U.S FISH AND WILDLIFE SERVICE:

3 Aaron Nadig

4

5 FOR CHAMPLIN WIND:

6 Mike Cutbirth

7

8 FOR MUNEKIYO & HIRAGA, INC..

9 Lelani Pulmano

10 Tessa Munekiyo

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1 I N D E X

2	PRESENTATION SPEAKERS:	PAGE:
3	Aaron Nadig	4
4	Mike Cutbirth	6
5	Aaron Nadig	10
6	PUBLIC AUDIENCE COMMENTS:	
7	Carl Ho	12
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(6:20 p.m.)

P R O C E E D I N G S

MR. NADIG: Thanks, everyone, for coming.

I am Aaron Nadig with the U.S. Fish and Wildlife Service. This is the Scoping Meeting for Champlin Wind, this project, Na Pua Makani.

Mike Cutbirth is here to talk about the details of the project. Munekiyo & Hiraga have been out here doing media outreach on the Habitat Conservation Plan, trying to help us do the paperwork on the regulatory actions.

Basically, Fish and Wildlife Service is supporting alternative energy, and we're trying to set it in responsible areas and to responsibly offer conservation for precious resources. That's the reason that the EIS is seeking an incident permit and that's the reason we're here tonight, because the Federal energy compliance is part of that.

This is a scoping process. Tonight, we are going to focus on public comment. We will be up here after the presentation, we will give you guys an opportunity to come up and speak.

I would like everyone to be cognizant about the time mentioned and basically give other people

1 comment, and that will be provided later. If you
2 wish to comment, we have an e-mail address comment
3 for the scope of the process.
4 Everyone, I assume, signed in at the front
5 desk, with Lelani. Like I said, we will be taking
6 written comments as well for those who aren't able to
7 speak tonight. We have a court reporter right here
8 and she'll be taking a transcript of tonight's
9 hearing so that we will have a record.
10 This is, like I said, this is the Federal
11 portion of working on the Na Pua Makani project. We
12 are working in conjunction with the state of Hawaii.
13 They are a little bit behind us in the process and I
14 think that they'll be having their scoping meeting
15 probably a month after ours, sometime in December.
16 So you will have another opportunity for a
17 scoping meeting at the time that the EPA process
18 kicks in for the state. That triggers, like I said,
19 for the issue of our permit, protecting threatened
20 species related to this project; and triggers for
21 the state's environmental process the fact that the
22 Na Pua Makani will be situated on state lands.
23 Tonight, we want to give you an opportunity
24 as a public to ask questions and try to provide
25 answers to your questions. This is the start of the

1 process, so we are just beginning. So we might not
2 be able to answer all of those questions. We have a
3 lot of work still ahead of us. It is a long process.
4 There will be another opportunity to comment, like I
5 said, in December for scoping process.
6 And then when we have draft documents, more
7 information on the project, on the siting and the
8 effects of the project, they will be released in a
9 public meeting that will also be open for public
10 review.
11 So this is just a slide. There's also one
12 over here, shows where we are in the process. So,
13 like I said, on the EIS side of things, we were at
14 least knowing tonight it was part of the scoping
15 process.
16 The state, it's pretty close to us right
17 now. We are dovetailing more as we work towards
18 completing the project. It will be both state and
19 Federal funded.
20 So we are ready for Mike Cutbirth from
21 Champlin to discuss more about the project with us.
22 MR. CUTBIRTH: Thank you, everyone, good
23 evening. My name is Mike Cutbirth. I am the manager
24 of Champlin Wind Holdings, sponsor of the project.
25 Appreciate all of you coming out to this

1 public scoping meeting. This is the first couple of
2 meetings.
3 Just by way of background, I have been in
4 the wind industry about 18 years. Our management
5 team has developed over a dozen wind projects over
6 the years in the United States. And we are not
7 affiliated with First Wind, this is not a First Wind
8 project. So, why are we here?
9 We're proposing a wind energy project
10 because the state of Hawaii has passed two laws that
11 require 70 percent clean energy and require
12 40 percent of the electricity generated to be
13 generated from renewable sources. This project will
14 help achieve those goals and meet those laws.
15 Additionally, Hawaii has the highest
16 electricity costs in the nation. And renewable
17 energy projects generate electricity at a fraction of
18 the cost of burning oil. Currently, Hawaii imports
19 about four and a half billion dollars of oil from
20 foreign countries each year, and that represents
21 about eight percent of Hawaii's economy. So every
22 renewable project that is brought on line helps
23 reduce that dependence on oil and it helps to drive
24 down the cost of the electricity for all the
25 customers in Hawaii.

1 customers in Hawaii.

2 So the project is proposed on the North

3 Shore. And the area in yellow is the First Wind

4 Kahuku project and the area in purple is our proposed

5 project.

6 MR. KONOMOANA: Question?

7 MR. CUTBIRTH: Sir?

8 MR. KONOMOANA: Can you go back a slide?

9 Where is the Kahuku community located? Can you point

10 to it on the map, where the Kahuku community is, a

11 residential community?

12 I've got a real good map that demonstrates

13 where the Kahuku Community is between those two

14 projects. If you can't do it, I can.

15 MR. CUTBIRTH: Well, if you have a better

16 map later --

17 MR. KONOMOANA: I have a real good one,

18 because this map here doesn't show the other project

19 as well as the Kahuku Community property, for all

20 those who may not know where we live.

21 MR. CUTBIRTH: Well, Ken, I think you may be

22 a little generous on that. I think there's a

23 subdivision, and you live kind of right in this area

24 right here, and the community is down around the

25 Kamehameha Highway.

1 it would be built on both state land, which is
2 managed by the Department of Natural Land and Natural
3 Resources and also on private land. The project is
4 proposed in two phases.
5 The first phase would be eight turbines, the
6 second phase up to seven turbines. Some of the
7 additional infrastructure would include access roads,
8 transmission lines, potentially an on-site substation
9 and another building.
10 This is a layout of the project, the
11 location of the wind turbines as well as access
12 roads, and in-ground transportation lines.
13 As a part of the permitting process, we'll
14 prepare in conjunction with the State and Federal
15 agencies a Habitat Conservation Plan. And we do that
16 because there are five Federally listed endangered
17 species and one state listed endangered species.
18 The Habit Conservation Plan will be a joint
19 document, both Federal and State, and will cover both
20 the construction and operation of the project.
21 And we're currently working with the
22 agencies to develop estimates and litigation plans
23 and strategies. And we expect that the HCP for the
24 project will be similar to other HCP's that have been
25 prepared on other projects here in Hawaii.

1 So, over the course of the last nine months,
2 we have had a number of meetings with the community
3 and we've gotten a lot of good comments and questions
4 and input. And tonight is important because this is
5 an opportunity to provide your input and comments in
6 particular matters that are important to you to be
7 evaluated and studied as a part of the preparation of
8 an Environmental Impact Study. So your input here is
9 actually going to become a part of the official
10 project record.
11 And while we've had over the months some
12 very good comments, very good questions related to
13 what health and safety impacts this project and wind
14 turbines generally have, what length of additional
15 fire leads, whether the project designed to withstand
16 hurricanes, what sort of noise levels, clients we
17 have.
18 It's important that you give those comments
19 tonight because this is where they become a part of
20 the official record. And this comment period is open
21 through the 5th of December.
22 And if I could, turn over the balance of the
23 process to Aaron. Thank you.
24 MR. NADIG: So again, this is a scoping
25 process. So this is the beginning of the process.

1 Obviously, the state isn't here so there still is
2 continued scoping necessary with EPA.
3 The draft EIS and draft HCP, at the time
4 they are released they will be a joint document for
5 both agencies. And there will be another public
6 comment period in 2014, and you'll have more
7 information to answer your questions, and to see what
8 the project is as it develops.
9 So, like I side, the deadline for the
10 scoping process for the Federal side is December 5.
11 Obviously, it's going to be open also for the state.
12 And both those comment periods will be provided in
13 the document.
14 Tonight, we have the mikes and I guess we
15 have the court reporter. The oral comments will be
16 recorded. Again, for those that don't necessarily
17 feel comfortable speaking, you will have an
18 opportunity for written comments as well as the
19 e-mail addresses here. I believe you guys have a
20 hand-out, correct?
21 So there will be a hand-out that will have
22 your e-mail address on it and you'll be able to do
23 that. Again, on the Federal side we have a fax
24 number if you want to submit a fax letter. We also
25 have an address if you want to submit it through

1 traditional mail.

2 So, thank you for coming. And I would like

3 to open up the mikes now. Please step up, please

4 make sure you say your name, say your name clearly so

5 the reporter can get that. And then we'll proceed

6 with comments.

7 MR. HO: My is Carl Ho, I live in Laie.

8 I understand we need some renewable energy.

9 I understand that. But I am born and raised here,

10 Hawaiian. My mistake, I will live with that. I have

11 been an American and I am a proud vet. I also am

12 Hawaiian. And now, seeing for the first time going

13 over towards which Waialua and standing at the 18th

14 hole of the golf course, seeing the wind mills, it's

15 an eyesore. This is a beautiful state, this is our

16 land.

17 Everything is done in ways -- everybody

18 wants to get paid. You here for money. You're not

19 here for our this or that. You know, you're trying

20 to do something, everybody is here for money. You

21 want money. You want to get while the getting is

22 good. I understand that too. I have got to live

23 with it.

24 But it's still hard to swallow. Waimea Bay,

25 we have gone to sleep on that. I kind to like to

1 sleep on this one too. You know, I wasn't really an
2 activist, but I do have a say. Some of these wind
3 mills are a little close for the children, for the
4 elders. But it is convenience that you put a way
5 for. And I mean, there is a lot into it --
6 You put a Hawaiian name on this project.
7 Why don't you put your own name on it, you know.
8 Don't put something that's Hawaiian that is
9 Caucasian. We need it, yes, I understand. We can do
10 better, we can make better choices.
11 One on the back side, we were talking to
12 Joe, I don't mind if it's further away. I understand
13 we need it. But if some of those blades come off on
14 some high winds -- and the school is right in the
15 area -- I mean -- everyone is going to get disaster
16 anyway if we get a hurricane like the Philippines
17 just had. But I lived through Hurricane Eva. Even
18 this part of the island got as bad as the other side
19 on Waianae. This side barely got touched.
20 But Eva, we don't have a little bit -- all
21 the blades are gone. We were out of electricity for
22 six weeks, but that was play time costs. It was fine
23 with me.
24 But, there's certain things we need, I
25 understand. My say is the one that's too close, put

1 them back farther. Figure out a way. I don't know,
2 you're still going to do what you're going to do.
3 You're going to get your approval, you're going to
4 get your permits, I understand. But I don't know,
5 the people got a say for it, yay or nay. And that's
6 really all I have to say.
7 MR. FONOIMOANA: My name is Kurt Fonoimoana.
8 I have been involved with gathering information with
9 this project since its inception.
10 During the first phase, a gentleman came
11 through, his name was Keith Avery. Keith Avery made
12 several representations to our community, I was in
13 total support at that time. When they first brought
14 in the original project, they were going to put --
15 unfortunately I don't have fancy maps so I can find
16 it on this one though -- they were going to put four
17 turbines right about there, right in here.
18 (Indicating) And we stood up and said we don't want
19 them there. And we appreciate the fact that they
20 took them out.
21 However, there's more than that argument
22 about the close proximity. And we have this in the
23 proximity. If we were to put the same layout of
24 these turbines around the James Campbell Wildlife
25 Refuse, you guys would all scream.

1 Refuse, you guys would all scream.

2 But we can do it to us, humans. Mike has

3 had several conversations with me regarding the --

4 about Dr. Pierpont's theory of turbine syndrome.

5 He can argue from a scientific point of

6 view. He was also on the committee that -- part of

7 the agencies that came up with the information to

8 debunk Pierpont's theories of turbine syndrome.

9 Personally, I don't want -- I supported the

10 First Wind project when they came in, after many

11 weeks of talking to whoever I can, including my

12 maker, to see if that was the right thing to do for

13 our community.

14 Renewable energy, you heard my buddy Carl

15 say we need it, I support renewable energy. I would

16 like to add a word in there, responsible. In my book

17 it is irresponsible to completely surround the Kahuku

18 Community on three sides with turbines.

19 We have done our share for this island.

20 7,000 homes are being powered now that they got First

21 Wind back up on line, and I am glad that they did.

22 Where's Caroline? Caroline shared that with

23 Brandon and the other guys. I'm glad to see you guys

24 back on line. Now we are producing juice. However,

25 I didn't particularly want them here either. But not

1 finding a good enough argument to argue against them,
2 I had nothing else to do but try to support the
3 bigger picture.
4 However, the bigger picture in my book
5 includes human beings at this point when we're
6 surrounding ourselves, the Kahuku Community. Since
7 we're providing 7,000 -- well -- on its optimum
8 energy output -- 7,000 homes are getting energy due
9 to Kahuku's good will. We've done our share. Kahuku
10 quote/unquote has done our share as a local.
11 Waialua has done their share.
12 I am waiting to see them pop up in East
13 Honolulu. If they can put them up over here, they
14 can put them up over there. Kailua, Nanakuli, which
15 was the original place they were supposed to put
16 these turbines. However, their community objected
17 and our former leaders in government leadership said,
18 oh, let's put them in Kahuku because they're not
19 organized.
20 This is a personal issue to me. I live up
21 there where I will be impacted.
22 Our elementary school is 1,200, 1,300 feet
23 away from the closest turbine. Our high school the
24 same, police, fire station the same distance.
25 The problem is not only the distance, the

1 It's upwind of the -- normally normal trade
2 winds upwind. Our students are already struggling,
3 you want to give them more distractions? This isn't
4 entirely a hurricane safety-type issue.
5 When the big storm comes, I am sure it's
6 possible that one such as that hit the Philippines
7 will hit us. I think one of those 150-foot long,
8 7-ton blades could do quite a bit of damage if it
9 landed in the wrong spot. I don't know if there
10 would be a right spot.
11 I'm not against renewable energy, but I
12 certainly am against this project. Keith Avery, when
13 he first came to Kahuko, promised us if your
14 community says they don't want it, we're not going to
15 build it.
16 Well, we organized and we let him know we
17 didn't want it. I walked personally my entire
18 community. And I have been lucky if I found two
19 people who said, oh, well, it's not that bad. But
20 every person that I talked to, up and down the
21 roads said, no, we don't want any more, and those
22 over there are too close.
23 I didn't have to say anything, oh, by the
24 way, I kind of voted for those. I felt bad. I
25 regret that decision sometimes.

1 regret that decision sometimes.

2 I want accountability. Fish and Wildlife,

3 you, the Federal Government and State, all this other

4 stuff, you guys are going about your business as if

5 it's already a done deal. You are going to make the

6 community, which is not exactly informed, because I

7 know there's public information person, they are not

8 doing their job. How many people are from Kahuku?

9 One, two, three, four, five, six, seven or so.

10 My goodness, there's more people in Kahuku

11 than that. How many people are not from Kahuku,

12 raise your hands. I want to see everybody.

13 No shame in the back, you're not from

14 Kahuku, I don't recognize some of you guys, we're out

15 numbered. We are being kind of told what to do.

16 And I'm telling you that I am going to spend

17 a lot of my time and energy, Mike, to try to guide

18 the community through a responsible process of

19 bringing energy to the people. And in my honest

20 opinion, no problem with wind energy, we need wind

21 energy -- to me is a scam -- close to it.

22 The longer that we defray from focusing on

23 true answers for this particular state -- wind energy

24 is good in other parts of the country, don't get me

25 wrong -- I am not anti-wind. But in this particular

1 state we're sitting on a resource that we're not
2 using that could provide 24/7, 365 consistent power
3 all the time.
4 And that will be geothermal. And any more
5 focus on going after wind is putting -- is punting
6 that ball down the road, geothermal ball. In my
7 book, I'm opposed. Thank you for your time.
8 MR. PRIMACIO: My name is Junior Primacio.
9 I am a long-time resident in Kahuku, born and raised
10 in Kahuku. Graduated from Kahuku High School, worked
11 for the plantation, and raised my family here. The
12 only time I was not in Kahuku is when I went to
13 Vietnam.
14 I'm here to let you all know where Kahuku is
15 coming from. Kahuku is a deprived community,
16 deprived in many ways. Talking about the hurricanes
17 that occurred in Kahuku two times. We were the last
18 to be served, including our elderly housing,
19 including our hospital. We were without water, we
20 were without electricity. We managed. We managed.
21 We had our people go to the mill, the sugar
22 mill, where we had a potable water well that was
23 acceptable for drinking. People with buckets had to
24 come to the mill and get water. We had to get the
25 National Guard to provide water for the hospital and

1 also the elderly housing.

2 It wasn't easy, but we survived. And if

3 you're going further back, when the plantation left

4 Kahuku, we were dominantly independent in Kahuku with

5 no help from nobody. But we had one hotel that was

6 going to be built, being built.

7 And a lot of the things we said that we are

8 going to do, we did. We decided that, okay, the

9 plantation is closing down, we better do something

10 about that hotel. We were the only community that

11 supported that hotel. And it's unfortunate, but we

12 had to survive.

13 And again, if you look at today's situation,

14 Kahuku has problems with the bridge, Kahuku has

15 problems with our elderly, our Kahuku Housing area,

16 Kahuku has problems with our district both. All that

17 wasn't there, we put it together. And yet we needed

18 the support of the community to survive and the

19 support of the government to help us endure

20 ourselves, which was not in prevail.

21 What I'm getting at here, here we have

22 Kahuku's wind energy is one of the best on this

23 island. We have got 12 wind mills that first we put

24 up, and we can put up to another 15, I think, in our

25 area, to be sustainable.

1 And we had denied First Wind, they wanted to
2 put five more wind mills along Kam Highway which we
3 denied vehemently.
4 We are now supporting our effort to get this
5 wind project going. Now, let me tell you, why do we
6 feel the way we do?
7 Look at our gas price right across the
8 street here. That's $4.20, that's higher than any
9 other place in our neighboring communities and up in
10 Kaaawa, likewise in Waialua. Why? Is it harder to
11 bring gas to Kahuku? But we had to live with that.
12 That's one true fact that exists. Who hurts? Our
13 community.
14 Okay, we talk about having wind farm, we put
15 up 12 wind farm, we supported that. We hope that
16 some day our electric bill going down. Never going
17 to happen, never going to happen.
18 I don't think it will ever come about where
19 our electric bill will go down. Unfortunately,
20 that's the way I feel.
21 So I am taking a different view with this
22 wind farm. I'm saying, yeah, we can put up to 15
23 or -- I am not sure what the number -- 15 or 20 more
24 wind mills in our area.
25 And I cannot speak for our neighboring

1 can put up about 15 more wind mills, and we will,
2 without interference from people who are not
3 undesirable or just don't want wind mills or don't
4 want turbines or don't want nothing to be developed.
5 We are going to pursue this because -- let
6 me tell you this -- I want our people -- not their
7 electric bill going down because that will never
8 happen -- even if we go to Hawaiian Electric or even
9 we go with the City or the State to get monies to
10 help our community, that will never happen.
11 I know that's the developer, he is going to
12 give this community monies. And somehow, some way we
13 are going to put it together so that our people in
14 our community can benefit. And I'm sincere in that
15 effort.
16 These guys are not going to get a free ride
17 this time. What they are proposing to do is give us,
18 per turbine, $10,000 per turbine. That's $80,000
19 that we don't have and our school can use, that the
20 community can use in their endeavor.
21 Maybe I should stop. Thank you.
22 MR. REED: My name is Tanoai Reed and I am
23 born and raised in this community and five
24 generations deep we are family. I just came back
25 from living on the mainland for 15 years. Returned

1 home with my wife and my son. And I am proud to come
2 back to Kahuko where I went to, and wanted him to be
3 raised here like I did.
4 And, you know, it's happening. But this
5 really breaks my heart to see this area and the fact
6 that this community is getting money -- it also
7 breaks my heart because it seems like this company is
8 dangling a carrot in front of a low-income area. You
9 never see this thing be put up in Hawaii Kai or in
10 Kailua; there is a reason why these aren't near big
11 cities, because it's dangerous.
12 If you want to put these up, fine, it is
13 sustainable energy, good, all that is good. Move it
14 back, spend the extra couple million, build the roads
15 and make it safe. Because when they say billboards,
16 these things are not going to benefit the community,
17 billboards will not benefit the community, only the
18 people putting them up.
19 If you're going to put these up, would you
20 put these in your backyard? Would you put these with
21 the kids in school? That has to stay behind like
22 this. No, you get a job, the wind here is making all
23 this money and spread a couple of dollars at us and
24 expect us to be happy at that with the long-term
25 effects of this.

1 There are studies out there people getting
2 affected, physically not sleeping because of the
3 sound of this. You guys are supposed to go to every
4 community that has turbine engines, and turbine wind
5 turbines that are near communities, find out there is
6 any other kind of complaint of what they are before
7 you can consider putting these things in our area.
8 Thank you.
9 MR. CUTBIRTH: Do we have time for Q and A?
10 I was just wondering if there was anyone else that
11 wants to make comments on the scoping meeting before
12 we move on to Q and A session.
13 Is there anybody else that wants to make
14 comments on the EIS for the scoping meeting portion?
15 MR. NADIG: Okay, Mike, we can close that
16 comment period.
17 MR. HO: Everyone is going with solar now
18 and that impacts us right away as a home owner.
19 You know, I am going -- one of my friends
20 had proposed to me already that I wouldn't pay more
21 than what I've already paid in order to get a system
22 set up. And within five years, it will be done. I
23 don't have to pay nothing, I pay nobody nothing. In
24 fact, when I'm backwards -- I mean, I have got to do
25 my roof and stuff like that.

1 my roof and stuff like that.

2 But, you know, so if everybody goes with

3 solar, you guys are out. So is that the push or

4 what? No? What do you mean no?

5 No? No, I see you shaking your head no.

6 That doesn't -- like he said -- if we've done our

7 share, 7,000 homes, why does it have to be here?

8 You can choose somewhere else. But you want

9 to push it on the people that don't fight as hard.

10 But now we're fighting. Waimea was kind of the last

11 straw for me. Turning on Waimea now. So I'm on

12 board for no. I don't know, push it back farther.

13 MR. NADIG: Does anybody have any other

14 comments for the EIS scoping portion of the meeting?

15 Okay, Mike, do you want to answer some

16 questions?

17 MR. CUTBIRTH: Sure.

18 MR. NADIG: So we'll close the public

19 portion. Thank you, everybody, for coming for this.

20 (QUESTION AND ANSWER PERIOD)

21 MR. KONOMOANA: Thank you, Mike. It will be

22 more amenable for me to ask you a few questions. I

23 will be nicer than I was the last time, I promise.

24 The last time you presented to the Kahuku

25 Community Association, when I was here. That was

1 September, I believe it was. September, correct?
2 MR. CUTBIRTH: I think it was August.
3 MR. KONOMOANA: Oh, no, August. August,
4 that's right, I'm sorry. Jet lag, I hadn't been on a
5 flight for a while.
6 In August, one of the most important -- you
7 gave us a whole bunch of -- answered a whole bunch of
8 questions for the community. But one question I had
9 asked you in public prior to that that you didn't
10 answer was, are we going to uphold the commitment
11 that Keith Avery made to this community by him
12 saying, if the community says no, we're not going to
13 move forward with this project?
14 Are we going to honor that? As a man to a
15 man, he's a man. He sat here, he mentioned that.
16 It's in print by the way on the Star advertiser, his
17 comments.
18 MR. CUTBIRTH: So I wasn't here when the
19 discussion occurred. I did ask Keith about that.
20 And so, what he told me was that when we first
21 identified this site as a good potential wind site --
22 and I would tell you that we're looking at a site in
23 Kahuku because of the wind resource and the fact that
24 there's transmission capacity --
25 MR. KONOMOANA: That's not my question.

1 MR. KONOMOANA: That wasn't my question.
2 Sorry, you're doing the same thing as last time and
3 that's why I had to step on you. I tried to be more
4 respectful than that, but please --
5 MR. CUTBIRTH: Let me finish.
6 MR. KONOMOANA: The flesh of the question
7 was --
8 MR. CUTBIRTH: Yeah, so I asked Keith what
9 the discussion was, what the commitment was.
10 And he started working on this project, I
11 think, in 2008.
12 MR. KONOMOANA: Correct.
13 MR. CUTBIRTH: When he identified the land,
14 it was land that was in the state --
15 MR. KONOMOANA: State agricultural park.
16 MR. CUTBIRTH: And what he told me was --
17 MR. KONOMOANA: Mike, I'm sorry, not to cut
18 you off. I don't want to be up here all night. It's
19 the same thing you did the last time. I told you I
20 would be nicer.
21 Can you at least respect my question and
22 answer the question with a simple yes or no?
23 MR. CUTBIRTH: I'm trying to answer your
24 question.
25 MR. KONOMOANA: Yes or no; are we going to

1 MR. KONOMOANA: Yes or no; are we going to
2 honor the agreement that Keith Avery, your
3 prospector, made with this Community? If the
4 Community says we don't want to move forward with
5 this project, then we will not is exactly what he
6 said.
7 Now that he has got all the -- his ducks
8 lined up -- he steps out of the project and they
9 bring you in. Now, you can deny that he made those
10 representations to the Kahuku Community, but I am
11 here to tell you that he did.
12 MR. CUTBIRTH: Okay, let me just tell you --
13 MR. KONOMOANA: That's my first question.
14 MR. CUTBIRTH: So, first of all, he's not a
15 prospector of ours, we weren't involved with him in
16 this project when he first started in 2008.
17 But he told me that before he asked the
18 state to remove this property from the Governor's
19 executive order, that he went to the Community to ask
20 for their support and that he would not ask the State
21 to remove it from the executive order --
22 MR. KONOMOANA: That's the point. He did
23 not get the support is what I'm trying to tell you.
24 MR. CUTBIRTH: His version of the story,
25 Kent, is that he got the Community's support and he

1 did get the property removed from the Executive
2 Order.
3 And again, recognizing I wasn't there --
4 MR. KONOMOANA: I would like to see a vote
5 from the Kahuku Community Association, since the
6 president of the KCA Board is here tonight -- do you
7 happen to know, Melissa, has the Kahuku Community
8 Association come out with a position positive to
9 support this project?
10 MS. MELISSA PRIMACIO: It's still in
11 Planning.
12 MR. KONOMOANA: It has not, is that correct?
13 It has not, is that correct?
14 MS. MELISSA PRIMACIO: What was your
15 question?
16 MR. KONOMOANA: Has the KCA approved this
17 project?
18 MS. MELISSA PRIMACIO: It's still in
19 discussion.
20 MR. KONOMOANA: It has not. It is either it
21 has or it has not been approved.
22 MS. MELISSA PRIMACIO: It has not.
23 MR. KONOMOANA: It has not been approved.
24 Thank you, Melissa. It has not.
25 The Kahuku Community Association is

1 can tell you this because I live in the community and
2 I'm in touch -- there are several other folks in the
3 community are now thinking, oh, a wonderful thing for
4 me to do, run for the community association, I will
5 get on the board so that I can get access to that
6 money so I can probably do my foundation -- but even
7 if it goes to the Hawaii Foundation.
8 So it's created some kind of issue within
9 the community, this promise of money. It has. I
10 came here to tell you that, plain and simple; people
11 want money for their own foundation, their own pet
12 projects I call them. I understand that.
13 If there's some good that you want to do,
14 it's going to take money and I understand that.
15 That's all good.
16 However, when you circumvent the Community,
17 who I have walked up here and talked to most of my
18 neighbors. And I'm telling you, to a person, most of
19 them say we don't want any more. You're not
20 respecting the host community, although you can hear
21 one from a previous generation that worked in the
22 plantation. When we first -- I'll give some dirty
23 history -- I hate to do this. Well, maybe I better
24 not. I better save that.
25 Question: 70 percent renewable energy by

1 2015 -- 2030 -- 2015 -- how many wind mills would
2 that translate into? Of the amount of megawatts this
3 island uses, how many wind turbines does that
4 translate into? I know it's got to be more than 400.
5 MR. CUTBIRTH: So, Kent, you know, I think
6 it's actually 40 percent of electricity from
7 renewable generation, and that's the thing that would
8 drive what the number of mill projects are.
9 And it's, you know, it kind of depends on
10 what happens in the future because you probably know
11 there are off island projects that are proposed for
12 the cable to Oahu.
13 But I would tell you just from the couple of
14 years that we have looked at wind sites on Oahu --
15 MR. KONOMOANA: How many turbines does that
16 translate into? Again, I don't need a real long
17 answer. I don't want to be disrespectful to you,
18 Mike.
19 MR. CUTBIRTH: But it's not feasible --
20 MR. KONOMOANA: Out of concern for her
21 typing fingers -- how many does it -- if you don't
22 know, just say you don't know.
23 MR. CUTBIRTH: Well, I can't tell you off
24 the top of my head.
25 MR. KONOMOANA: It's going to be more than

1 MR. KONOMOANA: It's going to be more than
2 this island can handle.
3 MR. CUTBIRTH: You're not going to get all
4 wind turbines to satisfy the requirement. That is
5 going to be a combination of technologies, and it may
6 be a combination of off-island projects as well.
7 But you're not going to get 40 percent of
8 electricity generated from Oahu from wind turbines on
9 Oahu, it's just not feasible. There are not enough
10 wind sites that are viable to do that.
11 MR. KONOMOANA: When you first came to Maui,
12 they were responsible enough to build a road high
13 mountain on -- I think it was over -- First Wind. I
14 am not on their side either too much.
15 When they built that road, it cost
16 $8 million was the number that was told to me.
17 One of their project managers mentioned to
18 me that they learned a lesson to not build so far up.
19 We've got Kahuku right next to the main highway.
20 Now, we have you coming in here, want to surround us
21 on the other two sides. We have our sunsets, our
22 napooana o ka la, and now our sunrises are going to
23 be the same thing.
24 These huge industrial turbines that we have
25 to look at -- are you willing to give up your sunrise

house, 20 questions? What is the closest turbine to your house? That's a good question.

MR. CUTBIRTH: Where I live, there aren't any turbines.

MR. KONOMOANA: Why not?

MR. CUTBIRTH: Well, there are a number of reasons for that. But it's not really a viable wind area.

MR. KONOMOANA: As mentioned before, turbines may be appropriate some places, but they're not here. We have had enough of them already, somebody else needs to step up.

What is the acceptable -- you do realize that you guys are going to be upwind from our community -- upwind versus downwind. I can hear the ones that are almost a mile away from my house and they're downwind.

I understand Mr. Primacio's reasons for wanting to support this plan, they're not going to impact him.

He's one of the folks that may have -- but it's not going to impact him as much as it is other people like myself.

MR. CUTBIRTH: I can tell you that one of the issues that was raised, I think, in our first

1 the issues that was raised, I think, in our first
2 community meeting at the KCA Board meeting in May was
3 noise. And since that meeting, we did noise studies.
4 And first of all, the State has a noise
5 ordinance, and we comply with that ordinance. The
6 studies we completed, and that will be supplemented
7 in the Environmental Impact Study, show that the
8 people that live in the subdivision you're referring
9 to down here are going to have noise levels of
10 45 decibels, which is a quiet residential
11 neighborhood.
12 What that translates to me is you won't hear
13 the wind turbines. And that's based on studies we
14 have done to indicate that.
15 MR. KONOMOANA: We can already hear the ones
16 that are farther away and downwind, you're going to
17 tell me, after I can hear you the ones that are
18 closer and upwind, that just does not compute, no
19 matter what you say.
20 MR. CUTBIRTH: I would be happy to share the
21 study with you.
22 MR. KONOMOANA: If you're telling me that
23 you can't hear them, I'm telling you you're wrong.
24 If you come up with the decibel levels of 40 or 60 or
25 whatever is acceptable with the state, then I can

1 bringing up hustle and bustle of Waikiki and putting
2 it out here in Kahuko.
3 MR. CUTBIRTH: Forty-five decibels is a
4 quiet residential street, an area. It's no different
5 than if you're out in your community and you will
6 hear the wind blow, you will hear the palm trees
7 sway. But you're not going to hear --
8 MR. KONOMOANA: But the monies that are
9 being promised to the community by your firm,
10 $10,000 per turbine, that will be -- well, first it
11 was $180,000 because you were proposing 18. Now, you
12 changed, you're down-sizing to 15, so now it's down
13 to $150,000 for the community's benefit.
14 Somehow -- how are you going to get that
15 money to someone like me? How is that going to
16 benefit me? Not that I want to be benefited from
17 this, but how would it benefit the average everyday
18 Kahuko citizen?
19 MR. CUTBIRTH: So, I would tell you that
20 first of all, this proposal to provide a community
21 benefit fund of $10,000 per turbine per year over the
22 life of the project was Keith Avery's proposal. And
23 our company is honoring that proposal. And I would
24 tell you that --
25 MR. KONOMOANA: You're picking and choosing

1 which one you want to honor. Again, that's the same
2 point that we had the last time. You put up all the
3 nice stuff but you're not honoring the main one that
4 he will not -- and you guys will respect the
5 Community's desire to say we have these here already,
6 we're doing our share for the rest of the island --
7 go somewhere else, respectfully.
8 MR. CUTBIRTH: Well, Kent, I think I
9 answered your question before, and Keith's version of
10 the story is very different from yours. I wasn't
11 there.
12 MR. KONOMOANA: That's what they call a
13 fed-up man.
14 MR. CUTBIRTH: But I would say that from our
15 standpoint, this is a unique idea. We've never had a
16 Community benefit fund in any project we developed in
17 the 18 years I have been in this business. And to
18 us, we really look at it as giving back to the
19 Community.
20 And frankly, we appreciate the community
21 considering hosting this project here. I would tell
22 you that I really enjoyed meeting some of the folks
23 here in this Community, and many of whom I would feel
24 like I could have them over for dinner.
25 It's been a really terrific experience from

1 my standpoint. And there's been a lot of very good
2 ideas on how that community fund should be
3 administered and what the priorities ought to be.
4 This is something that we don't want to try
5 and tell the Community how to administer it or what
6 the priorities are. But we've heard everything from
7 assistance with special projects that the community
8 needs done to support of the schools -- again,
9 everything from special projects for the schools,
10 vocational training, jobs training, support for the
11 high school's booster club, support for some of the
12 new facilities planned at the high school.
13 We even had a comment from one person that
14 maybe this should just be a direct rebate to the
15 Community that would act kind of like a rebate on the
16 electricity cost. All of these are very good ideas,
17 but we're not the party that should try and set the
18 priorities for this Community. The Community knows
19 better than we do what the needs are.
20 MR. KONOMOANA: A couple more questions real
21 quick. And I apologize for asking this.
22 Did you not yourself, Keith Avery and
23 myself, the three of us, have lunch one day at out at
24 Turtle Bay discussing this matter?
25 MR. CUTBIRTH: Discussing the project?

1 MR. CUTBIRTH: Discussing the project?
2 MR. KONOMOANA: Yes.
3 MR. CUTBIRTH: Yes.
4 MR. KONOMOANA: We did. We did have lunch.
5 MR. CUTBIRTH: We did.
6 MR. KONOMOANA: I had a hot sandwich.
7 During that lunch, was it not mentioned -- you can
8 confirm or deny, that's up to you -- Keith Avery and
9 yourself mentioned to me that there was an
10 opportunity for me to be part of this money fund that
11 would actually be a booster club for Kahuku High
12 School Raiders, which I support with all my -- every
13 atom of my body -- if I would be agreeable to the
14 project?
15 Now, you can confirm or deny that. That I
16 was there.
17 MR. CUTBIRTH: I would absolutely disagree
18 with that statement.
19 MR. KONOMOANA: Did you not mention our
20 football team, our football program and all that?
21 I am just laying it out there and being honest --
22 MR. CUTBIRTH: Absolutely, I did. Let me
23 just explain. That's not our idea.
24 MR. KONOMOANA: That was your idea at the
25 time.

1 MR. CUTBIRTH: That was one of the local
2 Community leader's idea to help support the booster
3 club. And this is a good example of why we shouldn't
4 be the ones to try and set the priorities for the
5 Community.
6 Because when I first started working in this
7 area two years ago, I thought, well, maybe what would
8 be good was to provide scholarships at the high
9 school or computers at the high school. But, you
10 know, a lot of the feedback that I've heard from
11 folks here in town is that the high school needs
12 support. But one of the things that's really
13 important to the Community is the athletic teams.
14 MR. KONOMOANA: There's no argument from me
15 that we need support with our high school. I agree
16 with Mr. Primacio regarding that issue and other
17 community members in Kahuku who would like to have
18 some support. But I personally don't want hand-outs.
19 But what I'm referring to is we need the assistance,
20 yes.
21 Now, wouldn't it behoove the community and
22 you, and these guys, and the James Campbell, whatever
23 else, to simply invest the money that you would be
24 giving to the Community, instead put that in a road
25 and put it farther up? Because one of them is going

1 to cost you less, and that's buying the Community
2 off, than building a road.
3 And I take issue with that, especially when
4 they have a huge area right up there where these 12
5 First Wind -- when they came in, I told Ray, if
6 you're going to put 12 -- Ray Westin from First Wind
7 for anybody who's taking notes -- I said, if you're
8 going to put 12 and take the view from us over here,
9 you might as well keep going up that ridge because
10 then they're there already. Now you can have free
11 license to knock yourselves out.
12 Because the Federal Government -- which
13 you guys -- some of you folks in this room work for,
14 are really not interested in partnering with the
15 maka ainana. We're commoners, we're working class.
16 It makes more sense to me to take this
17 project and put it somewhere else and you can give
18 some other community the same amount of money that
19 you're promising Kahuku if you can find somebody else
20 to take it. I'm wondering if there's -- that is the
21 end of the discussion.
22 MS. LEILANI PULMANO: Is there anybody else
23 that has any questions for Mike?
24 MR. PRIMACIO: I would like to rebut that.
25 MR. KONOMOANA: We are going to have

1 rebuttals. I am going to ask to be rebutted and
2 rebutted.
3 MR. PRIMACIO: I will say some more. A lot
4 of the discussion is on why we want the wind farm
5 here. And it's obvious that some people don't want
6 the wind farm here.
7 But, you know, the saying, the saying is I
8 support the wind energy process, but don't put in it
9 my back yard, put it someplace else. We have the
10 ability because we've got the wind. Thanks to God's
11 blessing, Kahuku has the wind energy to provide that
12 kind of resources.
13 When those wind mills at First Wind stops, I
14 am the first one to make noise and I call Carol.
15 Calling Carol, hey, what's happening to the wind
16 farm, why the turbines are not turning?
17 The thrust -- the more it turns, the better
18 the state would be in wind energy and reduce the
19 purchasing of oil.
20 So, you know, I have 46 grandchildren and
21 52 great-grandchildren. And somehow, someway, it's
22 my responsibility to help them better themselves when
23 they grow up in this Community. They want to stay in
24 this Community.
25 My five sons are all in Seattle. And I've

1 got a couple in Guam and a couple in Texas.
2 But that's not going to the point, we don't
3 want to leave here. We want to share -- when
4 Kahuku -- when the plantation closed we had no fire
5 station, we had no police station, we had no
6 elementary school. All of that was put together by
7 our community with the help of Campbell Estate, who
8 was the land owner then, the City and County of
9 Honolulu, we made them help us. We made them help
10 us.
11 MR. CUTBIRTH: Okay, thank you.
12 MR. PRIMACIO: Turtle Bay has been
13 supportive to this community. Christmas,
14 Thanksgiving, just to name a few, the Kahuku School
15 and Athletic program. So, you know, we need to have
16 more institute built in this community that can help
17 us.
18 If we depend entirely on low-income housing,
19 we're not going to be able to survive in this
20 Community. So we depend a lot on the surrounding
21 businesses that prevails in this Community. And I
22 can see that this is one of them.
23 First Wind has been favorable in
24 contributing to this Community, which I appreciate
25 and I'm quite sure everyone -- even Kent appreciates

1 that.

2 But, you know, that's not the end to it.

3 We've got to help each other out here. And

4 nobody should tell us what's good for our back yard.

5 We supported the First Wind because we supported wind

6 energy.

7 Other communities said, no, we support wind

8 energy but not in my back yard. Kahuku was the first

9 that said, we support them and we'll put them in our

10 back yard. Now, what's wrong with 15 more, which is

11 the maximum they can put up out here. And we need

12 them wind mills to survive in this Community.

13 And that's where I'm coming from. Now I ask

14 you, yourself, where are the people in this, where

15 are the people from this Community? Why are they not

16 here? Why are they not here? They're frustrated,

17 they're disgusted. They feel that government going

18 to let them down, which they have.

19 The best thing we did in this Community is

20 build our elderly housing.

21 Our elderly housing is built with a subsidy

22 from HUD. And that's why we get good people living

23 there today. And I hope we can continue on that way.

24 Thank you.

25 MR. REED: The question is, with this

1 effect on the community, whether people can't sleep
2 at night or if somebody is injured from something,
3 will you guys be willing to take more down and move
4 them?
5 What would it take? Put this up, who knows
6 what it is going to do. But there are adverse
7 reactions like there are other communities that have
8 these near, that have adverse reaction. And there
9 are people writing about it all the time.
10 Wind turbines, we don't want this stuff. We
11 experience that here. We have people coming down,
12 take them down? What's it going to take, people
13 dying or sick people or --
14 MR. CUTBIRTH: Well, I can tell you that the
15 first company I joined in the wind industry has
16 projects that have been operating for more than 30
17 years. There are currently over 225,000 wind
18 turbines across our globe in 70 countries.
19 And I'm not aware of one instance where
20 anyone has been injured or has gotten sick as a
21 result of being around a wind turbine.
22 I can tell you that there are more than a
23 dozen independent scientific reports that have been
24 done to address that very subject. And just to
25 correct the comment that Kent made earlier, I've

1 never been involved in any of those studies as the
2 chair or a contributor or anything else.
3 But as a part of the Environmental Impact
4 Statement that will be prepared for this project,
5 those issues are issues that will be addressed. So I
6 can tell you that the issue of wind turbine syndrome,
7 the issue of noise, the issue of shadow figure, all
8 of those issues will be addressed. And those will be
9 important components to ultimately what gets approved
10 or not for this project.
11 MR. REED: Is it an option to move them
12 farther back for you guys? Is that option there?
13 MR. CUTBIRTH: I would tell you what, you
14 know, two of the biggest constraints for wind is
15 finding a windy site and finding a site with
16 transmission. And we've looked at a lot of sites out
17 on the North Shore, around the point.
18 And behind this project, proposed site area,
19 is primarily government land. And the problem is,
20 we're not going to be able to develop anything on
21 that land. I think the bulk of that is for training
22 and other purposes, but it's just not a viable option
23 to develop on U.S. Government land.
24 MR. REED: Why in Hawaii? I mean,
25 government is only there?

1 MR. CUTBIRTH: Well, I believe they use the
2 area for training, helicopter training and other
3 uses.
4 MS. LEILANI PULMANO: Does anybody have any
5 other questions? Okay, thanks.
6 MR. TABLIN: I have just got a couple of
7 questions for you. You say you have been in business
8 for over 30 years?
9 MR. CUTBIRTH: What I said was the company
10 that I first joined in the wind industry has projects
11 that have been operating for 30 years.
12 MR. TABLIN: You said that nobody ever got
13 hurt on those studies?
14 MR. CUTBIRTH: I am not personally aware of
15 any member of the public ever being hurt with a wind
16 project. Now, I would say that there is maintenance
17 that's done on them and I'm sure there has been
18 accidents that have occurred when people that climb
19 the towers and service the machines.
20 But in terms of a member of the public, I am
21 not aware of any member of the public being hurt.
22 MR. TABLIN: Have you ever lived in
23 California before?
24 MR. CUTBIRTH: I'm sorry?
25 MR. TABLIN: Have you ever lived in

1 California before?

2 MR. CUTBIRTH: In California, yes. I'm from

3 California.

4 MR. TABLIN: Okay. I lived in California

5 for about 18 years, come back here now.

6 In California, when you drive up the coast,

7 see the coast highway or going to Malibu, Hollywood,

8 and Beverly hills, all the way down to close to the

9 end of the bay where you're going to -- all those

10 areas along the coast -- you don't see no wind mill.

11 The only place I saw a wind mill over there

12 is in Bakersville, and that's up in the mountains.

13 When we drive along the highway, nobody live around.

14 So that's why nobody got hurt. I mean, from

15 my experience from what I see, you know, they don't

16 put wind mills in these neighborhoods for a reason.

17 They put it up in the mountains or independent land.

18 That's my point, you know, what I saw. I

19 lived in California, that's why I notice it. And now

20 you guys are putting a wind mill right there near

21 people's house over there -- that's not right.

22 You know, there's a reason why they're not

23 putting them in Malibu, they're not putting Beverly

24 Hills. They have got hills up there, plenty of

25 winds. I worked in Kahala, Hawaii Kai, there is

1 plenty of wind coming through there, I don't know why
2 it's not there.
3 MR. CUTBIRTH: Well, I think I can address
4 that, because the company I joined when I first got
5 into the industry actually was one of first companies
6 to develop projects in some of those areas. And
7 there's three main wind areas of California,
8 Tehachapi is one, Palm Springs is the other, and
9 there's an area up near the Bay Area also.
10 And the reason projects were developed there
11 was because the winds was really good and there was
12 transmission capacity.
13 MR. TABLIN: I don't see no wind mill; I
14 mean, that is wind -- I understand your point about
15 the wind but they're not putting right behind
16 people's back yard either.
17 MR. CUTBIRTH: Well, I would say that in
18 projects throughout the United States, wind turbines
19 operate on farms and on ranches. I can tell you that
20 the County of Honolulu has adopted set-back
21 requirements for wind turbines. And the set-back
22 requirements that we have, or the actual setbacks
23 we've proposed here are per those requirements.
24 So, you know --
25 MR. TABLIN: They are not to me, like a scam

1 act.

2 MR. MARVIS: My name is Scott Marvis. I had

3 a question on the design of these wind mills.

4 Are they designed for a specific wind? And

5 what kind of a procedures do they do if there's a

6 pending hurricane?

7 MR. CUTBIRTH: So wind turbines are designed

8 to withstand hurricane strength winds, and it's part

9 of the engineering process that manufacturers go

10 through. I am not an engineer, but I can tell you

11 that the machines are engineered to withstand

12 hurricane winds. And they go through a certification

13 and testing process, a very thorough process.

14 And they have engineering design and

15 construction standards. But again, that's not really

16 my area of expertise.

17 MR. MARVIS: The hurricanes seem to be

18 getting worse or stronger winds. So that's going to

19 cause them to destruct?

20 MR. CUTBIRTH: You know, again, I don't know

21 what the wind design is on them, but I can tell you

22 that all of the engineering that I'm familiar with,

23 they design them for certain maximum winds. And then

24 there's a safety factor built in above that as well.

25 MR. MARVIS: Thank you.

1 MS. LEILANI PULMANO: Anybody else, any more
2 questions? We are going to be around.
3 MR. KONOMOANA: I have got a question, just
4 a small one, rebuttal to a comment that he just made.
5 He was asked the question about if he's aware of
6 anyone getting sick.
7 If you read -- had you been on the internet
8 researching your own technology, probably get a
9 different perspective. Because if you do go on the
10 internet, which is a wonderful tool to provide
11 unbiased information and to do some research, you
12 mentioned that you were not on the body when actually
13 your bio is on your web site says you were.
14 I read it. I read. I study before I open
15 my mouth.
16 You mentioned that no one got sick. Well, I
17 have to argue with you on that point. Because when
18 you're being impacted by low impulse sounds that you
19 can't hear yourself -- sound which these blades have
20 been proven to generate -- that there is some
21 negative impact on people's sleeping patterns -- on
22 whether they're getting quality good night's sleep
23 which can in turn manifest itself in your health.
24 Which is actually -- I don't know -- I don't even
25 want to argue that point.

1 So I think that you're being disingenuous
2 with the audience and with our Community by not
3 acknowledging the fact that, yes, there have been
4 some reports of negative impacts on communities where
5 the wind turbines are placed in close proximity to
6 someone's residence.
7 And you can't really say no, it doesn't,
8 because I've seen the videos myself. I've looked at
9 people, I've heard their testimony on line.
10 Farmers who have lost their farms because
11 they had to move. Not because they didn't own the
12 land anymore, but they got tired of dealing with the
13 impacts as well as the wind developers.
14 The East Coast is where most of the problems
15 are occurring as far as proximity and certain
16 agricultural areas where they are placing them on
17 farms. The West Coast seems to be doing it smarter
18 by putting it away from communities.
19 Now, if we emulate what the West Coast is
20 doing, then we may not have so much opposition within
21 the Community.
22 The question then is, are you aware of the
23 other side's opinions and have you done any
24 fact-finding of your own besides just being fed from
25 one source?

1 It's important to have a diverse amount of
2 information to come up with a proposal that's going
3 to impact supporters and opposers to this particular
4 project. And we're asking, like we did before, is to
5 move them back away from the Community.
6 Then you can -- then the noise will more
7 than likely go away. But I am stubborn and
8 motivated. And I'm telling you, I don't have the
9 resources that you do. But I am going to fight for
10 this Community, which I believe the Community --
11 because I have walked my Community and talked to most
12 I can -- I am not going to go into it.
13 I run into a few here and there who think
14 this is a good thing. It is a good thing. But, like
15 I mentioned to someone else earlier, if I have a rose
16 growing out of my ear, it's a beautiful rose but it's
17 in the wrong place. Let's take it out and put it
18 where it belongs. Would you consider that again?
19 I am going to ask it public like I did
20 with -- the first time -- will you consider honoring
21 the representation that Mr. Avery made to this
22 community; that if the community says we don't want
23 it, then you'll pack up your bags and put it where
24 Mr. Avery was living for a point, which was in
25 Waialula.

1 Waialula.

2 MR. CUTBIRTH: Well, I think I've already

3 responded to that same question earlier.

4 MR. KONOMOANA: Can I get it in writing?

5 MRS. BROWN: And I would tell you too

6 that -- want to say something -- because I don't

7 this, do I have time?

8 MR. CUTBIRTH: Sure.

9 MRS. BROWN: You know, I'm like him, I live

10 under -- my name is Mrs. Brown. I live underneath

11 those turbines, right underneath.

12 And I've been studying, and there's so many

13 lawsuits like this one, Massachusetts. And I mean,

14 do you guys consider us underneath the turbines with

15 these health issues like from these residents? Do

16 you guys run lawsuits?

17 I'm just asking because I live underneath

18 them. They're ugly. Every time I come in I hate it,

19 like I'm looking at some kind of alien. They're

20 ugly, quite ugly.

21 I call them research. There is a lot of

22 companies suing everywhere. You guys responsible?

23 Because you don't live here, but I do, I live

24 underneath. I look up, it's right there.

25 So do you guys consider people like us when

1 thing, take it somewhere else like Latoo said, take
2 it somewhere where there's no one. Why Kahuko?
3 MR. CUTBIRTH: Because of the transmission
4 available, wind source.
5 MRS. BROWN: Because we need to sign
6 something that if we ever sick, cancer, everything.
7 Of course you guys would blame cancer for that. But,
8 do you guys want to like sign something, you're
9 liable? And if it happens to us underneath those
10 ugly --
11 MR. CUTBIRTH: Well, as I mentioned, the
12 whole issue of wind turbine syndrome or turbines
13 making people sick is something that's been studied
14 extensively. And that's something that will be
15 looked at again in the Environmental Impact
16 Statement.
17 And I actually think the setbacks we have,
18 they're a multiple of the county's requirements. And
19 I have not seen anything so far on any studies we've
20 done that makes me think anyone will be harmed by
21 this proposed project.
22 MRS. BROWN: Damn, you're like the governor,
23 useless.
24 MR. CUTBIRTH: Name, please?
25 MR. FONOIMOANA: My name is Kurt Fonoimoana.

1 I am not the talker. He can talk, my friend. But I
2 am the one that actually -- I just wanted to see your
3 face.
4 Health wise, is it going to affect my
5 grand-kids? Listen, is it going to affect my
6 grand-kids?
7 MR. CUTBIRTH: I don't believe so.
8 MR. FONOIMOANA: You don't believe so? I
9 would like to know. I'm putting a face so I know who
10 to go after.
11 MR. CUTBIRTH: I don't believe so.
12 MR. FONOIMOANA: You don't believe so? You
13 don't know?
14 MR. CUTBIRTH: From everything --
15 MR. FONOIMOANA: I want to know.
16 MR. CUTBIRTH: -- everything I've read --
17 MR. FONOIMOANA: I don't believe? I would
18 like to know.
19 MR. CUTBIRTH: From decades of experience in
20 the industry, I don't think there's any health --
21 negative health impacts and will not be from --
22 MR. FONOIMOANA: Just remember, I'm old
23 school. My kids not for sale, my grand-kids.
24 MR. CUTBIRTH: Nor mine.
25 MR. FONOIMOANA: But you just gave them a

1 MR. FONOIMOANA: But you just gave them a
2 price of what you're going to give to our community.
3 I finally thought of an intelligent
4 question. Should this project move forward as it's
5 planned to, as you're planning and hoping to, should
6 the project move forward, and you will install your
7 15 more turbines, are you going to be putting some
8 funds into an escrow account like they do other
9 projects across the United States, into a fund for
10 anyone in Kahuku who owns a home who says, "I don't
11 want to live here anymore, I am going to sell my
12 home."
13 Are you guys going to be putting money into
14 an escrow account that's going to cover the cost of
15 that person's home when they can't sell it because no
16 one else wants to live around a wind turbine? And
17 these are what other companies across the United
18 States have been doing, is putting money into an
19 escrow account, not the total value of 400 houses,
20 there are up there because that's roughly
21 200 million, all of that is a good place to start for
22 me.
23 But that's a little unfair. We'll say it's
24 a percentage, five percent or whatever. Are you guys
25 going to be ponying up? Because my girlfriend and I

1 have been talking about this, we don't want to live
2 around here, that's how adamant I am about it, is
3 that we're going to have to move because you're
4 moving in.
5 So, since you're moving in we've got to move
6 out because we object to the close proximity of these
7 machines. Are you -- I am thinking of the name of
8 the company -- I was going to call it Champlin -- I
9 know you were with the ones that made these up
10 here -- what is the name of that company?
11 MR. CUTBIRTH: Clipper Wind Power.
12 MR. FONOIMOANA: Clipper, I know it started
13 with a "C." Is Champlin going to be putting money
14 into an escrow account to cover however many people
15 say we're moving. Because that's what other
16 companies are doing and that is the responsible thing
17 to do.
18 If you can't sell your house within "X"
19 amount of time in these other projects and your house
20 doesn't sell, the company that came in has to buy it,
21 has to pay for it. And I suggest that you put some
22 homework to that and think about it. Because that
23 money will tell you everybody in Kahuku they are
24 going to be buying their houses pretty soon. Let's
25 put them all for sale.

1 the system out -- but the short question is, are you
2 going to be putting money into an escrow account to
3 cover the folks who are impacted to a point where
4 they choose to move and you guys will buy that person
5 out basically?
6 MR. CUTBIRTH: And none of the companies
7 I've ever been with have done that.
8 MR. FONOIMOANA: You haven't been reading
9 the internet like I have. And if it's all false
10 information, if that's what you're telling me, that
11 all the companies that you know about -- well, that
12 could be two or three for all I know. Is that true?
13 That's true? I do think that -- I think
14 that that falls --
15 MR. CUTBIRTH: I haven't heard of that in
16 all the years I have been in the industry.
17 MS. LEILANI PULMANO: Does anybody else have
18 any questions or comments?
19 MR. WASSON: Oh, I came in late but my name
20 is Harry Wasson. I would like to know if you guys
21 have plenty house sites, like other places. That's
22 where you guys like to build them winds mills and
23 stuff. Today plenty cultural sites, stay there. You
24 guys want to address that about the sanctity of those
25 sites? Or about plans, plans -- plans --

1 MR. CUTBIRTH: So part of the EIS will cover
2 archeological cultural sites -- archeological is not
3 like dating people who know the place, not like from
4 an academic standing. We're talking about people who
5 actually take plants from the mountain, medicine,
6 plants for their burials or, you know, traditional
7 like caves and stuff like that.
8 We've done an initial archeological and
9 cultural survey and found no artifacts of interest.
10 There will be additional studies done.
11 MR. WASSON: I worked on the coconut tree
12 area and the farm cultural effects. And they said
13 the first time they ever found anything up there. I
14 never found sites.
15 Then they said, they are only going to limit
16 them to this immediate area, they're not going to
17 include the native plants which is up there or the --
18 up there they have bats, Hawaiian bats in that area,
19 it comes down to the bridge sanctuary in the
20 summertime.
21 Are you guys addressing that too?
22 MR. CUTBIRTH: Bats are one of the species
23 that will be studied as a part of the habitat
24 conservation plan and that's something that we do in
25 conjunction with the State and Federal agencies. So

1 those will be evaluated.

2 MR. WASSON: But that still don't address

3 the part of the Hawaiians is the one that's the main

4 agreement for this stuff, not archaeologists and

5 Federal agencies because they are not -- Hawaiian

6 plants and Hawaiian cultural places and plants and

7 animals up there.

8 So I don't know you're talking about

9 archaeologists -- I worked with them -- they only

10 know the academia part. When I tell them about the

11 history of the plants they say, oh, we don't know

12 that. I am the Hawaiian practitioner, cultural

13 monitor. You guys only do the paperwork.

14 So, you guys not -- you guys not interested

15 in doing Hawaiian stuff because that area get plenty

16 of plants. You guys asking for plenty of trouble

17 because right next to you guys going to be the -- we

18 tired of looking at these stupid turbines. The

19 better they burn the better -- and was how many

20 times -- about four times.

21 It was crazy. But, I can see this stuff

22 within -- it's not going to benefit us -- you're

23 going to make money. You guys take off, we're stuck

24 looking at the thing.

25 The frequency from turbines is the stuff

1 that caused the syndrome, that people getting sick.
2 So you guys should just beat it. We don't
3 need this kind of stuff. If you guys need more
4 power, turn off -- you know -- turn off till you save
5 some, save money. Don't need to build this stuff
6 that it's not for -- you guys going to make this
7 place look more ugly.
8 The trees going to get down on that side,
9 the first ridge or whatever, then you're going to get
10 this one. Then that's going to be right around
11 Kailua Town and right next to Hawaii Kai -- don't get
12 that, whatever, development stuff.
13 It's way ugly. People don't like coming
14 here and see those ugly wind mills. Like both you
15 guys can shove it up your ass.
16 MRS. REED: My name is Suzanne Reed. I
17 know you said you haven't heard of any deaths. But
18 the Forbes Magazine published that there were 14
19 deaths in England in 2011 from incidences of wind
20 power.
21 Like I said, I am not sure whether those
22 were just maintenance workers or the people living
23 around. But there were also other instances, I
24 believe it was Pocatello and San Diego where the
25 blade had fallen off and it weighs about 100 tons.

1 blade had fallen off and it weighs about 100 tons.
2 It was near homes when it was discovered. And I
3 think they tried to cover it up.
4 But that same company had also -- it was
5 Simons I believe, they have been having other issues,
6 apparently. And it also happened again in Idaho.
7 So I mean, it's not unheard of that these
8 blades fall off. And this one in particular
9 apparently had fallen off in winds that night that
10 averaged 19 to 20 miles an hour. Now, according to
11 the article these, well -- the winds that we sustain
12 here from Hurricane Iniki -- I am not sure what the
13 miles per hour of was -- but that would be a
14 concern.
15 SPEAKER: 234 miles an hour sustained wind
16 on Kauai.
17 MRS. REED: When they had checked the blades
18 on these wind mills it was -- I believe they said all
19 75 blades had to be replaced on 25 of their turbines.
20 So that was -- just wanted to give you
21 thought about that it does occur.
22 MS. LEILANI PULMANO: Well, we will be
23 around if anybody else has any more questions to ask.
24 We really appreciate you guys coming out and taking
25 the time and providing us with some comments and some

1 Aaron, did you want to say any closing
2 remarks?
3 MR. NADIG: Again, the public comment period
4 is open till December 5 for those that feel
5 uncomfortable speaking, there's an opportunity to do
6 it from your e-mail. And they have graphic cards for
7 contact information; that is address and e-mail
8 address and we'll address all comments in our
9 documentation.
10 Thank you for coming.
11 (The Public Hearing was concluded at
12 7:49 p.m.)
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1

2 C E R T I F I C A T E

3

4 I, KATHRYN PLIZGA, do hereby

5 certify that the proceedings are contained fully and

6 accurately in the notes taken by me during the

7 hearing of the foregoing cause, to the best of my

8 ability, and that this copy is a correct transcript

9 of the same.

10

11

12 Kathryn Plizga

13 Kathryn Plizga,
Certified Shorthand Reporter

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HEPA PUBLIC SCOPING MEETING

NA PUA MAKANI WIND PROJECT

(SCOPING COMMENTS PORTION)

PLACE: Kahuku Community Center
56-576 Kamehameha Highway
Kahuku, Hawaii
DATE: January 10, 2014
TIME: 6:30 p.m.

Reported by:
Kathryn Plizga, RPR
Hawaii CSR No. 497

APPEARANCES:

Leland Chang, Mediator/Facilitator

Ned Busch, Mediator
Mediation Center of the Pacific
245 N. Kukui Street
Honolulu, HI

ON BEHALF OF CHAMPLIN WIND HOLDINGS, LLC
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Amy Rosenthal
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(6:35 P.M.)

P R O C E E D I N G S

MR. CUTBIRTH: Good evening. My name is Mike Cutbirth, I am the manager of Champlin Wind, and we're the sponsor of the proposed Na Pua Makani Wind Project.

I want to thank you all for coming tonight to the HEPA scoping meeting. And I would like to introduce Leland Chang, our moderator, for the meeting.

13 MR. CHANG: Thanks, Mike.

14 Good evening. Aloha, welcome.

15 I know that this is the start of the weekend

16 for everybody, so we're really appreciative that you

17 took the time to come out and join us tonight. As

18 Mike said, it's my pleasure to be serving as your

19 facilitator this evening.

20 It is my job to sort of pass through the

21 agenda for tonight and to encourage you to

22 participate; and also to sort of manage the time and

23 flow of this discussion so that everybody that wants

24 to make a contribution has a chance to do that.

25 It's also a very important part of our role

1 today to stay completely neutral. I'm not taking any

2 stand on the proposed plans one way or the other. In

3 fact, in 30 years of marriage, I've lost a lot of

4 arguments with my wife because I refuse to take a

5 position on things.

6 So I am very comfortable serving in this

7 neutral role. I have been doing this for about 28

8 years. That includes eight years as the executive

9 director of what was then called the Neighborhood

10 Justice Center in Honolulu. They have since changed

11 their name to the Mediation Center of the Pacific.

12 And as a mediator, I've done a lot of

13 divorce cases; and things get a little heated there.

14 So I learned to sort of -- to be comfortable with

15 that level of conflict.

16 On the community liaison facilitator side, I

17 have been able to work on a number of projects
18 including the Hawaii Community Foundation and the
19 Convention Center, the State Hospital, Sandy Creek,
20 and more recently the Hawaii 2050 Sustainability
21 Plan, and working with all of the consulting and
22 conciliative parties that work on the historic
23 ramifications of the rail project.
24 I've also led community groups that have
25 developed waste water management plans, both for your

1 neighbors on the North Shore as well as Maui County.
2 So I'm very glad to be here with you. And
3 again, I thank you for being here.
4 The agenda tonight here is very straight
5 forward. First of all, I wanted to mention -- you
6 heard from Mike Cutbirth -- but we also have folks
7 from Munekiyo & Hiraga, community relations for this
8 project as well as Tetra Tech, Brita Woeck, who later
9 will be doing one of these presentations.
10 Based on our agenda, again, it's very
11 straight forward. I'm sorry, I must apologize.
12 Hopefully, you've signed in. And there are comment
13 sheets there that you can submit comments either at
14 the end of the meeting or submit it some time after
15 the meeting.
16 And the EIS spoken portion of this meeting
17 is -- because it's a formal part of the EIS
18 process -- we have a court reporter, Kathy, who is a
19 certified court reporter, who will be recording that

20 portion.
21 So, we will be turning over the session to
22 Mike and to Brita for two presentations, very brief
23 presentations; mike, on the proposed wind energy
24 project and Brita on the EIS process and the EIS time
25 line.

1 And then we'll sort of open things up for
2 the formal scoping portion where we will be inviting
3 you to tell us what you think should be studied as
4 part of the EIS process. For example, those studies
5 are always planned to handle things like
6 environmental impacts, noise impacts, effects on
7 endangered species, traffic and those kinds -- and
8 health impacts.
9 So we will be looking to you to tell us in
10 greater detail and greater depth what kind of things
11 are really important that should be covered as part
12 of the EIS evaluation.
13 Following the scoping comments, we will take
14 a quick break and then we'll reconvene, and we'll
15 open things up for sort of more general discussion
16 and Q and A.
17 Then we'll talk a little bit about next
18 steps and we'll set it off with our final aloha. So
19 that we can have as productive a discussion as
20 possible, we do have a few simple ground rules that
21 we would like to ask people to "kokua."
22 Throughout the evening, Ned Busch is going
23 to be coordinating all of your comments on this pad

24 here. So if he doesn't quite capture something that
25 you told us, be sure to point that out, and he will

1 make the appropriate comment. Ned is a trained and
2 experienced mediator with the Mediation Center of the
3 Pacific and I've worked with him before.
4 A summary of Ned's notes are also going to
5 be posted on Champlin Wind's web site.
6 Let's see. We would like to, as much as
7 possible, have only one person speaking at a time so
8 everybody can hear what's being said. And it also
9 allows me as a facilitator to try to keep better
10 track of what's going on.
11 I will recognize you by bringing this
12 microphone over to you. When I do that, please
13 introduce yourself and then proceed with your
14 comments.
15 I would like to share the speaking time. So
16 if you can try to be concise and to the point. And
17 I'll call on the people that haven't taken a turn yet
18 before I return to folks who have already had a
19 chance to speak.
20 And lastly, this is not really a ground
21 rule, it's more just kind of a request. I realize
22 that projects like this -- and this project in
23 particular, you know, may engender some strong
24 opinions and strong feelings, and people have really
25 big questions about this project. And that's fine,

we can't capture all that.

I am just going to ask people to respect the process, respect each other and, you know, treat each other with aloha.

All right.

With that, I guess I'll turn things over to Mike and then Brita. Thank you.

MR. CUTBIRTH: Thank you, Leland.

So why are we here proposing the wind project? The state of Hawaii has passed two laws that require 70 percent clean energy and 40 percent electricity from renewable sources. Those laws are the Clean Energy Initiative and the Renewable Portfolio Standard.

The state has a goal to reduce the cost of electricity to its rate payers and to achieve energy and independence. Currently, Hawaii imports four billion dollars of oil from foreign countries. Wind generates clean renewable energy at about half the cost of burning oil.

So the project is being proposed up to 45 megawatts in size located approximately adjacent to the existing Kahuku wind project. The first phase is planned for approximately 24 megawatts. The second phase, up to another 21 megawatts.

Currently, the Phase I project is the only project that is pending approval with the State

Public Utility Commission. The Phase II project is not something that would be built concurrently. And because of additional transmission upgrades that HECO would be required to make, would be expected to be built several years after the first phase of the project.

The project is proposed to be built on both state land managed by the DLNR and also private land. Additional infrastructure will include a permanent (inaudible) tower, access roads, assembly, (inaudible) during construction; and transmission and collector lines as well as a potential substation and maintenance building.

This is the current layout of the project, the Phase I project, which is the only project pending before the PUC at this point. You'll notice that there's eight turbines proposed.

We have also shown white and black circles around each proposed turbine location. Those are setback areas that are required by county code. And we've also shown the setbacks, proposed setbacks, from key points of the community, both residential areas as well as the high school and elementary

school.

This is a layout that includes both the Phase I and the Phase II project, also with setbacks shown.

Part of the permitting process will include

the preparation of a Habitat Conservation Plan, and this really addresses potential (inaudible)of endangered species. And those species are listed up here.

So I would like to introduce Brita Woeck from Tetra Tech to continue the presentation.

Thank you, Mike.

MS. WOECK: Hi, everybody. My name is Brita Woeck. I see a lot of familiar faces from last night.

So I just want to talk you through -- some of you kind of already heard this -- sort of the process we are going through now for the environmental analysis. I work for Tetra Tech. And so we have been asked to do the environmental analysis for the wind project and prepare an Environmental Impact Statement.

So the reason we're here tonight is we are sort of starting the official State Environmental Review Period. So when we say scoping, we're

basically scoping out the issues and things that you're concerned about or want to see us address in our analysis.

So I know that many of you were at a similar scoping meeting that was held in November. That one was hosted by the Fish and Wildlife Service. As Mike mentioned, the project needs a Habitat Conservation Plan, so that triggers the Federal review. For tonight, we're talking about the State review, which

is triggered by a portion of the project being on state land.

So back in November, the State process and the Federal process weren't quite aligned yet. So just to meet our State requirements, we have to hold a second scoping meeting.

So tonight, the purpose of the meeting, as Leland said, is to basically get comments and feedback from you that will help inform how we put that Environmental Analysis together.

So we strongly encourage you to provide comments on like the scope of the analysis, if you have ideas on alternatives or just other concerns that you haven't voiced already, this is the time to do that, and that's going to go right into that public record.

So many of you saw this slide last night. This kind of depicts the State and the Federal process. We're up here at Scoping, and so we have -- you know, we have to kind of wait until that Environmental Analysis is completed. The yellow box here indicates where we're going to have an opportunity to provide input. So part of that is now we're in scoping. But once the draft Environmental Impact Statement is released, that is another great opportunity for you to provide feedback.

You can review the document, review all the different studies in the analysis, and then we'll

13 have another set of meetings where you can come and
14 you can ask us questions about the specific studies
15 themselves.
16 Based on meetings that we've had so far, the
17 Federal Scoping meeting as well as other community
18 meetings, here are some of the issues that we know
19 that your community wants to have us evaluate. And
20 so when we prepare that draft EIS, look for those
21 issues because those will be addressed in there.
22 So, as I mentioned, the next step in this
23 process is once the scoping period ends, which is
24 January 22, you know, we take your comments and your
25 feedback, put our environmental analysis together,

1 then we'll hold another set of meetings.
2 We will give you a chance to ask some
3 questions about the specific studies.
4 So in talking about (inaudible) comments, I
5 know many of you have already made some comments.
6 You know, Leland said you can make them tonight via
7 the microphone. If you're not comfortable doing
8 that, please grab a blue piece of paper out there.
9 It outlines all the options you have.
10 You can submit via e-mail, via fax, letter,
11 you can hand deliver a letter to our office in
12 Honolulu, whatever works best. If you know somebody
13 that wasn't able to make it any of these meetings,
14 please share that, have them send an e-mail comment
15 in. That's a great way to have your feedback
16 (inaudible). We are at the (inaudible) process right

now --

MR. KENT FONOIMOANA: Excuse me. Where is your e-mail address? Is it on this piece of paper?

MS. WOECK: It's actually still going to --

MR. KENT FONOIMOANA: Still the Fish and Wildlife Service?

MS. WOECK: It is actually -- I'll just clarify -- so we have these two scoping meetings. But after tonight, everything is going to be sort of

like a parallel process.

So one EIS, one -- you know, our next set of comment periods will be one set of meetings -- so yeah -- that e-mail address is something that the Fish and Wildlife Service put together.

And they're taking comments on all aspects of the project. So that's a significant question.

MR. CHANG: Thank you, Brita. All right. So, this is the official formal scoping portion of the agenda.

And again, as Brita mentioned a few times previously -- hold on a second -- we're asking that you focus your comments on issues that you believe should be studied as part of the EIS.

So if you can try to frame these comments during this portion, you know, in terms of this EIS study, look at these types of impacts and study these issues, study these types of alternatives. That is the kind of thing that we are looking for in this

portion.

The other "Questions and Comments" if you could hold until the agenda and -- that portion -- that would be great.

Yes, sir.

MR. CURTIS: You're merging documents or

having them go with parallel (inaudible)?

MS. WOECK: Just one document.

MR. CURTIS: So who is the accepting agency?

MS. WOECK: For the state, it's DLR. And then on the Federal side, it's the Fish and Wildlife Service.

MR. CURTIS: So two accepting agencies for one document?

MS. WOECK: One document, yes.

* * * * *

MR. CHANG: All right, Scoping comments. I will bring the microphone to you, just let me know.

So if you just introduce yourself for the benefit of Kathy, our court reporter, and then provide your comments.

MS. MOORE: Verla Moore, Koolauloa Neighborhood Board.

I think I heard in your comment that you said between Phases I and II that HECO may have to do some type of upgrading before you proceed with II, I believe that's what I heard.

My question is because -- I think I'm focusing from the impact on solar -- is what type of

upgrades are they planning to do during that phase? And how will that affect this overall process?

MR. CHANG: Okay, so the types of upgrades that will be -- that HECO will be required -- one of the things that is to be studied in greater depth as part of the EIS.

MS. MILLER: Kela Miller, Koolauloa Neighborhood Board.

Just wanted to ask, why are the wind mills so close to the community and the school, and what is the benefit part of it for the community?

What kind of benefit does the Community get?

MR. CHANG: So one thing that you're -- you want to study -- is the types of impacts of having the turbines located where they are relative to the schools?

MS. MILLER: (Nodding head)

MR. CHANG: And also question -- I'm not sure if EIS is studying about the community benefits package.

But you want to know what the package will look like?

MS. MILLER: Yes, sir.

MR. KENT FONOIMOANA: One of many more, probably.

I would like to know that when you folks do the study on the value that should be assigned to the

loss of our business and the impact that it has of the industrializing to our rural community by surrounding them on three sides by what you can term as asset or what I can term a liability. But it could be an asset in the right spot. And I would like to know if you guys can put a financial number as well as a social and economic and psychological evaluation of the entire community, on how that impacts the Community.

MR. CHANG: So the economic and -- what I'm hearing -- so the non-tangible impacts or losses that might accrue to public --

MR. KENT FONOIMOANA: They're fairly tangible from what I look at.

MR. CHANG: You mentioned psychological -- or losses --

MR. KENT FONOIMOANA: Just us being enclosed and surrounded by wind mills.

MR. CHANG: Hopefully everybody signed in so we can get the spellings of their names. Thank you.

MR. MAKAIAU: Ralph Makaiau, and I have three comments.

I am going to piggy-back on the regulation -- and I know that you have a foyer of regulation of a safe buffer zone. From our

experience, there is a quote of the safe buffer zone for agriculture zoned lands, but not necessarily

residentially zoned lands.

So as a Community, we have been participating in regulations that has changed for land zoning, that included residential zoning. That's point number one.

The second impact that I'm concerned about is that for this area, particularly the sub-district one, when an industrial alternative energy comes in, they fulfill -- as I understand it -- they fulfill the HECO quota of alternative energy, which competes with the residential quorum of alternative energy. So, being a part of quote/unquote sub-district one, we learned that exercise from First Wind's project.

Now we're in this, and about to be a second industrial wind project. And this resident has less of a chance to apply for alternative energy benefits from the overall regional program for sub-issues on the program. So, to me that's a significant impact, okay? Especially when they haven't charged me less.

My third concern is that we have, for the area of sub-district one, we have on an ongoing basis studied our quality as a result of alternative energy. Particularly industrial wind turbines.

And as we understand it, they can fluctuate and fluctuate significantly. Therefore, we would like to at least understand that with some reasonable confidence that we -- that this output can control or show us quality -- yet you're going to defend the

outcome by saying -- oh, we're going on HECO's grid; therefore, it's their responsibility in cost cutting -- not fair.

Because if you guys come with lower voltage to us, our toasters burn out prematurely. If you guys come out with significant variance in a frequency and sign wave, our T.V. burns out prematurely. And poor John Q. Public doesn't understand any of this. And my wall-mounted T.V. blows up.

So it's a matter of the impact of the life cycle from my investigation, is what I'm speaking of. So I think they belong in that consideration in the environmental impact.

MR. CHANG: Thank you, Ralph.

So, the quality of the power and the impact of possible fluctuations, the impacts of this project on opportunities for residents to, you know, initiate their own clarifications like he did. And then the first one was agriculture versus --

MR. MAKAIAU: State buffer zone. We are aware of regulations within agricultural zoning area, we are not aware of any safe buffer regulation at the point of the residential zoning.

Recognizing that the windmill planning be built in an agricultural zone, but it doesn't necessarily help the values in this origination.

MR. CHANG: Thank you, Ralph.

All right. Who else hasn't had a chance to

comment?

Your name, sir?

MR. BROWN: My name is Harry Brown, Kahuku Community member. Mine is a simple one. I'm not sure what the health and safety impacts are. And in terms of the power generated by the windmill, how does it affect (inaudible) directly or indirectly to those within our vicinity -- and danger to the plants -- the electrical power to make that -- plus the safety issue in case of a storm, a hurricane speed.

What is going to happen to those blades, where are they going to go? How strong can it stand the power of the winds? What is the rating on that, that kind of thing?

MR. CHANG: Thank you, Harry.

So all the potential defects or part defects possibly of -- in terms of the health and safety type of project.

Anybody else who hasn't had a chance to talk yet, want to take over here?

Thank you.

MS. PONDER: I am Aliitasi Ponder. I have a number of questions and comments, but I'll just start with wanting to understand why there wasn't -- or if there was a location considered that was farther away from the community, and why was it chosen -- why was this particular location chosen? Why take on the

13 health and danger factors involved with being this
14 close?
15 MR. CHANG: Thank you, I didn't quite get
16 the first --
17 MS. PONDER: Allitasi.
18 MR. CHANG: So the concern is, were other
19 alternatives considered for a site --
20 MS. PONDER: Farther away.
21 MR. CHANG: -- farther away, were they
22 considered?
23 MS. PONDER: And why were they not
24 considered if they were considered.
25 Anybody else? Yes, sir.

1 MR. BROWN: If this project is -- what do I
2 want to say -- a Phase I, whatever the maximum
3 generation is 45 megawatts, what is the anticipated
4 overall production on a day-to-day basis.
5 Secondly, what is the cost that's going to
6 be passed on to consumers versus other forms of
7 electricity? That is my question.
8 MR. CHANG: Okay, so cost that get passed
9 through to consumers directly as a function of this
10 project?
11 MR. BROWN: Yes.
12 MR. CHANG: And also, are you talking
13 about --
14 MR. BROWN: Cost of electricity generated.
15 Will it have any impacts on rates?
16 MR. CHANG: Rates.

MR. BROWN: And then also the --

MR. CHANG: The anticipated --

MR. BROWN: -- the anticipated average production. Because it will be something less than 45 megawatts, right?

MR. CHANG: I am not sure.

Yes, sir.

MR. HUBBELL: My name is Carl Hubbell, and I just wanted to know, First Wind is up, are they using

all the power that's being output? And if not, where is it being held to?

So, if they're not using it or if they're using it, what kind of impact by not using it, where they're dumping it. And with them putting out 45 megawatts is HECO -- I mean, these are all statistics of what kind of having included in this impact. Because if HECO is not a hundred percent going to use the power, and big business is just coming in because of financial gain.

The impact that it has, it's on site obviously, on the 18, looking at the windmill on Kahuku Golf Course, which we play all the time. So that's an impact, you know, looking at them, they're unsightly. And they're not even using all -- that's just hearsay. I mean, that's just people saying. So, why am I dealing with this if they're only using 25 percent of what they're putting out.

It's hearsay. But that doesn't make sense.

20 So if you're -- I want statistics written in it -- if
21 First Wind is not using all their power and you're
22 going to tap into the power over here, and HECO is
23 now going to pass on the cost, obviously, if they
24 have to upgrade.
25 They are not going to feel it, we're going

1 to feel it. And then it impacts us obviously. So I
2 want that in the impact statement.
3 Like if they're obligated to use it first,
4 you understand what I mean? Because why have it
5 there if they're not going to use it, and why do we
6 have to put up with it if they're not going to use it
7 all.
8 MR. CHANG: So will the power -- will all
9 power generated as a result of this project and
10 what's already on tap --
11 MR. HUBBELL: Existing, yeah.
12 MR. CHANG: Will it all be utilized?
13 You also mentioned impacts on rates to the
14 consumer --
15 MR. HUBBELL: Excuse me?
16 MR. CHANG: You mentioned about the impact
17 of all this on your rates --
18 MS. ROSENTHAL: Well, visual -- there was a
19 visual impact too.
20 MR. HUBBELL: There's obviously a visual
21 impact.
22 And, yes, rates. The Hawaiian card, yes,
23 it's bad enough.

24 MR. CHANG: Rates as in --

25 MR. HUBBELL: People.

1 MR. CHANG: Yes, sir?

2 MR. CURTIS: Henry Curtis, Life of the Land.

3 What percentage of the community would have

4 to oppose the project for the developer to leave?

5 MR. CHANG: Is that something that -- say

6 you want sort of looked at in the EIS?

7 MR. CURTIS: Sure.

8 MR. CHANG: How would you phrase that so

9 that it's something that they study?

10 MR. CURTIS: Some developers say if a

11 community opposes us, we'll leave, and we'll work

12 with the community and try to reach a common

13 understanding. But if they say no, we'll leave.

14 Other developers say we're here no matter what. I'm

15 curious what this developer thinks and how they have

16 handled other projects where there has been

17 opposition.

18 MR. CHANG: Okay. But is there a suggestion

19 then that this study should examine sort of the level

20 of community support or lack of support?

21 MR. CURTIS: No, it should answer the

22 question of the developer, whether the developer

23 would leave at some point if there were a sizeable

24 opposition they could not overcome.

25 MR. CHANG: Okay, thank you.

Verla, you've had a chance. Anybody not have a chance yet? And then there are one or two others who wanted to comment.

MS. VASA TAVALII: What I would like to know is -- I'm Vasa Tavalii -- what I would like to know is the direct impact financially on the community. How does the community benefit in any way, shape or form? And what is your data to support this? This is your immediate community in this room.

MR. CHANG: Thank you.

Make sure that if you haven't already signed in, that you sign in so we get all the names correct.

Anybody else not have a chance? You've had a chance so we are going to go to -- anybody else?

MR. KENT FONOIMOANA: My girlfriend -- ladies first.

MS. ALLITASI PONDER: What other instances have they -- has this developer placed a project of this magnitude this close to a community, this close to a school? And what has been the resulting reaction from that community?

MR. CHANG: So precedence in terms of the effects of proximity of projects like this to like schools and houses and so on and so forth?

MS. MOORE: Just a feedback onto -- he was asking what would make the developer stop the

project. What impact indicators with the environmental study would actually stop this project?

MR. CHANG: Thank you. Kent?

MR. KENT FONOIMOANA: I'm going to piggy-back on what Mr. Curtis mentioned. What is it going to take for the amount of opposition within a community to stop a project? I'm going to speak from a historical perspective, but there's going to be a question in here --

MR. CHANG: Perfect, perfect.

MR. KENT FONOIMOANA: -- as short as I can.

I am a former member of the Kahuku Community Association, current member again as of this month.

It is my understanding from dealing with the previous predecessor -- which I am going to consider them one and the same company because evidently the state is doing the same thing by transferring the lease to this gentleman here -- and so back in 2006 when they first came -- and I've got a copy of it -- actually I forgot it at home but I can provide a copy to everyone if they want -- the developer first came and said that if the community doesn't want this project, we won't build it.

In response to that, down the line in 2010, while the gentleman sitting behind me was leading -- was the president of the Kahuku Community Association -- we did come out with a statement and a position on wind mills. We said no more wind mills

be installed in Kahuku -- installed.

However, another gentleman on the Board has continued to open the door to Mike and other companies to try to install wind mills in this input.

We have generated several petitions from several points of view -- it's my way of polling the community -- one of them was asking for a three-quarter mile set-back, and one of them was saying none at all. And I can tell you, the "none at all" is easy to get signatures.

I have a hundred and something signatures in here that took me less than an hour and a half to get by walking and talking. So the opposition is there.

So Mike -- or anyone else listening to this EIS -- as a matter of fact, I am going to make a comment on that picture right there -- Habitat Conservation Plan -- and I'll make the same statement, we need to do a Habitat Conservation Plan that applies to human beings.

Are you going to provide us that?

Also, before this EIS process moves forward, the Community needs to be provided with a 360-degree virtual images of what this project will look like.

Also, this project needs to do a study on what may happen to a community that's surrounded on three sides by these large industrial wind turbines should an Iniki-type hurricane event strike this area. It is good for wind, it's even better in a hurricane. And I am quite concerned about large

debris flying through the air.

There is a reason why they place the turbines so far apart. It's to avoid the domino effect should one of them fail and take out another wind turbine. Yet they don't have -- the same distance doesn't apply to a residential community -- and I would like to know why.

MR. CHANG: You're going beyond my ability to summarize. But the things I picked up on were impacts on not only creatures, but also the human creature in determining habitat, and also the impact in terms of a natural disaster like a hurricane.

Did I miss anything else?

MR. KENT FONOIMOANA: You got it.

MR. CHANG: Thank you.

MS. MILLER: Just one more thing, is what

kind of impact would this have on -- we understand that it will affect the rest of the communities like Laie, Hauula, Pupukea -- what kind of impact is it going to have.

And on the cultural side, what about all of the native plants, the animals that we have, the Kahoalawe, you know, things like this that it's up there?

What has taken place to see that that doesn't get harmed? So that's one of my questions. Thank you.

MR. CHANG: So I think -- when I saw you

first and then come back to Henry.

MR. CURTIS: My understanding was that when Keith Avery was involved in the project, there was reached an understanding that if the community didn't want it, the developer would leave.

When the new developer acquired the rights from Keith Avery and from others, did those conditions go with it or not? And if not, why not?

MR. CHANG: Okay, is that something again that EIS normally would assess?

MR. BROWN: That is something that the developer may decide whether or not to stick it in the EIS. And the community may or may not decide to

call up DLNR and say why is it not there? So I would think the developer would want to stick it in the EIS. Thank you.

MR. CHANG: Thank you, Harry.

MS. MILLER: This is an expansion of my earlier comment on the health and on the plants effects as well as what Kela said on the -- mine is what kind of impact would it have as well on the cultural side, on the native Hawaiian -- on the native Hawaiian's ability to exercise their gathering rights if need be, to give up to areas where it is, and pick up those native plants or plants that are -- (inaudible) Or whatever -- cultural.

MR. CHANG: To study the impact on traditional cultural practices. This is great, you guys are doing fantastic. They are getting lots of

17 stuff that they know they are going to need to work
18 on.
19 Anybody else not have a chance yet?
20 If not, Ralph, did you have --
21 MR. MAKAIAU: Ralph Makaiau. Again, when we
22 had the fire up at First Winds, it was very --
23 obviously everybody responded to the environmental
24 impact of that disaster, if you will.
25 But, in following the process of Department

1 of Health, and the monitoring that the First Wind
2 people did, they hired (inaudible) and contractors as
3 such.
4 One data that we did not see -- we saw all
5 of the proof measurements, downstream measurements of
6 the wind, and we saw all of the data represented in
7 the ground contamination.
8 But at the time of the fire, as the fire
9 department was trying to at least control the
10 perimeter burn, nobody was able to give us
11 information on the downstream impact of Pahipahialua
12 Stream and (inaudible) Stream, both of which cross
13 agricultural areas, both of which settle a
14 preservation lands wildlife. And it was interesting
15 for us that DLH didn't even think about it. And they
16 are updating just the mere reporting from the
17 contractor. That wasn't comfortable with me either.
18 MR. CHANG: Okay, so see if I understand.
19 So, the EIS -- you would like the EIs to look at the

need for environmental data in case of things like the First Wind fire if something goes wrong with the infrastructure?

MR. MAKAIAU: Why don't they establish a baseline like that (inaudible) stream or even the adjacent farm water run-off path. Establish a

baseline so that when they come back in an emergency, we know if there's any impacts.

MR. CHANG: Thank you for helping me out on that.

Who did I miss over here?

MS. PONDER: The notes that are coming out of this meeting, will they be -- will we be provided a copy of those notes, all of our questions, our collective questions? Are you taking these notes in order to also share the result of this meeting with -- the contents of this meetings with us? That's one question.

Another question, the past fires that we experienced here from First Wind resulted in a lot of the awareness that we were under-equipped in terms of our fire department capabilities, our emergency response capabilities.

What additional resources will you be providing or be required by the city in order to respond?

MR. KENT FONOIMOANA: What is the developer's share?

MS. PONDER: Right. What will the developer

be providing, and then what will be left over for someone to provide in order to adequately meet those

emergencies?

That's the second question.

I forgot my third question. I'll come back.

MR. CHANG: So the suggestion is to study the need for additional emergency responses as a result of these projects.

MS. PONDER: The first one was about the notes.

MR. CHANG: The notes, yes.

As I understand it, the scoping notes get summarized, get posted on this project web site. Am I correct that the recording here goes -- becomes part of the document or --

MS. WOECK: It will be part of -- the transcripts from this meeting and from the NEPA meeting that was in November will be part of a scoping report, which will be an appendix of the EIS -- draft EIS -- and we can also discuss posting them on the Champlin web site once they're available. But they will definitely be in the draft EIS.

MS. PONDER: When is that?

MS. WOECK: Mid year -- this year, mid year.

MR. CHANG: Does anyone else have a comment that begins with study this, we want you to study this?

Thank you.

MS. BORGES: My name is Ghia. And I just wanted to touch on the other fact of acquiring access rights and gathering rights. I think it's important also to look at the effect of the native Hawaiians as a people and their cultural aspects since -- if we are not able to -- if we are to be surrounded by these wind mills, if we're not able to access it. Because once the wind mills are up, it would be developed land.

And native Hawaiians have access rights to under-developed land and land that is not fully developed so --

MR. CHANG: Got that? The impact of developing this particular parcel on native Hawaiians' gathering rights.

MR. BROWN: You said to us as personal study this, but before I want to ask that for anybody asks, I wanted to know how are you guys study this? I mean, are you actually on land or you just look on the screen or how are you guys really study this project? I mean, are you actually walking up there and check the land or --

MR. CHANG: Maybe we can respond to that in the general portion. Yeah, great question.

Anyone else? Study this. Evaluate that?

Kent, you got one?

MR. KENT FONOIMOANA: I got plenty of stuff.

MR. CHANG: You got one that you can share right now?

MR. KENT FONOIMOANA: I got about four or five.

I would like them to study the impacts on the near shore waters, they will be installing roads up there. Roads will create more run-off. I would also like you to study the community sentiment involved in -- through that in your report.

I would like you to study the impacts of infrasound. Low sub-sonic sounds caused by wind turbines moving at 159 or 80 miles an hour at the wind turbine tips and blades and the effect on infrasound on critters as well as human beings.

MR. CHANG: Thanks, Kent. Anyone else?

Going once --

MS. MILLER: What we need to study the people of the areas, the communities, study the people, what are their needs? What are some of the things that we need? I think that's one of the things you guys should consider to do.

MR. CHANG: Human and social impacts.

MS. PONDER: And to reply to what my third question was, I would like to know how well the developer knows our community in terms of demographic break-down.

How many youngsters, kapuna, people who are

health challenged, have they taken those things into consideration. And we would like them to take those things into consideration.

I would like to understand the individuals and the groups that they have approached and motivated through offers of support.

I know they approached Kent and he was quick to turn them down. So I would like to know who else in our community, on our board, our immediate community, outside of our community, is being incentivicized in any way; current support, offers of future support, anyone that they have approached, I think that should be public knowledge.

MR. CHANG: Anyone else?

MS. MOORE: I want a study comparison -- we have a lot of wind mills, I think -- I've seen there is -- it's great because it's wide-spread, and up and down this coast line we have a variety of wind mills.

So I would like a study and comparison on the wind mills per square miles, the output it does

and compare it to something at this site. If you were to consider this all one project, and you took another project of this same scope including all these -- what is the output -- are we producing more than what this island needs?

Are we storing -- I mean -- there's got to be a limit as to when enough is too much. So I want a study and comparison to something -- comparison of this side from Waimea down to this side.

Is that the function of the ESI?

MR. CHANG: All right. Yes?

MR. MAKAIAU: I think this is all in addition to the study Kent had some of the studies on this, on these within the floods, in going to build whatever they want to build, you know, they are going to grade some of the mountainside, or what are they going to do that is going to change what's already there.

It may have a negative impact followed by what nature wants to do. Just in the case, I don't want any negative impacts on the land in addition to questions that Kent mentioned about erosion and run-off.

MR. CHANG: Okay. Anything else?

All right, can we take like five minutes and

then we will come back and then we will open things up and we can talk some more with Brita, with Michael a little bit more. Five minutes.

(HEPA Public Meeting Scoping Comments concluded at 7:25 p.m.)

C E R T I F I C A T E

STATE OF HAWAII)
CITY AND COUNTY OF HONOLULU)

I, KATHRYN PLIZGA, RPR, CSR NO. 497, State of Hawaii, hereby certify:

That the proceedings herein were by me taken down in machine shorthand and thereafter reduced to print via computer-aided transcription; that the foregoing represents, to the best of my ability, a complete and accurate transcription of said proceeding.

DATED: Honolulu, Hawaii, _____

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19 KATHRYN PLIZGA

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1 HEPA PUBLIC SCOPING MEETING

2

3 NA PUA MAKANI WIND PROJECT

4

5 (QUESTION AND ANSWER PORTION)

6

7

8

9 PLACE: Kahuku Community Center

10 56-576 Kamehameha Highway

11 Kahuku, Hawaii

12 DATE: January 10, 2014

13 TIME: 7:35 p.m.

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19

Reported by:
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(7:35 p.m.)

P R O C E E D I N G S

MR. CHANG: Okay, so for the next 30 minutes or so, you know, it's a chance for you folks to ask questions that you might have, the right people here in terms of Mike and Brita. They'll do their best to respond. If they can't, at the very least, they will encourage you -- they'll take it back and they'll consider it further.

So who would like to go first? Does anybody have a question?

Okay, Carl?

MR. HUBBELL: Carl Hubbell. I have a question for Mike.

MR. CUTBIRTH: Yes, sir.

MR. HUBBELL: So you're going to saturate the system and we're not going to be able to put in our own solar panels if you go up first. Is that a true statement?

MR. CUTBIRTH: So, I don't think that's a true statement. And I asked the folks at HECO transmission about this question.

And the existing wind projects and our proposed project connects to the high voltage

distribution line, the 46 kv main. Rooftop solar connects to the residential feeder lines, the low

voltage residential feeder lines. So, the issue of capacity on the distribution lines is really a separate issue for how much rooftop solar can be built.

This is something that I've asked HECO if they could address this issue to the community because I understand it's an important issue. And they indicated they are going to work on putting together a statement. And potentially we could organize a meeting with someone from HECO to better address that question.

MR. HUBBELL: Will that happen on Wednesday?

MR. CUTBIRTH: I don't know that that could be done unless we -- the Wednesday meeting is really oriented for its health impacts of wind turbines.

One of the issues that we've heard from the Community is a concern about health impacts. And there's going to be a presentation on what the research and data and reports have shown.

MR. CHANG: Okay. Thank you, Carl.

MR. HUBBELL: One more question. When we contacted the representative, he said that HECO would be able to answer those questions. Isn't he supposed

to be hosting this meeting along with you guys?

MR. CUTBIRTH: Well, he may have a representative from HECO here, but I haven't talked to him directly about that, so I don't know.

MR. CHANG: The question is noted. Next

question.
MR. HUBBELL: I thought that was the purpose.
MR. RIVIERE: Thanks, my name is Gil Riviere.
Is this a 20-year project and then you take them down at the end of 20 years or what happens when it's done? Will you restore the ground and what happens then?
MR. CUTBIRTH: So, the project will have a 20-year power contract. So we would expect the project to go for at least 20 years. If there's no further agreements to purchase power, then our obligations would be to restore the land to the condition that it was in before the project was built.
MR. RIVIERE: Does that include removing the entire concrete pads?
MR. KENT FONOIMOANA: No, they take up the top three feet. I'm just answering.

MR. CUTBIRTH: I mean, my understanding is we remove the improvements that we put in there.
MR. KENT FONOIMOANA: Except for the top three feet of the concrete when you pass, which your engineers shared with me.
MR. CHANG: Yes, ma'am.
MS. MILLER: Mike, Kela Miller.
What kind of impact do you see happening on not only Kahuku but on Laie, Pupukea, you know

further on down the coast line? What kind of impact do you see it would have on the rest of the communities?

MR. CUTBIRTH: Well, I think the most obvious impact is just the visual impact. The Environmental Impact Statement that will be prepared will address all of the impacts of the project. And to me, that's the most obvious, is that you could see the turbines once they're up.

MS. MILLER: Who needs to be able to see it?

MR. CHANG: I guess the EIS -- if that's what is suggested -- needs to look at the impacts on either side of the Leeward communities.

Kent, question?

MR. KENT FONOIMOANA: Question. If everyone between Kahuku and Pupukea or Waialua installed solar

panels on their homes, everyone, and took advantage of the tax credits being available for them, would that impact your tax credits negatively?

MR. CUTBIRTH: No.

MR. KENT FONOIMOANA: And would this project still be feasible?

MR. CUTBIRTH: Yes.

MR. KENT FONOIMOANA: We need to have HECO here to answer that question honestly.

MS. MOORE: I am going to ask the question that was asked last night over and over, and they waited for you to come before them.

What would it take for you to stop this project should the people decide they overwhelmingly don't want it? Are you willing to give this up? And at what point would you determine that it is still no go?

MR. CUTBIRTH: Well, our company has made a commitment to Hawaiian Electric and the state to build a renewable project here, and to generate power at about half the cost of burning oil.

Any decision to not honor those commitments that we've made is something that would have to be from our management. So I don't have any specific criteria that I can give you for that.

I think what we really would like to do though is to work with the Community to make sure that we address the issues. To the extent that there are issues of concern, that we can address, we would like to try and do that.

And as an example, since we started working with the Community about nine months ago, we have actually modified the proposed plan, the layout of the project, removed four proposed turbines from -- (Cross Hill) -- and relocated one turbine from the adjacent site.

And this really is trying to address the issue and concern about setbacks as well as noise. So that's really our preferred approach. That's typically what we've done on other projects; trying to work with the Community, identify what the issues

are, and actually try and work with them to see if we can get them figured out.

MS. MOORE: Okay.

MR. CURTIS: Henry Curtis. I know from sitting on the Public Utilities Commission Reliability Standards Working Group, that wind fluctuates and that the utility grid has to fluctuate in reverse to offset the impact of wind. And, therefore, the cost to a wind is both the direct cost

at the wind site and also the system costs to adjust, to deal with the winds coming in. And therefore, your component is half the cost of the grid. But what is the other component cost?

MR. CUTBIRTH: Again, that's probably a question better asked to HECO, that's not really something that I could address.

MR. CURTIS: They haven't either.

MR. CHANG: Put that in to them when they come.

Next.

MS. VASA TAVALII: Vasa Tavalii.

I have a question for you. If the approval for this project was given to you by the City, the State, then why are we having this discussion? If you're pushing the project forward with adjustments, with the determination to implement the project -- because the question still hasn't been answered -- what would it take for you to discontinue the

project?

MR. CHANG: Do you recall your prior --

MR. CUTBIRTH: I don't know that I've got anything additional to add other than what I already stated to that question.

MR. CHANG: Okay, so one of the recurrent

themes we're getting is what would it take for this project to basically have it bungled?

MS. VASA TAVALII: Would the land owners keep --

MR. CHANG: Anybody else not have a chance? Hold on.

MR. BROWN: Aloha. I'm looking in your brochure. And it says "How will the Project Benefit Us?" And I'm not seeing us being (inaudible) Community or people of Hawaii. Most likely at this point, here Kahuku. How would it benefit us? As I read some of these things in here, I'm not sure that any of them -- some of them is true -- like will it benefit us by bringing our electricity rate down?

You don't control that. That's HECO and them, they saying to that. So to me I'm kind of thinking it's on here, because it is going to benefit package. And if there is a benefit package to the Community, what are they looking at? What are you talking about? What figures came over, you know, can we talk?

MR. CUTBIRTH: Right. So, with regards to the cost of the electricity, the state has got a goal

24 to reduce the cost of the electricity to rate payers.
25 And this project will cost about half of what burning

1 oil to generate electricity costs. And Hawaiian
2 Electric included in their filings for the state a
3 statement to the effect that by adding this project,
4 it will avoid spending millions of dollars in
5 purchasing oil. So I think they've tried to, at
6 least, put some kind of quantification on this.
7 So, with regards to benefits, I think that
8 you can look at benefits from a number of levels.
9 You can look at it from a state standpoint, the
10 standpoint of trying to reduce the cost of the
11 electricity; of helping to reduce the imports of
12 foreign oil. The State currently spends over
13 four million dollars buying oil from foreign
14 countries. And that's money right out of the economy
15 of Hawaii.
16 Additionally, because a portion of this land
17 is State land, the State would receive revenues, base
18 revenues, for 20 years. Additionally, there are jobs
19 that will be created from the project, short-term
20 construction jobs as well as long-term operations
21 jobs. I believe the First Wind project employs about
22 50 percent locally, and we think we can do at least
23 that well.
24 Additionally, the original developer of this
25 project had proposed to the Community a Community

benefit fund. And that was $10,000 per wind turbine per year over the life of the project. So, if you look at that in terms of the Phase I project, that would be $80,000 over a 20-year life or about $1.6 million. If the second phase project was built, that would be $150,000 per year over the 20-year life or $3 million.

This concept is something that's unique for our company, we have not had a Community Benefit Fund for any of our other projects. But this is something that we propose to honor, a commitment that was made by the prior developer.

So those are a few of what we think are pretty tangible benefits. Thank you.

MR. CHANG: Kent, I know you have a question. Anybody else have a chance to raise a question yet?

MR. REED MATSUURA: My name is Reed Matsuura. Last night there was a question about the agreement that was signed with the windmill project.

My question is, the agreement is between you and the private owner of the property or the City? And if this owner somehow renig on this agreement or whatever, are you still planning -- because this is property -- but I have from my understanding is most

of the property is owned by the private owner -- we not focus on wind mills. So I just want to know if

the agreement was with you, your company, or with the City or -- and then the other part is, does that interfere with you stopping the project? No?

I'm trying to, you know, rephrase the question earlier, that what it takes for you to stop the project. If that's why you cannot stop the project because of the agreement?

MR. CHANG: I guess the essential question is about the ownership of the land. If something happened with that, you know, the agreement with that, would that be enough to, you know, change direction?

MR. CUTBIRTH: So, a portion of the project is planned on State land. And that would be five turbines, and if just the first phase project was built, there would be three additional turbines on the adjacent private land.

The State land agreements are with our company, and it's actually the project company which we own. And likewise, the lease on the private land is a different land owner than our project land.

MR. CHANG: Thank you.

MR. KENT FONOIMOANA: The first question

real quick, are you not the CEO of Champlin Wind Energy?

MR. CUTBIRTH: I am.

MR. KENT FONOIMOANA: So you are part of the management. Should the management make a decision to

stop the project, you are the top.

MR. CUTBIRTH: I report to a board, and I am the CEO. But that board is actually the group that makes major decisions.

MS. PONDER: I would like to know, Mike, your job project history in terms of like what you've done in wind development in the last 10 years; and what projects you oversee of this magnitude or close to this magnitude in that time frame.

That's one question. And then I have another.

MR. CHANG: Track record.

MR. CUTBIRTH: So just kind of a brief history, I got into the wind industry about 18 years ago and joined a company called Zond Corporation. Zond was one of the pioneers in wind energy, they built one of the first projects to sell electricity to Southern California Edison.

While I've been in the wind industry, I've personally been involved in over 750 megawatts of

projects, development projects. And our company management team has been involved with about double that amount.

My role over the years, I've had different hats. When I first got into the industry, my responsibilities were in the area of finance. And over time, took the lead on the development of projects.

I personally have not had any involvement in

the operations and maintenance of the projects.

MS. PONDER: So none here in Hawaii?

MR. CUTBIRTH: While Zond and Enron Wind worked on a number of projects -- and in fact, the original developer of this project was a colleague of mine at Zond and Enron -- and he's been involved in a number of projects that were developed here in Hawaii. This is my first -- personally my first experience in Hawaii.

MS. MOORE: I would like to ask one last question before I have to leave. And this may come as part of a study. You mentioned the Community set this package up at about $10,000 per turbine. I put up a PV system on my home a year ago. It saved me $400 a month. Times that by 12, it's $4,800 just the past year. Two households of HV system would equate

to a benefits package of one turbine.

My question is -- well -- actually my statement is in comparison, if we had 1,000 homes with PV systems on their homes, multiply that by savings of $400, this is a direct savings to the customer, that's a benefits package of $400,000 a year -- a benefit, that's huge. So I think the benefits package pales in comparison. There's never been a comparison study with PV, individual PV versus all these turbines.

I understand people wanting to get off the fossil fuel, I totally understand that. But when you

generate that energy and you redistribute the cost to Oahu to one million customers or whatever we have, I think that's a savings of about one and half cents a year. That's nothing. It's negligible.

So something really has to be addressed. If we're going to pull through with this, there's no turn-around in this project -- if I was the community leader I would up the ante for every single one of those turbines that go up so that it equates to the number of the homes in this Community -- let's start with this Community alone -- that at least $400 go back in their pocket on a monthly basis. To me that's fair.

If we're going to move and there is no point of return, what is fair is to put the savings right in their pockets. And don't tell them we're going to save because HECO is going to save. Because there is no reason for limiting this -- I apologize, but I have to leave.

MR. CHANG: Thank you.

Do you have a comment, Mike?

MR. CUTBIRTH: Well, I would just say the one comment is that rooftop solar and an additional wind project are not mutually exclusive. Additional rooftop solar as well as wind projects and utility sides of solar is part of the energy plan for Hawaii.

So, the fact that individuals want to add solar is not something that -- from what I understand and from what I have been told from HECO -- is that

is going to be impacted by this project.

MS. PONDER: Well, it is, and it's on your site -- it is on HECO's site -- that it is a direct correlation between these wind projects and the number of households that can have it. You will have to address that issue.

MR. CUTBIRTH: We'll try and help facilitate getting someone from HECO to address that because I know this is an important issue to everyone.

MR. CHANG: Thank you. Thank you, Mike.

MS. MILLER: Do we know, since First Wind went up, that there was a decrease in electric bills in any of communities here, the residents?

And do we see in the future, with this other wind mill that's going to go up, that there will definitely be a decrease in electric, in our electric bills?

Is there something that we can truly say, HECO will actually decrease our electric bill? Because we have not seen one bit of decrease -- I don't think so -- anybody have. So that would be something of a concern, that if we do this -- if -- that there will definitely be a decrease in our electric bill.

I know we all pay the price on electric. And so, I think that's a really big concern for all the Community. Thank you guys, so much.

MR. CHANG: Thank you, Ms. Kela.

20 So the question has to do with at what point
21 do people actually see a reduction or lowering of
22 their light bills because of alternative energy.
23 MR. CUTBIRTH: Just a couple of comments. I
24 would just say that this is an important goal for the
25 state. In HECO'S filings with the State, they have

1 indicated that this project will save millions of
2 dollars over time.
3 I realize that it's frustrating to have a
4 renewable project go on line and then not be able to
5 look at your bill and see a reduction. And I think
6 that one of the issues is that the cost of
7 electricity that everyone pays is an average. And
8 there's -- I don't know what the number is -- that
9 1,200 megawatts of total generation on the island.
10 And right now there's just a very small percentage of
11 renewables.
12 As that percentage increases over time to
13 meet the State's laws for renewables, it seems
14 logical that the bills would go down. But I think
15 this is really a better question for HECO to have
16 them actually try and give you an estimate on that.
17 MR. CHANG: I'll take one question. I see
18 two people. Three more, and then we are going to ask
19 Mike to say aloha and mahalo and good night.
20 MR. KENT FONOIMOANA: Three quick rapid-fire
21 questions since my time is short, maybe four.
22 Has the Kahuku Community Association --
23 you're sitting in right now -- have they endorsed

this project?

MR. CUTBIRTH: I don't think that the

association -- the KC Board -- is that what you're referring to?

MR. KENT FONOIMOANA: The association, have they endorsed this project through a general membership meeting or any forum?

MR. CUTBIRTH: You're not referring to the KC Board?

MR. KENT FONOIMOANA: I am.

MR. CUTBIRTH: So I don't believe the Board has endorsed it.

MR. KENT FONOIMOANA: Thank you. That's my first question.

Are you -- because we are short on time I'm just trying to --

MR. CHANG: Thank you, appreciate it.

MR. KENT FONOIMOANA: Are you aware that last night the Kahuku Neighborhood voted down the resolution to increase the amount of setbacks from the current one-time item turbine to the three-quarters of a mile is what this Kahuku Neighborhood Board, which represents the entire community -- are you aware of that?

MR. CUTBIRTH: Yes.

MR. KENT FONOIMOANA: Are you aware that when First Wind proposed to put five more turbines on

the stretch here right before you got -- right across the street from our -- that the Kahuku Community Association in response to Keith Avery, your partner or your prospector as I prefer to call him -- although you don't like that term, that is exactly what he does -- that we, in response to his request to put this other project up here as well as First Wind's which we gave out the -- the Kahuku Association came out with our position saying we don't want any more.

And this is back in 2010. Are you aware of that?

MR. CUTBIRTH: I'm not.

MR. KENT FONOIMOANA: I have a copy for you, I can provide that for you.

MR. CHANG: Next question.

MR. KENT FONOIMOANA: Last question.

In jumping through all these hoops with this EIS process that we're doing right now, the process up at the PUC, you guys filing for a non-competition clause with other vendors, don't you think the first move that you should clear would be the Community?

MR. CUTBIRTH: Kent, well, like I said, we have been -- I think we started talking to the Community about this project more than nine months

ago; had our first meeting in front of the KC Board, I believe that was in May of last year.

So we've actually -- we've started that work -- we know we have more work to do. But we sincerely do want to try and -- as best as we can -- address any issues that the Community has.

MR. KENT FONOIMOANA: Like no?

MR. CURTIS: One of the things that Champlin Wind Holdings is fond of using is reference to the energy agreement of the Hawaii Clean Energy Initiative because it's often quoted but seldom read.

That document says that short-term electric bills will rise and then stabilize. The HCEI agreement says nothing about lowering costs and nothing about -- but that it's always quoted as going down.

It says that when you add wind and you add solar, you have to put in a smart grid, you have to put in batteries, it will raise the price. But since the price of oil is expected to rise also, eventually the wind and the solar will come out less than the oil. But in the short term, it will go up.

MR. CHANG: Thank you, Henry.

So our last question or comment.

MS. PONDER: Okay. The fact that this is

the last question allowed is actually part of my concern. Okay?

The tactic that I see being taken in getting this project shoved up our butts is to keep walking us along toward the Nazi showers as we make

conversation together getting our last questions in. But in actuality, we're being marched along, given very little time.

What you've said is you have been in conversation with this Community for nine months and the conversation has gone like this. You say this is what we want to do. The collective says no. You say this is what we want to do. The collective says no.

So, it's kind of like a kid asking permission but not taking in the information. We don't want this here. Okay?

The only people that I know that are even open to this -- we have been here six generations in Kahuku, my grandfather worked at the sugar mill -- okay, the only people that I know that are open to this are people who we understand have been approached by either you or someone in your group and incenticized in some way, whether it's now or in some future time.

Okay? So I have a real problem with the

tactic of making nice, but not taking in the information, not really giving us the answer, but passing the buck. Passing on the question to people that are not here in this room like HECO or the management, you know. So the same thing that happened to us last night.

Having meetings on Friday nights when you know that is very -- you know -- what do they say in the business? The best time to give out bad news is

on a Friday night.

So, it's not -- you're making it look like you're talking to us -- but you're really not. It's not a two-way conversation.

Okay, I have a question.

How much have you or other projects of this size paid out to those whose medical conditions existing were new, have been impacted by projects like this? I would like to know that. Have you been approached by people in those areas? Have you had to pay out in like projects?

So, I want to know in another project where you are this close to the community -- that's two-part -- and in those communities, how long have they been putting up with the wind turbine, the turbine syndrome as we all know it, is called.

And if they put up with it for one year, the project being there 10 years, during the course of that time what has been the reporting of medical conditions?

How have you collected the information? So that you can't say, oh, no one has reported it because there's no place to report it.

MR. CHANG: Thank you.

So as I understand it, next Wednesday is about the research. Sort of health events.

But the other question is, you know, in your experience, have there been claims brought because

of, you know, health impacts as a function of these projects?

MR. CUTBIRTH: So, I've been with four wind companies over the last 18 years; and I'm not aware of any claims that were paid to anyone claiming to be sick as a result of it.

And with regards to your question about addressing the issues, the focus of the meeting plan next Wednesday is to actually provide the community with the data and research and surveys in a summary form by a Harvard medical physician who is an expert in this area, and give the Community an opportunity to talk to him about this so called wind turbine

syndrome.

MS. PONDER: But not somebody paid for -- just someone who's on their own just coming on their own defense?

MR. CUTBIRTH: I'm not aware of anybody that would come to Hawaii for that purpose on their own nickle.

MS. PONDER: So a disinterested party is coming?

MR. CUTBIRTH: An individual physician that has been involved in this area for years.

MS. PONDER: In other projects?

MR. CUTBIRTH: No, no, in this area of research and health impacts of wind turbines.

MS. PONDER: And who is that person? I would like to know that.

MR. CHANG: Come next Wednesday, you will find out.

MS. PONDER: No, I would like to know the name of that person, so we can be prepared.

MR. CUTBIRTH: Dr. Robert McCunney, M-C-C-U-N-N-E-Y.

MR. CURTIS: Robert what?

MR. CUTBIRTH: McCunney, M-C-C-U-N-N-E-Y.

MR. CHANG: Okay, so just for myself, I want

to say that how appreciative I am of the input you provided and you're a great group to work with. And I am going to just turn this over to Mike, send you off to begin your weekend. So I will say aloha for myself and mahalo.

MR. CUTBIRTH: Thank you so much for attending tonight and all your good questions. We appreciate you coming out.

(The Question and Answer Portion of the Kahuku Scoping Meeting was concluded at 8:12 p.m.)

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C E R T I F I C A T E

STATE OF HAWAII)
CITY AND COUNTY OF HONOLULU)

I, KATHRYN PLIZGA, RPR, CSR No. 497, State of Hawaii, hereby certify:

That the proceedings herein were by me taken down in machine shorthand and thereafter reduced to print via computer-aided transcription; that the foregoing represents, to the best of my ability, a complete and accurate transcription of said proceeding.

DATED: Honolulu, Hawaii, _____

_____
KATHRYN PLIZGA

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APPENDIX D
PUBLIC COMMENTS AND RESPONSES

Appendix D

This appendix includes each of the submissions received during the HEPA and NEPA scoping periods and associated responses. Each response letter included the following list of Issue Categories and Summary Statements as an attachment which corresponds to the three-letter issue code assigned to each substantive comment within the submission (identified by brackets). A summary statement was developed for each issue code to reflect how it was incorporated in the draft EIS.

Issue Categories and Summary Statements

Comment Acknowledged (ACK) – Comments that were received and noted, including general comments, expressions of opinion, and comments that do not fall within the scope of analysis for this EIS.

Air Quality (AIR) – Comments related to air quality impacts (criteria pollutants), climate change, and emission of greenhouse gases by the Project; comments related to meteorology; comments related to renewable energy standards.

- **AIR 1**: Air quality impacts (criteria pollutants) and greenhouse gases resulting from construction and operation of the Project, and how impacts will be calculated and mitigated.
- **AIR 2**: Impacts to meteorology (at the meso-scale and micro-scale) resulting from the Project.
- **AIR 3**: Impacts related to climate change should be identified and analyzed.

Alternatives (ALT) – References to any alternative that could be evaluated through the NEPA/HEPA process, including comments on the range of alternatives to be considered.

- **ALT 1**: Would like to see alternative energy solutions analyzed, including solar, geothermal, personal photovoltaic systems, and geothermal as part of the alternatives analysis.
- **ALT 2**: An alternate location for the Project should be analyzed (e.g. moving turbines further inland, different location on Oahu) due to the current Project's close proximity to the community and schools.
- **ALT 3**: The alternatives analysis should include a reasonable range of alternatives, and should describe how alternatives were developed and also how they were eliminated from further analysis.

Cultural Resources (CUL) – Concerns over impacts to cultural and archaeological resources; concerns over impacts to Native Hawaiian access to land.

- **CUL 1**: Protection of Native Hawaiian cultural sites and burial grounds, and preservation of culturally-significant lands.
- **CUL 2**: Native Hawaiian land access and gathering rights being restricted as a result of the Project.
- **CUL 3**: Proper consultation is conducted between the USFWS and Native Hawaiian people and mitigation measures are developed for potential impacts to cultural resources.

Data (DAT) – Data that were put forth for inclusion in the EIS, including reference materials and scientific papers that were attached to comment letters and emails.

- **DAT 1**: Recommended specific studies and reports to be reviewed for inclusion in the EIS, or made data requests related to specific issues for inclusion in the EIS.
- **DAT 2**: Recommended visual simulations of the Project be included in the EIS.

Direct, Indirect, and Cumulative Impacts (DSC) – Comments related to any potential impact of the EIS alternatives that would have direct, indirect, or contribute to cumulative impacts to local communities, fish and wildlife, or the economy; identification of reasonably foreseeable future actions to be considered in the analysis of cumulative effects.

- **DSC 1**: Direct, indirect, and cumulative impacts to public health, visual resources, and socioeconomics for communities nearby.
- **DSC 2**: Direct, indirect, and cumulative impacts to aquatic and terrestrial ecosystems, habitat, native plants, wildlife, bat, and avian species.
- **DSC 3**: The EIS should utilize a clear methodology for analyzing direct, indirect, and cumulative impacts; proposed mitigation measures should be identified and analyzed; and past, present, and future actions should be analyzed as part of the cumulative impact analysis.
- **DSC 4**: Cumulative impacts associated with power generation of the Project when combined with other nearby wind farms, and whether the power being produced is more than is needed.

Environmental Justice (ENJ) – Issues pertaining to compliance with the Executive Order on Environmental Justice; comments related to the evaluation of environmental justice populations.

- **ENJ 1**: The EIS should address any disproportionate adverse impacts to minority and low-income populations, and should reflect coordination with those affected populations.

Public Health and Safety (HAS) – Comments related to potential health and safety-related impacts of the Project, including wind turbine syndrome, noise-caused health effects, blade throw, turbine collapse, shadow flicker, and fire.

- **HAS 1**: Health impacts resulting from noise (infrasound and audible) such as headaches, loss of sleep, and lack of concentration as well as health impacts resulting from shadow flicker that may affect community members who live within close proximity to the Project should be discussed and analyzed.
- **HAS 2**: Safety impacts to community members related to wind turbine mechanical issues, such as blade throw or turbine collapse should be discussed and analyzed.
- **HAS 3**: Fire hazards associated with the Project's construction and operation including facility electrical failure and the identification of appropriate safety measure to address fire preparedness and emergency response.

Natural and Man-Made Hazards (HAZ) – Concerns over how the Project will be impacted by natural disasters; comments related to hazardous materials that are associated with the construction and operation

of the Project.

- **HAZ 1**: The threat of natural disasters, including hurricanes, tsunamis, and earthquakes, and how these events could in turn threaten the health and safety of nearby communities through the collapse of turbine towers or blade throw should be discussed and analyzed.
- **HAZ 2**: Hazardous wastes, chemicals, and pesticides that will be produced or used by the Project, and how they will be stored, disposed of, and managed.

Land Use (LAN) – Concerns about potential changes to existing land uses; comments about current or future land uses; right-of-way issues; military land uses; agriculture.

- **LAN 1**: The existing condition of the land and land uses within the wind farm site.
- **LAN 2**: The status and value of agricultural lands within the wind farm site.
- **LAN 3**: Potential negative impacts to U.S. Army training facilities located adjacent to the wind farm site.
- **LAN 4**: Potential impacts to agriculture and how any impacts may be mitigated.

Mitigation (MIT) – Types of mitigation measures associated with the Project and the HCP for inclusion in the EIS.

- **MIT 1**: Would like to see mitigation measures included in the analysis to reduce impacts to biological resources such as ecosystems, habitat, native plants, wildlife, bird and avian species.
- **MIT 2**: Would like to see mitigation measures and BMPs related to water resources, including water quality, landscape irrigation, and stormwater management.
- **MIT 3**: Would like to see mitigation measures designed to minimize traffic impacts during construction.
- **MIT 4**: Would like to see mitigation measures constructed to use less hazardous materials during construction and operation.
- **MIT 5**: Suggested a specific mitigation measure for inclusion in the impact analysis in the EIS.

Noise (NOI) – Concerns over potential impacts related to noise during construction and operation of the Project.

- **NOI 1**: Noise from the wind turbines associated with construction and operation of the Project impacting sensitive receptors.

Proposed Project (PRO) – Comments related to the Project's purpose and need, or description of the Proposed Action; comments related to potential impacts during construction, operation, or decommissioning; specific criteria related to Project design, such as the number or location of turbines.

- **PRO 1**: The proposed locations for the wind turbines are too close to residences and schools, and potential impacts should be analyzed. The EIS should show distances from the closest turbines to the elementary and high schools, the community boundary, and nearest residences.
- **PRO 2**: Power generation – specifically, what the overall capacity and daily production of the Project will be, transmission line upgrades that might be needed, how much electricity will go into the HECO grid, and how much of that electricity will stay in local communities.

- **PRO 3**: Would like to see more detail on the Proposed Action and Project components (in text and represented graphically), including: wind turbine components, specifications, and materials needed for construction of turbines; turbine upgrades (if needed); the locations of turbines, collection lines, and point of interconnection; access road construction and maintenance; plans for turbine operations and maintenance; and plans for decommissioning and site restoration.
- **PRO 4**: Clarification on the purpose and need of the Project, including how the Project would fit into the larger energy market that it would serve.

Recreation and Tourism (REC) – Concerns over impacts to recreation activities, including surfing, hiking, wildlife viewing opportunities; concerns over a potential loss in tourism to the area as a result of the Project.

- **REC 1**: Potential decreases in tourism to the area could occur as a result of the change to the visual landscape from the Project.

Regulatory (REG) – Comments related to the adherence to state and federal laws, including NEPA, HEPA, ESA; coordination with state and federal agencies and local governments; permitting and zoning requirements; compatibility with other adjacent land use plans.

- **REG 1**: Compliance with both the NEPA and HEPA processes for public scoping and outreach, that community members and agencies have been adequately consulted during scoping, and will continue to be consulted with during the entire planning process.
- **REG 2**: The City and County of Honolulu setback distance regarding proximity of wind turbines to residences is insufficient and must be updated to reflect safe distances.
- **REG 3**: The Project must be in compliance with all federal, state, and county regulations, plans, and policies, including obtaining applicable federal, state, and county permits.
- **REG 4**: Would like to see the development of a scientifically-supportable Habitat Conservation Plan (HCP), and a description of how the HCP will be implemented.

Socioeconomics (SOC) – Concerns over the economic viability of the Project; comments related to job creation and economic development; concern over impacts to local community stability and quality of life; comments about the community benefits package associated with the Project.

- **SOC 1**: Concerned about the details of the community benefits package.
- **SOC 2**: How the Project would affect homeowners' ability to install photovoltaic systems.
- **SOC 3**: Concern that the Project would impact the quality of life for nearby communities.
- **SOC 4**: How would the Project contribute to a savings on the electrical bills of local residents, and how soon once the Project is operational could residents begin to see any potential savings.
- **SOC 5**: Concern that the Project would lower property values and make it harder for homeowners to sell homes that are in close proximity to the turbines.
- **SOC 6**: Short- and long-term socioeconomic impacts to the community resulting from the Project.

Transportation and Traffic (TRA) – Issues identified around potential construction delays or new access roads that could be needed for the Project.

- **TRA 1**: Short- and long-term traffic impacts to the community, and what mitigation measures could be used to decrease impacts during construction.

Vegetation and Wetlands (VEG) – Types, values, functions, and potential disturbances to of wetlands and waters of the U.S. within the wind farm site; comments related to populations of vegetative communities and potential disturbances; concerns over invasive species.

- **VEG 1**: Potential impacts to Native plant communities located within the wind farm site, and how any impacts would be mitigated.
- **VEG 2**: The EIS should include measures to monitor and control invasive plant species and noxious weeds.

Visual Resources (VIS) – Changes to the visual resources within and around the wind farm site.

- **VIS 1**: Wind turbines impact the scenic beauty of the wind farm site, and steps should be taken to minimize visual impacts.

Water Resources (WAT) – Comments associated with potential impacts to hydrology, water quality, floodplains, or groundwater.

- **WAT 1**: Water resources impacts including water sources for the Project, sediment run-off, and potential effects to coastal zones should all be analyzed in the EIS.

Wildlife (including Threatened and Endangered Species) (WIL) – Comments associated with potential disturbance of fish, avian, or other wildlife populations and/or their habitat.

- **WIL 1**: Avian and bat impacts, including potential cumulative impacts resulting from existing and future wind projects should be discussed and analyzed. Comprehensive pre-construction and post-construction mortality monitoring surveys should be conducted.
- **WIL 2**: Critical fish habitat within the wind farm site and potential impacts should be disclosed.
- **WIL 3**: Direct, indirect, and cumulative impacts to native wildlife species and habitat, as well as mitigation measures, should be identified.

April 1, 2015 TTCES-4819-OUT-15-001

Lauren A
alohalaurenjoy@gmail.com

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Interested Stakeholder,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your comments; every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of Proposed Action and alternatives.

Your comment submission is attached to this letter, along with the issue topics and summary statements so that you can view the complete list of issues that were raised. The following issues were raised in your submittal:

- Fire hazards associated with the Project's construction and operation including facility electrical failure and the identification of appropriate safety measure to address fire preparedness and emergency response.
- Potential decreases in tourism to the area could occur as a result of the change to the visual landscape from the Project.
- Wind turbines impact the scenic beauty of the wind farm site, and steps should be taken to minimize visual impacts.
- Direct, indirect, and cumulative impacts to native wildlife species and habitat, as well as mitigation measures, should be identified.

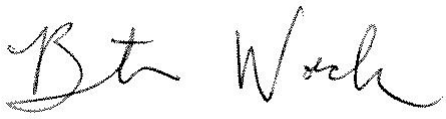
Tetra Tech, Inc.
1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

We appreciate you taking the time during the public scoping period to provide feedback about the Project. These topics will be considered and addressed in the Draft EIS as applicable in the appropriate resource sections.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,

Tetra Tech Inc.



Brita Woeck

Project Manager, Na Pua Makani Wind Project EIS

Cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC

Alicia Oller, Tetra Tech, Inc.

---------- Forwarded message ----------
From: **lauren a** <alohalaurenjoy@gmail.com>
Date: Wed, Dec 4, 2013 at 10:02 AM
Subject: no wind farm!
To: napuamakanihcp@fws.gov

HAS 3
REC 1
VIS 1
WIL 3

the wind farm is an eye soar, tourists complain, the windfarm is inefficient (the fire problems too) and also DANGEROUS to the community and to wildlife. Solar powered Germany has much to teach Hawaii.

April 1, 2015 TTCES-4819-OUT-15-002

Ann Allred
AllredA@hawaiireserves.com

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Ms. Allred,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your comments; every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of Proposed Action and alternatives.

Your comment submission is attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. The following issues were raised in your submittal:

- Fire hazards associated with the Project's construction and operation including facility electrical failure and the identification of appropriate safety measure to address fire preparedness and emergency response.
- Wind turbines impact the scenic beauty of the wind farm site, and steps should be taken to minimize visual impacts.

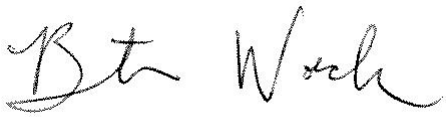
Tetra Tech, Inc.
1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

We appreciate you taking the time during the public scoping period to provide feedback about the Project. These topics will be considered and addressed in the Draft EIS as applicable in the appropriate resource sections.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,

Tetra Tech Inc.



Brita Woeck

Project Manager, Na Pua Makani Wind Project EIS

Cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC

Alicia Oller, Tetra Tech, Inc.

---------- Forwarded message ----------
From: **Ann Allred** <AllredA@hawaiireserves.com>
Date: Mon, Dec 2, 2013 at 2:03 PM
Subject: Na Pua Makani HCP and DEIS
To: napuamakanihcp@fws.gov

Mr. Mehrhoff:

VIS 1
HAS 3

Our family is quite concerned about the proposed wind farm near Kahuku. The existing turbines are horrible enough to look at, and the fire that put them out of commission was frightening. These proposed ones, so close to neighborhoods, is not a good idea.

ACK

Please accept this note in opposition, and listen to the voices of our community.

Thank you.

Allred Family

Laie, Hawaii

April 1, 2015 TTCES-4819-OUT-15-003

Andrea Anixt
P.O. Box 646
Ka'a'awa, HI 96730
andreapeatmoss@yahoo.com

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Ms. Anixt,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your written comments. Every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of Proposed Action and alternatives.

Your comment submissions are attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. The following issues were raised in your submissions:

- Would like to see alternative energy solutions analyzed, including solar, geothermal, personal photovoltaic systems, and geothermal as part of the alternatives analysis.
- Recommended specific studies and reports to be reviewed for inclusion in the EIS, or made data requests related to specific issues for inclusion in the EIS.
- Health impacts resulting from noise (infrasound and audible) such as headaches, loss of sleep, and lack of concentration as well as health impacts resulting from shadow flicker that may affect community members who live within close proximity to the Project should be discussed and analyzed.
- Safety impacts to community members related to wind turbine mechanical issues, such as blade throw or turbine collapse should be discussed and analyzed.

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1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

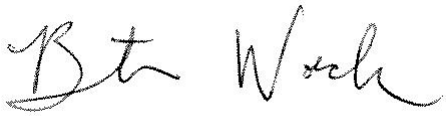
- Fire hazards associated with the Project's construction and operation including facility electrical failure and the identification of appropriate safety measure to address fire preparedness and emergency response.
- The threat of natural disasters, including hurricanes, tsunamis, and earthquakes, and how these events could in turn threaten the health and safety of nearby communities through the collapse of turbine towers or blade throw should be discussed and analyzed.
- The proposed locations for the wind turbines are too close to residences and schools, and potential impacts should be analyzed. The EIS should show distances from the closest turbines to the elementary and high schools, the community boundary, and nearest residences.
- The City and County of Honolulu setback distance regarding proximity of wind turbines to residences is insufficient and must be updated to reflect safe distances.
- Wind turbines impact the scenic beauty of the wind farm site, and steps should be taken to minimize visual impacts.
- Avian and bat impacts, including potential cumulative impacts resulting from existing and future wind projects should be discussed and analyzed. Comprehensive pre-construction and post-construction mortality monitoring surveys should be conducted.
- Direct, indirect, and cumulative impacts to native wildlife species and habitat, as well as mitigation measures should be identified.

We appreciate you taking the time during the public scoping period to provide feedback about the Project. These topics will be considered and addressed in the Draft EIS as applicable in the appropriate resource sections.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,

Tetra Tech Inc.



Brita Woeck

Project Manager, Na Pua Makani Wind Project EIS

Cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC

Alicia Oller, Tetra Tech, Inc.

---------- Forwarded message ----------
From: **andrea anixt** <andreapeatmoss@yahoo.com>
Date: Sat, Nov 16, 2013 at 9:19 AM
Subject: Na Pua MAKANI HCP DEIS Testimony
To: "napuamakanihcp@fws.gov" <napuamakanihcp@fws.gov>

Andrea Anixt P.O. Box 646 Ka'a'awa, HI. 96730 808 237 8595
Aloha,

HAS 2
REG 2

I oppose more wind turbines closer than 1 mile to any inhabited area. The law in Hawaii is too lax so it is not something illegal to put them closer, but the experience in Europe I have had is that these can be blown far from origin and be destructive thereby.

HAZ 1

We are subject to hurricanes in Hawaii and it is better to be safe than sorry in that case alone. There is also the possibility of mechanical failure that could cause one of those huge blades to be where it should not be and at a very high velocity.

ALT 1
VIS 1

I also think they are not scenic and they are too visible in our scenic corridor along Kamehameha Highway in rural Windward Oahu. We depend on beauty for income thru tourism. Photovoltaic systems on rooftops are a much more aesthetic delivery system for green energy. They don't mar the landscape and take up open space land visually. Pouring a lot of money into Kahuku doesn't compensate for the damage done to the world class destination of Hawaii's beautiful Ko'olauloa and North Shore region. The scenic factor is of primary importance in this area now and into the future.

HAS 1

There are noise and flicker effects that we could all do without too while attending school nearby, or teaching there.

Regards,
Andrea Anixt

---------- Forwarded message ----------
From: **andrea anixt** <andreapeatmoss@yahoo.com>
Date: Wed, Dec 4, 2013 at 10:29 AM
Subject: Fw: TESTIMONY ON WIND TURBINES IN KAHUKUU DSEIS
To: "napuamakanihcp@fws.gov" <napuamakanihcp@fws.gov>

On Wednesday, December 4, 2013 10:24 AM, "andreapeatmoss@yahoo.com" <andreapeatmoss@yahoo.com> wrote:

TESTIMONY ON WIND TURBINES IN KAHUKUU

Andrea Anixt Post Office Box 646 Ka'a'awa, HI. 96730 808 237 8595

Aloha,

HAS 2
HAS 3
DAT 1

I am against the 15 new 500' wind turbines in Kahuku's placement. They are the cause of @144 deaths and 1500 accidents in Europe plus 211 fires and 272 blade failures with blade pieces thrown into motion. This is documented at www.caithnesswindfarms.co.uk

HAZ 1
REG 2

Hawaii setback law is insufficient and should be changed, but in the meantime it is better to be safe than sorry. Even if the distance is legal, it is not morally or ethically acceptable to endanger people like this. The fact that Hawaii is subject to hurricanes and tsunami and earthquake alone is a red flag for this proximity to homes and schools. What are the chances that people are safe within the height alone of these towers.

PRO 1

The furthest one has become a projectile is 2 miles! The consensus in Europe is 1 mile should be the minimum from housing, etc . Why can't we learn from their experience?

HAS 1
WIL 1
DAT 1

Also, there was a recent article on the death of 600,000 bats from the wind turbines in the continental U.S. This wasn't even caused by the blades which bats can avoid by their natural 'sonar' – which won't protect other birds in Hawaii Nei. The bats died due to the "subtle changes in barometric pressure created by the rotating blades causing the bats' capillaries to burst, resulting in deadly internal hemorrhaging." So far we have not gotten into studies of this that I've found relating to people, but is it worth the chance? Again, better safe than sorry! (Honolulu Star-Advertiser –Dec.1,2013 for bat study).

WIL 1
WIL 3

This is a bad location in general for birds. The 1100 acre J. P. Campbell Wildlife Refuge is extremely close by also. There are rare and endangered species and migratory birds lured to the area who will meet their death by these blades. If you indeed are an agency to protect fish and wildlife, this should also be a reason to reject this location for yet more wind turbines. It will become the 'Bermuda Triangle' for birds and probably humans at some point.

ACK

The Ka'a'awa Community Association is taking up this matter in a week, I think it is likely that we will oppose it, but your deadline is too close to wait for the result.

Regards,

Andrea Anixt

---------- Forwarded message ----------
From: **andrea anixt** <andreapeatmoss@yahoo.com>
Date: Sat, Jan 18, 2014 at 3:40 PM
Subject: Na Pua Makani HCP and EIS
To: "napuamakanihcp@fws.gov" <napuamakanihcp@fws.gov>

HAS 2

WIL 1
HAS 2

ALT 1

Aloha,

I have researched accidents involving wind turbines and do not want to have any wind turbines closer than 1 (one) mile away from houses, schools, or occupied structures in Hawaii at the minimum. It is not safe. This was also the consensus of a vote taken at the Ko'olauLoa Neighborhood Board January 9th, 2014.

There are plans placing them closer than this now by the developer. That also puts them on 3 sides of many Kahuku residents. This was not considered a health hazard by an 'expert' flown in by Champlin at the January 15 meeting in Kahuku. That does not discount that the wind turbines ARE an accident hazard. There are records of these accidents numbering over many thousands...and this does not include the deaths of hundreds of thousands of bats and birds. Unfortunately this project is very near an 1100 acre wildlife refuge where migratory and endangered birds are located also.

I support a large photovoltaic 'farm' of alternative energy instead on the land this company has leased. They are safe, not as view plane destructive or annoyingly noisy. The clean energy benefits are greater too.

Sincerely,
Andrea Claire Anixt
PO Box 646 Ka'a'awa, Hawaii 808 237 8595
Ka'a'awa Community Association Board of Directors member -
Disaster Preparedness team of KCA also
OahuMPO Citizen's Advisory Committee member
January 18, 2014
DEADLINE TO SUBMIT OF JANUARY 22, 2014 has been met, please acknowledge receipt of this testimony.

April 1, 2015 TTCES-4819-OUT-15-004

Leo Asuncion
Acting Director
Office of Planning
State of Hawaii
P.O. Box 2359
Honolulu, HI 96804

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Mr. Asuncion,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your written comments. Every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of the Proposed Action and alternatives.

Your comment submissions are attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. The following issues were raised in your submittal:

- Potential impacts to agriculture and how any impacts may be mitigated.
- Suggested a specific mitigation measure for inclusion in the impact analysis in the EIS.
- The proposed locations for the wind turbines are too close to residences and schools, and potential impacts should be analyzed. The Environmental Impact Statement should show distances from the closest turbines to the elementary and high schools, the community boundary, and nearest residences.
- Would like to see more detail on the Proposed Action and Project components (in text and represented graphically), including: wind turbine components, specifications, and materials needed for construction of turbines; turbine upgrades (if needed); the locations of turbines, collection lines,

Tetra Tech, Inc.
1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

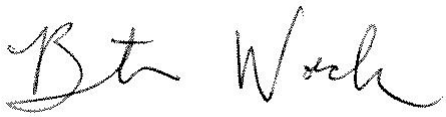
and point of interconnection; access road construction and maintenance; plans for turbine operations and maintenance; and plans for decommissioning and site restoration.

- Compliance with both the NEPA and HEPA processes for public scoping and outreach, that community members and agencies have been adequately consulted during scoping, and will continue to be consulted with during the entire planning process.
- The Project must be in compliance with all federal, state, and county regulations, plans, and policies, including obtaining applicable federal, state, and county permits.

We appreciate you taking the time during the public scoping period to provide feedback about the Project. These topics will be considered and addressed in the Draft EIS as applicable in the appropriate resource sections.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
Tetra Tech Inc.



Brita Woeck
Project Manager, Na Pua Makani Wind Project EIS

cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC
Alicia Oller, Tetra Tech, Inc.

OFFICE OF PLANNING
STATE OF HAWAII

235 South Beretania Street, 6th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

NEIL ABERCROMBIE
GOVERNOR

JESSE K. SOUKI
DIRECTOR
OFFICE OF PLANNING

Telephone: (808) 587-2846
Fax: (808) 587-2824
Web: http://hawaii.gov/dbedt/op/

Ref. No. P-14250

January 17, 2014

Mr. Mike Cutbirth
c/o Tetra Tech, Inc.
737 Bishop Street, Suite 2340
Honolulu, Hawaii 96813

Subject: Na Pua Makani Wind Energy Facility
Environmental Impact Statement Preparation Notice
Kahuku, Oahu

Dear Mr. Cutbirth:

Thank you for the opportunity to review the subject Environmental Impact Statement Preparation Notice (EISPN) for a proposed wind power facility, meteorological tower, substation, maintenance building, and access road in Kahuku, Oahu.

According to the EISPN, a portion of the 685-acre parcel is privately owned and is classified as State Agricultural District. The remainder portion of the parcel is public land leased by the Department of Land and Natural Resources (DLNR). The project consists of a maximum of 45 megawatt wind energy facility to be generated by 15 proposed wind turbines with a peak height of 440 feet.

Due to the limited information provided, OP is unable to offer any detailed comments at this time. However, the following general comments are offered:

PRO 3

1. The EISPN did not provide adequate locational information such as Tax Map Key, address, or a clear location map. The document also lacked any reference maps for evaluating potential impacts, such as site plan/aerial maps, ownership, soils, land use, and zoning maps.

LAN 4
REG 3

2. The Draft EIS should provide an evaluation of the proposed project to address the criteria for permissible uses within the agricultural districts under Hawaii Revised Statutes (HRS) §205-4.5, including any mitigation measures to minimize impacts.

LAN 2

3. The Draft EIS should fully describe the agricultural and resource potential of the affected lands.

PRO 1

4. The Draft EIS should disclose the proximity of wind turbine facilities to residences in the area, including any associated impacts and mitigation measures.

MIT 5
REG 1

5. The Draft EIS should discuss any community consultations and any impact mitigation measures.

REG 3

6. The entire state is defined to be within the Coastal Zone Management Area, pursuant to HRS §205A-1 (definition of "coastal zone management area"). The Draft EIS should include a discussion of the proposed project's ability to meet the objectives and policies set forth in HRS §205A-2.

REG 3

7. The Draft EIS should include the Coastal Zone Management Act, HRS Chapter 205A, in a section that discusses the project's "Relationship to Land Use Plans, Policies, and Controls."

ACK

If you have any questions or comments, please contact Jenny Lee of our Land Use Division at 587-2805.

Sincerely,

Jesse K. Souki
Director

April 1, 2015 TTCES-4819-OUT-15-005

George Atta
Director, Department of Planning and Permitting
City and County of Honolulu
650 South King Street, 7th Floor
Honolulu, HI 96813

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments, 2013/ELOG-2416(WA)

Dear Mr. Atta,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your written comments. Every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of the Proposed Action and alternatives.

Your comment submission is attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. The following issues were raised in your submission:

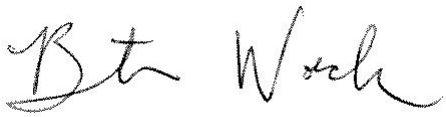
- The Project must be in compliance with all federal, state, and county regulations plans, and policies, including obtaining applicable federal, state, and county permits.
- Wind turbines impact the scenic beauty of the wind farm site, and steps should be taken to minimize visual impacts.
- Avian and bat impacts, including potential cumulative impacts resulting from existing and future wind projects should be discussed and analyzed. Comprehensive pre-construction and post-construction mortality monitoring surveys should be conducted.

Tetra Tech, Inc.
1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

We appreciate you taking the time during the public scoping period to provide feedback about the Project. These topics will be considered and addressed in the Draft EIS as applicable in the appropriate resource sections.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
Tetra Tech Inc.



Brita Woeck
Project Manager, Na Pua Makani Wind Project EIS

cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC
Alicia Oller, Tetra Tech, Inc.

DEPARTMENT OF PLANNING AND PERMITTING
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 7TH FLOOR • HONOLULU, HAWAII 96813
PHONE: (808) 768-8000 • FAX: (808) 768-6041
DEPT. WEB SITE: www.honoluludpp.org • CITY WEB SITE: www.honolulu.gov

KIRK CALDWELL
MAYOR

GEORGE I. ATTA, FAICP
DIRECTOR

ARTHUR D. CHALLACOMBE
DEPUTY DIRECTOR

2013/ELOG-2416(WA)

January 21, 2013

Mike Cutbirth
Tetra Tech, Incorporated
737 Bishop Street, Suite 2340
Mauka Tower
Honolulu, Hawaii 96813

Dear Mr. Cutbirth:

SUBJECT: Environmental Impact Statement Preparation Notice (EISPN)
for the Na Pua Makani Wind Farm Project
56-452 and 668 Kamehameha Highway - Kahuku
Tax Map Keys 5-6-6: 18 and 5-6-8: 6

This is in response to your December 20, 2013 letter, requesting comments for the proposed Na Pua Makani Wind Farm Project. We have reviewed the subject EISPN and have the following comments:

ACK

1. Development and design standards in the Land Use Ordinance Section 21-5.700(a)(b) and (c) shall apply to the proposed project.

REG 3

2. A Conditional Use Permit (CUP) No. 2013/CUP-23 approved on May 10, 2013, to establish an agribusiness activity (agricultural tour with zip line) on Parcel 18, as an accessory use to the existing crop production operations on the site. Approximately six acres of the 452.723-acre site will be used for the agribusiness activities, and 226 acres, or 50 percent of the lot area of the parcel will be dedicated for agricultural use for ten years. Compliance with Condition B of the approval should be explained.

REG 3

3. The Draft Environmental Impact Statement (DEIS) should address potential hazards to birds.

WIL 1

4. The DEIS should explain how wind energy facilities and appurtenances are compatible with agriculture uses and cause minimal impact on agricultural land pursuant to Chapter 205-4.5(a)(14) Hawaii Revised Statutes (HRS).

REG 3

5. The DEIS should address the policies and guidelines of the North Shore Sustainable Communities Plan, with respect to the following:

REG 3

(a) agriculture

(b) scenic resources.

VIS 1

The DEIS should also address how the windfarm will be situated in appropriate locations to minimize their impact on visual resources and what techniques will be used to visually blend the facilities and equipment into the natural environment.

REG 3

6. We note that the windfarm site is zoned AG-1 Restricted Agricultural District, AG-2 General Agricultual District, and R-5 Residential District. Wind machines are a permitted use with an approved CUP-minor. We further note that an approved CUP-minor for joint development of two or more adjacent lots would be required.

REG 3

7. As portions of the windfarm maybe on State Agricultural Lands, the DEIS should explain how the project is consistent with the requirements of Chapter 205, HRS.

Please contact William J. Ammons of our staff at 768-8025 if you have any questions.

Very truly yours,

for George I. Atta, FAICP
Director

GIA:nw

April 1, 2015 TTCES-4819-OUT-15-006

Ghialana Borges
ghialana@hawaii.edu

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Ms. Borges,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your written comments and testimony from the public scoping meeting. Every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of Proposed Action and alternatives.

Your comment submission is attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. The following issues were raised in your comment submission and verbal testimony:

- Protection of Native Hawaiian cultural sites and burial grounds, and preservation of culturally-significant lands.
- Native Hawaiian land access and gathering rights being restricted as a result of the Project.
- Health impacts resulting from noise (infrasound and audible) such as headaches, loss of sleep, and lack of concentration as well as health impacts resulting from shadow flicker that may affect community members who live within close proximity to the Project should be discussed and analyzed.
- The proposed locations for the wind turbines are too close to residences and schools, and potential impacts should be analyzed. The EIS should show distances from the closest turbines to the elementary and high schools, the community boundary, and nearest residences.

Tetra Tech, Inc.
1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

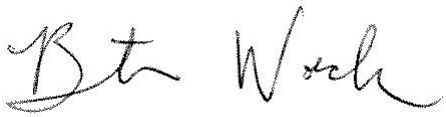
- Water resources impacts including water sources for the Project, sediment run-off, and potential effects to coastal zones should all be analyzed in the EIS.
- Direct, indirect, and cumulative impacts to native wildlife species and habitat, as well as mitigation measures, should be identified.

We appreciate you taking the time during the public scoping period to provide feedback about the Project. These topics will be considered and addressed in the Draft EIS as applicable in the appropriate resource sections.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,

Tetra Tech Inc.



Brita Woeck

Project Manager, Na Pua Makani Wind Project EIS

Cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC

Alicia Oller, Tetra Tech, Inc.

---------- Forwarded message ----------
From: **Ghialana Borges** <ghialana@hawaii.edu>
Date: Thu, Dec 5, 2013 at 6:55 PM
Subject: NA PUA MAKANI HCP & DEIS
To: napuamakanihcp@fws.gov

Aloha,

CUL 1
HAS 1
PRO 1
WAT 1
WIL 3

I speak for my family and myself in strong opposition to the proposed additional windmills in our community of Kahuku. These wind turbines are 15,500' tall monstrosities and this project places them too close to our elementary, intermediate and high school, and our homes. Many independent studies have linked significant health effects to wind turbines in close proximity. Low frequency sound vibrations, noise, and shadow flicker of windmills all contribute to medical effects such as anxiety, epilepsy, cardiovascular effects, sleeping patterns, and even children's performance in school. Environmentally, sediment run-off is a potential issue, as well as the need to preserve Native Hawaiian cultural sites and burial grounds. Native birds and other animals are also a big concern for these extremely large turbines will negatively impact them.

ACK

All of these reasons should be enough for any person with sensibilities to respect the wishes of a community that opposes such a development project.

As a resident of Kahuku, I am against this wind project and I sincerely ask that Na Pua Makani HCP does not move forward with any development plans.

Mahalo,
Ghialana B.

TETRA TECH

April 1, 2015 TTCES-4819-OUT-15-007

Harry Brown
donnabrown@hawaii.rr.com

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Mr. Brown,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your written comments and testimony from the public scoping meeting. Every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of Proposed Action and alternatives.

Your comment submission is attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. The following issues were raised in your comment submission and verbal testimony:

- Health impacts resulting from noise (infrasound and audible) such as headaches, loss of sleep, and lack of concentration as well as health impacts resulting from shadow flicker that may affect community members who live within close proximity to the Project should be discussed and analyzed.
- Safety impacts to community members related to wind turbine mechanical issues, such as blade throw or turbine collapse should be discussed and analyzed.
- The threat of natural disasters, including hurricanes, tsunamis, and earthquakes, and how these events could in turn threaten the health and safety of nearby communities through the collapse of turbine towers or blade throw should be discussed and analyzed.
- Power generation – specifically, what the overall capacity and daily production of the Project will be, transmission line upgrades that might be needed, how much electricity will go into the HECO grid, and how much of that electricity will stay in local communities.

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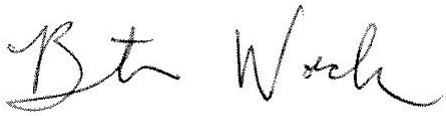
- Compliance with both the NEPA and HEPA processes for public scoping and outreach that community members and agencies have been adequately consulted during scoping, and will continue to be consulted with during the entire planning process.
- The construction and operation of the Project must be in compliance with all federal, state, and county regulations; Champlin must obtain applicable federal, state, and county permits.
- How would the Project contribute to a savings on the electrical bills of local residents, and how soon once the Project is operational could residents begin to see any potential savings.
- Wind turbines impact the scenic beauty of the wind farm site, and steps should be taken to minimize visual impacts.

We appreciate you taking the time during the public scoping period to provide feedback about the Project. These topics will be considered and addressed in the Draft EIS as applicable in the appropriate resource sections.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,

Tetra Tech Inc.



Brita Woeck

Project Manager, Na Pua Makani Wind Project EIS

Cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC

Alicia Oller, Tetra Tech, Inc.

---------- Forwarded message ----------
From: **Harry** <harrybrown@hawaii.rr.com>
Date: Wed, Dec 4, 2013 at 8:27 AM
Subject: Na Pua Makani HCP and DEIS
To: "napuamakanihcp@fws.gov" <napuamakanihcp@fws.gov>

Aloha,

ACK

I would like to inform you of my total opposition to your windmill project that you are planning to do in our community of Kahuku (Malaekahana Windmill project).

HAS 1
HAS 2
SOC 4
VIS 1

While there are many important and pertinent reasons (such as health and safety, and financial gain and benefits for your company, with no financial relief for us, while our electric bill continues to rise despite the existing windmill that is in our community), my family and I, as well as many of my neighbors) are AGAINST having an ugly giant eyesore of a windmill being erected in our "back yard".

ACK

You can contact me via my cell phone (384-5678) should you have any questions or further clarifications. Do not respond to my email, as I am not able to receive any email due to an unresolved email problem, however, you can email me at my wife's email, which is donnabrown@hawaii.rr.com

Thank you very much,
Harry Brown
Sent from my iPad

April 1, 2015 TTCES-4819-OUT-15-008

Rebecca Carlson
55-568 Naniloa Loop Apt 4A
Laie, HI 96762
beckbj@gmail.com

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Ms. Carlson,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your comments; every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of Proposed Action and alternatives.

Your comment submission are attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. The following issues were raised in your submittal:

- Would like to see alternative energy solutions analyzed, including solar, geothermal, personal photovoltaic systems, and geothermal as part of the alternatives analysis.
- Recommended specific studies and reports to be reviewed for inclusion in the EIS, or made data requests related to specific issues for inclusion in the EIS.
- Cumulative impacts associated with power generation of the Project when combined with other nearby wind farms, and whether the power being produced is more than is needed.
- Wind turbines impact the scenic beauty of the wind farm site, and steps should be taken to minimize visual impacts.

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1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

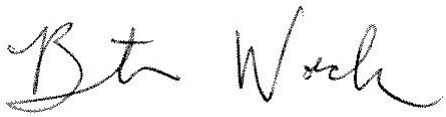
- Avian and bat impacts, including potential cumulative impacts resulting from existing and future wind projects should be discussed and analyzed. Comprehensive pre-construction and post-construction mortality monitoring surveys should be conducted.

We appreciate you taking the time during the public scoping period to provide feedback about the Project. These topics will be considered and addressed in the Draft EIS as applicable in the appropriate resource sections.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,

Tetra Tech Inc.



Brita Woeck

Project Manager, Na Pua Makani Wind Project EIS

Cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC

Alicia Oller, Tetra Tech, Inc.

---------- Forwarded message ----------
From: **Rebecca Carlson** <beckbj@gmail.com>
Date: Fri, Jan 17, 2014 at 10:40 PM
Subject: Na Pua Makani HCP and EIS
To: Napuamakanihcp@fws.gov

ACK

DAT 1
DSC 4
VIS 1
WIL 1

ALT 1

ACK

I am opposed to any additional wind farm development in Kahuku.

Wind farms are not a good energy solution for our area. They disrupt the natural beauty of our North Shore. They are also hazardous to our native Hawaiian hoary bats, who are being killed in disturbing numbers by the windmills that are already installed. Furthermore, windmills rely on a very unpredictable energy source, the wind! They can only operate at certain wind speeds. Too slow, no power. Too fast, they have to be shut down to avoid damaging the motors. Considering the entire picture of construction, maintenance, and eventual failure and disposal of electric power generating windmills, they are not reducing our carbon footprint. Please see this article from Denmark, perhaps the world capitol of windmills, about the problems with electrical wind farms:
http://www.thedutcheye.com/opinions/environment/why-windmills-aren-t-a-good-energy-solution.html

Instead of wind, we should be working to develop solar energy solutions. We have very good sun at this latitude, solar farms have a low profile and will not disturb the skyline, and they do not have large moving parts that pose hazard to wildlife.

Once again, I oppose wind farm development in Kahuku.

Thank you,

Rebecca J. Carlson
808-232-2329
55-568 Naniloa Loop Apt. 4A
Laie, HI 96762
beckbj@gmail.com

--
Rebecca J. Carlson

beckbj@gmail.com
http://rebeccajcarlson.blogspot.com

TETRA TECH

April 1, 2015 TTCES-4819-OUT-15-009

Aaron Mosiah Curtis
aaron.curtis@byuh.edu

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Mr. Curtis,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your comments; every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of Proposed Action and alternatives.

Your comment submission is attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. The following issues were raised in your submittal:

- Power generation – specifically, what the overall capacity and daily production of the Project will be, transmission line upgrades that might be needed, how much electricity will go into the HECO grid, and how much of that electricity will stay in local communities.
- Clarification on the purpose and need of the Project, including how the Project would fit into the larger energy market that it would serve.
- How the Project would affect homeowners' ability to install photovoltaic systems.
- How would the Project contribute to a savings on the electrical bills of local residents, and how soon once the Project is operational could residents begin to see any potential savings.
- Avian and bat impacts, including potential cumulative impacts resulting from existing and future wind projects should be discussed and analyzed. Comprehensive pre-construction and post-construction mortality monitoring surveys should be conducted.

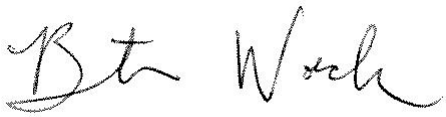
Tetra Tech, Inc.
1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

We appreciate you taking the time during the public scoping period to provide feedback about the Project. These topics will be considered and addressed in the Draft EIS as applicable in the appropriate resource sections.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,

Tetra Tech Inc.



Brita Woeck

Project Manager, Na Pua Makani Wind Project EIS

Cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC

Alicia Oller, Tetra Tech, Inc.

---------- Forwarded message ----------
From: **Aaron Mosiah Curtis** <aaron.curtis@byuh.edu>
Date: Tue, Jan 21, 2014 at 9:42 PM
Subject: Na Pua Makani HCP and EIS
To: Napuamakanihcp@fws.gov

ACK

I am writing to express my concern and opposition regarding the current proposal for the Na Pua Makani windfarm in Kahuku.

In brief my concerns include the following:

WIL 1

- Insufficient controls have been proposed to mitigate the harmful effects of wind turbines on the dwindling native species such as the Hawaiian hoary bat.

SOC 2

- It is unclear how this project will affect homeowners' ability to install PV systems such as solar installations.

PRO 2

- There is insufficient evidence that the current power grid servicing the Koolauloa region would be able to provide the maximum benefit to regional residents. In other words, because of limitations to the powergrid in this region, the Koolauloa residents would bear much of the cost of this project, but not receive most of the benefits.

PRO 4

- Because of the economic and legal transfers of assets and development agreements among LLCs throughout the development of this project proposal, it is difficult for us community members to understand the full scope of what is being proposed.

SOC 4

- There is insufficient evidence that this project will actually reduce the costs of electricity to HECO customers.

Mahalo,

Aaron Curtis

April 1, 2015 TTCES-4819-OUT-15-010

Henry Curtis
Executive Director, Life of the Land
P.O. Box 37158
Honolulu, HI 96837
henry.lifeoftheland@gmail.com

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Mr. Curtis,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your written comments and testimony from the public scoping meeting. Every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of the Proposed Action and alternatives.

Your comment submission is attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. The following issues were raised in your submittal and verbal testimony:

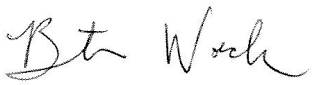
- Air quality impacts (criteria pollutants) and greenhouse gases resulting from construction and operation of the Project, and how impacts will be calculated and mitigated.
- Impacts related to climate change should be identified and analyzed.
- An alternate location for the Project should be analyzed (e.g. moving turbines further inland, different location on Oahu) due to the current Project's close proximity to the community and schools.
- The alternatives analysis should include a reasonable range of alternatives, and should describe how alternatives were developed and also how they were eliminated from further analysis.
- Native Hawaiian land access and gathering rights being restricted as a result of the Project.

- Recommended specific studies and reports to be reviewed for inclusion in the EIS, or made data requests related to specific issues for inclusion in the EIS.
- Recommended visual simulations of the Project be included in the EIS.
- The EIS should utilize a clear methodology for analyzing direct, indirect, and cumulative impacts; proposed mitigation measures should be identified and analyzed; and past, present, and future actions should be analyzed as part of the cumulative impact analysis.
- Hazardous wastes, chemicals, and pesticides that will be produced or used by the Project, and how they will be stored, disposed of, and managed.
- Power generation – specifically, what the overall capacity and daily production of the Project will be, transmission line upgrades that might be needed, how much electricity will go into the HECO grid, and how much of that electricity will stay in local communities.
- Would like to see more detail on the Proposed Action and Project components (in text and represented graphically), including: wind turbine components, specifications, and materials needed for construction of turbines; turbine upgrades (if needed); the locations of turbines, collection lines, and point of interconnection; access road construction and maintenance; plans for turbine operations and maintenance; and plans for decommissioning and site restoration.
- Concerned about the details of the community benefits package.
- Wind turbines impact the scenic beauty of the wind farm site, and steps should be taken to minimize visual impacts.
- Avian and bat impacts, including potential cumulative impacts resulting from existing and future wind projects should be discussed and analyzed. Comprehensive pre-construction and post-construction mortality monitoring surveys should be conducted.
- Direct, indirect, and cumulative impacts to native wildlife species and habitat, as well as mitigation measures, should be identified.

We appreciate you taking the time during the public scoping period to provide feedback about the Project. These topics will be considered and addressed in the Draft EIS as applicable in the appropriate resource sections.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
Tetra Tech Inc.



Brita Woeck
Project Manager, Na Pua Makani Wind Project EIS

cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC
Alicia Oller, Tetra Tech, Inc.

LIFE OF THE LAND
P.O. Box 37158, Honolulu, Hawai`i 96837-0158
Phone: 927-0709; E: henry.lifeoftheland@gmail.com

January 22, 2014

Mike Cutbirth
Champlin Hawaii Wind Holdings, LLC
<contact@champlinwind.com>

William Aila
Department of Land and Natural Resources
<william.j.aila@hawaii.gov>

Brita Woeck
Tetra Tech, Inc.
<Brita.Woeck@tetratech.com>

Loyal Mehrhoff or Aaron Nadig,
U.S. Fish and Wildlife Service
<NaPuaMakanihcp@fws.gov>

Re: Na Pua Makani Wind Project (EISPN)

ACK

Life of the Land herein submits scoping questions for the Na Pua Makani Wind Project Environmental Impact Statement Preparation Notice (EISPN)

DAT 1

1. "Figure 1. Napua Makani Project Vicinity Map" please provide one map that shows the existing and planned wind farms as well as the existing and planned residential and commercial developments including Kahuku, Malaekahana, Sunset, Haleiwa and Turtle Bay.

DAT 1
PRO 3

2. Please provide a map showing planned roads and planned turbine sites.

DAT 1

3. Please show on one color-coded map the rough area inhabited by the ‘a’o, ōpe‘ape‘a, ‘alae ke’oke’o, ‘alae ‘ula, ae’o and pueo.

ACK	4. Please provide details about how Champlin has dealt with endangered and threatened species, Incidental Take Permits and Incidental Take Licenses on its other projects, both in the U.S. and elsewhere.
PRO 2	5. What will be the capacity factor of the wind farm?
SOC 1	6. The previous developer made certain concessions to the community. Please list the ones you are aware of and specify whether you plan to adhere to each one.
HAZ 2	7. If the facility is built what pesticides (herbicides, insecticides, nemacides) will you use on a regular or irregular basis and in what quantity?
AIR 2	8. As wind farms are being to proliferate there has been some scientific analysis of impacts that were often overlooked in earlier installations. Wind farms affect local Mesoscale and Microscale meteorology. Have you calculated the impacts? If so, what are they? If not, why not?
AIR 3	9. Will the wind farm act as a heat source or a heat sink? Have you calculated the impacts? What impact will that have on the local environment?
VIS 1 DAT 2	10. How many homes (or what percentage of homes) will be able to see blinking red lights when the residents are in their homes?
PRO 3	11. What will be the upstream and downstream wake patterns?
PRO 3	12. How big will the holes be that will hold the turbine platforms?
PRO 3	13. How much material (type and weight) will need to go into each hole to support the turbine?
AIR 1	14. What is the amount of greenhouse gases released in making and then shipping the turbine base support?
AIR 1	15. Wind farms that replace fossil fuel facility result in less greenhouse gas emissions per kWh of electricity produced. The offsets are the greenhouse gases emitted during construction of the turbine, the grading and building of the roads AND the design and filing in of the hole that is used to support the turbine. What is the rough amount of greenhouse gases emitted in each phase (measured in total and per kWh of projected electricity that will be produced)?
PRO 2	16. Each turbine will, over its lifetime, produce how many kilowatt-hours of electricity?
AIR 1	17. If the above questions can't be answered, then how can the greenhouse gas emission savings are calculated?

PRO 2

18. What will be the marginal cost of the wind with and without considering the ancillary services (spinning reserves etc.) needed to incorporate the wind energy into the grid?

SOC 1

19. What is the cost of the community benefits package as a percentage of the total construction cost?

SOC 1

20. What is the cost of the community benefits package as a percentage of the anticipated annual revenue generated?

CUL 2

21. What restrictions will be placed on Native Hawaiian access?

ALT 2

22. Could the turbines be built further away from residential areas? Please detail all of Champlin's efforts to evaluate this possibility.

ALT 3

23. What options did Champlin consider in designation the No Build Alternative?

ACK

24. When did Champlin become involved with this Project?

25. When did Champlin first become involved in Hawai'i projects?

WIL 1
WIL 3

26. How has the applicant dealt with the natural annual variability of bird and wildlife habitat?

DSC 3

27. To what extent has the developer analyzed predictive and risk- assessment models of potential, cumulative impacts that include full season and multi-year pre-siting studies?

ACK

28. Please provide a Subtransmission map showing the connection between the First Wind facility and the HECO grid to the Weed Circle and Wahiawa.

PRO 3

29. Please provide a Subtransmission map showing the connection between your proposed site and Kaneohe.

PRO 3

30. Please detail at what point or under what conditions the Subtransmission system will need to be increased, either with another Subtransmission line, or a transmission line. Please cite all documents and provide web base locations?

SOC 1

31. What percentage of the community benefits package will be local to Kahuku?

Mahalo

Henry Curtis
Executive Director

April 1, 2015 TTCES-4819-OUT-15-011

Maria Feagai
maria.feagai@byuh.edu

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Ms. Feagai,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your comments; every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of Proposed Action and alternatives.

Your comment submission is attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. The following issues were raised in your submittal:

- Health impacts resulting from noise (infrasound and audible) such as headaches, loss of sleep, and lack of concentration as well as health impacts resulting from shadow flicker that may affect community members who live within close proximity to the Project should be discussed and analyzed.
- Safety impacts to community members related to wind turbine mechanical issues, such as blade throw or turbine collapse should be discussed and analyzed.
- Potential decreases in tourism to the area could occur as a result of the change to the visual landscape from the Project.
- Wind turbines impact the scenic beauty of the wind farm site, and steps should be taken to minimize visual impacts.
- Direct, indirect, and cumulative impacts to native wildlife species and habitat, as well as mitigation measures, should be identified.

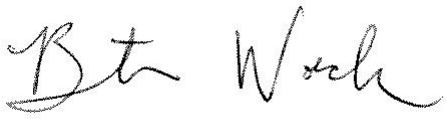
Tetra Tech, Inc.
1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

We appreciate you taking the time during the public scoping period to provide feedback about the Project. These topics will be considered and addressed in the Draft EIS as applicable in the appropriate resource sections.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,

Tetra Tech Inc.



Brita Woeck

Project Manager, Na Pua Makani Wind Project EIS

Cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC

Alicia Oller, Tetra Tech, Inc.

---------- Forwarded message ----------
From: **Maria Feagai** <maria.feagai@byuh.edu>
Date: Tue, Dec 3, 2013 at 9:17 AM
Subject: I OBJECT to the New proposed wind farm in Kahuku
To: "napuamakanihcp@fws.gov" <napuamakanihcp@fws.gov>

Aloha,

ACK

I'm writing to voice my objection to the proposal of the plans for another wind farm to be built in Kahuku. I am opposed to this project for many reasons.

REC 1
VIS 1

As it is, the existing wind farms are an eye sore. It breaks my heart to see how these have marred our beautiful landscape through Kahuku and Waimea. If tourism is our #1 source of income, why are we scaring the land? Perhaps they work where there are wide expanses of ranch land, but on a small island, we do not have that luxury.

HAS 1
HAS 2

Our children attend Kahuku High School, which will be in unacceptable close proximity to the huge windmills and we still do not know what the long term effects of these monstrous machines will be.

WIL 3

I am concerned about the ecosystem and the effects it has on our wildlife. I do not feel that enough has been done to study the impact on our plants and animals. We need to protect the aina from further destruction.

ACK

I would be opposed to the wind farms even if we had something to gain monetarily by having them here. Those that will benefit from the profits do not have to live with them surrounded by all sides.

ACK

The north shore of Oahu has been the so-called "country" of our island. We have been bullied enough by big developers and politicians. Please DO NOT allow this to go forward. I understand the need for alternate energy, but do not feel that this is the answer.

Thank you for your time and consideration in this matter. Have a wonderful day.

Mahalo,

Maria F. Feagai

April 1, 2015 TTCES-4819-OUT-15-012

Kent Fonoimoana
PO Box 122
Laie, HI 96762
kent@trisland.com

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Mr. Fonoimoana,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your written comments and testimonies from both of the public scoping meetings. Every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of the Proposed Action and alternatives.

Your comment submissions are attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. The following issues were raised in your submittals and verbal testimony:

- Would like to see alternative energy solutions analyzed, including solar, geothermal, personal photovoltaic systems, and geothermal as part of the alternatives analysis.
- An alternate location for the Project should be analyzed (e.g. moving turbines further inland, different location on Oahu) due to the current Project's close proximity to the community and schools.
- Recommended specific studies and reports to be reviewed for inclusion in the EIS, or made data requests related to specific issues for inclusion in the EIS.
- Recommended visual simulations of the Project be included in the EIS.

Tetra Tech, Inc.
1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

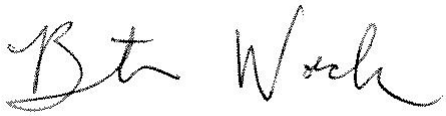
- The EIS should utilize a clear methodology for analyzing direct, indirect, and cumulative impacts; proposed mitigation measures should be identified and analyzed; and past, present, and future actions should be analyzed as part of the cumulative impact analysis.
- Health impacts resulting from noise (infrasound and audible) such as headaches, loss of sleep, and lack of concentration as well as health impacts resulting from shadow flicker that may affect community members who live within close proximity to the Project should be discussed and analyzed.
- Safety impacts to community members related to wind turbine mechanical issues, such as blade throw or turbine collapse should be discussed and analyzed.
- Fire hazards associated with the Project's construction and operation including facility electrical failure and the identification of appropriate safety measure to address fire preparedness and emergency response.
- The threat of natural disasters, including hurricanes, tsunamis, and earthquakes, and how these events could in turn threaten the health and safety of nearby communities through the collapse of turbine towers or blade throw should be discussed and analyzed.
- Noise from the wind turbines associated with construction and operation of the Project impacting sensitive receptors.
- The proposed locations for the wind turbines are too close to residences and schools, and potential impacts should be analyzed. The EIS should show distances from the closest turbines to the elementary and high schools, the community boundary, and nearest residences.
- Power generation – specifically, what the overall capacity and daily production of the Project will be, transmission line upgrades that might be needed, how much electricity will go into the HECO grid, and how much of that electricity will stay in local communities.
- Potential decreases in tourism to the area could occur as a result of the change to the visual landscape from the Project.
- Compliance with both the NEPA and HEPA processes for public scoping and outreach that community members and agencies have been adequately consulted during scoping, and will continue to be consulted with during the entire planning process.
- The City and County of Honolulu setback distance regarding proximity of wind turbines to residences is insufficient and must be updated to reflect safe distances.
- How the Project would affect homeowners' ability to install photovoltaic systems.
- Concern that the Project would impact the quality of life for nearby communities.
- Short- and long-term socioeconomic impacts to the community resulting from the Project should be analyzed.
- Wind turbines impact the scenic beauty of the wind farm site, and steps should be taken to minimize visual impacts.
- Water resources impacts including water sources for the Project, sediment run-off, and potential effects to coastal zones should all be analyzed in the EIS.

- Avian and bat impacts, including potential cumulative impacts resulting from existing and future wind projects should be discussed and analyzed. Comprehensive pre-construction and post-construction mortality monitoring surveys should be conducted.

We appreciate you taking the time during the public scoping period to provide feedback about the Project. These topics will be considered and addressed in the Draft EIS as applicable in the appropriate resource sections.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
Tetra Tech Inc.



Brita Woeck
Project Manager, Na Pua Makani Wind Project EIS

cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC
Alicia Oller, Tetra Tech, Inc.

---------- Forwarded message ----------
From: **Kent Fonoimoana-TRIsland** <kent@trisland.com>
Date: Mon, Dec 2, 2013 at 1:59 PM
Subject: Na Pua Makani HCP DEIS
To: "napuamakanihcp@fws.gov" <napuamakanihcp@fws.gov>

To whom it may concern,

ACK

I am submitting comments in strong opposition to the wind farm that is proposed for properties located at Malaekahana and the Kahuku State Agriculture Park.
In 2011, as a member of Kahuku Community Association, I and my fellow board members took a position against the installation of any more industrial sized wind turbines in the Kahuku area. The community support for this position was and is overwhelming.
The reasoning for my position are as follows:

HAZ 1
HAS 2
PRO 1
REG 2

1- Current safety zones between these machines and occupied structures are woefully inadequate. Placing 500' tall machines with moving parts 1200' upwind from Kahuku schools and community creates an untenable safety hazard. It is not if, but when a major hurricane strikes Oahu and these machines are composed of 150' blades that are designed to be light and aerodynamic. Each of the blades on a single turbine weigh in excess of 14,000 lbs. and could become windblown debris that could impact human life. To date, not one wind turbine worldwide has been subjected to an 'Iniki type event. To surround Kahuku community with these machines will likely be a life ending disaster for some of us who live here.

HAS 1

2- There are independent studies that support adverse health impacts on humans who live close proximity to these machines. Sleeplessness caused by noise and vibration has detrimental impacts on folks already living in close proximity to windmills. Others across the nation and worldwide are suffering vertigo, headaches, irritability, and a host of other ailments that they attribute to large industrial windmills.

ACK

3- This proposed project will surround Kahuku community on three sides which is unacceptable as well as irresponsible.

ACK

4- The power delivered fluctuates greatly and there is a detrimental impact on privately owned electrical devices of nearby consumers.

WIL 1

5- There is a significant impact on avian and bat species. The EIS of the First Wind project failed to address all avian species as the impacts on 'Iwa or Frigate bird was not studied.

ALT 1
SOC 2

6- There are other alternatives available that will not impact private consumers. HECO has stated that Kahuku is at or beyond the saturation rate for renewable energy. The existing wind energy facility has usurped private consumer's options for photo-voltaic panel installation. According to HECO, should a homeowner desire to install PV, there may be a discriminatory fee involved for Kahuku consumers.

ACK

7- Kahuku community has done its share for Oahu and it's time for others to do the same.

8- The state has initiated a policy to commit to renewable energy yet the state lacks committment as the vast majority of state owned buildings lack PV panels or any other renewable energy source.

ALT 2

9- The federal government has committed to green energy yet they hypocritically prohibit the installation of wind mills in close proximity to the Kahuku Army training facility.

REC 1

10- Tourists and residents do not appreciate the industrialized look that these turbines create.

DSC 3

11- Installing these unsightly machines in close proximity to communities will have an adverse impact on future projects. Proper installation of wind turbines at appropriate sites may lessen legal challenges that may/will arise.

Mahalo,

Kent Fonoimoana
Board member - Kahuku Community Association
Board member - Ko'olauloa Neighborhood Board #28

April 1, 2015 TTCES-4819-OUT-15-013

Michael D. Formby
Director
Department of Transportation Services
City and County of Honolulu
650 South King Street, 3rd Floor
Honolulu, Hawaii 96813

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments, TP12/13-542880R

Dear Mr. Formby,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your written comments. Every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of the Proposed Action and alternatives.

Your comment submission is attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. The following issues were raised in your submittal:

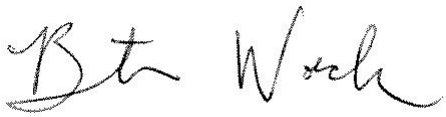
- Would like to see mitigation measures designed to minimize traffic impacts during construction.
- Compliance with both the NEPA and HEPA processes for public scoping and outreach, and that community members and agencies have been adequately consulted during scoping, and will continue to be consulted with during the entire planning process.
- Short- and long-term traffic impacts to the community, and what mitigation measures could be used to decrease impacts during construction.

Tetra Tech, Inc.
1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

We appreciate you taking the time during the public scoping period to provide feedback about the Project. These topics will be considered and addressed in the Draft EIS as applicable in the appropriate resource sections.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
Tetra Tech Inc.



Brita Woeck
Project Manager, Na Pua Makani Wind Project EIS

cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC
Alicia Oller, Tetra Tech, Inc.

DEPARTMENT OF TRANSPORTATION SERVICES
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 3RD FLOOR
HONOLULU, HAWAII 96813
Phone: (808) 768-8305 • Fax: (808) 768-4730 • Internet: www.honolulu.gov

KIRK CALDWELL
MAYOR

MICHAEL D. FORMBY
DIRECTOR

MARK N. GARRITY, AICP
DEPUTY DIRECTOR

TP12/13-542880R

January 22, 2014

SENT VIA EMAIL

Mr. Mike Cutbirth
NaPuaMakanihcp@fws.gov

Dear Mr. Cutbirth:

SUBJECT: Environmental Impact Statement Preparation Notice (EISPN) for the Na Pua Makani Wind Farm Project; Kahuku, Hawaii

In response to your memorandum dated December 20, 2013, we have the following comments:

TRA 1

1. The Draft Environmental Impact Statement (DEIS) should include a discussion of traffic impacts on the surrounding City roadways as a result of the project, including short-term impacts during construction, short and long term proposed mitigating measures, and complete streets concepts.

TRA 1
REG 1

2. The area Neighborhood Board, as well as the area residents, businesses, etc., should be kept apprised of the details of the proposed project and the impacts, particularly during construction, the project may have on the adjoining local street area network.

MIT 3

3. Any construction materials and equipment should be transferred to and from the project site during off-peak traffic hours (8:30 a.m. to 3:30 p.m.) to minimize any possible disruption to traffic on the local streets.

ACK

We reserve further comment pending submission of the DEIS.

ACK

Thank you for the opportunity to review this matter. Should you have any further questions, please contact Michael Murphy of my staff at 768-8359.

Very truly yours,

for Michael D. Formby
Director

April 1, 2015 TTCES-4819-OUT-15-014

Karen Gallagher
gallaghek007@hawaii.rr.com

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Ms. Gallagher,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your written comments. Every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of Proposed Action and alternatives.

Your comment submission is attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. The following issues were raised in your submittal:

- Would like to see alternative energy solutions analyzed, including solar, geothermal, and personal photovoltaic systems, as part of the alternatives analysis.
- An alternate location for the Project should be analyzed (e.g. moving turbines further inland, different location on Oahu) due to the current Project's close proximity to the community and schools.
- Concern that the Project would impact the quality of life for nearby communities.
- Wind turbines impact the scenic beauty of the wind farm site, and steps should be taken to minimize visual impacts.
- Direct, indirect, and cumulative impacts to native wildlife species and habitat, as well as mitigation measures, should be identified.

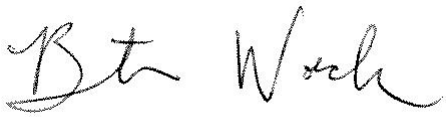
Tetra Tech, Inc.
1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

We appreciate you taking the time during the public scoping period to provide feedback about the Project. These topics will be considered and addressed in the Draft EIS as applicable in the appropriate resource sections.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,

Tetra Tech Inc.



Brita Woeck

Project Manager, Na Pua Makani Wind Project EIS

Cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC

Alicia Oller, Tetra Tech, Inc.

---------- Forwarded message ----------
From: **Karen Gallagher** <gallaghek007@hawaii.rr.com>
Date: Tue, Jan 21, 2014 at 10:25 AM
Subject: Na pua Makani HCP and EIS
To: NaPuaMakanihcp@fws.gov

ACK

SOC 3
VIS 1
WIL 3

ACK

ALT 1
ALT 2

ACK

Aloha,
I am a resident of O'ahu who is very much for renewable energy.
However, I do not believe that this ought to be done in a way that destroys our beautiful landscapes,
kills our native species or diminishes the quality of life for our residents.
The Kahuku community has been used and abused enough already by the wind industry and has nothing to gain, only losses.
Placing the windmills way back in the Ko'olau Range would eliminate two of the above; placing solar panels in that area would
be even better; producing way more energy w/o the negative effects.
I am opposed to the current windmill plan.
Aloha,
Karen Gallagher

April 1, 2015 TTCES-4819-OUT-15-015

Fred Geibelt
fgeibelt@aol.com

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Mr. Geibelt,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your written comments. Every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of Proposed Action and alternatives.

Your comment submission is attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. The following issues were raised in your submittal:

- Would like to see alternative energy solutions analyzed, including solar, geothermal, personal photovoltaic systems, and geothermal as part of the alternatives analysis.
- Health impacts resulting from noise (infrasound and audible) such as headaches, loss of sleep, and lack of concentration as well as health impacts resulting from shadow flicker that may affect community members who live within close proximity to the Project should be discussed and analyzed.
- Clarification on the purpose and need of the Project, including how the Project would fit into the larger energy market that it would serve.
- Wind turbines impact the scenic beauty of the wind farm site, and steps should be taken to minimize visual impacts.

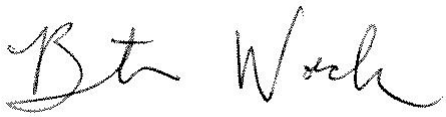
Tetra Tech, Inc.
1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

We appreciate you taking the time during the public scoping period to provide feedback about the Project. These topics will be considered and addressed in the Draft EIS as applicable in the appropriate resource sections.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,

Tetra Tech Inc.



Brita Woeck

Project Manager, Na Pua Makani Wind Project EIS

Cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC

Alicia Oller, Tetra Tech, Inc.

---------- Forwarded message ----------
From: <fgeibelt@aol.com>
Date: Sat, Jan 18, 2014 at 4:33 PM
Subject: Naouamakani HCP & EIS
To: Napuamakanihcp@fws.gov

Dear Sirs:

ACK

Thank you very much for allowing feedback regarding the construction of a new windmill farm in Kahuku.

VIS 1

Being from Pupukea, as I round the corner of the Kam Hwy that faces toward Waimea Bay, I keep saying to myself how distracting these towers are when trying to soak in the natural beauty of the bay area. It is difficult to believe these behemoths are 400 ft tall. Before the first windmills arrived on Oahu, I don`t believe anyone realized how its appearance affects the natural beauty of our endangered pristine views of nature.

HAS 1
VIS 1

And, having spoken to some friends who live along Alapio Rd which faces the towers, they express their displeasure now that their view of Kaena Pt has been ruined. They can also hear the hum of these towers, too.

ALT 1

If you took the same area intended for these towers and built a solar panel field, you would probably produce the same or better in energy production and would not have to hear or see them.

ACK

Essentially, windmills are fine in theory. But they would be best practiced in a desert. Hawaii is known for natural beauty. Oahu has just about tipped the scales with its overbuilding. Let`s not push it over the edge.

ALT 1
PRO 4

Finally, what is the main point of windmills in Hawaii? Is it to save on energy costs? Is there a savings to the end consumer? I bet these things are very expensive to maintain. And, without outside subsides, are they economical at all? Or do we have them because of an objection to fossilized fuels? I guess no one wants to mention natural gas, but it is cheaper than renewables, it`s American, and it produces very low pollution.

ACK

So, I guess by now, you know that I would not be happy with more windmills. And, I`m sure it is one of those things where people say, "not in my back yard!." Forget these monstrocities.

Thank you for hearing me out - I hope.

Sincerely,

Fred Geibelt
Pupukea

April 1, 2015 TTCES-4819-OUT-15-016

Carter Griffin
58 Church St.
Westborough, MA 01581-1925
cartergrifin@gmail.com

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Interested Stakeholder,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your comments; every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of Proposed Action and alternatives.

Your comment submission is attached to this letter, along with the issue topics and summary statements so that you can view the complete list of issues that were raised. The following issues were raised in your submittal:

- Would like to see alternative energy solutions analyzed, including solar, geothermal, personal photovoltaic systems, and geothermal as part of the alternatives analysis.
- Health impacts resulting from noise (infrasound and audible) such as headaches, loss of sleep, and lack of concentration as well as health impacts resulting from shadow flicker that may affect community members who live within close proximity to the Project should be discussed and analyzed.

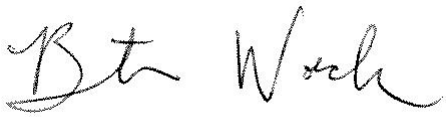
Tetra Tech, Inc.
1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

We appreciate you taking the time during the public scoping period to provide feedback about the Project. These topics will be considered and addressed in the Draft EIS as applicable in the appropriate resource sections.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,

Tetra Tech Inc.



Brita Woeck

Project Manager, Na Pua Makani Wind Project EIS

Cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC

Alicia Oller, Tetra Tech, Inc.

---------- Forwarded message ----------
From: **Carter Griffin** <cartergrifin@gmail.com>
Date: Tue, Dec 3, 2013 at 9:52 AM
Subject: Na Pua Makani HCP and DEIS
To: napuamakanihcp@fws.gov

Aloha,

ACK

I would like to voice my opinion against the proposal to erect 15 500' tall towers and turbines at Malaekahana in close proximity to Kahuku schools and the Kahuku community. Please do not allow this project to move forward.

HAS 1

I live outside of Boston, MA, & for the last 4 years I have been visiting Friends Of Malaekahana campground for a yearly vacation. I will continue to visit the area yearly now. I have become friends with many Kahuku & the surrounding communities. Here in Massachusetts, we do have wind turbines in and around populated areas. The turbines DO cause health issues, continuous insomnia, headaches, psychological disturbances, dental injuries just to name a few. People in the recent past didn't realize this until the turbines are already up & running.

ALT 1

Additional turbines in Kahuku, especially in close proximity to any community will only be problematic. I understand the need to make the islands more self sustainable in power generation, but there has to be a better way to do it. I mean, look at the issues of the current turbines in Kahuku. Of the 4 years I've been I've only seen them active once and that was minimal.

ACK

Please take my concerns into consideration.

Mahalo,
Carter T. Griffin
58 Church St
Westborough, MA
01581-1925

April 1, 2015 TTCES-4819-OUT-15-017

Rolland Harvest
Assistant Chief
Honolulu Fire Department
City and County of Honolulu
636 South Street
Honolulu, HI 96813

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Mr. Harvest,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your written comments. Every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of the Proposed Action and alternatives.

Your comment submission is attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. The following issues were raised in your submittal:

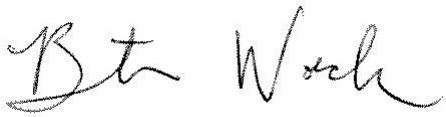
- Fire hazards associated with the Project's construction and operation including facility electrical failure and the identification of appropriate safety measure to address fire preparedness and emergency response.
- The Project must be in compliance with all federal, state, and county regulations, plans, and policies, including obtaining applicable federal, state, and county permits.

Tetra Tech, Inc.
1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

We appreciate you taking the time during the public scoping period to provide feedback about the Project. These topics will be considered and addressed in the Draft EIS as applicable in the appropriate resource sections.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
Tetra Tech Inc.



Brita Woeck
Project Manager, Na Pua Makani Wind Project EIS

cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC
Alicia Oller, Tetra Tech, Inc.

HONOLULU FIRE DEPARTMENT

CITY AND COUNTY OF HONOLULU

636 South Street
Honolulu, Hawaii 96813-5007
Phone: 808-723-7139 Fax: 808-723-7111 Internet: www.honolulu.gov/hfd

KIRK CALDWELL
MAYOR

MANUEL P. NEVES
FIRE CHIEF

LIONEL CAMARA JR.
DEPUTY FIRE CHIEF

December 30, 2013

Mr. Mike Cutbirth
c/o Tetra Tech, Inc.
737 Bishop Street, Suite 2340
Mauka Tower
Honolulu, Hawaii 96813

Dear Mr. Cutbirth:

Subject: Environmental Impact Statement Preparation Notice
Na Pua Makani Wind Farm Project
Kahuku, Hawai'i

In response to a memorandum from Ms. Brita Woeck, dated December 20, 2013, regarding the above-mentioned subject, the Honolulu Fire Department (HFD) requires that the following be complied with:

REG 3

1. Fire department access roads shall be provided such that any portion of the facility or any portion of an exterior wall of the first story of the building is located not more than 150 feet (46 m) from fire department access roads as measured by an approved route around the exterior of the building or facility. (National Fire Protection Association [NFPA] 1; Uniform Fire Code [UFC]™, 2006 Edition, Section 18.2.3.2.2.)

REG 3

A fire department access road shall extend to within 50 ft (15 m) of at least one exterior door that can be opened from the outside and that provides access to the interior of the building. (NFPA 1; UFC™, 2006 Edition, Section 18.2.3.2.1.)

HAS 3
REG 3

2. A water supply approved by the county, capable of supplying the required fire flow for fire protection, shall be provided to all premises upon which facilities or buildings, or portions thereof, are hereafter

HAS 3
REG 3

REG 3

ACK

constructed, or moved into or within the county. When any portion of the facility or building is in excess of 150 feet (45 720 mm) from a water supply on a fire apparatus access road, as measured by an approved route around the exterior of the facility or building, on-site fire hydrants and mains capable of supplying the required fire flow shall be provided when required by the AHJ [Authority Having Jurisdiction]. (NFPA 1; UFC™, 2006 Edition, Section 18.3.1, as amended.)

3. Submit civil drawings to the HFD for review and approval.

Should you have questions, please call Battalion Chief Socrates Bratakos of our Fire Prevention Bureau at 723-7151 or sbratakos@honolulu.gov.

Sincerely,

ROLLAND J. HARVEST
Assistant Chief

RJH/CN:bh

April 1, 2015 TTCES-4819-OUT-15-018

Larissa Hekau
hekaul@hotmail.com

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Ms. Hekau,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your written comments. Every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of Proposed Action and alternatives.

Your comment submission is attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. The following issues were raised in your submittal:

- An alternate location for the Project should be analyzed (e.g. moving turbines further inland, different location on Oahu) due to the current Project's close proximity to the community and schools.
- Health impacts resulting from noise (infrasound and audible) such as headaches, loss of sleep, and lack of concentration as well as health impacts resulting from shadow flicker that may affect community members who live within close proximity to the Project should be discussed and analyzed.
- The proposed locations for the wind turbines are too close to residences and schools, and potential impacts should be analyzed. The EIS should show distances from the closest turbines to the elementary and high schools, the community boundary, and nearest residences.
- Concerned about the details of the community benefits package.
- Concern that the Project would impact the quality of life for nearby communities.

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Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

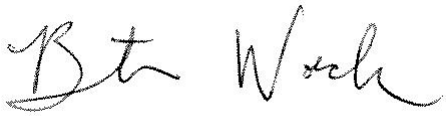
- Wind turbines impact the scenic beauty of the wind farm site, and steps should be taken to minimize visual impacts.
- Avian and bat impacts, including potential cumulative impacts resulting from existing and future wind projects should be discussed and analyzed. Comprehensive pre-construction and post-construction mortality monitoring surveys should be conducted.

We appreciate you taking the time during the public scoping period to provide feedback about the Project. These topics will be considered and addressed in the Draft EIS as applicable in the appropriate resource sections.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,

Tetra Tech Inc.



Brita Woeck

Project Manager, Na Pua Makani Wind Project EIS

Cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC

Alicia Oller, Tetra Tech, Inc.

---------- Forwarded message ----------
From: **Larissa Hekau** <hekaul@hotmail.com>
Date: Thu, Dec 5, 2013 at 3:35 PM
Subject: Na Pua Makani HCP and DEIS
To: "napuamakanihcp@fws.gov" <napuamakanihcp@fws.gov>

Good Afternoon!

ACK

My name is Larissa and I am a resident of Kahuku. My children attend Kahuku Elementary and my husband is self employed in and around our community.

ALT 2
HAS 1
PRO 1
SOC 1
SOC 3
VIS 1
WIL 1

We are very disappointed you have chosen to install your wind turbines in our community and within close proximity to our lives. It seems very lazy/sloppy to plonk the turbines so near in everyone's view for your immediate benefit. Though we are for clean energy, measures should be taken to build the turbines much further inland (practically out of sight), or somewhere where it is not so close to a village and its schools. These massive turbines already have negative visual impact on our people. Your location is not suitable for any of us, the scale and appearance of one turbine is loathed and having 14 of the proposed and within close proximity to the schools and residents is outrageous. I fear for the community in regards to health issues that may arise, noise that we will have to bear because we are upwind. Even to deal with their revolving shadows as soon as the sun rises first thing in the morning would be devastating to wake up to. It wont feel like our tropical paradise with these turbines along our highway as we try to push for keeping our country clean, pristine and tranquil. We want our wildlife to be free to fly where they want and not have to dodge blades. Please don't try to make the excuse that it is benefiting our local area. Our cost of living is high. Many of us work two jobs trying to put food on the table. Your $10,000 per turbine a year is a slap in the face. The cost equivalents to a little more then what a BYUH student living off campus pays for a single twin bed in a room shared with other students per month. We understand there is a lot of money benefited in installing your turbines. We already sacrifice our community with the current turbines to help benefit HECO and our brothers and sisters on the island, but please don't think you can come and abuse us. We are unanimously against your wind turbines in our Kahuku community.

ACK

By the unspoken natural law of the universe, the goodwill you do to man, will reciprocate back to bless you.
\
With strong objection,

Larissa Hekau

April 1, 2015 TTCES-4819-OUT-15-019

Angela Huntemer
ahuntemer@aol.com

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Ms. Huntemer,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your written comments. Every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of Proposed Action and alternatives.

Your comment submission is attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. The following issues were raised in your submittal:

- Avian and bat impacts, including potential cumulative impacts resulting from existing and future wind projects should be discussed and analyzed. Comprehensive pre-construction and post-construction mortality monitoring surveys should be conducted.
- Direct, indirect, and cumulative impacts to native wildlife species and habitat, as well as mitigation measures, should be identified.

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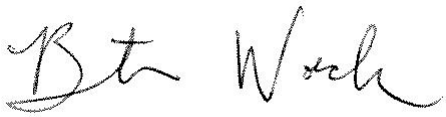
We appreciate you taking the time during the public scoping period to provide feedback about the Project. These topics will be considered and addressed in the Draft EIS as applicable in the appropriate resource sections.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,

Tetra Tech Inc.



Brita Woeck

Project Manager, Na Pua Makani Wind Project EIS

Cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC

Alicia Oller, Tetra Tech, Inc.

---------- Forwarded message ----------
From: <ahuntemer@aol.com>
Date: Wed, Dec 4, 2013 at 10:05 AM
Subject: Windmills on the North Shore
To: napuamakanihcp@fws.gov

WIL 1

WIL 3

Aloha,
I live a Turtle Bay and I oppose the installation of any more windmills up here.
As you know, this area is an important area for
1/ migratory birds (MBTA)
2/ Endangered waterbirds and bats
3/ native birds and unusual "blow ins".
The impact of the existing windmills in the Kahuku area and the wind farm that stretches from Haleiwa to Waimea is more than enough impact on these species.
No to more windmills.
Thank you, Angela Huntemer, M.Ed.

April 1, 2015 TTCES-4819-OUT-15-020

Choon James
56-1081 Kamehameha Highway
Kahuku, HI 96731
ChoonJamesHawaii@gmail.com

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Choon James,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your written comments. Every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of Proposed Action and alternatives.

Your comment submissions are attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. The following issues were raised in your submittals:

- Recommended specific studies and reports to be reviewed for inclusion in the EIS, or made data requests related to specific issues for inclusion in the EIS.
- Direct, indirect, and cumulative impacts to public health, visual resources, and socioeconomics for communities nearby
- Direct, indirect, and cumulative impacts to aquatic and terrestrial ecosystems, habitat, native plants, wildlife, bat, and avian species.
- The EIS should address any disproportionate adverse impacts to minority and low-income populations, and should reflect coordination with those affected populations.
- Health impacts resulting from noise (infrasound and audible) such as headaches, loss of sleep, and lack of concentration as well as health impacts resulting from shadow flicker that may affect

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community members who live within close proximity to the Project should be discussed and analyzed.

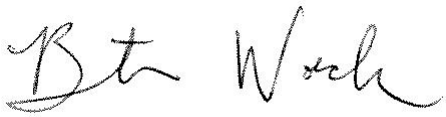
- Fire hazards associated with the Project's construction and operation including facility electrical failure and the identification of appropriate safety measure to address fire preparedness and emergency response.
- The proposed locations for the wind turbines are too close to residences and schools, and potential impacts should be analyzed. The EIS should show distances from the closest turbines to the elementary and high schools, the community boundary, and nearest residences.
- Compliance with both the NEPA and HEPA processes for public scoping and outreach, that community members and agencies have been adequately consulted during scoping, and will continue to be consulted with during the entire planning process.
- Concern that the Project would impact the quality of life for nearby communities.

We appreciate you taking the time during the public scoping period to provide feedback about the Project. These topics will be considered and addressed in the Draft EIS as applicable in the appropriate resource sections.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,

Tetra Tech Inc.



Brita Woeck

Project Manager, Na Pua Makani Wind Project EIS

Cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC

Alicia Oller, Tetra Tech, Inc.

---------- Forwarded message ----------
From: **Choon James** <choonjamesstorage@gmail.com>
Date: Tue, Dec 3, 2013 at 1:50 PM
Subject: "Na Pua Makani HCP and DEIS" - WE STRONGLY OPPOSE MORE WIND TURBINES IN KAHUKU
To: napuamakanihcp@fws.gov

ACK

PLEASE DENY THIS PROJECT!

Loyal Mehrhoff, Field Supervisor,
U.S. Fish and Wildlife Service,
Pacific Islands Fish and Wildlife Office,
300 Ala Moana Boulevard, Room 3-122,
Honolulu, Hawaii 96850

REG 1

We're very concerned that due process, transparency has been sorely lacking in this project. People are very busy and cannot attend every meeting.

ACK

Corporations whose bottom line is PROFITS will come and go but the residents are the ones who bear the blunt of these long-term impacts and irreparable damages.

DSC 1
DSC 2
HAS 3

We're not against exploring alternative energy but there should be no sacred cows. Every project must take into serious consideration the impacts on human beings, the natural environment and social impacts. There are issues of "dirty electricity", noise, potential fire and malfunction on the human, natural and social environment that need to be studied.

ACK

A Project to erect 15 500' tall towers and turbines at Malaekahana in close proximity to Kahuku schools and the Kahuku community is a big deal to us. If this happens, the Kahuku Residential areas and farms will be surrounded on three sides by industrial sized wind mills.

HAS 1
PRO 1

Independent studies have linked wind turbines to health issues that impact humans if placed in close proximity to residential areas. The proposed wind farm will be 3 times closer to our schools and residences than the existing facility. It will also be upwind - which is significant.

ACK

Kahuku Community Association (KCA) has taken a position against any additional wind mills in our area, and yet the developer is quietly moving ahead against the wishes of the community.

Mahalo!

Choon James,
56-1081 Kam Hwy,
Kahuku, Hawaii, 96731

808 293 9111
Email: ChoonJamesHawaii@gmail.com

http://www.CountryTalkStory.com

---------- Forwarded message ----------
From: **Choon James** <choonjameshawaii@gmail.com>
Date: Wed, Jan 22, 2014 at 12:02 PM
Subject: STRONGLY OPPOSE : Na pua Makani HCP and EIS
To: NaPuaMakanihcp@fws.gov, Choon James <choonJamesHawaii@gmail.com>

STRONGLY OPPOSE : Na pua Makani HCP and EIS

Aloha.

ACK

Kahuku has two residential subdivisions of approximately 900 households, an elementary, intermediate, and high school. There are also acres of active agricultural farms as well as small businesses.

PRO 1

The overwhelming majority are against this wind turbine project. As you can see, the turbines are too close to homes, schools and farms.

ACK

Green Energy in concept is a remarkable idea.

DSC 1

However, it is imperative that you somberly include the cumulative negative impacts of wind turbines on physical and psychological health, valued view planes, environment and economic marginalization upon our area. When you do, the answer becomes very clear that this wind project is NOT SUITABLE in this area.

ACK

You must look beyond the sleek marketing from using beautiful Hawaiian names to Champlin hiring an outrageously biased "Harvard medical expert' to tell us that noise is not a disease, but only an annoyance.

ENJ 1
SOC 3

You must also note that these industrial projects are often heaved upon on poorer communities. Surely, there has to be equity in quality of life, whether one lives in Kahuku or Kahala.

DAT 1

Please also note the following links which should further adequately describe a common thread of concerns with such projects.

DAT 1

http://fairwindenergy.org/testimony.html

http://www.liverpoolecho.co.uk/news/liverpool-news/airports-object-wind-turbine-plans-6532548

ACK

We STRONGLY OPPOSE this project and request that it be decisively denied.

Mahalo,

Choon James,
56-1081 Kam Hwy
Kahuku Hawaii 96731

ChoonJamesHawaii@gmail.com

http://www.CountryTalkStory.com
Saturdays 5:00 pm Olelo TV 52

April 1, 2015 TTCES-4819-OUT-15-021

Mary Kamauoha
kanakatonk@yahoo.com

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Ms. Kamauoha,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your comments; every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of Proposed Action and alternatives.

Your comment submission is attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. The following issues were raised in your submittal:

- The status and value of agricultural lands within the wind farm site should be discussed and analyzed.
- Clarification on the purpose and need of the Project, including how the Project would fit into the larger energy market that it would serve.
- The construction and operation of the Project must be in compliance with all federal, state, and county regulations, plans, and policies; Champlin must obtain applicable federal, state, and county permits.
- Short- and long-term socioeconomic impacts to the community resulting from the Project.

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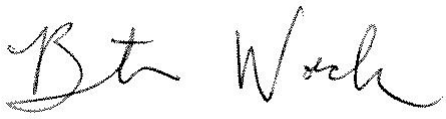
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

We appreciate you taking the time during the public scoping period to provide feedback about the Project. These topics will be considered and addressed in the Draft EIS as applicable in the appropriate resource sections.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,

Tetra Tech Inc.



Brita Woeck

Project Manager, Na Pua Makani Wind Project EIS

Cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC

Alicia Oller, Tetra Tech, Inc.

---------- Forwarded message ----------
From: **mary kamauoha** <kanakatonk@yahoo.com>
Date: Mon, Jan 20, 2014 at 10:25 PM
Subject: Na Pua Makani HCP and DEIS
To: "Napuamakanihcp@fws.gov" <Napuamakanihcp@fws.gov>
Cc: "Rep. Richard Lee Fale" <repfale@capitol.hawaii.gov>

REG 3

LAN 2

PRO 4

ACK

SOC 6

ACK

Gentlemen and Ladies

I am a concerned citizen of the Kawailoa ahupuaʻa district, neighbor to Koʻolauloa residents, some of whom rightfully oppose additional wind turbine construction expansion and operations above their homes and businesses. I am not an expert. Like you, I hope the experts will come forward and share their opinions of this proposed "taking" and impacting of natural land and air space for this proposed wind energy solution. I hope you also take into account the for-profit effort of these foreign (non-Hawaii) investors, and before a final decision, ensure any decision to lease agricultural land to generate wind energy is just and defensible. I am not an expert, but, very supportive of synergistic decisions, that when all options considered the decision the agreed solution is the best, with least possible, negative impacts to our ecosystem, health and economy. The investors must also be accountable to the community and government, in full compliance w/federal, state, Hawaiian, and community regulations and concerns, completing and presenting a sound and timely EIS what is the timeline??). Legislators must also seek expert advise, as well listen to all stakeholders, before making this critical decision. These are some of my questions and comments for the experts and for you:

1. What is the basis, the 232-acres of agricultural real estate, "not suitable for conventional farming practices...", and how was it acceptable? This language in the July 2012, DLNR 080D-110 document, unfairly favors WWW, LLC and itʻs subsidiariesʻ proposed wind project, before finalized EIS. All real estate can be cultivated by knowledgeable, hard-working, individual or group efforts, and the right crop or animal. The ahupuaʻa system of land cultivation and a generationally sustained ecosystem for itʻs citizens is evidenced by farmers who practice these principles. This valuable wisdom is dismissed by those who rely on western influences and their knowledge and experiences for decisions w/out seeking experts in all areas.
2. Where is HECOʻs committed support of the proposed 45MW+ wind energy solution? HECO representatives admitted no business liaisons with commercial "solar" companies, for various reasons, but notably, to consume commercial solar energy, for reserve, conversion, storage and/or disposal! HECO admitted in a news special, the solar companies out-sold HECOs capacity or readiness to consume, regenerate and disperse the new alternative energy as the infrastructure to do so is not yet funded/available. Is there an unfair advantage for the wind energy companies versus solar company market where alternate energy solutions concerned? And, if HECOʻs infrastructure is not ready, then Hawaii will be paying for wind energy that we cannot use. There needs be accountability and transparency in this effort to harness and convert useable energy.
3. Recommend seek the opinions of experts on all sides, before making decisions for citizens.
4. Recommend a true cost/benefit analysis that weighs impacts and effects of government, investors, residents, farmers, landowners, small businesses, and ALL stakeholders, across the state who will be impacted by this decision forever; positively or negatively.

Mahalo for allowing me to give my concerns. I look forward to watching the decision process. Hawaiiʻs climate and location make us unique and alternative energy advantageous. Hawaii also has a finite ecosystem to protect and nurture for generations. We need proceed thoughtfully and responsibly with implementing new solutions, to ensure sustainability and impacts to future peoples of Hawaii.

Aloha
M Kamauoha

April 1, 2015 TTCES-4819-OUT-15-022

Merania Kekaula
paitonu@msn.com

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Ms. Kekaula,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your comments; every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of Proposed Action and alternatives.

Your comment submission is attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. The following issues were raised in your submittal:

- Health impacts resulting from noise (infrasound and audible) such as headaches, loss of sleep, and lack of concentration as well as health impacts resulting from shadow flicker that may affect community members who live within close proximity to the Project should be discussed and analyzed.
- Hazardous wastes, chemicals, and pesticides that will be produced or used by the Project, and how they will be stored, disposed of, and managed.
- Power generation – specifically, what the overall capacity and daily production of the Project will be, transmission line upgrades that might be needed, how much electricity will go into the HECO grid, and how much of that electricity will stay in local communities.
- Clarification on the purpose and need of the Project, including how the Project would fit into the larger energy market that it would serve.

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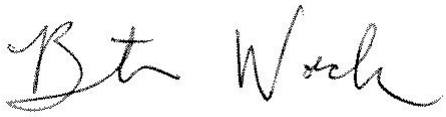
- How would the Project contribute to a savings on the electrical bills of local residents, and how soon once the Project is operational could residents begin to see any potential savings.

We appreciate you taking the time during the public scoping period to provide feedback about the Project. These topics will be considered and addressed in the Draft EIS as applicable in the appropriate resource sections.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,

Tetra Tech Inc.



Brita Woeck

Project Manager, Na Pua Makani Wind Project EIS

Cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC

Alicia Oller, Tetra Tech, Inc.

---------- Forwarded message ----------
From: **Merania Kekaula** <paitonu@msn.com>
Date: Wed, Jan 22, 2014 at 7:39 PM
Subject: "Napua Makani HCP and IES"
To: "NaPuaMakanihcp@fws.gov" <napuamakanihcp@fws.gov>

ACK

SOC 4

PRO 2

PRO 4

ACK

HAZ 2

ACK

HAS 1

I am opposed to the building of windmills on and around Kahuku and in close proximity to the High School and Elementary School for the following reasons:
1. The windmills haven't reduced our electricity bills; in fact our electric bills continue to soar.
2. From observation, the windmill blades don't turn enough rpm to warrant enough electricity being generated. How much electricity actually goes on the grid? I want to know how much electricity goes to HECO and of that amount, how much stays in Kahuku and/or is banked out of state?
3. Is the company getting tax payer dollars from the Federal government? If so this company is ripping us off more than 2X, (go and build your windmills in the county and state where you live!)
4. Are these federally funded monies available to everyone or just the lobbyists of the party in power?
a. A better word for this type of dealing is a "shell game."
b. Who is going to remove the concrete and whatever else is under the windmills, (the movie I saw indicated chemicals underneath the concrete foundations), windmill blades etc.
5. I'm concerned for the community at large; your *conquer and divide* tactics are disgraceful and we're sick and tired of your pitting neighbor against neighbor.
6. You insult us by coming back to Kahuku to build more windmills, (gth somewhere else!)... then you try to "stick your finger in our eyes," by wanting to build these behemoths close to our children's schools without knowing the health risks? Here's a big fat finger in all your eyes - gth out of Hawaii and go play your ponzi schemes back in your own states ... I also wonder who the other fat devils are who are making money "hand over fist," from these turbine windmill ponzi schemes!
Kahuku has too many wind turbines already! NO MORE WIND TURBINES!!
Merania Kekaula

April 1, 2015 TTCES-4819-OUT-15-023

Ernest Lau
Manager and Chief Engineer
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, HI 96843

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Mr. Lau,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your written comments. Every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of Proposed Action and alternatives.

Your comment submission is attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. The following issues were raised in your submittal:

- Fire hazards associated with the Project's construction and operation including facility electrical failure and the identification of appropriate safety measure to address fire preparedness and emergency response.
- The Project must be in compliance with all federal, state, and county regulations, plans, and policies, including obtaining applicable federal, state, and county permits.

Tetra Tech, Inc.
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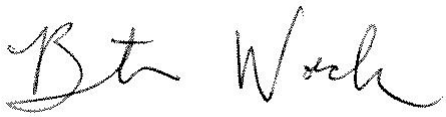
Tel 503.221.8696 Fax 503.227.1287 www.tetratech.com

We appreciate you taking the time during the public scoping period to provide feedback about the Project. These topics will be considered and addressed in the Draft EIS as applicable in the appropriate resource sections.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,

Tetra Tech Inc.



Brita Woeck

Project Manager, Na Pua Makani Wind Project EIS

Cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC

Alicia Oller, Tetra Tech, Inc.

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

February 4, 2014

KIRK CALDWELL, MAYOR

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Manager and Chief Engineer

ELLEN E. KITAMURA, P.E.
Deputy Manager and Chief Engineer

Mr. Mike Cutbirth
c/o Tetra Tech, Inc.
737 Bishop Street, Suite 2340
Honolulu, Hawaii 96813

Dear Mr. Cutbirth:

Subject: The Letter Dated December 20, 2013 on the Environmental Impact Statement Preparation Notice for the Na Pua Makani Wind Farm Project in Kahuku – Tax Map Key: 5-6-006:018, 5-6-008:008

Thank you for the opportunity to comment on the proposed wind farm project.

REG 3

The project is in the vicinity of Board of Water Supply (BWS) Kahuku wells, transmission mains and 228' reservoir. We have future plans to install a second reservoir at the site and will require sufficient setback around the entire facility. The construction drawings should be submitted to BWS for review.

HAS 3
REG 3

The on-site fire protection requirements should be coordinated with the Fire Prevention Bureau of the Honolulu Fire Department.

If you have any questions, please contact Robert Chun at 748-5443.

Very truly yours,

for ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

April 1, 2015 TTCES-4819-OUT-15-024

Susan A. Lebo, PhD
Oahu Lead Archaeologist
State Historic Preservation Division
Department of Land and Natural Resources
State of Hawaii
601 Kamokila Boulevard, Room 555
Kapolei, Hawaii 96707

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments, Log No. 2013.7101, Doc No. 1402NN16

Dear Ms. Lebo,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your written comments. Every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of the Proposed Action and alternatives.

Your comment submission is attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. The following issue was raised in your submittal:

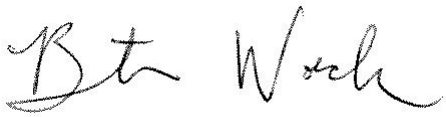
- The Project must be in compliance with all federal, state, and county regulations, plans, and policies, including obtaining applicable federal, state, and county permits.

Tetra Tech, Inc.
1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

We appreciate you taking the time during the public scoping period to provide feedback about the Project. This topic will be considered and addressed in the Draft EIS as applicable in the appropriate resource sections.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
Tetra Tech Inc.



Brita Woeck
Project Manager, Na Pua Makani Wind Project EIS

cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC
Alicia Oller, Tetra Tech, Inc.

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

WILLIAM J. AILA, JR.
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

ESTHER KIA`AINA
FIRST DEPUTY

WILLIAM M. TAM
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
STATE HISTORIC PRESERVATION DIVISION
601 KAMOKILA BOULEVARD, ROOM 555
KAPOLEI, HAWAII 96707

February 20, 2014

Brita Woeck
Tetra Tech, Inc.
737 Bishop St. Suite 2340
Honolulu, Hawaii 96813-3484

LOG NO: 2013.7101
DOC NO: 1402NN16
Archaeology

Dear Ms. Woeck,

SUBJECT: **Chapter 6E-42 Historic Preservation Review –**
Environmental Impact Statement Preparation Notice for Na Pua Makani Wind Farm
Kahuku Ahupuaʻa, Koʻolauloa District, Island of Oʻahu
TMK: (1) 5-6-008:006, 5-6-006:018

ACK

Thank you for the opportunity to review and comment of the EIS being prepared for the Na Pua Makani Wind Farm. Our office received your letter on December 20, 2013. According to the information you provided, Chaplin Hawaii Wind Holdings proposes to construct up to 15 turbines and supporting infrastructure anticipated to include met towers, access roads, wind turbine assembly lay down areas, overhead and underground transmission and collector lines, an on-site substation, and operation and maintenance buildings. The proposed EIS will analyze the potential impacts of the proposed wind farm. The project area lies on 685 acres of land in Kahuku, a portion of which is state land.

A joint Federal and State Habitat Conservation Plan will be prepared in anticipation of project proponents seeking an Incidental Take Permit from the U.S. Fish and Wildlife Service and an Incidental Take License from the State Department of Land and Natural Resources Division of Forestry and Wildlife. In addition, federal funding may be pursued as the project evolves. For these reasons, the proposed project may be a federal undertaking that may also require historic preservation review under Section 106 under the National Historic Preservation Act. Our office recommends that you conduct Section 106 consultation concurrently with Hawaii Revised Statutes (HRS) 6E-42.

Our records indicate that in 1992 Cultural Survey Hawaii (CSH) surveyed a portion of the proposed project area (Stride, Craddock and Hammatt 2003). Although sites were encountered, they were not described. This study predates the current regulations and does not conform with Hawaii Administrative Rules (HAR) §13-276. In 2009, International Archaeological Research Institute, Inc. conducted archival research for TMK: (1) 5-6-008:006 (Morrison 2009) in preparation for the Oahu Wind Partners wind farm (also called Na Pua Makani); no field work was conducted.

REG 3

SHPD recommends that an archaeological inventory survey (AIS) be conducted of the entire proposed project area in order to identify any historic properties and, if necessary, to determine an appropriate course of action. We look forward to the opportunity to review and accept an AIS report that meets the standards of HAR §13-276 and *The Secretary of the Interior's Standards for Archaeological Documentation*, which shall include information on the presence, appearance, significance, integrity and boundaries of each historic property sufficient to permit an evaluation of its significance. The identification effort should include consultation with Native Hawaiian Organizations (NHOs) pursuant to 36 CFR Part 800.4(a)(4). For the level of effort identified in 36 CFR Part 800.4(b)(1), we recommend the field survey include identification of areas of ground disturbance, and background research for areas of potential visual impacts, in addition to consultation with NHOs. We look forward to the opportunity to consult on the significance evaluations [36 CFR Part 800.4(c)], assessment of project effects [36 CFR Part 800.5] and, if necessary, resolution of adverse effects [36 CFR Part 800.6] for any historic properties located

REG 3

within the APE. Also, 36 CFR Part 800 mandates that NHOs be provided the opportunity to consult on each of these review phases.

ACK

Please contact Deona Naboa at (808) 692-8015 or at Deona.Naboa@hawaii.gov if you have any questions or concerns regarding this letter.

Aloha,

Susan A. Lebo

Susan A. Lebo, PhD
Oahu Lead Archaeologist

April 1, 2015 TTCES-4819-OUT-15-025

Dee Dee Letts
P.O. Box 524
Kaaawa, HI 96730
Ddletts@lava.net

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Ms. Letts,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your written comments. Every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of Proposed Action and alternatives.

Your comment submission is attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. The following issues were raised in your submittal:

- The existing condition of the land and land uses within the wind farm site should be addressed.
- The proposed locations for the wind turbines are too close to residences and schools, and potential impacts should be analyzed. The EIS should show distances from the closest turbines to the elementary and high schools, the community boundary, and nearest residences.
- Would like to see more detail on the Proposed Action and Project components (in text and represented graphically), including: wind turbine components, specifications, and materials needed for construction of turbines; turbine upgrades (if needed); the locations of turbines, collection lines, and point of interconnection; access road construction and maintenance; plans for turbine operations and maintenance; and plans for decommissioning and site restoration.

Tetra Tech, Inc.
1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

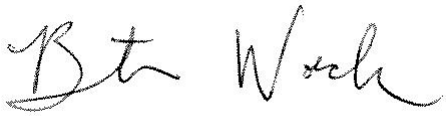
- Compliance with both the NEPA and HEPA processes for public scoping and outreach, that community members and agencies have been adequately consulted during scoping, and will continue to be consulted with during the entire planning process.
- Direct, indirect, and cumulative impacts to native wildlife species and habitat, as well as mitigation measures, should be identified.

We appreciate you taking the time during the public scoping period to provide feedback about the Project. These topics will be considered and addressed in the Draft EIS as applicable in the appropriate resource sections.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,

Tetra Tech Inc.



Brita Woeck

Project Manager, Na Pua Makani Wind Project EIS

Cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC

Alicia Oller, Tetra Tech, Inc.

---------- Forwarded message ----------
From: **Dorothy Letts** <ddletts@lava.net>
Date: Fri, Dec 6, 2013 at 6:17 AM
Subject: Napua makani
To: "napuamakanihcp@fws.gov" <napuamakanihcp@fws.gov>

PRO 1
PRO 3
REG 1
WIL 1
LAN 1

This email is regarding the proposed napua makani wind farm. I am opposed to the project for the following reasons that have not been adequately addressed. One the impacts on surrounding residences and community institutions. There have been issues regarding this issue with the current wind farm and they relocated some of their windmills in the community consultation phase for this reason. Two lack on a scientifically established and adopted buffer zone between these use and residential, institutional, and commercial uses. Three Impacts on the bird sanctuary. Fourth this developer has not adequately consulted with the Neighborhood Board or the impacted community.

Dee Dee Letts
Kaaawa resident
30 year member of the Koolauloa Neighborhood Board
PO Box 524
Kaaawa, Hi 96730
Ddletts@lava.net
Sent from my iPad

April 1, 2015 TTCES-4819-OUT-15-026

Wendell Lum
Delivered in-person (no contact information available)

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Mr. Lum,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your written comments. Every letter from the public was read thoroughly, and substantive comments were grouped into general issue topics. Summary response statements were then created to address the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to the summary responses.

Your comment submission is attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. The following issues were raised in your submittal:

- Recommended specific studies and reports to be reviewed for inclusion in the EIS, or made data requests related to specific issues for inclusion in the EIS.

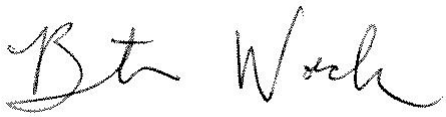
Tetra Tech, Inc.
1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8696 Fax 503.227.1287 www.tetratech.com

We appreciate you taking the time during the public scoping period to voice your concerns about the Project. These topics will be considered and addressed in the Draft EIS as applicable in the appropriate resource sections.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,

Tetra Tech Inc.



Brita Woeck

Project Manager, Na Pua Makani Wind Project EIS

Cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC

Alicia Oller, Tetra Tech, Inc.

Subject: Na Pua Makani HCP and EIS

To: Mike Cutbirth c/o Tetra Tech @ 737 Bishop Street, Suite 2340, Honolulu, Hi 96813

ACK

According to HB 1726 HD1 SD2 CD1 RELATING TO ENERGY Act 151 (06/25/12

Amends Act 253, session laws of 2007, establishing the energy systems development special fund to develop an integrated approach and portfolio management of renewable energy project that will reduce Hawai'i dependence on fossil fuel and imported oil and other imported energy resources and move Hawai'i toward energy self sufficiency by extending the sunset date. – HB1726 CD1

Environmental impact of wind power

copied portion of Page 6 of 10

From Wikipedia, the free encyclopedia

Noise annoyance

DAT 1

In 2011, the British Acoustics Bulletin published the 10th independent review of the evidence on wind farms causing annoyance and ill health in people. And for the 10th time it has emphasised that "annoyance has far more to do with social and psychological factors in those complaining than any direct effect from sound or inaudible infrasound emanating from wind turbines". Two factors repeatedly came up. "The first is being able to see wind turbines, which increases annoyance particularly in those who dislike or fear them. The second factor is whether people derive income from hosting turbines, which miraculously appears to be a highly effective antidote to feeling of annoyance and symptoms".

DAT 1

A 2009 expert panel review, sponsored by the Canadian Wind Energy Association and American Wind Energy Association, delved into the possible adverse health effects of those living close to wind turbines. Their 85-page report concluded that wind turbines do not directly make people ill. The study did allow that some people could experience stress or irritation caused by the swishing sounds wind turbines produce. "A small minority of those exposed report annoyance and stress associated with noise perception…"{however} "Annoyance is not a disease." The study group pointed out that similar irritations are produced by local and highway vehicles, as well as from industrial operations and aircraft.

The 2009 study panel members included: Robert Dobie, a doctor and clinical professor at the University of Texas, Geoff Leventhall, a noise vibration and acoustics expert in the United Kingdom, Bo Sondergaard, with Danish Electronics Light and Acoustics, Michael Seilo, a professor of audiology at Western Washington University, and Robert McCunney, a biological engineering scientist at the Massachusetts Institute of Technology. McCunney contested statements that infrasounds from wind turbines could Create vibrations causing ill health: "It doesn't really have much credence, at least based on the literature out there" he stated The academic and medical experts who conducted the study stated that they reached their conclusions independent of their sponsors. "We

DAT 1

were not told to find anything," said panel expert David Colby, a public health officer in Chatham-Kent and a Professor of Medicine at the University of Western Ontario, "It was completely open ended."

Eighteen research reviews about wind turbines and health, published since 2003, all showed that there was very little evidence that wind turbines were harmful in any direct way. Simon Chapman, professor of public health at Sydney University said that if wind farms did genuinely make people ill there would by now a large body of medical literature that would preclude putting them near populated areas. But this is not the case. Sickness being attributed to wind turbines is more likely to be caused by people getting alarmed at the health warnings circulated by activists. Complaints of illness were far more prevalent in communities targeted by anti-wind groups. Chapman's report concludes "that illnesses being blamed on windfarms are more than likely caused by the psychological effect of suggestions that the turbines make people ill, rather that by the turbines themselves."

Nina Pierpont, a New York pediatrician and wife of an anti-wind energy activist, states that noise can be an important disadvantage of wind turbines, especially when building the wind turbines very close to urban environments. The controversy around Pierpont's work centers around her statements made in a self-published non-peer-reviewed book that ultra-low frequency sounds affect human health, which are based on a very small sample of self-selected subjects with no control group for comparison. She asserts that wind turbines affect the mood of people and may cause physiological problems such as insomnia, headaches, tinnitus, vertigo, vertigo and nausea. Simon Chapman has said that "wind turbine syndrome" is not recognized by any database. He says that the term appears to be spread by anti-wind farm activist groups. The 2009 expert panel review found that "wind turbine syndrome" symptoms are the same as those seen in the general population due to stresses of daily life, and include headaches, insomnia, anxiety, and dizziness.

A 2007 report by the U.S. National Research Council noted that noise produced by wind turbines is generally not a major concern for humans beyond a half-mile or so. Low-frequency vibration and its effects on humans are not well understood and sensitivity to such vibration resulting from wind-turbine noise is highly variable among humans. There are opposing views on this subject, and more research needs to be done on the effects of low-frequency noise on humans.

In a 2009 report about "Rural Wind Farms", a Standing Committee of the Parliament of New South Wales, Australia, recommended a minimum setback of two kilometers between wind turbines and neighbouring houses (which can be waived by the affected neighbor) as a precautionary approach. In July 2010, Australia's National Health and Medical Research Council reported that "there is no published scientific evidence to support adverse effects of wind turbines would require a noise study.

In Ontario, Canada, the Ministry of the Environment created noise guidelines to limit wind turbine noise levels 30 metres away from a dwelling or camp site to 40

DAT 1

dB(A). These regulations also set a minimum distance of 550 metres (1800 feet) for a group of up to five relatively quiet {102 dB(A)} turbines within a 3-kilometre (1.9 mi) radius, rising to 1,500 metres (4,900 ft) for a group of 11 to 25 noisier (106-107 dB(A)) turbines. Larger facilities and noisier turbines would require a noise study.

A 2008 guest editorial in *Environmental Health Perspectives* published by the National Institute of Environmental Health Sciences, the U.S. National Institutes of Health, stated: Even seemingly clean sources of energy can have implications on human health. Wind energy will undoubtedly create noise, which increases stress, which in turn increases the risk of cardiovascular disease and cancer.

Modern wind turbines produce significantly less noise than older designs. Turbine designers work to minimize noise, as noise reflects lost energy and output. Noise levels at nearby residences may be managed through the siting of turbines, the approvals process for wind farms, and operational management of the wind farm.

In conclusion:

Because of noise annoyance the guidelines to limit wind turbine noise levels in Ontario, Canada, the Ministry of the Environment created noise guidelines to limit wind turbine noise levels 30 metres away from a dwelling or camp site to 40 dB. These regulations also set a minimum distance of 550 metres (1800 feet) for a group of up to five relatively quiet {102 dB} turbines within a 3-kilometre (1.9 mi) radius, rising to 1,500 metres (4,900 ft) for a group of 11 to 25 noisier (106-107 dB) turbines. Larger facilities and noisier turbines would require a noise study.

ACK

Note:

There is an existing 12-turbine wind farm on the north and the new proposed 15-turbine project on the south. The Koolauloa Neighborhood Board recently passed a resolution that no turbine be located closer than 3/4 mile, or about 4,000 feet from the nearest home for the proposed project.

Introduced by: Wendell Lum

Copy to Department of Planning & Permitting; Mike Cutbirth of Champlin Wind; and Rep. Richard Lee Fale; Rep. Cynthia Thielen; Rep. Chris Lee; Rep. Ty J.K. Cullen; Rep. Faye P. Hanohano; Rep. Denny Coffman; Rep. Nicole E. Lowen; Rep. Cindy Evans; Rep. Derek S.K. Kawakami

April 1, 2015 TTCES-4819-OUT-15-027

Ralph Makaiau
56134 Pualalea St
Kahuku, HI 96731
rmakaiau@hawaii.rr.com

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Mr. Makaiau,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your written comment and testimony from the public scoping meeting. Every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of Proposed Action and alternatives.

Your comment submission is attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. The following issues were raised in your submittal and verbal testimony:

- Fire hazards associated with the Project's construction and operation including facility electrical failure and the identification of appropriate safety measure to address fire preparedness and emergency response.
- The existing condition of the land and land uses within the wind farm site.
- The proposed locations for the wind turbines are too close to residences and schools, and potential impacts should be analyzed. The EIS should show distances from the closest turbines to the elementary and high schools, the community boundary, and nearest residences.
- Would like to see more detail on the Proposed Action and Project components (in text and represented graphically), including: wind turbine components, specifications, and materials needed for construction of turbines; turbine upgrades (if needed); the locations of turbines, collection lines,

Tetra Tech, Inc.
1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

and point of interconnection; access road construction and maintenance; plans for turbine operations and maintenance; and plans for decommissioning and site restoration.

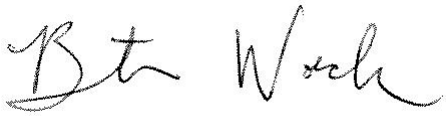
- The City and County of Honolulu setback distance regarding proximity of wind turbines to residences is insufficient and must be updated to reflect safe distances.
- How the Project would affect homeowners' ability to install photovoltaic systems.
- How would the Project contribute to a savings on the electrical bills of local residents, and how soon once the Project is operational could residents begin to see any potential savings.
- Water resources impacts including water sources for the Project, sediment run-off, and potential effects to coastal zones should all be analyzed in the EIS.

We appreciate you taking the time during the public scoping period to provide feedback about the Project. These topics will be considered and addressed in the Draft EIS as applicable in the appropriate resource sections.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,

Tetra Tech Inc.



Brita Woeck

Project Manager, Na Pua Makani Wind Project EIS

Cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC

Alicia Oller, Tetra Tech, Inc.

Na Pua Makani Wind Project EIS Public Scoping Meeting

Ways to Provide Comments

DEADLINE for submitting comments is January 22, 2014.

- Oral comments will be received at the scoping meeting
- Written comment form available at this scoping meeting
- E-mail: NaPuaMakanihcp@fws.gov
  (Include "Na Pua Makani HCP and EIS" in the subject line of the message)
- U.S. Mail: Mike Cutbirth, c/o Tetra Tech 737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
- In-Person Drop-off, Viewing, or Pickup: Written comments will be accepted at the public scoping meeting on January 10, 2014 at the Kahuku Community Center, or can be dropped off during regular business hours at the above address; or
- Fax: (808) 836-1689, Attn.: Mike Cutbirth

Ralph K. Makaian [56134 Puakea St. Kahuku 96731]
rmakaian@hawaii.rr.com [Kahuku Sub District #1 resident]

"I do not support NaPuaMakani as presented because:
1. lack of regulatory safe buffer zone to R5 zone.
2. residental application quota impact.
3. assurance of power quality."

[redacted]

4. environmental ground baseline testing at stream outlets

Ralph 01-10-14

REG 2

SOC 4

ACK

WAT 1

April 1, 2015 TTCES-4819-OUT-15-028

Kent Fonoimoana
Makani Pono ʻo Kahuku
PO Box 122
Laie, HI 96762
kent@trisland.com

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Mr. Fonoimoana,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period on behalf of Makani Ponoʻo Kahuku. Every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of Proposed Action and alternatives.

Your comment submission is attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. The following issues were raised in your submittal:

- An alternate location for the Project should be analyzed (e.g. moving turbines further inland, different location on Oahu) due to the current Project's close proximity to the community and schools.
- Proper consultation is conducted between the USFWS and Native Hawaiian people and mitigation measures are developed for potential impacts to cultural resources.
- Recommended specific studies and reports to be reviewed for inclusion in the EIS, or made data requests related to specific issues for inclusion in the EIS.
- Recommended visual simulations of the Project be included in the EIS.

Tetra Tech, Inc.
1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

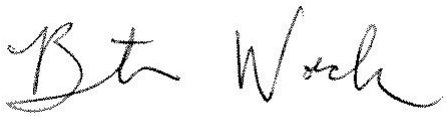
- Health impacts resulting from noise (infrasound and audible) such as headaches, loss of sleep, and lack of concentration as well as health impacts resulting from shadow flicker that may affect community members who live within close proximity to the Project should be discussed and analyzed.
- Safety impacts to community members related to wind turbine mechanical issues, such as blade throw or turbine collapse should be discussed and analyzed.
- The threat of natural disasters, including hurricanes, tsunamis, and earthquakes, and how these events could in turn threaten the health and safety of nearby communities through the collapse of turbine towers or blade throw should be discussed and analyzed.
- Noise from the wind turbines associated with construction and operation of the Project impacting sensitive receptors.
- The proposed locations for the wind turbines are too close to residences and schools, and potential impacts should be analyzed. The EIS should show distances from the closest turbines to the elementary and high schools, the community boundary, and nearest residences.
- Would like to see more detail on the Proposed Action and Project components (in text and represented graphically), including: wind turbine components, specifications, and materials needed for construction of turbines; turbine upgrades (if needed); the locations of turbines, collection lines, and point of interconnection; access road construction and maintenance; plans for turbine operations and maintenance; and plans for decommissioning and site restoration.
- The City and County of Honolulu setback distance regarding proximity of wind turbines to residences is insufficient and must be updated to reflect safe distances.
- The construction and operation of the Project must be in compliance with all federal, state, and regulations; Champlin must obtain applicable federal, state, and county permits.
- Concerned about the details of the community benefits package.
- Concern over how the Project would affect homeowners' ability to install photovoltaic systems.
- Concern that the Project would impact the quality of life for nearby communities.
- Concern that the Project would lower property values and make it harder for homeowners to sell homes that are in close proximity to the turbines.
- Water resources impacts including water sources for the Project, sediment run-off, and potential effects to coastal zones should all be analyzed in the EIS.
- Avian and bat impacts, including potential cumulative impacts resulting from existing and future wind projects should be discussed and analyzed. Comprehensive pre-construction and post-construction mortality monitoring surveys should be conducted.
- Direct, indirect, and cumulative impacts to native wildlife species and habitat, as well as mitigation measures, should be identified.

We appreciate you taking the time during the public scoping period to provide feedback about the Project. These topics will be considered and addressed in the Draft EIS as applicable in the appropriate resource sections.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,

Tetra Tech Inc.



Brita Woeck

Project Manager, Na Pua Makani Wind Project EIS

Cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC

Alicia Oller, Tetra Tech, Inc.

ACK

---------- Forwarded message ----------
From: **Kent Fonoimoana-TRIsland** <kent@trisland.com>
Date: Tue, Jan 21, 2014 at 2:44 PM
Subject: Na Pua'a Makani HCP, EIS
To: "napuamakanihcp@fws.gov" <napuamakanihcp@fws.gov>, "contact@champlinwind.com" <contact@champlinwind.com>, "william.j.aila@hawaii.gov" <william.j.aila@hawaii.gov>, "Brita.Woeck@tetratech.com" <Brita.Woeck@tetratech.com>

Aloha,

Please accept the comments on the proposed Kahuku Champlin Wind energy project as provided by Makani Pono 'o Kahuku.

Kent Fonoimoana
Makani Pono 'o Kahuku
#808-294-9991

January 22, 2014
EISPN response questions from Makani Pono ‘o Kahuku

Representive for Makani Pono ‘o Kahuku –
Kent Fonoimoana
PO Box 122
Laie, Hawaii 96762
Email: Kent@TRIsland.com
808-294-9991

Mike Cutbirth, Champlin Hawaii Wind Holdings, LLC
contact@champlinwind.com

William Aila, Department of Land and Natural Resources
william.j.aila@hawaii.gov

Brita Woeck, Tetra Tech, Inc.
Brita.Woeck@tetratech.com

Loyal Mehrhoff or Aaron Nadig, U.S. Fish and Wildlife Service
NaPuaMakanihcp@fws.gov

Re: Na Pua Makani Wind Project (EISPN)

ACK

Makani Pono ‘o Kahuku herein submits scoping questions for the Na Pua Makani Wind Project Environmental Impact Statement Preparation Notice

DAT 2

1. Has Champlin provided accurate renditions of the proposal from multiple view locations? If not, can they please provide the Kahuku community and the public with virtual renditions of the project from 360 degrees?

DAT 1
PRO 3

2. Please provide a map showing planned roads and planned turbine sites.

WAT 1

3. Please show on one map the projects detailed plans to mitigate flooding and runoff.

SOC 2

4. If this project moves forward, how will that impact homeowner’s ability to install PV? Please provide an explanation from HECO of the clear and accurate impacts to homeowners who wish to install PV systems.

SOC 1	5. When comparing the Champlin community benefit package to the potential private rate payer's savings lost due to HECO restrictions on renewables, which number is greater?
SOC 1	6. What is the cost of the community benefits package as a percentage of the total construction cost? Anticipated annual revenues of Champlin? Anticipated tax revenue for the state?
SOC 2	7. If every home in Ko'olauloa had PV installed, what would be the impact on this wind energy project?
SOC 2	8. What are the impacts to ratepayers who wish to install PV under current HECO restrictions identical to those imposed on communities without wind energy? Is HECO willing to substantiate your answer? According to a public statement made by Mike Cutbirth, there will be no impacts on PV installations caused by his proposal. Can Champlin's CEO Mike Cutbirth back this statement up using HECO's statistics? If not, how did he arrive at this conclusion?
PRO 3	7. In Champlin's documents, a third phase is mentioned which is an additional 45 megawatt addition to the project. Please show on a map the intended location of phase III.
DAT 1 HAZ 1	8. Please provide a computer generated video rendition of what may occur should the project be involved in an 'Iniki or 'Iwa type hurricane event. Include the existing Firstwind facility in your rendition. Also, in this rendition, please include all possible scenarios from 360 degrees. Additionally, please include scenarios where the facility has lost its ability to communicate with the control center and the turbines are unable to be manipulated.
HAZ 1	9. Champlin has stated that the turbines have been designed to withstand hurricanes. Has any of Champlin's turbines been involved in an 'Iniki of 'Iwa like hurricane?
HAZ 1 HAS 2	10. Although Champlin's Mike Cutbirth publically denies personal knowledge of a single turbine blade failure event, what is the possible distance turbine blades or any turbine component can travel in the event of a hurricane?
ALT 2	11. Regardless of location ownership, Can you please provide an island wide site study showing the most preferable and more feasible locations for wind turbines based on wind profiles alone? Can you include locations where there will be little or no impacts to PV installation by private homeowners?
WIL 1 WIL 3	12. Can you please provide details about how Champlin has dealt with endangered and threatened species, Incidental Take Permits and Incidental Take Licenses on its other projects, both in the U.S. and elsewhere? In addition to studying the impacts on endangered avian species, will there be a complete study

WIL 1
WIL 3

on the impacts on other native species like the Frigate bird ('Iwa), Wedge Tailed Shearwater (Ua Kani), Hawaiian Petrel and others? Specifically, how are these studies to be conducted and by who?

ACK

13. The previous developer made certain representations and commitments to the community. One of these was to stop efforts to implement the proposal if the community opposed it. Does Champlin plan on honoring this commitment to the Kahuku community?

DAT 1

14. Champlin's CEO, Mike Cutbirth is the former CEO of the American Wind Energy Association (AWEA) as well as a former ENRON executive. Champlin recently brought in Dr. McCunney, a paid AWEA consultant, to address the community's concerns regarding health impacts imposed on folks living in close proximity to Industrial Wind Turbines (IWT's). McCunney acknowledged that IWT's are indeed an annoyance but in his opinion -do not cause disease. Will this process include entertaining other opposing views such as this comment by Dr. Michael A. Nissenbaum, MD - November 5, 2013 Industrial wind turbines, human variability, and adverse health effects New England College of Occupational and Environmental Medicine - Michael A. Nissenbaum, MD - November 5, 2013. Dr. Michael Nissenbaum, who conducted extensive research into the effects of audible wind turbine noise on sleep disturbance, has written a paper that explains his findings to other medical professionals who are unaware of the issue. The summary of his paper follows:

SUMMARY

In summary, in many IWT projects, the preconstruction sound modeling has underestimated the eventual real world sound levels those turbine projects eventually produce. When coupled with the underappreciated human physiological responses to the type of noise large turbines produce (adverse sleep and mental health effects), this has had real world consequences for those living near them. The relationship of noise to sleep disturbances is established. The biological plausibility of sleep disturbances resulting in ill health is settled science. Chronic noise exposure leads to chronic sleep disturbance in many of those exposed, often resulting in ill health. Observed adverse human effects must trump preconstruction sound modeling; changes in practice must occur when there are errors. It's all about distance when siting decisions are made.

REG 2
REG 3

15. What are the industry recommended optimal distances placed between each turbine? What are the complete scientific and engineering rationale for these recommended distances? Are these distances greater or less than City and County of Honolulu set back distances?

PRO 1
HAS 1

16. There are numerous wind energy facilities in place around the world. The vast majority of health and quality of life complaints come from people who live in close proximity to IWT's - similar to the distances Kahuku community will be from Champlin's turbines. If we are to benefit from wind energy, would it not benefit all to place these machines further away from residential communities? Would greater set back distances mitigate most health or other complaints?

HAS 1

17. If the facility is built and later found to contribute to health issues associated with IWT's, what mitigating plans or response can the community expect? Are Champlin, the State of Hawaii and the private land owner's involved prepared to address preventable impacts? Would it be reasonable for the impacted community to take legal action against any entity involved in this project? Before and after implementation?

PRO 1

18. Champlin has stated that the nearest turbine will be 2100 feet removed from the nearest residence. What is the exact distance from the Elementary and High schools? Community boundary? Also, in examining distances from our community residences, does that include the Patsy and Lee Colburn residence?

NOI 1

19. Will there be audible sounds noticeable from the schools? Community? What will be infra-sound levels be at the schools? Community?

HAS 1

20. Sound engineers have developed devices specifically used to disperse crowds using subsonic sounds similar if not identical to the type of sound generated by wind turbines. This same type of sound is utilized in small home devices intended to drive away pests like rodents, cockroaches and the like. If this type of sound has been developed to cause distress, would it not be safe to conclude that IWT generated infrasound has negative impacts on humans living in close proximity to IWT's?

PRO 3

21. When decommissioning the turbines, have/will funds be/been set aside for this purpose? Will these components be placed in local landfills or taken out of state for disposal or recycling? Will the parcels be 100% fully returned to their previous state? If not, why?

CUL 3

22. Will planning and pre-construction include Ko'olauloa based and approved native Hawaiian cultural consultants? What are Champlin's mitigation plans should culturally significant sites be discovered? Should any dispute arise, will

CUL 3

there be a fair dispute resolution process developed that allows the issue to be fully explored from the Ko'olauloa community's perspective?

ACK

23. If HECO switched to utilizing LNG to generate electricity, would the power generated be more of less per kilowatt hour than wind? Taking wind out of the equation, would the addition of LNG be less or more costly to O'ahu ratepayers?

24. The previous developer of this project, Keith Avery of West Wind Works, made several representations to the Kahuku community. One such promise he made was that all residents within the Kahuku State Agricuture Park would receive free electricity when the project comes on line. This promise was made in the presence of the manager of the Kahuku State Agriculture Park, multiple lessees of the park, and several community members including current representatives of Makani Pono 'o Kahuku. Can HECO and the State Dept. of Agriculture confirm this offer? Another representation Mr. Avery made was that if the community opposed this project, he would cease his attempt to develop the project. Is Champlin willing to honor this? Why?

SOC 1

25. Since West Wind Works has since passed this project on to Champlin, is Champlin required to re-examine and support previous commitments made by WestWind Works? If not, would it be fair to say that the developer is employing less than credible bait and switch tactics?

DAT 1

26. Since West Wind Works did all the preliminary footwork for Champlin, is the previous Environmental Assessment of 2008 (EA 2008) still valid?

DAT 1

27. There have been significant alterations to the project as detailed in the EA 2008. Does this negate or have any effect on the findings of the EA 2008?

SOC 5

28. Many communities across the country are learning that there are impacts to private property values as well as salability of homes in close proximity to wind energy facilities. Some municipalities are requiring wind energy developers to place monies in an escrow fund set up to compensate impacted private property owners. Should the accepting agencies develop a plan to institute this practice that is designed to protect private property owners, will Champlin oppose such efforts?

SOC 3

29. Are there plans to study the impacts this project will have on the collective psyche of the Kahuku community? If not - why not? If yes, who and how will the study be conducted?

Regards,

Makani Pono 'o Kahuku

April 1, 2015 TTCES-4819-OUT-15-029

Marvin Kaleo Manuel
Acting Planning Program Manager
Department of Hawaiian Home Lands
PO Box 1879
Honolulu, HI 96805

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Mr. Manuel,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your written comments. Every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of Proposed Action and alternatives.

Your comment submission is attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. As there were no issues raised in your submittal that fall within the scope of the EIS analysis, your letter has been coded as "Comment Acknowledged."

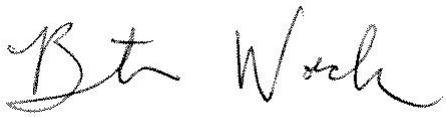
Tetra Tech, Inc.
1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

We appreciate you taking the time during the public scoping period to provide feedback about the Project.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,

Tetra Tech Inc.



Brita Woeck

Project Manager, Na Pua Makani Wind Project EIS

Cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC

Alicia Oller, Tetra Tech, Inc.

NEIL ABERCROMBIE
GOVERNOR
STATE OF HAWAII

JOBIE M. K. MASAGATANI
CHAIRMAN
HAWAIIAN HOMES COMMISSION

DARRELL T. YOUNG
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P. O. BOX 1879
HONOLULU, HAWAII 96805

January 17, 2014

TETRA TECH, INC.
Attn: Brita Woeck
737 Bishop Street,
Mauka Tower, Suite 2340
Honolulu, Hawaii 96813

Dear Birta Woeck:

Subject: Public Release of Environmental Impact Statement Preparation Notice (EISPN) for the Na Pua Makani Wind Farm Project, Kahuku, Hawai'i

ACK

Thank you for the opportunity to review the subject EISPN. The Department of Hawaiian Home Lands has no comment to offer at this time. If you have any questions, please contact our Planning Office at 620-9480.

Aloha,

Marvin Kaleo Manuel,
Acting Planning Program Manager

April 1, 2015 TTCES-4819-OUT-15-030

Kealoha Mercurio
mountaintodaocean@yahoo.com

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Mr. Mercurio,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your written comments. Every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of Proposed Action and alternatives.

Your comment submission is attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. The following issues were raised in your submittal:

- Protection of Native Hawaiian cultural sites and burial grounds, and preservation of culturally-significant lands.
- Health impacts resulting from noise (infrasound and audible) such as headaches, loss of sleep, and lack of concentration as well as health impacts resulting from shadow flicker that may affect community members who live within close proximity to the Project should be discussed and analyzed.
- The proposed locations for the wind turbines are too close to residences and schools, and potential impacts should be analyzed. The EIS should show distances from the closest turbines to the elementary and high schools, the community boundary, and nearest residences.
- Wind turbines impact the scenic beauty of the wind farm site, and steps should be taken to minimize visual impacts.

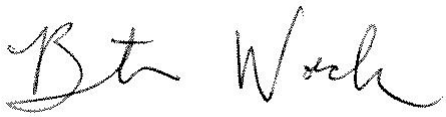
Tetra Tech, Inc.
1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

We appreciate you taking the time during the public scoping period to provide feedback about the Project. These topics will be considered and addressed in the Draft EIS as applicable in the appropriate resource sections.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,

Tetra Tech Inc.



Brita Woeck

Project Manager, Na Pua Makani Wind Project EIS

Cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC

Alicia Oller, Tetra Tech, Inc.

---------- Forwarded message ----------
From: **Julio Mercurio** <mountaintodaocean@yahoo.com>
Date: Thu, Dec 5, 2013 at 7:44 PM
Subject: "Na Pua Makani HCP and DEIS"
To: "napuamakanihcp@fws.gov" <napuamakanihcp@fws.gov>

Aloha,

CUL 1
HAS 1
PRO 1
VIS 1

I am speaking on behalf of all the Kahuku residents that are not aware of this project being put into action. These wind turbines will take away from the beautiful country scenery that we all love and there have also been studies suggesting that there are terrible health problems that are linked to them. These wind turbines are being proposed too close to our schools and community, for us to find out the hard way that those studies were correct. Also, the land that is proposed to be desecrated for the development of these wind turbines have great purpose and significance in the NATIVE HAWAIIAN COMMUNITY in Kahuku. It is not right to have people who are not connected to the ʻāina (land) in this specific ahupuaʻa (land division) to say it is okay to go on with development, because as a Native Hawaiian with a love for this land, IT IS NOT okay to build a wind farm on this land!!!! I humbly ask you to think with your hearts and not with your wallets….

Mahalo
Kealoha Mercurio

April 1, 2015 TTCES-4819-OUT-15-031

Delsa Moe
55-706 E Wahinepee St.
Laie, HI 96762
kekamoe@gmail.com

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Delsa Moe,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your comments; every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of Proposed Action and alternatives.

Your comment submission is attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. The following issues were raised in your submittal:

- Would like to see alternative energy solutions analyzed, including solar, geothermal, personal photovoltaic systems, and geothermal as part of the alternatives analysis.
- The alternatives analysis should include a reasonable range of alternatives, and should describe how alternatives were developed and also how they were eliminated from further analysis.
- The proposed locations for the wind turbines are too close to residences and schools, and potential impacts should be analyzed. The EIS should show distances from the closest turbines to the elementary and high schools, the community boundary, and nearest residences.
- Wind turbines impact the scenic beauty of the wind farm site, and steps should be taken to minimize visual impacts.

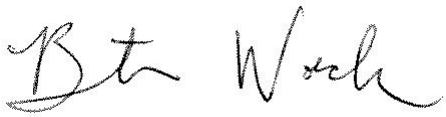
Tetra Tech, Inc.
1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

We appreciate you taking the time during the public scoping period to provide feedback about the Project. These topics will be considered and addressed in the Draft EIS as applicable in the appropriate resource sections.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,

Tetra Tech Inc.



Brita Woeck

Project Manager, Na Pua Makani Wind Project EIS

Cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC

Alicia Oller, Tetra Tech, Inc.

---------- Forwarded message ----------
From: **Delsa Moe** <kekamoe@gmail.com>
Date: Thu, Nov 14, 2013 at 11:26 PM
Subject: Na Pua Makani HCP and DEIS
To: napuamakanihcp@fws.gov

ACK

I am a resident of Laie and I oppose the additional windmills being proposed for the Kahuku area for the following reasons:

PRO 1
ALT 3
VIS 1

1. The proposed location for these windmills is too close to the school and the residential community.
2. We already have enough windmills in our area -- any more would be overkill for this small area.
3. These machines are huge and they overpower the rural beauty of this land. The worst example of this are the ones that appear above pristine Waimea Valley. In an attempt to save the environment by providing alternative energy, these gigantic turbines have ruined the beauty of that unique place because of their location. The current windmills in Kahuku are located away from the residential area and placed in an area not known for it's picturesque views so they are less of an eyesore than the ones being proposed behind the high school.

ALT 1

Please find another location or another source of providing alternative energy.

--
Delsa Moe
55-706 E Wahinepee St
Laie, HI 96762

TETRA TECH

April 1, 2015 TTCES-4819-OUT-15-032

Steve Molmen
Supervising Land Agent, Land Division
Department of Land and Natural Resources
State of Hawaii
1151 Punchbowl Street, Suite 220
Honolulu, HI 96809-0621

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Mr. Molmen,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received the written comments you submitted from several DLNR Divisions, including the Land Division – Oahu District, State Parks, Office of Conservation & Coastal Lands, Engineering Division, and Commission on Water Resource Management. Every letter from agencies and the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of the Proposed Action and alternatives.

The DLNR comment submissions are attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. The following issues were raised in the DLNR submittals:

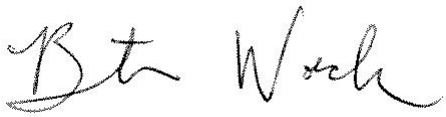
- Would like to see mitigation measures and Best Management Practices related to water resources, including water quality, landscape irrigation, and stormwater management.
- The Project must be in compliance with all federal, state, and county regulations, plans, and policies, including obtaining applicable federal, state, and county permits.
- Water resources impacts including water sources for the Project, sediment run-off, and potential effects to coastal zones should all be analyzed in the Environmental Impact Statement.

Tetra Tech, Inc.
1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

We appreciate you taking the time during the public scoping period to provide feedback about the Project. These topics will be considered and addressed in the Draft EIS as applicable in the appropriate resource sections.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
Tetra Tech Inc.



Brita Woeck
Project Manager, Na Pua Makani Wind Project EIS

cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC
Alicia Oller, Tetra Tech, Inc.

---------- Forwarded message ----------
From: <Steve.Molmen@hawaii.gov>
Date: Thu, Jan 23, 2014 at 9:21 AM
Subject: Public Release of Environmental Impact Statement Preparation Notice (EISPN) for the Na Pua Makani Wind Farm Project, Kahuku, Hawai`i
To: NaPuaMakanihcp@fws.gov

ACK

Dear Mr. Cutbirth,

Attached, please find our comments on the subject project. No hard copy will be sent.

Best regards,

Steve Molmen, Supervising Land Agent
Land Division
Department of Land and Natural Resources
State of Hawaii
1151 Punchbowl Street, Suite 220
Honolulu, HI 96809-0621
Tel.: (808) 587-0439
Fax: (808) 312-6357
Email: steve.molmen@hawaii.gov

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NEIL ABERCROMBIE
GOVERNOR OF HAWAII

WILLIAM J. AILA, JR.
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

January 21, 2014

Mr. Mike Cutbirth
c/o Tetra Tech, Inc.
737 Bishop St., Suite 2340, Mauka Tower
Honolulu, HI 96813

via email: NaPuaMakanihcp@fws.gov

Dear Mr. Cutbirth,

SUBJECT: Public Release of Environmental Impact Statement Preparation Notice (EISPN) for the Na Pua Makani Wind Farm Project, Kahuku, Hawai`i

ACK

Thank you for the opportunity to review and comment on the subject matter. The Department of Land and Natural Resources' (DLNR) Land Division distributed or made available a copy of your report pertaining to the subject matter to DLNR Divisions for their review and comments.

At this time, enclosed are comments from (1) Land Division – Oahu District; (2) Division of State Parks; (3) Office of Conservation & Coastal Lands; (4) Engineering Division; and (5) Commission on Water Resource Management. No other comments were received as of our suspense date. Should you have any questions, please feel free to call Supervising Land Agent Steve Molmen at 587-0439. Thank you.

Sincerely,

Russell Y. Tsuji
Land Administrator

Enclosure(s)

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

WILLIAM J. AILA, JR.
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

December 20, 2013

MEMORANDUM

TO: **DLNR Agencies:**
___Div. of Aquatic Resources
___Div. of Boating & Ocean Recreation
_X_ Engineering Division
_X_ Div. of Forestry & Wildlife
_X_ Div. of State Parks
_X_ Commission on Water Resource Management
_X_ Office of Conservation & Coastal Lands
_X_ Land Division – Oahu District
_X_ Historic Preservation

FROM: Russell Y. Tsuji, Land Administrator
SUBJECT: Public Release of Environmental Impact Statement Preparation Notice (EISPN) for the Na Pua Makani Wind Farm Project, Kahuku, Hawai`i
LOCATION: Kahuku, Hawai`i,
APPLICANT: Champlin Hawaii Wind Holdings, LLC by Tetra Tech, Inc.

ACK

Transmitted for your review and comment on the above-referenced document. If we have not provided you with one of the limited number of CD's, the document can be found here:

1. Go to: https://sp01.ld.dlnr.hawaii.gov/LD
2. Login: Username: LD\Visitor Password: 0pa$$word0 (first and last characters are zeros)
3. Click on: Requests for Comments
4. Click on the subject file "Public Release of Environmental Impact Statement Preparation Notice (EISPN) for the Na Pua Makani Wind Farm Project, Kahuku, Hawai`i" then click on "Files" and "Download a copy".

We would appreciate your comments on this document. Please submit any comments by January 21, 2014. If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact Supervising Land Agent Steve Molmen at (808) 587-0439. Thank you.

Attachments

REG 3

Comments:
Any improvements on the State land requires a disposition from the Board. We have no objections.

(✓) We have no objections.
( ) We have no comments.
(✓) Comments are attached.

Signed: T Chee
Print Name: Jimmy Chee
Date: 1/9/2014

cc: Central Files

55957

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

WILLIAM J. AILA, JR.
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RECEIVED
STATE PARKS DIV

'13 DEC 23 A10:59

DEPT OF LAND & NATURAL RESOURCES

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

December 20, 2013

MEMORANDUM

RECEIVED
LAND DIVISION
2014 JAN -2 PM 2:46
DEPT. OF LAND & NATURAL RESOURCES
STATE OF HAWAII

TO: **DLNR Agencies:**
__Div. of Aquatic Resources
__Div. of Boating & Ocean Recreation
X Engineering Division
X Div. of Forestry & Wildlife
X Div. of State Parks
X Commission on Water Resource Management
X Office of Conservation & Coastal Lands
X Land Division – Oahu District
X Historic Preservation

FROM: Russell Y. Tsuji, Land Administrator
SUBJECT: Public Release of Environmental Impact Statement Preparation Notice (EISPN) for the Na Pua Makani Wind Farm Project, Kahuku, Hawai`i
LOCATION: Kahuku, Hawai`i,
APPLICANT: Champlin Hawaii Wind Holdings, LLC by Tetra Tech, Inc.

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Attachments

( ) We have no objections.
(✓) We have no comments.
( ) Comments are attached.

Signed: [signature]
Print Name: Daniel S. Quinn
Date: 12/30/13

cc: Central Files

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

WILLIAM J. AILA, JR.
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

2013 DEC 23 A 9:39

OFFICE OF CONSERVATION & COASTAL LANDS

DEPT. OF LAND & NATURAL RESOURCES STATE OF HAWAII

Conservation

December 20, 2013

MEMORANDUM

~~TO:~~ FROM

DLNR Agencies:
__Div. of Aquatic Resources
__Div. of Boating & Ocean Recreation
X Engineering Division
X Div. of Forestry & Wildlife
X Div. of State Parks
X Commission on Water Resource Management
X Office of Conservation & Coastal Lands
X Land Division – Oahu District
X Historic Preservation

2014 JAN -7 AM 9:58

DEPT. OF LAND & NATURAL RESOURCES STATE OF HAWAII

RECEIVED LAND DIVISION

TO:
~~FROM:~~ Russell Y. Tsuji, Land Administrator
SUBJECT: Public Release of Environmental Impact Statement Preparation Notice (EISPN) for the Na Pua Makani Wind Farm Project, Kahuku, Hawai`i
LOCATION: Kahuku, Hawai`i,
APPLICANT: Champlin Hawaii Wind Holdings, LLC by Tetra Tech, Inc.

ACK

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We would appreciate your comments on this document. Please submit any comments by January 21, 2014. If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact Supervising Land Agent Steve Molmen at (808) 587-0439. Thank you.

Attachments

Not in Conservation District.

( ) We have no objections.
(X) We have no comments.
( ) Comments are attached.

Signed: [signature]
Print Name: ALEX ROY
Date: 12-31-2013

cc: Central Files

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

WILLIAM J. AILA, JR.
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

December 20, 2013

RECEIVED
LAND DIVISION
2014 JAN 15 PM 2:57
DEPT. OF LAND & NATURAL RESOURCES STATE OF HAWAII

MEMORANDUM

TO: FR:

DLNR Agencies:
__Div. of Aquatic Resources
__Div. of Boating & Ocean Recreation
X Engineering Division
X Div. of Forestry & Wildlife
X Div. of State Parks
X Commission on Water Resource Management
X Office of Conservation & Coastal Lands
X Land Division – Oahu District
X Historic Preservation

TO:

FROM: Russell Y. Tsuji, Land Administrator
SUBJECT: Public Release of Environmental Impact Statement Preparation Notice (EISPN) for the Na Pua Makani Wind Farm Project, Kahuku, Hawai`i
LOCATION: Kahuku, Hawai`i,
APPLICANT: Champlin Hawaii Wind Holdings, LLC by Tetra Tech, Inc.

Transmitted for your review and comment on the above-referenced document. If we have not provided you with one of the limited number of CD's, the document can be found here:

1. Go to: https://sp01.ld.dlnr.hawaii.gov/LD
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3. Click on: Requests for Comments
4. Click on the subject file "Public Release of Environmental Impact Statement Preparation Notice (EISPN) for the Na Pua Makani Wind Farm Project, Kahuku, Hawai`i" then click on "Files" and "Download a copy".

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Attachments

( ) We have no objections.
( ) We have no comments.
(✓) Comments are attached.

Signed: _____
Print Name: Carty S. Chang, Chief Engineer
Date: 1/14/14

cc: Central Files

ACK

REG 3

REG 3

REG 3

DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

LD/Russell Y. Tsuji
Ref.: EISPN for Na Pua Makani Wind Farm Project, Kahuku
Oahu.025

COMMENTS

( ) We confirm that the project site, according to the Flood Insurance Rate Map (FIRM), is located in Flood Zone ___.

(X) Please take note that the project site according to the Flood Insurance Rate Map (FIRM), is located in Zones X (shaded), AEF, AE, and A. The National Flood Insurance Program (NFIP) regulates developments within Zones X (shaded), AEF, AE, and A as indicated in bold letters below.

( ) Please note that the correct Flood Zone Designation for the project site according to the Flood Insurance Rate Map (FIRM) is ___.

(X) Please note that the project must comply with the rules and regulations of the National Flood Insurance Program (NFIP) presented in Title 44 of the Code of Federal Regulations (44CFR), whenever development within a Special Flood Hazard Area is undertaken. If there are any questions, please contact the State NFIP Coordinator, Ms. Carol Tyau-Beam, of the Department of Land and Natural Resources, Engineering Division at (808) 587-0267.

Please be advised that 44CFR indicates the minimum standards set forth by the NFIP. Your Community's local flood ordinance may prove to be more restrictive and thus take precedence over the minimum NFIP standards. If there are questions regarding the local flood ordinances, please contact the applicable County NFIP Coordinators below:

(X) Mr. Mario Siu Li at (808) 768-8098 or Ms. Ardis Shaw-Kim at (808) 768-8296 of the City and County of Honolulu, Department of Planning and Permitting.

( ) Mr. Frank DeMarco at (808) 961-8042 of the County of Hawaii, Department of Public Works.

( ) Mr. Carolyn Cortez at (808) 270-7813 of the County of Maui, Department of Planning.

( ) Mr. Stanford Iwamoto at (808) 241-4884 of the County of Kauai, Department of Public Works.

( ) The applicant should include project water demands and infrastructure required to meet water demands. Please note that the implementation of any State-sponsored projects requiring water service from the Honolulu Board of Water Supply system must first obtain water allocation credits from the Engineering Division before it can receive a building permit and/or water meter.

( ) The applicant should provide the water demands and calculations to the Engineering Division so it can be included in the State Water Projects Plan Update.

( ) Additional Comments: _____

( ) Other: _____

Should you have any questions, please call Mr. Dennis Imada of the Planning Branch at 587-0257.

Signed: _____
CARTY S. CHANG, CHIEF ENGINEER

Date: 1/14/14

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

WILLIAM J. AILA, JR.
CHAIRPERSON

WILLIAM D. BALFOUR, JR.
KAMANA BEAMER
GARY L. GILL
MILTON D. PAVAO
JONATHAN STARR
TED YAMAMURA

WILLIAM M. TAM
DEPUTY DIRECTOR

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P.O. BOX 621
HONOLULU, HAWAII 96809

January 15, 2014

REF: RFD.3893.3

TO: Russell Tsuji, Administrator
Land Division

FROM: William M. Tam, Deputy Director
Commission on Water Resource Management

SUBJECT: Public Release of Environmental Impact Statement Preparation Notice (EISPN) for the Na Pua Makani Wind Farm Project, Kahuku, Hawaii

LOCATION: Kahuku, Hawaii
TMK NO.:

RECEIVED
LAND DIVISION
2014 JAN 22 AM 10: 13
DEPT. OF LAND & NATURAL RESOURCES
STATE OF HAWAII

Thank you for the opportunity to review the subject document. The Commission on Water Resource Management (CWRM) is the agency responsible for administering the State Water Code (Code). Under the Code, all waters of the State are held in trust for the benefit of the citizens of the State, therefore, all water use is subject to legally protected water rights. CWRM strongly promotes the efficient use of Hawaii's water resources through conservation measures and appropriate resource management. For more information, please refer to the State Water Code, Chapter 174C, Hawaii Revised Statutes, and Hawaii Administrative Rules, Chapters 13-167 to 13-171. These documents are available via the Internet at http://www.hawaii.gov/dlnr/cwrm.

Our comments related to water resources are checked off below.

☐ 1. We recommend coordination with the county to incorporate this project into the county's Water Use and Development Plan. Please contact the respective Planning Department and/or Department of Water Supply for further information.

☐ 2. We recommend coordination with the Engineering Division of the State Department of Land and Natural Resources to incorporate this project into the State Water Projects Plan.

☐ 3. We recommend coordination with the Hawaii Department of Agriculture (HDOA) to incorporate the reclassification of agricultural zoned land and the redistribution of agricultural resources into the State's Agricultural Water Use and Development Plan (AWUDP). Please contact the HDOA for more information.

MIT 2

☒ 4. We recommend that water efficient fixtures be installed and water efficient practices implemented throughout the development to reduce the increased demand on the area's freshwater resources. Reducing the water usage of a home or building may earn credit towards Leadership in Energy and Environmental Design (LEED) certification. More information on LEED certification is available at http://www.usgbc.org/leed. A listing of fixtures certified by the EPA as having high water efficiency can be found at http://www.epa.gov/watersense/.

MIT 2

☒ 5. We recommend the use of best management practices (BMP) for stormwater management to minimize the impact of the project to the existing area's hydrology while maintaining on-site infiltration and preventing polluted runoff from storm events. Stormwater management BMPs may earn credit toward LEED certification. More information on stormwater BMPs can be found at http://hawaii.gov/dbedt/czm/initiative/lid.php.

MIT 2

☒ 6. We recommend the use of alternative water sources, wherever practicable.

☐ 7. We recommend participating in the Hawaii Green Business Program, that assists and recognizes businesses that strive to operate in an environmentally and socially responsible manner. The program description can be found online at http://energy.hawaii.gov/programs/achieving-efficiency/green-business-program

MIT 2

☒ 8. We recommend adopting landscape irrigation conservation best management practices endorsed by the Landscape Industry Council of Hawaii. These practices can be found online at http://landscapehawaii.org/_library/documents/lich_irrigation_conservation_bmps.pdf

REG 3

☒ 9. There may be the potential for ground or surface water degradation/contamination and recommend that approvals for this project be conditioned upon a review by the State Department of Health and the developer's acceptance of any resulting requirements related to water quality.

Permits required by CWRM:
Additional information and forms are available at http://hawaii.gov/dlnr/cwrm/info_permits.htm.

REG 3

☒ 10. The proposed water supply source for the project is located in a designated water management area, and a Water Use Permit is required prior to use of water. The Water Use Permit may be conditioned on the requirement to use dual line water supply systems for new industrial and commercial developments.

☐ 11. A Well Construction Permit(s) is (are) required before any well construction work begins.

☐ 12. A Pump Installation Permit(s) is (are) required before ground water is developed as a source of supply for the project.

REG3

☒ 13. There is (are) well(s) located on or adjacent to this project. If wells are not planned to be used and will be affected by any new construction, they must be properly abandoned and sealed. A permit for well abandonment must be obtained.

☐ 14. Ground water withdrawals from this project may affect streamflows, which may require an instream flow standard amendment.

REG 3

☒ 15. A Stream Channel Alteration Permit(s) is (are) required before any alteration(s) can be made to the bed and/or banks of a stream channel.

☐ 16. A Stream Diversion Works Permit(s) is (are) required before any stream diversion works is (are) constructed or altered.

☐ 17. A Petition to Amend the Interim Instream Flow Standard is required for any new or expanded diversion(s) of surface water.

☐ 18. The planned source of water for this project has not been identified in this report. Therefore, we cannot determine what permits or petitions are required from our office, or whether there are potential impacts to water resources.

WAT 1

☒ OTHER:
Projected potable and non-potable water demands and the calculations for these estimates should be disclosed. The proposed source of water supply should be identified.

REG 3

There are 8 existing wells in on TMK 5-6-006:018, 4 of which are used for agriculture. If the Wind Farm requires use from any of these or other well sources in the area then existing ground water use permits will need to be modified or new ground water use permits obtained.

If there are any questions, please contact Roy Hardy at 587-0225.

April 1, 2015 TTCES-4819-OUT-15-033

Joshua Noga
54 130 Imua Place
Hauula, HI 96717
joshua.noga@gmail.com

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Mr. Noga,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your written comments. Every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of Proposed Action and alternatives.

Your comment submissions are attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. The following issues were raised in your submittals:

- Health impacts resulting from noise (infrasound and audible) such as headaches, loss of sleep, and lack of concentration as well as health impacts resulting from shadow flicker that may affect community members who live within close proximity to the Project should be discussed and analyzed.
- The proposed locations for the wind turbines are too close to residences and schools, and potential impacts should be analyzed. The EIS should show distances from the closest turbines to the elementary and high schools, the community boundary, and nearest residences.

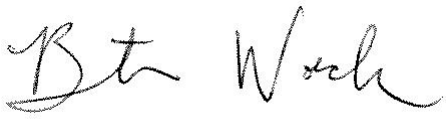
Tetra Tech, Inc.
1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

We appreciate you taking the time during the public scoping period to provide feedback about the Project. These topics will be considered and addressed in the Draft EIS as applicable in the appropriate resource sections.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,

Tetra Tech Inc.



Brita Woeck

Project Manager, Na Pua Makani Wind Project EIS

Cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC

Alicia Oller, Tetra Tech, Inc.

---------- Forwarded message ----------
From: **Joshua Noga** <joshua.noga@gmail.com>
Date: Thu, Dec 5, 2013 at 10:06 AM
Subject: No more windmills
To: napuamakanihcp@fws.gov

Aloha,

PRO 1

My name is Joshua Noga husband/father of two and I live in Hauula my church is St. Roch Parish in Kahuku. I am writing to let you know that I oppose any more windmills in Kahuku especially those so close to our schools. The windmills already present are proof that Ko'olau Loa has already done more than its fair share toward creating alternative clean energy solutions for our state.

HAS 1

Not enough studies and information have been provided to the negative consequences of these windmills so close to schools and children. Noise pollution is also a big concern revealed in youtube testimonials from an island community in Maine who had windmills constructed on their island who regret that they allowed it.

ACK

We need a more balanced discussion regarding this matter mahalo for your kokua.

Joshua Noga
54 130 Imua Place
Hauula, HI 96717

---------- Forwarded message ----------
From: **Joshua Noga** <joshua.noga@gmail.com>
Date: Thu, Dec 5, 2013 at 10:07 AM
Subject: Na Pua Makani No more windmills
To: napuamakanihcp@fws.gov

Aloha,

PRO 1

My name is Joshua Noga husband/father of two and I live in Hauula my church is St. Roch Parish in Kahuku. I am writing to let you know that I oppose any more windmills in Kahuku especially those so close to our schools. The windmills already present are proof that Ko'olau Loa has already done more than its fair share toward creating alternative clean energy solutions for our state.

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ACK

We need a more balanced discussion regarding this matter mahalo for your kokua.

Joshua Noga
54 130 Imua Place
Hauula, HI 96717

TETRA TECH

April 1, 2015 TTCES-4819-OUT-15-034

Aliitasi Ponder
P.O. Box 360
Kahuku, HI 96731
tasiponder1@yahoo.com

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Aliitasi Ponder,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your written comments and testimony from the public scoping meeting. Every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of Proposed Action and alternatives.

Your comment submissions are attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. The following issues were raised in your submittals and verbal testimony:

- An alternate location for the Project should be analyzed (e.g. moving turbines further inland, different location on Oahu) due to the current Project's close proximity to the community and schools.
- The alternatives analysis should include a reasonable range of alternatives, and should describe how alternatives were developed and also how they were eliminated from further analysis.
- Recommended specific studies and reports to be reviewed for inclusion in the EIS, or made data requests related to specific issues for inclusion in the EIS.
- Direct, indirect, and cumulative impacts to public health, visual resources, and socioeconomics for communities nearby.

Tetra Tech, Inc.
1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

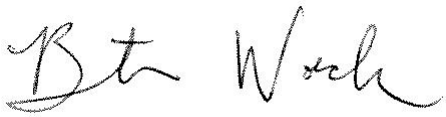
- Direct, indirect, and cumulative impacts to aquatic and terrestrial ecosystems, habitat, native plants, wildlife, bat, and avian species.
- Health impacts resulting from noise (infrasound and audible) such as headaches, loss of sleep, and lack of concentration as well as health impacts resulting from shadow flicker that may affect community members who live within close proximity to the Project should be discussed and analyzed.
- Fire hazards associated with the Project's construction and operation including facility electrical failure and the identification of appropriate safety measure to address fire preparedness and emergency response.
- The threat of natural disasters, including hurricanes, tsunamis, and earthquakes, and how these events could in turn threaten the health and safety of nearby communities through the collapse of turbine towers or blade throw should be discussed and analyzed.
- Hazardous wastes, chemicals, and pesticides that will be produced or used by the Project, and how they will be stored, disposed of, and managed.
- The status and value of agricultural lands within the wind farm site.
- The proposed locations for the wind turbines are too close to residences and schools, and potential impacts should be analyzed. The EIS should show distances from the closest turbines to the elementary and high schools, the community boundary, and nearest residences.
- Would like to see more detail on the Proposed Action and Project components (in text and represented graphically), including: wind turbine components, specifications, and materials needed for construction of turbines; turbine upgrades (if needed); the locations of turbines, collection lines, and point of interconnection; access road construction and maintenance; plans for turbine operations and maintenance; and plans for decommissioning and site restoration.
- Compliance with both the NEPA and HEPA processes for public scoping and outreach, that community members and agencies have been adequately consulted during scoping, and will continue to be consulted with during the entire planning process.
- Concerned about the details of the community benefits package.
- Concern that the Project would lower property values and make it harder for homeowners to sell homes that are in close proximity to the turbines.
- Short- and long-term socioeconomic impacts to the community resulting from the Project.
- Potential impacts to Native plant communities located within the wind farm site, and how any impacts would be mitigated.
- Avian and bat impacts, including potential cumulative impacts resulting from existing and future wind projects should be discussed and analyzed. Comprehensive pre-construction and post-construction mortality monitoring surveys should be conducted.
- Direct, indirect, and cumulative impacts to native wildlife species and habitat, as well as mitigation measures, should be identified.

We appreciate you taking the time during the public scoping period to provide feedback about the Project. These topics will be considered and addressed in the Draft EIS as applicable in the appropriate resource sections.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,

Tetra Tech Inc.



Brita Woeck

Project Manager, Na Pua Makani Wind Project EIS

Cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC

Alicia Oller, Tetra Tech, Inc.

From: Tasi P [mailto:tasiponder1@yahoo.com]
Sent: Wednesday, January 22, 2014 5:59 AM
To: NaPuaMakanihcp@fws.gov; contact@champlinwind.com; Woeck, Brita; william.j.aila@hawaii.gov
Subject: Na pua Makani HCP and EIS

,EISPN response questions from Aliitasi Ponder

Att:
Mike Cutbirth, Champlin Hawaii Wind Holdings, LLC
contact@champlinwind.com

William Aila, Department of Land and Natural Resources
william.j.aila@hawaii.gov

Brita Woeck, Tetra Tech, Inc.
Brita.Woeck@tetratech.com

Loyal Mehrhoff or Aaron Nadig, U.S. Fish and Wildlife Service
NaPuaMakanihcp@fws.gov

Re: Na Pua Makani Wind Project (EISPN)

ACK

I, a Kahuku community resident, herein submit scoping questions for the Na Pua Makani Wind Project Environmental Impact Statement Preparation Notice

(Note: Anywhere there is mention of Champlin, Champlin Hawaii Wind or Champlin WInd it is intended that they are all one and the same Champlin Hawaii Wind Holdings, LLC.)

Questions:

PRO 3

1. What is the length/ width/ surface depth of the road going from Kamehameha Hwy to the intended turbine site? What company will be building that private road?

2. What are the building spec requirements for the private road to the turbines iin order for it to handle the special

needs of this project?

PRO 3

3. How much will it cost the developer to build such a road going from Kamehameha Hwy to the turbine site? Will the developer cover all costs of the road leading to the turbines from the main public roadways?

PRO 3

4. In dollar amounts how much of Kamehameha Hwy's maintenance will Champlin Hawaii Wind be required to cover?

PRO 3

5. In other parts of the world where turbines of this size are installed, what is the life of these types of turbines in years? How does weather and temperature affect the longevity of a turbine?

DSC 1

6. How many communities have continued to report positively about the ongoing effects 1, 2 and 3 years after the turbines have been installed?

DSC 1

7. Has Champlin studied the types, basis and quantities of complaints by community members in other communities where turbines have been installed to be sure they don't repeat the same mistakes?

REG 1
ALT 3

8. What adjustments has Champlin made in their development process to lessen complaints in current and future wind developments?

ACK

9. How many complaints from community members have there been reported to city, county, state officials about wind turbines erected in their communities?

10. What is Champlin's track record for addressing and resolving community complaints made to them or to local/city/county/state officials and or organizations? What is Champlin's average time from complaint to resident-satisfactory resolution?

HAS 1

11. What organization will be monitoring the initial and ongoing effects the turbines have on sleep, health, concentration, and property values?Will Kahuku community members receive that report?

PRO 3

12. How do these turbines compare mechanically to those turbines installed and being taken down in Europe, Australia and other parts of the U.S.?

PRO 1

13. Where else in the world have turbines of this size and quantity been installed as close as is being proposed by Champlin in Kahuku to public schools and/or neighborhoods? What is the closest distance to a school where turbines in this size category have ever been installed?

SOC 1

14. Will the developer establish a fund to cover the cost of reviewing and addressing health issues, including loss of work, for community members who live within a mile of these turbines? If so, how much will there be in the fund initially and ongoing? Who at Champlin will be in charge of the fund and how do they propose to educate the Kahuku community on contacting them about resolving these issues?

ACK

15. What is the penalty to Champlin, enforced by our city/county/state organizations that monitor the ill effects of wind turbines on community members, for not resolving these issues in an expedient manner?

ACK

16. What are the specific city/county/state organizations currently established to monitor the complaints and negative impacts on the Kahuku community?

ACK

17. What is the process for community members to submit complaints about these proposed turbines once installed, including noise and impacts to health, sleep, loss of work, and increased stress? Who will fund the effort of reviewing complaints of community members and providing solutions to resolve these issues?

HAS 1
WIL 3

18. Have there been studies conducted on turbine effects on unborn fetuses? On the elderly? On special needs children? On those with ADD/ADHD? On those with mental health issues? On all the various types of animals that currently reside within 2 miles of the proposed turbines?

DAT 1

19. What are the list of all independent organizations that investigate the effects of turbines on public health? Has

DAT 1	Champlin conducted and published their own independent study? What is the size of Champlin's sampling used in their studies?
ACK	20. What are the names of all the Kahuku area organizations who have or will be given funds from the developer? i.e. athletic organizations, booster clubs. What are the names of the individuals and or organizations who are or will be managing those various groups who have or will receive Champlin Hawaii Wind monies/contributions? 21. Has Keith Avery ever worked with or for any member of Champlin Hawaii Wind Holdings, LLC? What is his connection with Champlin Hawaii Wind or any affiliation of Champlin Hawaii Wind?
DAT 1 HAS 1	22. Rather than minimizing, has Champlin Hawaii Wind Holdings, LLC objectively and seriously considered and evaluated the long list of health-impact issues by Dr. Pierpoint who wrote the book called, "Turbine Syndrome?" What are Champlin's results regarding such a comparative study and the methods and list of independent experts used by Champlin to conduct their own studies? What other medical study findings and independent medical experts have Champlin investigated in their health impact studies?
ACK	23. If the effects warned by Dr. Pierpoint and other medical experts do become a reality for Kahuku community members, what funds will be provided by Champlin to cover litigation costs so those costs do not fall on the state, city or county?
DAT 1	24. Has anyone at Champlin Hawaii Wind ever spoken directly with Dr. Pierpoint or others in the medical community with a differing viewpoint, to discuss those contrasting experts' published findings on the negative impacts to human health?
ACK	25. What other locations has Champlin Hawaii WInd installed turbines of this size? What is the largest number of wind turbines of this size that Champlin has installed or for which they have been directly responsible?
ACK	26. What other locations has Champlin Hawaii Wind installed turbines of this size in which there is a basin? What studies has Champlin conducted about the sound effects when turbines are installed within a basin?
ACK	27. On what other island has Champlin ever installed wind turbines of this size category? If so, exactly how tall are they? In what other tropical area has Champlin ever installed wind turbines? What experience has Champlin had with wind turbines installed and running in hurricane zones?
SOC 5	28. What is Champlin's proposal for covering the cost of lowered property values for homes within 2 miles of the proposed wind turbines, and for home owners who are unable to sell their homes at all as a result of the wind turbine industrialization of the Kahuku community?
HAZ 2 LAN 2	29. What is the effect of the installation on surrounding ag lands, including the chemicals used for clearing weeds/grounds and ongoing weed control?
ACK	30. In what other area has Champlin installed industrial size wind turbines where there is a similar complex, integrated, diverse eco system on par with that of Hawaii?
VEG 1	31. What studies has Champlin Hawaii Wind conducted themselves directly on the effects of turbines on plant matter where there is a rich, diverse and large quantity of plant matter before and at regular intervals after installation up to 5 years of large industrial turbines in full on operation?
WIL 1	32. What numbers and types of birds do Champlin estimate will be sacrificed annually if turbines are installed in Kahuku? Who are the bird specialists that Champlin Hawaii WInd currently employs?
HAS 1	33. In their due diligence studies, at what distance from the turbines has Champlin determined that there is a negative effect on human health, including emotional and or physical health?
	34. Dr. McCunney, a paid AWEA medical expert, was presented as an independent expert at a recent Kahuku

REG 1

community meeting. To assure us of his objectivity, he purported to have no connection to Champlin Hawaii WInd or to know Mike Cutbirth in any way, even though Mike was once the CEO of AWEA. Instead of owning up when his association was pointed out, he became outwardly defensive. Earlier in the presentation, when community members asked Dr. McCunney questions based on his being the wind expert, he deferred several of those questions requiring objectivity for Mike to handle at some future time. Also, his presentation inferred that health issues were from those who didn't approve of turbines to begin with. His condescending style of communicating was off-putting. He as the impartial independent expert appeared cautious about anything that might run counter to any position held by Champlin, even going as far as to build up and complement the developer as he went through his presentation. This non-transparent, partial. compromised approach increased community distrust in Champlin Hawaii Wind and Mike Cutbirth. How does Champlin propose they will become more transparent in their communication, and repair public distrust caused by their past methods and styles of communication (starting with their initial representative, Keith Avery) in our community?

ACK

35. In what legal litigations is Champlin currently involved, connected to other wind turbine development projects?

36. At times it has sounded as though Champlin is negating a connection with West Wind Works, the earlier version of the proposed project. If that is so, then shouldn't Champlin conduct their own, and more current, Environmental Assessment? What, if any, connection is there between Champlin and West Wind Works?

HAS 3

37. Based on First Wind's experiences with 3 fires, as a community we have learned that large wind developments require extra resources from our local fire department. What would Champlin be contributing to beef up/cover any extra equipment needed for proposed Champlin's Kahuku wind project's ongoing unique emergency needs?

HAZ 1

38. What is Champlin's emergency response strategy, policy, program and funding availability for dealing with turbines destabilized during a hurricane or as part of any other natural disaster?

ALT 2

39. If the majority of our community doesn't want the turbines as close as is being proposed to our schools and community, will you find another location more suited to these 50 story high machines?

ACK

40. What other turbine projects have you developed where large industrial turbines have been installed in a similar type of soil/rock bed with similar amounts of moisture as we have here in Kahuku?

PRO 3

41. What is the "tipping point" financially and environmentally? In other words, at what height do 50 story high turbines become less stable to where the cost of periodically stabilizing them and correcting environmental harm becomes too high to justify their 20 yr shelf life?

SOC 6

42. Based on your experience in wind development in other communities. how will our home insurance rates be affected by your proposed wind project in Kahuku? If rates increase, to what do you attribute the insurance companies need for the increase and will you cover the increase?

PRO 3

43. Since wind turbine technologies continue to develop and turbines evolve, what is your process and plans for upgrading your system and your process for communicating about those changes with the surrounding community before proceeding with upgrades?

NOI 1

44. Sound reverberates, bouncing off other sound "surfaces;" What are the findings on sound/vibrational effects on humans when surrounded by turbines on 3 sides?

REG 1

45. In blue-collar communities, like Kahuku, where english for many is a 2nd language and rising early/ working long hours means being unable to attend evening meetings, there has been a tendency for speculators to swoop in, identify a few influential key people, "motivate" them to cooperate by offering "extras" if they will sell out their own community and rush along the process, etc. With millions at stake, it is easy for developers and community members "helping" them to disregard the democratic process or to do what it takes to keep a community informed in an open and honest way. What are you doing to keep every member of the Kahuku community updated on your developmental process and best ways to weigh in along that process?

April 1, 2015 TTCES-4819-OUT-15-035

Melissa Primacio
Kahuku Community Association Chair
PO BOX 333
Kahuku HI 967312

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Ms. Primacio,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your written comments. Every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of Proposed Action and alternatives.

Your comment submission is attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. As there were no issues raised in your submittal that fall within the scope of the EIS analysis, your letter has been coded as "Comment Acknowledged."

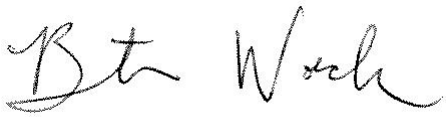
Tetra Tech, Inc.
1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

We appreciate you taking the time during the public scoping period to provide feedback about the Project.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,

Tetra Tech Inc.



Brita Woeck

Project Manager, Na Pua Makani Wind Project EIS

Cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC

Alicia Oller, Tetra Tech, Inc.

---------- Forwarded message ----------
From: **Melissa Primacio** <melissaprimacio@gmail.com>
Date: Tue, Dec 3, 2013 at 8:58 AM
Subject: wind farm
To: napuamakanihcp@fws.gov

Aloha All,

I would like to clarify an issue on a statement made by KCA in the above email by Kent Fonoimoana.

ACK

Kahuku Community Association (KCA) has taken a position against any additional wind mills in our area, and yet the developer is quietly moving ahead against the wishes of the community.

The developer is in the Environmental Impact Study (EIS) process with Fish and Wildlife.

This statement was not made by KCA. I am the current 2013 KCA President. Please let me share an official statement on our current position.

Kent does not represent KCA, he does not take his elected Board of Director seat until January 2014.

In March 2013 KCA took position to Support (Kent's) Wind Turbine Buffer Zone Resolution with recommendations for ONLY Sub district 01.

KCA has not taken any position on the newly proposed Champlin Wind Project.

Thank you for bringing this matter to my attention. Please feel free to forward this email to those that have received this wrong information.

Mahalo,

Melissa Primacio
Kahuku Community Association Chair
PO BOX 333
Kahuku, HI 96731
808-203-3838

---------- Forwarded message ----------
From: **Melissa Primacio** <melissaprimacio@gmail.com>
Date: Tue, Dec 3, 2013 at 8:56 AM
Subject: Fwd: FW: URGENT! Comments needed to oppose Malaekahana wind farm
To: napuamakanihcp@fws.gov

ACK

On Dec 2, 2013 4:08 PM, "Eric Beaver" <EBeaver@hawaiireserves.com> wrote:

Thanks for clarifying this matter.

From: Steve Hoag
Sent: Monday, December 02, 2013 12:48 PM
To: Jeff Tyau; Eric Beaver
Cc: Jonathan Miller
Subject: FW: URGENT! Comments needed to oppose Malaekahana wind farm

FYI

From: Kent Fonoimoana-TRIsland [mailto:kent@trisland.com]
Sent: Monday, December 02, 2013 12:02 PM
To: Kent Fonoimoana
Subject: URGENT! Comments needed to oppose Malaekahana wind farm

Aloha community member,

YOUR HELP IS URGENTLY NEEDED BEFORE DECEMBER 5th!

A wind farm developer is moving forward with a proposal to erect 15 500' tall towers and turbines at Malaekahana in close proximity to Kahuku schools and the Kahuku community. Should the project move forward, Kahuku's Ko'olau Housing will be surrounded on three sides by industrial sized wind mills.

Independent studies have linked wind turbines to health issues that impact humans if placed in close proximity to residential areas. The proposed wind farm will be 3 times closer to our schools and residences than the existing facility. It will also be upwind - which is significant.

Kahuku Community Association (KCA) has taken a position against any additional wind mills in our area, and yet the developer is quietly moving ahead against the wishes of the community.

The developer is in the Environmental Impact Study (EIS) process with Fish and Wildlife.

PLEASE TAKE THE TIME TO SUBMIT COMMENTS IN OPPOSITION TO:
E-mail: **napuamakanihcp@fws.gov**

Fax: 808-792-9581, Attn: Loyal Mehrhoff
Mail: Loyal Mehrhoff, Field Supervisor,
U.S. Fish and Wildlife Service,
Pacific Islands Fish and Wildlife Office,
300 Ala Moana Boulevard, Room 3-122,
Honolulu, Hawaii 96850
(Include "Na Pua Makani HCP and DEIS" in the subject line of the message, letter or fax)

DEADLINE for submitting comments is December 5th, 2013. Please forward this email to other area residents who are concerned about the proximity issues that will impact school children and residents.

Kent Fonoimoana
#808-294-9991

April 1, 2014 TTCES-4819-OUT-15-036

Suzanne Reed
hawaiianstuntmama@yahoo.com

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Ms. Reed,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your written comments. Every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of Proposed Action and alternatives.

Your comment submission is attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. The following issues were raised in your submittal:

- An alternate location for the Project should be analyzed (e.g. moving turbines further inland, different location on Oahu) due to the current Project's close proximity to the community and schools.
- Recommended specific studies and reports to be reviewed for inclusion in the EIS, or made data requests related to specific issues for inclusion in the EIS.
- Health impacts resulting from noise (infrasound and audible) such as headaches, loss of sleep, and lack of concentration as well as health impacts resulting from shadow flicker that may affect community members who live within close proximity to the Project should be discussed and analyzed.
- Safety impacts to community members related to wind turbine mechanical issues, such as blade throw or turbine collapse should be discussed and analyzed.

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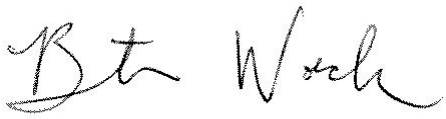
- The threat of natural disasters, including hurricanes, tsunamis, and earthquakes, and how these events could in turn threaten the health and safety of nearby communities through the collapse of turbine towers or blade throw should be discussed and analyzed.
- The proposed locations for the wind turbines are too close to residences and schools, and potential impacts should be analyzed. The EIS should show distances from the closest turbines to the elementary and high schools, the community boundary, and nearest residences.

We appreciate you taking the time during the public scoping period to provide feedback about the Project. These topics will be considered and addressed in the Draft EIS as applicable in the appropriate resource sections.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,

Tetra Tech Inc.



Brita Woeck

Project Manager, Na Pua Makani Wind Project EIS

Cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC

Alicia Oller, Tetra Tech, Inc.

---------- Forwarded message ----------
From: **Suzanne Reed** <hawaiianstuntmama@yahoo.com>
Date: Wed, Dec 4, 2013 at 9:48 PM
Subject: Wind turbines- not in our community, please
To: "napuamakanihcp@fws.gov" <napuamakanihcp@fws.gov>

ALT 2
HAS 1
HAS 2
PRO 1

Aloha,
My name is Suzanne Reed and I am against the Wind Project. Safety for the people should be the priority. These turbines are being installed too close to the Kahuku Community. I live in Laie, which is adjacent to Kahuku, and I am concerned for my 14 year old son who attends Kahuku Intermediate. These turbines are not a quiet as the company would like us to believe. This type of project should NOT be placed in an area that has residents and schools. People come first, not money. Yes, Hawaii needs green energy. I agree. Geothermal is great. Solar is great. Wind can work for certain areas- like the open desert or desolate land. What about all the land just mauka of Turtle Bay, next to the other windmills? Or Kaena Point? Why is it RIGHT behind the school?Can you imagine the constant beating of the blades? All day, all night, never ending. I am that worried it will affect the student's concentration and their scores. These students need all the help they can get. They don't need another noise disruption or any aggrevating sounds.

HAS 1

We have relatives who live in Kahuku. Will their sleep patterns be disrupted? Will my nephews sleep well at nightl? Will their parents have enough rest to perform at work? Will the overall lack of sleep exhaust a tired immune system?Causing sickness or over eating in order to stay awake and quite possibly lead to chronic illnesses. This has already occurred in other Wind turbine communities across the United States. People had to either sell or leave their beloved homes to escape the noise. I pray that the needs of the people living under this project will be seriously considered. From the last town meeting, it seemed as though this project will most certainly be moving forward and the turbines erected.

ALT 2
HAS 2
HAZ 1
DAT 1

Another safety concern that I have about this project is the actual blades becoming detached in high winds.Hurricane Iniki had winds exceeding 200mph. A wind project in San Diego had an 11 ton blade fall during 10-15 mile an hour winds. This is not an isolated incident. It has occurred in other locations. I have done my research and concluded that wind power is NOT for this community. Perhaps just a few miles down the road or further back into the mountains. Oh, wait, that will cost the company more money to build those roads. Well....get building ,if you want those turbines installed. Get them away from our ohana and our keiki. www.cbs8.com/.../**blade**-breaks-off-**wind**-**turbine**-at-ocotillo-**wind**-projec...

Sincerely,

Suzanne Reed

April 1, 2015 TTCES-4819-OUT-15-037

Tanoai Reed
samaoanstuntman@yahoo.com

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Mr. Reed,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your written comments and testimony from the public scoping meeting. Every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of Proposed Action and alternatives.

Your comment submission is attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. The following issues were raised in your submittal and verbal testimony:

- An alternate location for the Project should be analyzed (e.g. moving turbines further inland, different location on Oahu) due to the current Project's close proximity to the community and schools.
- Recommended specific studies and reports to be reviewed for inclusion in the EIS, or made data requests related to specific issues for inclusion in the EIS.
- The EIS should address any disproportionate adverse impacts to minority and low-income populations, and should reflect coordination with those affected populations.
- Health impacts resulting from noise (infrasound and audible) such as headaches, loss of sleep, and lack of concentration as well as health impacts resulting from shadow flicker that may affect community members who live within close proximity to the Project should be discussed and analyzed.

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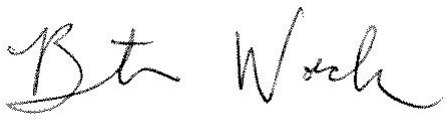
- Fire hazards associated with the Project's construction and operation including facility electrical failure and the identification of appropriate safety measure to address fire preparedness and emergency response.
- The threat of natural disasters, including hurricanes, tsunamis, and earthquakes, and how these events could in turn threaten the health and safety of nearby communities through the collapse of turbine towers or blade throw should be discussed and analyzed.
- How the Project would affect homeowners' ability to install photovoltaic systems.
- How would the Project contribute to a savings on the electrical bills of local residents, and how soon once the Project is operational could residents begin to see any potential savings.
- Concern that the Project would lower property values and make it harder for homeowners to sell homes that are in close proximity to the turbines.
- Short- and long-term socioeconomic impacts to the community resulting from the Project.
- Wind turbines impact the scenic beauty of the wind farm site, and steps should be taken to minimize visual impacts.
- Direct, indirect, and cumulative impacts to native wildlife species and habitat, as well as mitigation measures, should be identified.

We appreciate you taking the time during the public scoping period to provide feedback about the Project. These topics will be considered and addressed in the Draft EIS as applicable in the appropriate resource sections.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,

Tetra Tech Inc.



Brita Woeck

Project Manager, Na Pua Makani Wind Project EIS

Cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC

Alicia Oller, Tetra Tech, Inc.

---------- Forwarded message ----------
From: **Tanoai Reed** <samoanstuntman@yahoo.com>
Date: Wed, Dec 4, 2013 at 9:49 PM
Subject: Kahuku wind turbines.
To: "napuamakanihcp@fws.gov" <napuamakanihcp@fws.gov>

ACK

DAT 1
HAS 1
HAS 3
HAZ 1
SOC 5
WIL 3

VIS 1

HAS 1
HAS 3

Aloha Loyal,

My name is Tanoai Reed and Im a very concerned member of this community. Im against putting these new turbines up for so many different reasons. To start with let me share with you some video of the danger these things can bring to our people and our wildlife. Please take the time to view theses I will refer to them later.

1) The killing of wildlife. http://youtu.be/jwVz5hdAMGU
2) High wind/ Hurricanes. http://youtu.be/-YJuFvjtM0s
3) Electrical failure/ Fires. http://youtu.be/0ovHFTSBQ54
4) Property devaluation. http://youtu.be/_utFV2ukOtU
5) Sound pollution. http://youtu.be/SNxvkrgoPLo
6) Health Hazards. http://youtu.be/lm0Oe8J6qT8
7) *A similar community to Kahuku affected: http://youtu.be/jtGijb_oNeQ
8)** And yet another community tells its story of the wind turbines: http://youtu.be/MO53YqA0D9M
9) Lastly, Look at the pictures I attached. Can you HONESTLY tell me these things are beautiful or enhance our landscape? Our Aina is the most important and precious thing we have.Thats why they don't allow billboards or tall buildings in our community. These RUIN our beautiful scenery and landscape.

.....And the list goes on and on of videos, photos and first hand accounts and testimonies of the negative impacts of these monstrosities being built near communities.

The noise alone is enough to stop these from being built behind our elementary and high school. The students will hear the noise that was recorded in the video 5, ALL DAY LONG. How can they focus and concentrate with that? My son is an 8th

HAS 1
HAS 3

grader at Kahuku and I don't want him to be near these things. Not only because of the noise, but also because of what I've shown you in videos 2 & 3. If these things burst into flames, explode, or even if a hurricane hits, the proposed site right now is so close that it puts peoples lives in danger.

SOC 2

What about the fact that adding these wind turbines will prevent the addition of homeowners own individual solar energy (which will actually help impact our bills as well as conform to the green energy movement).

SOC 4

Each community is only allowed a certain percentage of renewable energy and the turbines (which don't help lower our monthly electric bills) are taking up all of that allowed percentage.Once the maximum wattage has been reached, HECO won't allow anymore alternatives like solar, which they lose money on. I smell something funny there.

SOC 5

As you see in video 4, these things bring down our property value. If there is even a small chance that these things do what you hear about and see in the videos, people won't want to move in....only out! Why should we have to sacrifice equity in our homes because some big multi-million dollar company wants to "drop their load and hit the road" with millions in their pockets off our our land? They might leave a handful of loose change to help buy our "pono", but that won't bring our property values back up.

ACK

As you can see there are MANY documented dangers and reasons why we shouldn't allow these next to our homes and schools. Even if there was only one reason, that should be enough.

The community voices have spoken. The majority are against it!! At the meeting we had, not too many people showed up and not too many spoke up. That doesn't mean the rest want to have these win turbines built. I learned that a lot of people didn't know about the meting or weren't able to make it. If we look at the people who did speak up, ONLY 1 person stood up FOR the wind turbines. There were at least 6 people who spoke up AGAINST them. I'm sure this reflects the communities voice percentage wise, per capita. The few people in our community who are for them have been approached and "bought off" by Champlin wind. If there was no offer of money, I'm sure they wouldn't say they like the presence of them looming over our homes and schools. Big Mainland companies know we are a low income community and that makes us easy prey. Look at what Monsanto has done to our land with the GMO's. Only NOW we are wising up and passing bills to stop them from polluting our soil? Champlain is no different. Both say they want to do good and help the environment, but we all know its about the all mighty $!!! Think about it.....They can't buy off or fool the rich communities. Thats why you don't see their footprint in those areas.

ACK

The homes, schools, families and countryside mountains of Kahuku are so beautiful and safe. PLEASE help us keep it that way.

Mahalo for your time,

-Tanoai Reed

April 1, 2015 TTCES-4819-OUT-15-038

Ben Shafer
52210 Kamehameha HWY
Hauula, HI 96717
bdshafer@gmail.com

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Mr. Shafer,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your written comments. Every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of Proposed Action and alternatives.

Your comment submissions are attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. The following issues were raised in your submittals:

- The City and County of Honolulu setback distance regarding proximity of wind turbines to residences is insufficient and must be updated to reflect safe distances.
- Wind turbines impact the scenic beauty of the wind farm site, and steps should be taken to minimize visual impacts.

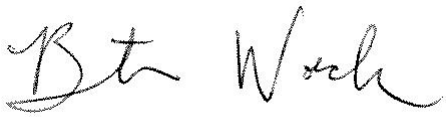
Tetra Tech, Inc.
1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

We appreciate you taking the time during the public scoping period to provide feedback about the Project. These topics will be considered and addressed in the Draft EIS as applicable in the appropriate resource sections.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,

Tetra Tech Inc.



Brita Woeck

Project Manager, Na Pua Makani Wind Project EIS

Cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC

Alicia Oller, Tetra Tech, Inc.

---------- Forwarded message ----------
From: **Aloha from Ben Shafer** <bdshafer@gmail.com>
Date: Tue, Dec 3, 2013 at 4:03 PM
Subject: Na Pua Makani HCP and DEIS
To: napuamakanihcp@fws.gov

Loyal Mehrhoff, Field Supervisor,
U.S. Fish and Wildlife Service,
Pacific Islands Fish and Wildlife Office,
300 Ala Moana Boulevard, Room 3-122,
Honolulu, Hawaii 96850

Benjamin Shafer
52210 Kamehameha Hwy
Hauula, Hawaii 96717
8082223138
bdshafer@gmail.com

December 4, 2013

RE: In full opposition to Windmills in Kahuku, Oahu.

Aloha Loyal
Mehrhoff,

ACK

I and many in our communities of Kaaawa, Kahana, Punalu'u, Hauula, Laie, Kahuku, Sunset and Waimea, the Ko'olauloa District are appalled at your request for windmills anywhere near schools, homes, agricultural area, activity centers in Kahuku or in any communities where these settings exist. Please note that these communities are in strong opposition to this assine plan.
There are too many reasons why this is will not work.

Respectfully submitted,
Ben Shafer

Sent via the Samsung GALAXY S®4, an AT&T 4G LTE smartphone

---------- Forwarded message ----------
From: **Ben Shafer** <bdshafer@gmail.com>
Date: Wed, Dec 4, 2013 at 3:59 PM
Subject: Request an email listing
To: napuamakanihcp@fws.gov

Aloha Loyal,

ACK

I would like to request and email listing of all those who supported and in not of support of the proposed windmills in Kahuku, Oahu as of the end of the deadline for submital of testimony.

Mahalo nui loa for all you do,
Ben Shafer
bdshafer@gmail.com
808.222.3138

VIS 1
REG 2

---------- Forwarded message ----------
From: **Aloha from Ben Shafer** <bdshafer@gmail.com>
Date: Mon, Jan 20, 2014 at 9:03 PM
Subject: No windmills
To: NaPuaMakanihcp@fws.gov
Cc: Kent Fonoimoana <kent@trisland.com>

Aloha,
No windmill should be built closer than three miles from any human or animal contact. All view plains should not obliterated windmills except ocean views.

Mahalo,
Ben Shafer
52210 Kamehameha Hwy
Hauula, Hawaii 96717
8082223138

Sent via the Samsung GALAXY S®4, an AT&T 4G LTE smartphone

April 1, 2015 TTCES-4819-OUT-15-039

Scott Sysum
National Older Worker Career Center, Energy Specialist
U.S. EPA Region IX, Environmental Review Office
75 Hawthorne Street CED-2
San Francisco, CA 94105
sysum.scott@epa.gov

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Mr. Sysum,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your written comments. Every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of the Proposed Action and alternatives.

Your comment submission is attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. The following issues were raised in your submittal:

- Air quality impacts (criteria pollutants) and greenhouse gases resulting from construction and operation of the Project, and how impacts will be calculated and mitigated.
- Impacts related to climate change should be identified and analyzed.
- The alternatives analysis should include a reasonable range of alternatives, and should describe how alternatives were developed and also how they were eliminated from further analysis.
- Proper consultation is conducted between the USFWS and Native Hawaiian people and mitigation measures are developed for potential impacts to cultural resources.

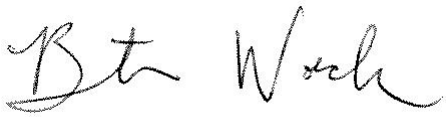
Tetra Tech, Inc.
1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

- Recommended specific studies and reports to be reviewed for inclusion in the EIS, or made data requests related to specific issues for inclusion in the EIS.
- Direct, indirect, and cumulative impacts to aquatic and terrestrial ecosystems, habitat, native plants, wildlife, bat, and avian species.
- The EIS should utilize a clear methodology for analyzing direct, indirect, and cumulative impacts; proposed mitigation measures should be identified and analyzed; and past, present, and future actions should be analyzed as part of the cumulative impact analysis.
- The EIS should address any disproportionate adverse impacts to minority and low-income populations, and should reflect coordination with those affected populations.
- Hazardous wastes, chemicals, and pesticides that will be produced or used by the Project, and how they will be stored, disposed of, and managed.
- The existing condition of the land and land uses within the wind farm site.
- Would like to see mitigation measures included in the analysis to reduce impacts to biological resources such as ecosystems, habitat, native plants, wildlife, bird and avian species.
- Would like to see mitigation measures and Best Management Practices related to water resources, including water quality, landscape irrigation, and stormwater management.
- Would like to see mitigation measures constructed to use less hazardous materials during construction and operation.
- Suggested a specific mitigation measure for inclusion in the impact analysis in the EIS.
- Noise from the wind turbines associated with construction and operation of the Project impacting sensitive receptors.
- Would like to see more detail on the Proposed Action and Project components (in text and represented graphically), including: wind turbine components, specifications, and materials needed for construction of turbines; turbine upgrades (if needed); the locations of turbines, collection lines, and point of interconnection; access road construction and maintenance; plans for turbine operations and maintenance; and plans for decommissioning and site restoration.
- Clarification on the purpose and need of the Project, including how the Project would fit into the larger energy market that it would serve.
- The Project must be in compliance with all federal, state, and county regulations, plans, and policies, including obtaining applicable federal, state, and county permits.
- Would like to see the development of a scientifically-supportable Habitat Conservation Plan (HCP), and a description of how the HCP will be implemented.
- The EIS should include measures to monitor and control invasive plant species and noxious weeds.
- Wind turbines impact the scenic beauty of the wind farm site, and steps should be taken to minimize visual impacts.
- Water resources impacts including water sources for the Project, sediment run-off, and potential effects to coastal zones should all be analyzed in the Environmental Impact Statement.
- Critical fish habitat within the wind farm site and potential impacts should be disclosed.
- Direct, indirect, and cumulative impacts to native wildlife species and habitat, as well as mitigation measures, should be identified.

We appreciate you taking the time during the public scoping period to provide feedback about the Project. These topics will be considered and addressed in the Draft EIS as applicable in the appropriate resource sections.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
Tetra Tech Inc.



Brita Woeck
Project Manager, Na Pua Makani Wind Project EIS

cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC
Alicia Oller, Tetra Tech, Inc.

---------- Forwarded message ----------
From: **Sysum, Scott** <Sysum.Scott@epa.gov>
Date: Thu, Dec 5, 2013 at 9:02 AM
Subject: Na Pua Makani HCP and DEIS-EPA R9 Scoping Comments
To: "NaPuaMakanihcp@fws.gov" <NaPuaMakanihcp@fws.gov>

ACK

Dear Sir
I have been assigned as the lead reviewer for U.S. EPA Region 9 for the Na Pua Makani Wind HCP Project Notice of Intent to prepare an Environmental Impact Statement. I have attached a pdf file of our comments. The signed letter was mailed today to Dr. Loyal Mehrhoff.

Thank you for providing us the opportunity to review this interesting project. Please feel free to contact us if you have any questions, seek clarifications or if we can help in any other way.

v/r
Scott Sysum

National Older Worker Career Center
Energy Specialist
U.S. EPA Region IX
Environmental Review Office
75 Hawthorne Street CED-2
San Francisco, CA 94105
voice-415-972-3742; fax-415-947-3562
Email: sysum.scott@epa.gov

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

DEC 0 5 2013

- 2013

Loyal Mehrhoff, Field Supervisor
Pacific Islands Fish and Wildlife Office
U.S. Fish and Wildlife Service
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawaii 96850

Subject: Notice of Intent to Prepare a Draft Environmental Impact Statement on a Proposed Incidental Take Permit for the Na Pua Makani Project, Kahuku, Hawai'i

Dear Dr. Mehrhoff:

ACK

The U.S. Environmental Protection Agency has reviewed the Notice of Intent to Prepare a Draft Environmental Impact Statement on a Proposed Incidental Take Permit for the Na Pua Makani Project, Kahuku, Hawai'i. Our comments are provided pursuant to the National Environmental Policy Act, Council on Environmental Quality regulations (40 CFR Parts 1500-1508) and our NEPA review authority under Section 309 of the Clean Air Act.

To assist in the scoping process for this project, we have identified several issues for your attention in the preparation of the EIS. We are most concerned about the following issues: impacts to water and air, impacts to biological resources, invasive species management, and habitat protection.

We appreciate the opportunity to review this NOI and are available to discuss our comments. Please send one hard copy of the Draft EIS and one CD ROM copy to this office at the same time it is officially filed with our Washington D.C. Office. If you have any questions, please contact me at (415) 972-3545, or contact Scott Sysum, the lead reviewer for this project. Scott can be reached at (415) 972-3742 or sysum.scott@epa.gov.

Sincerely,

Ann McPherson
Environmental Review Office
Communities and Ecosystems Division

Enclosure: EPA's Detailed Comments

Printed on Recycled Paper

ACK

PRO 4

DSC 3

ALT 3

US EPA DETAILED COMMENTS ON THE NOTICE OF INTENT TO PREPARE A DRAFT ENVIRONMENTAL IMPACT STATEMENT ON A PROPOSED INCIDENTAL TAKE PERMIT FOR THE NA PUA MAKANI PROJECT, KAHUKU, HAWAI'I, DECEMBER 5, 2013

Project Description

The U.S. Fish and Wildlife Service intend to prepare a Draft Environmental Impact Statement for the Habitat Conservation Plan and Incidental Take Permit associated with the construction and operation of the proposed Na Pua Makani Project (Project). Champlin Hawai'i Wind Holdings, LLC (Champlin) has proposed to build a 45-megawatt wind power facility adjacent to the existing Kahuku Wind Farm, near the town of Kahuku, on the north shore of O'ahu, Hawai'i. Champlin intends to seek incidental take coverage for the following five federally-listed threatened and endangered species: Newell's shearwater or 'a'o, Hawaiian coot or 'alae ke'oke'o, Hawaiian moorhen or 'alae 'ula, Hawaiian stilt or ae'o, and the Hawaiian hoary bat or 'ōpe'ape'a. The State-listed endangered Hawaiian short-eared owl or pueo may also be included.

The proposed facility will consist of 14 wind turbine generators, a maintenance building, an electrical substation, overhead and underground electrical collection systems, and access roads. It is anticipated that Champlin will request the ITP coverage for a period of 20 years.

Purpose and Need

The DEIS should include a clear description of the project purpose and need, including why the USFWS and Champlin are undertaking the proposed action and what objectives are intended to be met (40 CFR 1502.13). The purpose and need statement should clearly define the scope of proposed actions that the DEIS will describe and assess for environmental effects, such as issuing the ITP, and the covered activities and conservation measures of the HCP.

> *Recommendations:*
> The purpose and need should be a clear, objective statement of the rationale for the proposed project. Discuss the proposed project in the context of the larger energy market that this project would serve.
>
> The EIS should clarify whether any covered activities and conservation measures will be assessed under separate and future environmental review. If direct and indirect effects of any covered activities and conservation measures are not to be assessed in the EIS, they should be described and included in the cumulative impacts analysis to the extent that they are reasonably foreseeable.

Alternatives Analysis

The environmental document should evaluate a broad mix of possible alternatives. We recommend that a creative and flexible approach be taken in the development of potential alternatives. National Environmental Policy Act requires evaluation of reasonable alternatives, including those that may not be within the jurisdiction of the lead agency (40 CFR Section 1502.14(c)). A robust range of alternatives

ALT 3

will include options for avoiding significant environmental impacts. The DEIS should provide a clear discussion of the reasons for the elimination of alternatives which were not evaluated in detail.

ALT 3
WIL 3

The alternatives analysis should describe the approach used to identify environmentally sensitive areas and the process that was used to designate them in terms of sensitivity (low, medium, and high). The DEIS should indicate what measures will be taken to protect important wildlife habitat areas from potential adverse effects of the proposed alternatives. We encourage habitat conservation alternatives that avoid and protect high-value habitat and create or preserve linkages between habitat areas to better conserve the covered species. The DEIS should consider alternatives that will best benefit the long-term recovery of the covered species, even if immediate environmental effects and mitigation requirements are greater than other alternatives.

DSC 3
REG 4

It is important that the habitat conservation alternatives be based on defensible science. The environmental document should include a full description and evaluation of the scientific foundation and justification for the HCP design. If not already in place, we recommend the USFWS and Champlin consider the use of a scientific advisory committee to help develop a scientifically supportable HCP.

Alternatives should be developed to maximize benefits to the covered species while minimizing negative effects to environmental resources. Based on the information provided in the NOI, the EPA anticipates the potential for impacts to aquatic resources, air quality, the environmental justice community (if present), cultural resources, and other biological resources. The environmental document should describe the potential direct, indirect and cumulative impacts of the alternatives on all environmental resources in the project area.

ALT 3
DSC 3

Recommendations:
The DEIS should describe how each alternative was developed, how it addresses each project objective, and how it will be implemented. We urge consideration of all feasible options, including creative project development and wildlife management tools, habitat restoration, and species conservation measures.

The DEIS should clearly describe the rationale used to determine whether impacts of an alternative are significant or not. Thresholds of significance should be determined by considering the context and intensity of an action and its effects (40 CFR 1508.27).

The DEIS should provide a clear discussion of the reasons for the elimination of alternatives which were not evaluated in detail.

The alternatives analysis should include a discussion of reduced acreage, reduced megawatt and modified footprint alternatives, as well alternative sites and micro-siting of wind turbine generators.

ALT 3

The EPA recommends that the DEIS identify and analyze an environmentally preferred alternative. This alternative should consider options such as downsizing the proposed project within the project area and/or relocating sections/components of the project in other areas to reduce environmental impacts.

LAN 1

The DEIS should describe the current condition of the land selected for the proposed project, discuss whether the land is classified as disturbed, and describe to what extent the land could be used for other purposes into the future.

Mitigation

MIT 1
MIT 2
ENJ 1

The EPA encourages the USFWS and Champlin to develop appropriate mitigation measures for negative effects to other environmental resources that may occur as a result of implementing the HCP covered activities and conservation measures. Resources that may require mitigation could include aquatic resources, air quality, the environmental justice community, cultural resources, and other biological resources.

Aquatic Resources

DSC 2
DSC 3

If the HCP activities that are described in the DEIS have the potential to negatively affect aquatic resources, then potential direct, indirect and cumulative effects should be described. The environmental document should fully disclose potential beneficial and/or adverse direct, indirect and cumulative effects to surface and groundwater quality and quantity, wetlands, and aquatic ecosystems.

REG 3
WAT 1
WIL 2

Recommendations:
At a minimum, the DEIS should include:

a. A discussion of compliance with Clean Water Act Section 404(b)(1) Guidelines (40 CFR 230) if alternatives propose to place fill in water of the U.S (WOUS).
b. A description of any critical fisheries habitat, especially spawning and rearing areas, and other sensitive aquatic sites such as wetlands. Past and potential beneficial uses of these areas, and potential effects from the proposed alternatives should be disclosed.
c. An analysis of potential effects to coastal zones.
d. An analysis of the potential for alternatives to cause adverse effects to water quality and aquatic habitats.

If fill to WOUS is anticipated, the EPA recommends that the USFWS and Champlin include a jurisdictional delineation for all WOUS in accordance with the 1987 *Corps of Engineers Wetlands Delineation Manual*. A jurisdictional delineation will confirm the presence of WOUS in the project area and help determine impact avoidance, or as needed, where state and federal permits would be required for activities that affect WOUS.

REG 3

Construction Stormwater Discharge Permit
The Notice of Intent does not provide the total disturbance area for the project. Given the scope of this project, it is anticipated that the project will disturb more than one acre of soil during the construction phase. Lack of vegetation and periodic disturbance due to maintenance in these areas would potentially increase sedimentation and decrease water quantity.

The Hawai'i Department of Health requires owner/operators to obtain coverage under the either a General Permit for Discharges of Storm Water associated with construction activity or a individual permit if the project will disturb more than one acre of soil. Additionally, a Stormwater Pollution

Prevention Plan, that includes erosion control measures, would need to be generated for the project and implemented on-site.

REG 3

The SWPPP would include the elements described in the Construction General Permit, including a site map(s) showing the construction site perimeter, existing and proposed buildings, lots, roadways, storm water collection and discharge points, general topography both before and after construction, and drainage patterns across the project. The SWPPP also would list Best Management Practices, including erosion control BMPs that would be used to protect stormwater runoff, and include a description of required monitoring programs.

Additionally, the SWPPP must contain a visual monitoring program; a chemical monitoring program for "non-visible" pollutants to be implemented if there is a failure of BMPs; and a sediment monitoring plan if the site discharges directly to a water body listed on the 303(d) list for sediment. Guidance from other documents, such as the EPA document entitled "Developing Your Stormwater Pollution Prevention Plan: A Guide for Construction Sites" also could be used in the development of the SWPPP.

REG 3

Recommendation:
The EPA recommends that the applicant determine the need for a National Pollution Discharge Elimination System permit associated with construction activity. If such a permit is required, include a description of the proposed stormwater pollution control and mitigation measures in the DEIS.

Air Quality

AIR 1

The DEIS should provide a detailed discussion of air quality standards, ambient conditions, and potential air quality impacts for the project area and surrounding region. A description of current and proposed activities and their impacts on air quality, including indirect and cumulative impacts to the surrounding region, should be included. The DEIS should provide the estimated air emissions (tons per year) from the proposed project for criteria pollutants, including emissions from all construction, operation, and maintenance activities and vehicle traffic.

REG 3

Federal agencies are required by Clean Air Act Section 176(c) to assure that actions conform to an approved air quality implementation plan. If project emissions would exceed the de minimis thresholds identified at 40 CFR 51.853, the environmental document should include a conformity determination. General Conformity Regulations can be found in 40 CFR Parts 51 and 93 (58 Federal Register, page 63214, November 30, 1993).

AIR 1

Recommendations:
Existing Conditions – The DEIS should provide a detailed discussion of ambient air conditions, National Ambient Air Quality Standards, and criteria pollutant nonattainment areas in the vicinity of the project.

Quantify Emissions – The DEIS should estimate emissions of criteria pollutants from the proposed project and discuss the timeframe for release of these emissions over the lifespan of the project. The DEIS should describe and estimate emissions from potential construction activities, as well as proposed mitigation measures to minimize these emissions.

AIR 1

Specify Emission Sources – The DEIS should specify the emission sources by pollutant from mobile sources, stationary sources, and ground disturbance. This source specific information should be used to identify appropriate mitigation measures and areas in need of the greatest attention.

Greenhouse Gas Emissions – The DEIS should describe the type and annual amount (in tons per year) of greenhouse gas emissions that will result from HCP activities.

Biological Resources

DSC 2
REG 4
MIT 1

The DEIS should clearly describe direct, indirect, and cumulative impacts to wildlife and habitat and measures to avoid, minimize, and mitigate for these impacts. Emphasis should be placed on the protection and recovery of HCP-covered species due to their status or potential status under the Federal Endangered Species Act. Analysis of impacts and mitigation on covered species should include:

- Baseline conditions of habitats and populations of the covered species sufficient enough for estimates of take, and development of adequate avoidance, mitigation and conservation measures that are rationally related to anticipated take.
- A clear description of how avoidance, mitigation and conservation measures will protect and aid in the recovery of the covered species and their habitats in the project area.
- Monitoring, reporting and adaptive management efforts to ensure compliance with the HCP and species and habitat conservation effectiveness.

A comprehensive monitoring program should be designed to evaluate for impacts on bats and avian species. We suggest that the USFWS conduct pre-construction baseline surveys as well as post-construction surveys to determine the extent of mortalities and to determine the effectiveness of mitigation measures. Collision risk depends on a variety of factors related to species, numbers and behavior, weather conditions, topography, and lighting. The DEIS should identify and describe specific turbine types and their operating characteristics and consider turbine design standards that minimize adverse impacts to wildlife, particularly birds and bats. Consideration should be given to reducing perching and nesting opportunities, which may help reduce potential collisions.

REG 3
REG 4

The EPA supports the development of an HCP that is based on the "Five Point Policy" described in the 2000 addendum to the Service's HCP Handbook. We believe the environmental document would benefit from a description of how the HCP is based on guidance from the Five Point Policy in the areas of Biological Goals and Objectives, Monitoring, Adaptive Management, Permit Duration, and Public Participation. As described in the Service's HCP fact sheet, a screening process will be developed for reviewing future activities to determine whether they are covered under the HCP or whether they would require an amendment to the HCP. The environmental document should describe this process and the criteria used to screen future activities.

Recommendations:
Describe how the project will comply with the ESA.

REG 3

Discuss in the DEIS the applicability of the USFWS Land-Based Wind Energy Guidelines to the proposed project. Elaborate on siting, design, and operational modifications that will mitigate impacts.

MIT 1

Discuss design and management measures to minimize adverse impacts to wildlife and native and rare plants.

MIT 5

Consider utilizing unique types of radar technology to monitor for bird and bats.[1]

Consider a tactical shut down option during critical hours of species activity, as appropriate, to minimize adverse impacts on such species.

Consider blade feathering/idling (including on-the-spot and seasonal shutdowns), reducing cut-in speeds, and adjusting turbine speeds during strategic intervals to reduce take and to prevent mortality.

Invasive Species

REG 3

Executive Order 13112, *Invasive Species* (February 3, 1999), mandates that federal agencies take actions to prevent the introduction of invasive species, provide for their control, and minimize the economic, ecological, and human health impacts that invasive species cause. Executive Order 13112 also calls for the restoration of native plants and tree species. If the proposed project will entail new landscaping, the DEIS should describe how the project will meet the requirements of Executive Order 13112.

VEG 2

Recommendation:
The DEIS should include an invasive plant management plan to monitor and control noxious weeds.

Section 106 of the National Historic Preservation Act

REG 3

Section 106 of the National Historic Preservation Act, 16 U.S.C. § 470f, requires federal agencies to take into account the effects of their undertakings on historic properties and provide the Advisory Council on Historic Preservation a reasonable opportunity to comment on those undertakings. The ACHP has issued the regulations implementing Section 106, 36 CFR Part 800, "Protection of Historic Properties." The NHPA requires that, in carrying out the requirements of Section 106, each federal agency must consult with any Native Hawaiian organization that attaches religious and cultural significance to historic properties that may be affected by the agency's undertakings.

CUL 3

Recommendation:
The DEIS should describe the process and outcome of Section 106 consultation between the USFWS and any Native Hawaiian organization that has shown an interest in the covered

[1] For example, see http://www.detect-inc.com/avian.html and http://www.upi.com/Science_News/Resource-Wars/2010/03/18/Radar-reduces-wind-farm-risk-to-birds/UPI-71441268920323/. These resources are provided as examples only and do not constitute endorsement of any particular product by EPA.

activities within the project area, issues that were raised (if any), and how those issues were addressed in the selection of the proposed alternative.

REG 3

Environmental Justice and Impacted Communities

The interagency Memorandum of Understanding on Environmental Justice and Executive Order 12898 (August 4, 2011) and the Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (February 11, 1994) directs federal agencies to identify and address disproportionately high and adverse human health or environmental effects on minority and low-income populations, allowing those populations a meaningful opportunity to participate in the decision-making process. Guidance[2] by CEQ clarifies the terms low-income and minority population (which includes American Indians) and describes the factors to consider when evaluating disproportionately high and adverse human health effects.

ENJ 1

Recommendation:
The DEIS should include an evaluation of environmental justice populations within the geographic scope of the projects. If such populations exist, the DEIS should address the potential for disproportionate adverse impacts to minority and low-income populations, and the approaches used to foster public participation by these populations. Assessment of the projects impact on minority and low-income populations should reflect coordination with those affected populations.

Noise Impacts

NOI 1

The DEIS should include an assessment of noise levels from construction, maintenance and operation of the wind turbines. Decibel levels should be evaluated as should the effects of noise levels on a variety of species, as well as effects on sensitive receptors, residences, recreational use and property values.

Visual Impacts

VIS 1

Careful attention should be given to how a wind turbine array is set against the landscape. Steps should be taken to minimize the visual impacts and make the wind turbines less obtrusive.

Hazardous Materials/Hazardous Waste/Solid Waste

MIT 4

The DEIS should address potential direct, indirect and cumulative impacts of hazardous waste from construction and operation. The document should identify projected hazardous waste types and volumes, and expected storage, disposal, and management plans. It should address the applicability of state and federal hazardous waste requirements. Appropriate mitigation should be evaluated, including measures to minimize the generation of hazardous waste (i.e., hazardous waste minimization). Alternate industrial processes using less toxic materials should be evaluated as mitigation. This potentially reduces the volume or toxicity of hazardous materials requiring management and disposal as hazardous waste.

---

[2] Environmental Justice Guidance under the National Environmental Policy Act, Appendix A (Guidance for Federal Agencies on Key Terms in Executive Order 12898), CEQ, December 10, 1997.

PRO 3

Wind Turbine Production and Recycling

Wind turbine production can address the full product life cycle, from raw material sourcing through end of life collection and reuse or recycling. Wind turbine companies can minimize their environmental impacts during raw material extraction and minimize the amount of rare materials used in the product. Collection and recycling can be facilitated through buy-back programs or collection and recycling guarantees. Some companies provide recycling programs that pay all packaging, transportation, and recycling costs.

> *Recommendation:*
> EPA recommends that the proponent strive to address the full product life cycle by sourcing wind turbine components from a company that: 1) minimizes environmental impacts during raw material extraction; 2) manufactures wind turbines in a zero waste facility; and 3) provides future disassembly for material recovery for reuse and recycling.

PRO 3

Project Decommissioning, Site Restoration and Financial Assurance

On the average, a lifespan of a wind farm is 20-30 years. The life of the proposed wind project should be taken into consideration regarding decommissioning and reclamation.

> *Recommendation:*
> The decommissioning and site restoration plan should include the following elements: cost estimates; the project owner to secure a performance bond surety bond, letter of credit, corporate guarantee, or other form of financial assurance adequate to cover the cost of decommissioning/restoration; description of the conditions when decommissioning will commence; description of time allotted to complete the decommissioning; description of the structures, facilities, and foundations to be removed; and restoration of the site by recontouring the surface and revegetation to a condition reasonably similar to the original condition.

DSC 3

Cumulative and Indirect Impacts

The cumulative impacts analysis should identify how resources, ecosystems, and communities in the vicinity of the project have already been affected by past or present activities in the project area. Characterize these resources in terms of their response to change and capacity to withstand stresses. Trends data should be used to establish a baseline for the affected resources, to evaluate the significance of historical degradation, and to predict the environmental effects of the project components.

DSC 3
WIL 1

For the cumulative impacts assessment, we recommend focusing on resources of concern or resources that are "at risk" and/or are significantly impacted by the proposed project, before mitigation. For this project, the USFWS should ensure that a thorough assessment of the cumulative impacts to bird and bat species is included, especially in the context of other wind power developments occurring nearby and on other Hawaiian islands. In general, individual projects may not significantly affect bird or bat populations, but the USFWS should look at cumulative impacts based upon the avian and bat fatalities accumulating under all future wind development scenarios in the state of Hawaii.

DAT 1

The EPA assisted in the preparation of a guidance document for assessing cumulative impacts and we recommend consideration of its use for the DEIS. While this guidance was prepared for transportation projects in California, the principles and the 8-step process outlined therein can be applied to other types of projects and offers a systematic way to analyze cumulative impacts for a project. The guidance is available at: http://www.dot.ca.gov/ser/cumulative_guidance/purpose.htm. In the introduction to the *Cumulative Impacts Section*, identify which resources are analyzed, which ones are not, and why. For each resource analyzed, the DEIS should:

DSC 3

- Identify the current condition of the resource as a measure of past impacts. For example, the percentage of species habitat lost to date.
- Identify the trend in the condition of the resource as a measure of present impacts. For example, the health of the resource is improving, declining, or in stasis.
- Identify all on-going, planned, and reasonably foreseeable projects in the study area that may contribute to cumulative impacts.
- Identify the future condition of the resource based on an analysis of impacts from reasonably foreseeable projects or actions added to existing conditions and current trends.
- Assess the cumulative impacts contribution of the proposed alternatives to the long-term health of the resource, and provide a specific measure for the projected impact from the proposed alternatives.
- When cumulative impacts are identified for a resource, mitigation should be proposed.
- Disclose the parties that would be responsible for avoiding, minimizing, and mitigating those adverse impacts.
- Identify opportunities to avoid and minimize impacts, including working with other entities.

Recommendations:
The DEIS should consider the cumulative impacts associated with multiple large-scale renewable energy projects proposed in the Hawaiian Islands and the potential impacts on various resources including: water supply, covered species, and habitat.

DSC 2

The USFWS and project proponents should consider a regional assessment of resource impacts, including cumulative impacts to avian and bat populations, given the number of wind energy projects either built or planned for the area.

ACK

Climate Change

Scientific evidence supports the concern that continued increases in greenhouse gas emissions resulting from human activities will contribute to climate change. Global warming is caused by emissions of carbon dioxide and other heat-trapping gases. On December 7, 2009, the EPA determined that emissions of GHGs contribute to air pollution that "endangers public health and welfare" within the meaning of the Clean Air Act. Potential impacts from climate change could include the following changes: poor air quality; more severe heat; increased wildfires; shifting vegetation; declining forest productivity; decreased spring snowpack; water shortages; a potential reduction in hydropower; a loss in winter recreation; agricultural damages from heat, pests, pathogens, and weeds; and rising sea levels resulting in shrinking beaches and increased coastal floods.

Recommendations:

AIR 3

The DEIS should consider how climate change could potentially influence the proposed projects, specifically within sensitive areas, and assess how the projected impacts could be exacerbated by climate change.

AIR 1
AIR 3

The DEIS should quantify and disclose the anticipated climate change *benefits* of wind energy. We suggest quantifying greenhouse gas emissions from different types of generating facilities including solar, geothermal, natural gas, coal-burning, and nuclear and compiling and comparing these values.

April 1, 2014 TTCES-4819-OUT-15-040

Theone Taala
theone.taala@byuh.edu

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

DearTheone Taala,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your written comments. Every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of Proposed Action and alternatives.

Your comment submission is attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. The following issues were raised in your submittal:

- Health impacts resulting from noise (infrasound and audible) such as headaches, loss of sleep, and lack of concentration as well as health impacts resulting from shadow flicker that may affect community members who live within close proximity to the Project should be discussed and analyzed.
- The proposed locations for the wind turbines are too close to residences and schools, and potential impacts should be analyzed. The EIS should show distances from the closest turbines to the elementary and high schools, the community boundary, and nearest residences.
- Short- and long-term socioeconomic impacts to the community resulting from the Project.
- Wind turbines impact the scenic beauty of the wind farm site, and steps should be taken to minimize visual impacts.

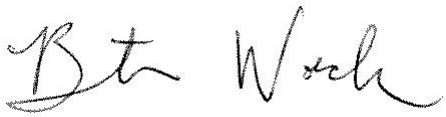
Tetra Tech, Inc.
1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

We appreciate you taking the time during the public scoping period to provide feedback about the Project. These topics will be considered and addressed in the Draft EIS as applicable in the appropriate resource sections.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,

Tetra Tech Inc.



Brita Woeck

Project Manager, Na Pua Makani Wind Project EIS

Cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC

Alicia Oller, Tetra Tech, Inc.

---------- Forwarded message ----------
From: **Theone Taala** <theone.taala@byuh.edu>
Date: Tue, Nov 19, 2013 at 8:17 AM
Subject: Na Pua Makani HCP and DEIS
To: napuamakanihcp@fws.gov

Loyal Mehrhoff,

ACK

I am in total opposition of the addition of 15 500' wind turbines in Kahuku.

HAS 1
PRO 1

These turbines will be in close proximity to Kahuku schools and the Kahuku community. Independent studies have linked wind turbines to health issues that impact humans if placed in close proximity to residential areas. The proposed wind farm will be 3 times closer to our schools and residences than the existing facility. It will also be upwind - which is significant.

VIS 1
SOC 6

I am totally opposed to the wind turbines already existing in Kahuku. They are an eye sore and do not appear to benefit anyone in the islands. They are a total waste of money and time; Hawaii does not need any more wind turbines.

Theone Taala

April 1, 2015 TTCES-4819-OUT-15-041

Chris Takashige
Director, Department of Design and Construction
650 South King Street, 11th Floor
Honolulu, HI 96813

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Mr. Takashige,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your written comments. Every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of Proposed Action and alternatives.

Your comment submission is attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. As there were no issues raised in your submittal that fall within the scope of the EIS analysis, your letter has been coded as "Comment Acknowledged."

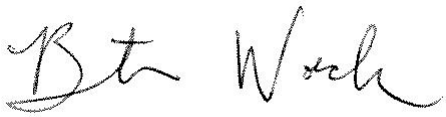
Tetra Tech, Inc.
1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

We appreciate you taking the time during the public scoping period to provide feedback about the Project.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,

Tetra Tech Inc.



Brita Woeck

Project Manager, Na Pua Makani Wind Project EIS

Cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC

Alicia Oller, Tetra Tech, Inc.

DEPARTMENT OF DESIGN AND CONSTRUCTION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 11TH FLOOR
HONOLULU, HAWAII 96813
Phone: (808) 768-8480 • Fax: (808) 768-4567
Web site: www.honolulu.gov

KIRK CALDWELL
MAYOR

CHRIS T. TAKASHIGE, P.E., CCM
DIRECTOR

MARK YONAMINE, P.E.
DEPUTY DIRECTOR

January 15, 2014

Tetra Tech, Inc.
737 Bishop Street, Suite 2340
Mauka Tower
Honolulu, Hawaii 96813

Attn: Mike Cutbirth

Dear Mr. Cutbirth:

Subject: Public Release of Environmental Impact Statement Preparation Notice (EISPN) for the Na Pua Makani Wind Farm Project, Kahuku, Hawaii

ACK

The Department of Design and Construction does have any comments to offer on the environmental impact statement preparation notice.

Thank you for the opportunity to review and comment. Should there be any questions, please contact me at 768-8480.

Sincerely,

for M. Yonamine

Chris T. Takashige, P.E., CCM
Director

CTT: cf (542797)

April 1, 2015 TTCES-4819-OUT-15-042

Vasa Taualii
vasa@icloud.com

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Ms. Taualii,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your written comments and testimony from the public scoping meeting. Every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of Proposed Action and alternatives.

Your comment submission is attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. The following issues were raised in your submittal and verbal testimony:

- Health impacts resulting from noise (infrasound and audible) such as headaches, loss of sleep, and lack of concentration as well as health impacts resulting from shadow flicker that may affect community members who live within close proximity to the Project should be discussed and analyzed.
- The proposed locations for the wind turbines are too close to residences and schools, and potential impacts should be analyzed. The EIS should show distances from the closest turbines to the elementary and high schools, the community boundary, and nearest residences.
- Power generation – specifically, what the overall capacity and daily production of the Project will be, transmission line upgrades that might be needed, how much electricity will go into the HECO grid, and how much of that electricity will stay in local communities.
- Would like to see more detail on the Proposed Action and Project components (in text and represented graphically), including: wind turbine components, specifications, and materials needed

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for construction of turbines; turbine upgrades (if needed); the locations of turbines, collection lines, and point of interconnection; access road construction and maintenance; plans for turbine operations and maintenance; and plans for decommissioning and site restoration.

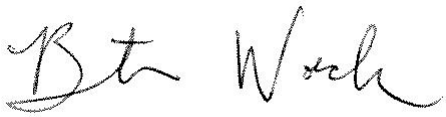
- Clarification on the purpose and need of the Project, including how the Project would fit into the larger energy market that it would serve.
- Concern that the Project would impact the quality of life for nearby communities.
- How would the Project contribute to a savings on the electrical bills of local residents, and how soon once the Project is operational could residents begin to see any potential savings.
- Wind turbines impact the scenic beauty of the wind farm site, and steps should be taken to minimize visual impacts.

We appreciate you taking the time during the public scoping period to provide feedback about the Project. These topics will be considered and addressed in the Draft EIS as applicable in the appropriate resource sections.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,

Tetra Tech Inc.



Brita Woeck

Project Manager, Na Pua Makani Wind Project EIS

Cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC

Alicia Oller, Tetra Tech, Inc.

---------- Forwarded message ----------
From: **vasa taualii** <vasa@icloud.com>
Date: Wed, Jan 22, 2014 at 5:22 PM
Subject: re: Questions re Makani HCP & EIS wind turbin project in Kahuku by Champlin HI Wind Holdings
To: napuamakanihcp@fws.gov

To Whom It May Concern:

SOC 3
HAS 1
PRO 1

I am a long-standing resident in the Laie/Kahuku area and have serious concerns regarding the wind-turbine project anticipated by Champlin HI Wind Holdings, LLC. If allowed to go through, it will reduce the quality of life for area residents by affecting their health and especially impact the health issues of our children. The placement of the wind turbines in close-proximity to the Kahuku Elementary and High Schools and the homes of the local residents is in total disregard for studies which have already been done and can be verified by the Canadian Physicians website, cases of residents living in the wind-turbine areas who suffer from the negative impact of the noise, flicker and ultra-sound influence. i have the following questions:

SOC 6

1. I understand the millions of dollars to be made by the makers of Wind Turbines, the Developer, the State and private land holders subsidized by our tax dollars, but what are the specific and direct short/long-term benefits to the community as a whole?

PRO 3
PRO 4

2. If the purpose of wind turbines is to reduce fossil fuel usage, what specific studies have been made to indicate the off-setting costs of wind turbine installations. While the wind is "free," the costs of equipment, labor, land and continual maintenance are not.

PRO 2
SOC 4

3. The wind is not always constant and, therefore, there is down-time when the turbines are not turning efficiently,
what studies have been done to factor in this aspect in the cost of electricity, what are the costs for constant maintenance of the wind turbines.

SOC 4

4. If the ultimate aim is to reduce electrical costs to the area, how does taking the wind from this area to generate electricity for the "whole grid" reduce our electrical costs? Will Champlin HI Wind Holdings, LLC., guarantee residents a reduction in their electrical monthly bills and how soon will residents see this difference? How much of a savings will this add to our current electrical bill and when would this take place?

SOC 4

5. If the total costs of the wind turbine project initially raises the costs of our current electrical bills, how much will this increase be? At what point in the project do residents begin to see a "savings and reduction" in their current
electrical bill and for how long into the project?

SOC 4

6. If the project is for only a 20-year period, how soon into the 20-year period do residents wait to: l) See an increase in their electrical bill as a result of the wind turbines and by what percent of increase? 2) How long do residents keep paying for

SOC 4

this increase before they experience the promise of "reduction of electrical bills?"
3) What is the specific time-period? 4) If residents keep paying for this increase, does this mean that not only is the wind turbine project being subsidized by our tax dollars, but residents are also paying for that increase in costs. This would mean as residents, we are paying twice for the cost of electricity: once for the initial costs of the project which increases the cost of our electricity then we are having to keep paying for that increase (the costs will never go down) to maintain this project. So the big question is, how is it that we save on electrical costs from our present costs?

PRO 3

4. Who pays for the costs of maintaining the wind turbines and are these costs passed on to the consumers? Again, as tax payers, we would be paying twice, once for the initial project and then to pay for high costs of maintaining this project which keeps our electrical costs going higher and higher. Is this just?

SOC 4

5. At the end of the 20-year period, will Champlin HI Wind Holdings, LLC make available the data of the real "pay off to the consumers?" Since the prevailing reason given is that the project will reduce the costs of electricity, will there be data available to substantiate this?"

SOC 6

6. Will there also be data that will specify how much fossil-fuel-savings made as the result of the wind-turbine project compared to the total of all costs related to the initial installation, maintenance over the 20-year period? It is important to area residents to know all this information.

PRO 3

7. What will happen after the 20-year period? Who will pay for the dismantling of the wind turbines after this period?

HAS 1

8. What are other studies available by physicians who are treating residents living in approximate wind-turbine areas? Will Champlin HI Wind Holdings, LLC, be responsible for any resulting physical injuries to children and adults as a result of noise, flicker, ultrasound disturbances? Resident physicians know the state of the health of residents before the wind turbines and after the wind turbines. Will Champlin HI Wind Holdings, LLC., sign a statement of responsibility for the after affects of wind turbine impact on their health?

PRO 3

9. Info on the internet states that turbines can sometimes spin at 180 miles an hour, what are the means of measuring the speed of the turbines and also the average daily speed of the turbine? Will the public have access to this information?

SOC 4

10. Will the public have a monthly, quarterly report of how much total electricity generated from these turbines and how this data reduces/increases monthly electrical bills?

VIS 2

I respect the need for reducing fossil fuel usage but can we be assured that we are not replacing fossil fuel for an alternative that brings other equally pressing long-term issues. I love my community and the children and families who reside in this area who are immediately affected. We are also giving up the "beauty of our environment." There is nothing that sticks out like a sore thumb among our beautiful mountains and greenery than wind turbines which reduces the natural beauty for which residents and tourists alike have enjoyed to date. All you have to do is look at the existing wind mills and know immediately how much they reduce Hawaii's ambiance.
I strongly oppose this project for many other reasons the least of which it reduces the spirit of our culture as wind turbines prevents us from enjoying our mountains and surrounding land.

Sincerely,

Vasa Taualii

ACK

5. If the initial costs of the wind-turbine machinery and equipment, the installation and maintenance, land, road costs and other associated costs to build and maintain this project are available, will this data be readily available to area residents since this project is being subsidized by our tax dollars.

TETRA TECH

April 1, 2015 TTCES-4819-OUT-15-043

Herman Tuiolosega
Senior Planner
Office of Environmental Quality Control
State of Hawaii
235 South Beretania Street, Suite 702
Honolulu, HI 96813

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Mr. Tuiolosega,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your written comments. Every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of the Proposed Action and alternatives.

Your comment submission is attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. The following issues were raised in your submittal:

- Direct, indirect, and cumulative impacts to public health, visual resources, and socioeconomics for communities nearby.
- The EIS should utilize a clear methodology for analyzing direct, indirect, and cumulative impacts; proposed mitigation measures should be identified and analyzed; and past, present, and future actions should be analyzed as part of the cumulative impact analysis.
- Noise from the wind turbines associated with construction and operation of the Project impacting sensitive receptors.
- Would like to see more detail on the Proposed Action and Project components (in text and represented graphically), including: wind turbine components, specifications, and materials needed

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1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

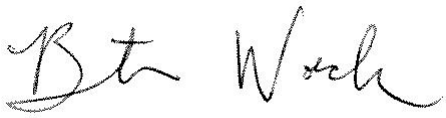
for construction of turbines; turbine upgrades (if needed); the locations of turbines, collection lines, and point of interconnection; access road construction and maintenance; plans for turbine operations and maintenance; and plans for decommissioning and site restoration.

- Compliance with both the NEPA and HEPA processes for public scoping and outreach, that community members and agencies have been adequately consulted during scoping, and will continue to be consulted with during the entire planning process.
- The Project must be in compliance with all federal, state, and county regulations, plans, and policies, including obtaining applicable federal, state, and county permits.

We appreciate you taking the time during the public scoping period to provide feedback about the Project. These topics will be considered and addressed in the Draft EIS as applicable in the appropriate resource sections.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
Tetra Tech Inc.



Brita Woeck
Project Manager, Na Pua Makani Wind Project EIS

cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC
Alicia Oller, Tetra Tech, Inc.

NEIL ABERCROMBIE
GOVERNOR

VACANT
DIRECTOR

STATE OF HAWAI'I
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
Department of Health
235 South Beretania Street, Suite 702
Honolulu, Hawai'i 96813
Telephone (808) 586-4185
Facsimile (808) 586-4186
Email: oeqchawaii@doh.hawaii.gov

January 23, 2013

TO: William J. Aila, Jr., Chairperson
Department of Land and Natural Resources

FROM: Herman Tuiolosega, Senior Planner
Office of Environmental Quality Control

SUBJECT: Na Pua Makani Wind Project, O'ahu Environmental Impact Statement Preparation Notice (EISPN)

The Office of Environmental Quality Control has reviewed the subject EISPN you submitted for publication in the December 23, 2013 issue of The Environmental Notice, and offer these comments:

REG 1

1. The EISPN explains the process well (including associated permits) and provides useful background information. However, as consultation is a very important part of the HEPA process and the direct to EIS option omits one layer of public participation that would otherwise occur through the EA process, it is important for agencies and preparers to undertake comprehensive consultation prior to and during the preparation of the Draft EIS (DEIS).

PRO 3

2. Although the design and development of the Na Pua Makani Wind Project are still in early stages, a sufficient amount of project description detail is necessary to help readers fully understand the proposed action.

   The EISPN identifies that the project consists of the construction of up to 15 turbines. Along with the supporting infrastructure that currently includes met towers, access roads, wind turbine assembly lay down areas, overhead and underground transmission and collector lines, and may also include an on-site substation, and an operations and maintenance building. It is recommended to describe these project components in much more detail to help readers to submit more refined scoping comments in the review of the DEIS. Further background information and project detail may also assist readers in commenting on the particular items you are seeking input on listed on page 3 of the EISPN. It's

important to stress that an EIS should convey information succinctly in easily understandable forms and address the environmental effects.

DSC 3
PRO 3

3. The TMKs are provided on the publication form and the EISPN includes a section that describes the existing conditions of the parcels and a project vicinity map. However, detailed maps that clearly illustrate the size of the parcels, existing agricultural uses, the topography, etc. are not included in the EISPN document. This makes it difficult to get a sense of the receiving environment and the potential impacts of the proposed wind turbines. It is recommended to include detailed maps and accurate visual representations of the wind turbines in the DEIS. Clarification on how the assessment would identify environmentally sensitive areas and how mitigation planning for these potential impacts will also be useful.

REG 3

4. The NA Pua Makani Wind Project EISPN explains the process and the intention to prepare a joint HEPA/NEPA document. It is noted that the Notice of Intent (NOI) was published in the Federal Register on Tuesday, November 5, 2013 and contains similar information that is presented in the EISPN. It's important to remember that NEPA documents do not sufficiently address all issues of concern in Hawaii. In particular cultural impact and environmental justice assessments are areas where content requirements may differ. To assist DLNR in identifying the HEPA EIS content requirements (prescribed in Section 11-200-18, HAR), it is recommended to clearly identify these elements in the document.

NOI 1
DSC 1

5. Also, it may be helpful for you to know that a recent EIS for a wind turbine project on O'ahu raised community concerns, due to a visual impact study that some residents considered a misrepresentation of the now built turbines. The noise impacts were also identified by community members as an area for concern. Therefore, both a robust visual impact assessment and noise analysis are recommended in the DEIS.

ACK

Thank you for the opportunity to comment on the subject document. Feel free to contact Genevieve Hilliard at (808) 586-4185 for any questions.

Copy: Champlin Hawai'i Wind Holdings, LLC

April 1, 2015 TTCES-4819-OUT-15-044

Cindy Tutor
55-488 Iosepa St
Laie, HI 96762
tutorc@hotmail.com

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Ms. Tutor,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your written comments. Every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of Proposed Action and alternatives.

Your comment submissions are attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. The following issues were raised in your submittals:

- Would like to see alternative energy solutions analyzed, including solar, geothermal, personal photovoltaic systems, and geothermal as part of the alternatives analysis.
- An alternate location for the Project should be analyzed (e.g. moving turbines further inland, different location on Oahu) due to the current Project's close proximity to the community and schools.
- Recommended specific studies and reports to be reviewed for inclusion in the EIS, or made data requests related to specific issues for inclusion in the EIS.
- Recommended visual simulations of the Project be included in the EIS
- The EIS should address any disproportionate adverse impacts to minority and low-income populations, and should reflect coordination with those affected populations.

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1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

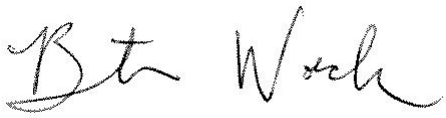
- Health impacts resulting from noise (infrasound and audible) such as headaches, loss of sleep, and lack of concentration as well as health impacts resulting from shadow flicker that may affect community members who live within close proximity to the Project should be discussed and analyzed.
- Safety impacts to community members related to wind turbine mechanical issues, such as blade throw or turbine collapse should be discussed and analyzed.
- The existing condition of the land and land uses within the wind farm site.
- The proposed locations for the wind turbines are too close to residences and schools, and potential impacts should be analyzed. The EIS should show distances from the closest turbines to the elementary and high schools, the community boundary, and nearest residences.
- The City and County of Honolulu setback distance regarding proximity of wind turbines to residences is insufficient and must be updated to reflect safe distances.
- The construction and operation of the Project must be in compliance with all federal, state, and county regulations, plans, and policies; Champlin must obtain applicable federal, state, and county permits.
- Concerned about the details of the community benefits package.
- How would the Project contribute to a savings on the electrical bills of local residents, and how soon once the Project is operational could residents begin to see any potential savings.

We appreciate you taking the time during the public scoping period to provide feedback about the Project. These topics will be considered and addressed in the Draft EIS as applicable in the appropriate resource sections.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,

Tetra Tech Inc.



Brita Woeck

Project Manager, Na Pua Makani Wind Project EIS

Cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC

Alicia Oller, Tetra Tech, Inc.

---------- Forwarded message ----------
From: **Cindy Tutor** <tutorc@hotmail.com>
Date: Wed, Jan 22, 2014 at 10:04 PM
Subject: Na pua Makani HCP and EIS
To: "napuamakanihcp@fws.gov" <napuamakanihcp@fws.gov>, "william.j.aila@hawaii.gov" <william.j.aila@hawaii.gov>, "Brita.Woeck@tetratech.com" <brita.woeck@tetratech.com>

HAS 1

Aloha,
I'm writing in opposition to Na Pua Makani Wind Project by Champlin/West Wind Works, docket #2013-0423 for the following reasons:

Health Impact - loss of sleep, lack of concentration, heart palpitations, lethargy, motion sickness, depression.

DAT 1
HAS 1

Attached are 3 documents

1-Wind Turbine Noise: What Audiologists Should Know
2-Bruce McPherson's Infrasound and Low Frequency Noise Study
These are excellent studies on the effects of Wind Turbines on health which show how detrimental the effects of industrial wind turbines on nearby residents.

The third attachment, WTS (Wind Turbine Syndrome) and Health Effects contains the findings of a panel of doctors including Dr. Robert McCunney hired by AWEA (American Wind and Energy Association). Mike Cutbirth was formerly the director of AWEA and is now the developer for the Na Pua Makani Wind Project. I would be highly suspicious of the motivation behind McCunney and his findings.

REG 2

Setback is not far enough-industry standards recommend it should be a minimum of 5 times the wing span. Choosing to err on the side of caution, I suggest 2 miles which would eliminate almost all possible health impacts.

SOC 1
SOC 4

Community benefits although Kahuku and it's surrounding communities will be the ones who will bear the burden of living with the noise, possible dangers, and unsightliness, they are not given any long term benefits of HECO credits or other compensations. The financial benefits from the former project went to organizations outside of Kahuku. KAHUKU HAS NOT BENEFITTED AT ALL FROM THE FIRST WIND PROJECT. Therefore, there is a ZERO degree of confidence that they will benefit from any future projects.

REG 3

Contradicts the Ko'olauloa SCP Vision "to preserve the region's overall rural character and its
natural, cultural and scenic resources."

ALT 2

Other locations-The Federal Government and DOD owns land further inland that would be more desirable locations for the wind turbines. That seems like a win-win situation. The Federal Govt can benefit from lease revenues as well as HECO payments.

ACK

I beg of you to please consider these and other objections presented by other community members as you contemplate the approval of this project. I am Cindy Fonoimoana Tutor, a resident of Ko'olauloa for 45+ years. I oppose the Na Pua Makani Wind Project.

Mahalo for your Kokua!
Cindy F. Tutor
55-488 Iosepa St.
Laie, HI 96762

From: Cindy Tutor [mailto:tutorc@hotmail.com]
Sent: Thursday, January 23, 2014 12:05 AM
To: napuamakanihcp@fws.gov; william.j.aila@hawaii.gov; Woeck, Brita
Subject: Na pua Makani HCP and EIS

HAS 1

Aloha,
I'm writing in opposition to Na Pua Makani Wind Project by Champlin/West Wind Works, docket #2013-0423 for the following reasons:

Health Impact - loss of sleep, lack of concentration, heart palpitations, lethargy, motion sickness, depression.

DAT 1
HAS 1

Attached are 3 documents

1-Wind Turbine Noise: What Audiologists Should Know
2-Bruce McPherson's Infrasound and Low Frequency Noise Study
These are excellent studies on the effects of Wind Turbines on health which show how detrimental the effects of industrial wind turbines on nearby residents.

The third attachment, WTS (Wind Turbine Syndrome) and Health Effects contains the findings of a panel of doctors including Dr. Robert McCunney hired by AWEA (American Wind and Energy Association). Mike Cutbirth was formerly the director of AWEA and is now the developer for the Na Pua Makani Wind Project. I would be highly suspicious of the motivation behind McCunney and his findings.

REG 2

Setback is not far enough-industry standards recommend it should be a minimum of 5 times the wing span. Choosing to err on the side of caution, I suggest 2 miles which would eliminate almost all possible health impacts.

SOC 1
SOC 4

Community benefits although Kahuku and it's surrounding communities will be the ones who will bear the burden of living with the noise, possible dangers, and unsightliness, they are not given any long term benefits of HECO credits or other compensations. The financial benefits from the former project went to organizations outside of Kahuku. KAHUKU HAS NOT BENEFITTED AT ALL FROM THE FIRST WIND PROJECT. Therefore, there is a ZERO degree of confidence that they will benefit from any future projects.

REG 3

Contradicts the Ko'olauloa SCP Vision "to preserve the region's overall rural character and its
natural, cultural and scenic resources."

ALT 2

Other locations-The Federal Government and DOD owns land further inland that would be more desirable locations for the wind turbines. That seems like a win-win situation. The Federal Govt can benefit from lease revenues as well as HECO payments.

ACK

I beg of you to please consider these and other objections presented by other community members as you contemplate the approval of this project. I am Cindy Fonoimoana Tutor, a resident of Ko'olauloa for 45+ years. I oppose the Na Pua Makani Wind Project.

Mahalo for your Kokua!
Cindy F. Tutor
55-488 Iosepa St.
Laie, HI 96762

---------- Forwarded message ----------
From: **Cindy Tutor** <tutorc@hotmail.com>
Date: Mon, Dec 2, 2013 at 5:36 PM
Subject: I oppose the proposed wind farm projects in Kahuku
To: "napuamakanihcp@fws.gov" <napuamakanihcp@fws.gov>

ACK

Aloha,
I oppose the new wind farm projects in Kahuku!

The majority of the community is against it as well. Do not believe the Kahuku Community Association President and her grandfather who are railroading these project through without the knowledge or consent of the other officers. Jr. Primacio did not disclose to the association and other officers, information regarding the THIRD proposed project! Something is very wrong here!

ALT 2
SOC 4

The Koolauloa communites should not sacrifice any more land, sleep or scenery for the sake of the rest of the island. There's lots of wind in other areas on the island. The community does NOT receive any benefits from the current wind farm. No one's electric bill has decreased since the First Wind install. Nor do they get any power from the wind mills in the event of a power outage. This is not about "not in my backyard". This is about sharing the costs and benefits.

REG 2
LAN 1

The law regarding the proximity of windmills to residences must be updated. It was originally written when windmills were proportionally smaller. The proposed farms could be installed a mile further inland. It is unwise to restrict the Kahuku Community's growth by more of these Goliath turbines.

ACK

In 1980 the largest wind turbine in the world was installed in Kahuku. It operated for a few years and then died. After which we had to put up with the monstrosity for almost 10 years as it slowly decayed and rusted.

Yes, we need alternative energy and wind may be a viable option. Just not so close to residential areas no matter where on the island they are.

Please DO NOT approve the Kahuku Wind Farm Project.

Mahalo,
Cindy Tutor

---------- Forwarded message ----------
From: **Cindy Tutor** <tutorc@hotmail.com>
Date: Mon, Dec 2, 2013 at 6:22 PM
Subject: Na Pua Makani HCP and DEIS
To: "napuamakanihcp@fws.gov" <napuamakanihcp@fws.gov>

ACK

Aloha,
Please DO NOT approve the Kahuku Wind Farm Project.

PRO 1
REG 2
HAS 2

The law regarding the proximity of windmills to residences must be updated. It was originally written when windmills were proportionally smaller. It is unsafe to install more of these Goliath turbines so close to the community and especially elementary and high school structures. The proposed wind farms will be significantly closer to the community than the current ones. AND the schools will be down hill from them. Should a catastrophic event occur causing the blades to come off, it is reasonable to believe that the children could be in danger.

ALT 1

Yes, we need alternative energy and wind may be a viable option. New technology exists that does not require such a large footprint.

Please DO NOT approve the Kahuku Wind Farm Project.

Mahalo,
Cindy Tutor

April 1, 2015 TTCES-4819-OUT-15-045

Tim Vandeveer
Co-Chair, Defend Oahu Coalition
defendoahucoalition@gmail.com

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Mr. Vandeveer,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your written comments. Every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of Proposed Action and alternatives.

Your comment submission is attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. The following issues were raised in your submittal:

- Health impacts resulting from noise (infrasound and audible) such as headaches, loss of sleep, and lack of concentration as well as health impacts resulting from shadow flicker that may affect community members who live within close proximity to the Project should be discussed and analyzed.
- The proposed locations for the wind turbines are too close to residences and schools, and potential impacts should be analyzed. The EIS should show distances from the closest turbines to the elementary and high schools, the community boundary, and nearest residences.
- The construction and operation of the Project must be in compliance with all federal, state, and county regulations, plans, and policies; Champlin must obtain applicable federal, state, and county permits.

Tetra Tech, Inc.
1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

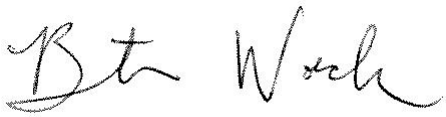
- Concern that the Project would impact the quality of life for nearby communities.
- Short- and long-term socioeconomic impacts to the community resulting from the Project.

We appreciate you taking the time during the public scoping period to provide feedback about the Project. These topics will be considered and addressed in the Draft EIS as applicable in the appropriate resource sections.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,

Tetra Tech Inc.



Brita Woeck

Project Manager, Na Pua Makani Wind Project EIS

Cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC

Alicia Oller, Tetra Tech, Inc.

---------- Forwarded message ----------
From: **DOC** <defendoahucoalition@gmail.com>
Date: Wed, Dec 4, 2013 at 9:01 PM
Subject: Na Pua Makani HCP and DEIS
To: napuamakanihcp@fws.gov

To whom it may concern-

ACK

The Defend Oahu Coalition is a diverse group of community residents, environmentalists, activists and religious leaders, all working together toward one immediate goal: protecting communities on Oahu from the dangerous effects of large scale development. As such, Defend Oahu Coalition is opposed to the large scale windmill development currently being proposed in the Na Pua Makani Draft Environmental Impact Statement (DEIS).

SOC 6
REG 3

Our coalition and the vast majority of Hawai'i residents are in strong support of renewable energy development (including solar, wave and wind) in our islands. Regardless of the source however, renewable energy developers must consider impacts that projects would have on residents as well as the sentiment of potential host communities in regard to proposed development. Large scale projects (such as wind farms) must be properly vetted and reviewed before being allowed to move forward. It is crucial that developers address resident concerns regarding size, scale and safety, and build consensus amongst those who would be affected most.

ACK

Our communities are tight-knit, especially in the rural Oahu, and if large scale energy development is perceived as dangerous or forced upon an unwilling public, it threatens the success of all renewable projects because developers are seen as putting profits ahead of people. This is unacceptable. As Dr. Martin Luther King Jr. said "injustice anywhere is a threat to justice everywhere." Defend Oahu Coalition works on land use policy and enforcement so we can realize a future for our island home that is truly sustainable. We recognize the role that renewable energy plays and are committed to ensuring that nothing threatens that future.

HAS 1
PRO 1
SOC 3

The Kahuku Community Association (KCA) has taken a position against any additional wind mills in the area, yet this developer is quietly moving ahead against the wishes of the host community. For this project in particular, residents have serious safety concerns that have not been addressed. Independent studies have linked wind turbines to negative health impacts for humans if placed in close proximity to residential areas. The proposed Na Pua Makani wind farm will be three times closer to schools and residences than the existing wind turbines. Also significant is the way in which the windmills would be situated upwind of many homes. This could also result in substantial negative impacts on the quality of life for many residents.

WIL 3

As the accepting authority, U.S. Fish and Wildlife should also insist that potential impacts on native fauna (i.e. bats or birds from the nearby James Campbell Wildlife Refuge) be rigorously studied and that developers make sure that minimal loss of wildlife occurs before the project is allowed to move forward.

ACK

For these reasons Defend Oahu Coalition opposes the wind farm project currently being proposed in the Na Pua Makani DEIS.

Mahalo for your time.

Tim Vandeveer
Co-Chair, Defend Oahu Coalition
808-388-0660
www.defendoahucoalition.org

April 1, 2015 TTCES-4819-OUT-15-046

Daniel Whitney
Colonel
U.S. Army Installation Management Command, Pacific Region
851 Wright Ave
Wheeler Army Airfield
Schofield Barracks, HI 96857-5000

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Col. Whitney,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your written comments. Every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of the Proposed Action and alternatives.

Your comment submission is attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. The following issues were raised in your submittal:

- An alternate location for the Project should be analyzed (e.g. moving turbines further inland, different location on Oahu) due to the current Project's close proximity to the community and schools.
- Potential negative impacts to U.S. Army training facilities located adjacent to the wind farm site should be analyzed.
- Compliance with both the NEPA and HEPA processes for public scoping and outreach, that community members and agencies have been adequately consulted during scoping, and will continue to be consulted with during the entire planning process.

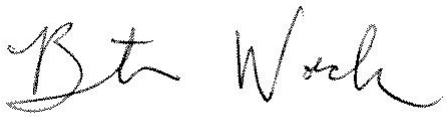
Tetra Tech, Inc.
1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

We appreciate you taking the time during the public scoping period to provide feedback about the Project. These topics will be considered and addressed in the Draft EIS as applicable in the appropriate resource sections.

As you are aware, we are engaging in ongoing coordination with the Department of Army.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
Tetra Tech Inc.



Brita Woeck
Project Manager, Na Pua Makani Wind Project EIS

cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC
Alicia Oller, Tetra Tech, Inc.

---------- Forwarded message ----------
From: **Naki, Brenda A CIV (US)** <brenda.a.naki.civ@mail.mil>
Date: Wed, Jan 22, 2014 at 2:25 PM
Subject: Sent on behalf of COL Daniel Whitney - USAG-HI (UNCLASSIFIED)
To: "NaPuaMakanihcp@fws.gov" <NaPuaMakanihcp@fws.gov>
Cc: "governor.abercrombie@hawaii.gov" <governor.abercrombie@hawaii.gov>, "susan.n.richey@hawaii.gov" <susan.n.richey@hawaii.gov>, "mayor@honolulu.gov" <mayor@honolulu.gov>, "loyal_mehroff@fws.gov" <loyal_mehroff@fws.gov>

Classification: UNCLASSIFIED
Caveats: NONE

Aloha Mr. Cutbirth,

ACK

As requested, please see attached letter sent on behalf of COL Daniel Whitney, Commander, U.S. Army Garrison, Hawaii.

v/r,
Brenda Naki
Office of the Garrison Commander
(808) 656-1153

Classification: UNCLASSIFIED
Caveats: NONE

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND, PACIFIC REGION
HEADQUARTERS, UNITED STATES ARMY GARRISON, HAWAII
851 WRIGHT AVENUE, WHEELER ARMY AIRFIELD
SCHOFIELD BARRACKS, HAWAII 96857-5000

REPLY TO
ATTENTION OF:

January 21, 2014

Office of the Commander

Mr. Mike Cutbirth
Champlin Hawaii Wind Holdings, LLC
2020 Alameda Padre Serra, Suite 123
Santa Barbara, CA 93103

Dear Mr. Cutbirth:

ACK

LAN 3
ALT 2

REG 1

I am writing to comment on your proposed wind project at Kahuku, Oahu, Hawaii. The land for the Na Pua Makani project borders the United States Army Garrison – Hawaii (USAG-HI) Kahuku Training Area (KTA). The KTA is an active Army training area where helicopter operations and ground maneuver training are performed throughout the year by Army and Marine units. KTA is the site of the recently completed Combined Arms Collective Training Facility (CACTF).

The proposed Na Pua Makani project would have a significant negative impact on U.S. Army training in the KTA and the CACTF. The operation of fifteen 440 ft. wind turbines directly adjacent to this USAG-HI training area will be detrimental to aviation training operations and unmanned aerial vehicle (UAV) use. Ground maneuvers will also be negatively impacted by interference with radio transmissions and GIS transmitters. Therefore, I am requesting that you select an alternative location for your project.

USAG-HI has not been engaged by your community outreach program and the existence of the Kahuku Training Area is not acknowledged in the description of existing conditions for the project. Further communication regarding your project may be forthcoming from the Department of Defense. However, as USAG-HI Garrison Commander, I am transmitting my comment now to meet the deadline of January 22, 2014.

Sincerely,

Daniel W. Whitney
Colonel, U.S. Army
Commanding

CF:
Brita Woeck
Governor Neil Abercrombie
Mayor Kirk Caldwell
Mr. William Aila
Dr. Loyal Mehrhoff

April 1, 2014 TTCES-4819-OUT-15-047

Casey Willis
Infinity Wind Power
3760 State St., Suite 102
Santa Barbara, CA 93105

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Mr. Willis,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your written comments. Every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of Proposed Action and alternatives.

Your comment submission is attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. As there were no issues raised in your submittal that fall within the scope of the EIS analysis, your letter has been coded as "Comment Acknowledged."

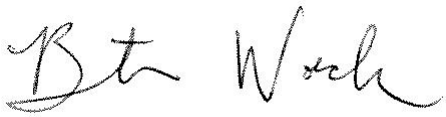
Tetra Tech, Inc.
1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

We appreciate you taking the time during the public scoping period to provide feedback about the Project.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,

Tetra Tech Inc.



Brita Woeck

Project Manager, Na Pua Makani Wind Project EIS

Cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC

Alicia Oller, Tetra Tech, Inc.

---------- Forwarded message ----------
From: **Casey Willis** <cwillis@infinitywind.com>
Date: Sat, Nov 9, 2013 at 12:41 PM
Subject: Na Pua Makani Distribution List
To: "NaPuaMakanihcp@fws.gov" <NaPuaMakanihcp@fws.gov>

To whom it may concern,

ACK

Can you please add my email list to the distribution list for the Na Pua Makani ITP application.

Thanks,

Casey Willis

Infinity Wind Power

3760 State St., Suite 102 | Santa Barbara, CA 93105

O 805.569.6185 | M 805.701.1979 | F 805.569.6190

April 1, 2015 TTCES-4819-OUT-15-048

Alec Wong, PE
Chief
Department of Health, Clean Water Branch
PO Box 3378
Honolulu, HI 96801

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Mr. Wong,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your written comments. Every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of Proposed Action and alternatives.

Your comment submission is attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. The following issues were raised in your submittal:

- The construction and operation of the Project must be in compliance with all federal, state, and county regulations, plans, and policies; Champlin must obtain applicable federal, state, and county permits.

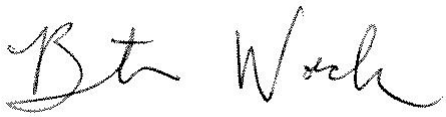
Tetra Tech, Inc.
1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

We appreciate you taking the time during the public scoping period to provide feedback about the Project. These topics will be considered and addressed in the Draft EIS as applicable in the appropriate resource sections.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,

Tetra Tech Inc.



Brita Woeck

Project Manager, Na Pua Makani Wind Project EIS

Cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC

Alicia Oller, Tetra Tech, Inc.

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

LORETTA J. FUDDY, A.C.S.W., M.P.H.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HI 96801-3378

In reply, please refer to:
EMO/CWB

12076PCTM.13

December 26, 2013

Mr. Mike Cutbirth
Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Mauka Tower
Honolulu, Hawaii 96813

Dear Mr. Cutbirth:

SUBJECT: Comments on the Environmental Impact Statement Preparation Notice (EISPN) for the Na Pua Makani Wind Farm Project Kahuku, Island of Oahu, Hawaii

REG 3

The Department of Health (DOH), Clean Water Branch (CWB), acknowledges receipt of your letter, dated December 20, 2013, requesting comments on your project. The DOH-CWB has reviewed the subject document and offers these comments. Please note that our review is based solely on the information provided in the subject document and its compliance with the Hawaii Administrative Rules (HAR), Chapters 11-54 and 11-55. You may be responsible for fulfilling additional requirements related to our program. We recommend that you also read our standard comments on our website at: http://health.hawaii.gov/epo/files/2013/10/CWB_Oct22.pdf

REG 3

1. Any project and its potential impacts to State waters must meet the following criteria:

   a. Antidegradation policy (HAR, Section 11-54-1.1), which requires that the existing uses and the level of water quality necessary to protect the existing uses of the receiving State water be maintained and protected.

   b. Designated uses (HAR, Section 11-54-3), as determined by the classification of the receiving State waters.

   c. Water quality criteria (HAR, Sections 11-54-4 through 11-54-8).

2. National Pollutant Discharge Elimination System (NPDES) permit coverage is required for pollutant discharges into State surface waters and for certain situations involving storm water (HAR, Chapter 11-55).

   a. Discharges into Class 2 or Class A State waters can be covered under an NPDES general permit only if all of the NPDES general permit requirements are met. Please see the DOH-CWB website (http://health.hawaii.gov/cwb/) for the NPDES general permits and instructions to request coverage.

REG 3

b. All other discharges into State surface waters and discharges into Class 1 or Class AA State waters require an NPDES individual permit. To request NPDES individual permit coverage, please see the DOH-CWB forms website located at: http://health.hawaii.gov/cwb/site-map/clean-water-branch-home-page/forms/

c. NPDES permit coverage for storm water associated with construction activities is required if your project will result in the disturbance of one (1) acre or more of total land area. The total land area includes a contiguous area where multiple separate and distinct construction activities may be taking place at different times on different schedules under a larger common plan of development or sale. NPDES permit coverage is required before the start of the construction activities.

   Land disturbance includes, but is not limited to clearing, grading, grubbing, uprooting of vegetation, demolition (even if leaving foundation slab), staging, stockpiling, excavation into pavement areas which go down to the base course, and storage areas (including areas on the roadway to park equipment if these areas are blocked off from public usage, grassed areas, or bare ground).

3. If your project involves work in, over, or under waters of the United States, it is highly recommend that you contact the Army Corp of Engineers, Regulatory Branch (Tel: 438-9258) regarding their permitting requirements.

   Pursuant to Federal Water Pollution Control Act [commonly known as the "Clean Water Act" (CWA)], Paragraph 401(a)(1), a Section 401 Water Quality Certification (WQC) is required for "[a]ny applicant for Federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may **result** in any discharge into the navigable waters..." (emphasis added). The term "discharge" is defined in CWA, Subsections 502(16), 502(12), and 502(6); Title 40 of the Code of Federal Regulations, Section 122.2; and Hawaii Administrative Rules (HAR), Chapter 11-54.

4. Please note that all discharges related to the project construction or operation activities, whether or not NPDES permit coverage and/or Section 401 WQC are required, must comply with the State's Water Quality Standards. Noncompliance with water quality requirements contained in HAR, Chapter 11-54, and/or permitting requirements, specified in HAR, Chapter 11-55, may be subject to penalties of $25,000 per day per violation.

12076PCTM.13

ACK

If you have any questions, please visit our website at: http://health.hawaii.gov/cwb, or contact the Engineering Section, CWB, at (808) 586-4309.

Sincerely,

Darryl Lum for AW

ALEC WONG, P.E., CHIEF
Clean Water Branch

CTM:rh

April 1, 2015 TTCES-4819-OUT-15-049

Leo R. Asuncion
Acting Director
Office of Planning
State of Hawaii
P.O. Box 2359
Honolulu, HI 96804

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Mr. Asuncion,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your written comments. Every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of the Proposed Action and alternatives. Note that the Draft EIS will include a discussion of the proposed Project's conformance with land use plans and policies.

Your comment submissions are attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. The following issues were raised in your submittal:

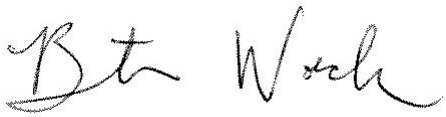
- The Project must be in compliance with all federal, state, and county regulations, plans, and policies, including obtaining applicable federal, state, and county permits.
- Water resources impacts including water sources for the Project, sediment run-off, and potential effects to coastal zones should all be analyzed in the Environmental Impact Statement.

Tetra Tech, Inc.
1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

We appreciate you taking the time during the public scoping period to provide feedback about the Project. These topics will be considered and addressed in the Draft EIS as applicable in the appropriate resource sections.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
Tetra Tech Inc.



Brita Woeck
Project Manager, Na Pua Makani Wind Project EIS

cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC
Alicia Oller, Tetra Tech, Inc.

OFFICE OF PLANNING
STATE OF HAWAII

DAVID Y. IGE
GOVERNOR

LEO R. ASUNCION
ACTING DIRECTOR
OFFICE OF PLANNING

235 South Beretania Street, 6th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

Telephone: (808) 587-2846
Fax: (808) 587-2824
Web: http://planning.hawaii.gov/

Ref. No. P-14590

December 1, 2014

Mr. Mike Cutbirth
Tetra Tech, Inc.
737 Bishop Street, Suite 2340
Mauka Tower
Honolulu, Hawaii 96813

Dear Mr. Cutbirth:

Subject: Environmental Impact Statement Preparation Notice – Na Pua Makani Wind Project, Kahuku Hawaii, TMK: (1) 5-6-008:006 (por); (1) 5-6-006:018, 32, 33, 34, 35, 47, 48, 49, 50, 51, 52, 54, 55, 56 (por); (1) 5-6-074:005:018 (por)

Thank you for the opportunity to provide comments on the Environmental Impact Statement Preparation Notice (EISPN) for the proposed Na Pua Makani Wind Project. It is our understanding that this project proposes to construct a wind farm generating a capacity of approximately 25 megawatts, consisting of 10 wind turbines, an onsite substation, operations and maintenance facilities, an electrical collection system, a 34.5 kilowatt HECO-owned transmission line, and grid construction access route along existing public roadways.

Based on our review of the documents provided to our office, by letter dated November 8, 2014, we have the following comments to offer:

1. The Office of Planning (OP) provides technical assistance to state and county agencies in administering the statewide planning system set forth in Hawaii Revised Statutes (HRS) Chapter 226, the Hawaii State Plan. The Hawaii State Plan provides goals, objectives, priorities, and priority guidelines for growth, development, and the allocation of resources throughout the State. The Hawaii State Plan includes diverse policies and objectives of state interest including but not limited to the economy, agriculture, the visitor industry, federal expenditure, the physical environment, facility systems, socio-cultural advancement, and sustainability.

   The Draft Environmental Impact Statement (Draft EIS) should include an analysis on the Hawaii State Plan, HRS Chapter 226, in a section that addresses the project's conformity or conflict with state and county plans, policies, and controls. The analysis should include a discussion on the project's ability to meet all of the objectives and policies listed in HRS Chapter 226.

REG 3

2. OP is the lead agency for the Hawaii CZM Program. The coastal zone management area is defined as "all lands of the State and the area extending seaward from the shoreline to the

limit of the State's police power and management authority, including the U.S. territorial sea" see HRS § 205A-1 (definition of "coastal zone management area").

REG 3

The Draft EIS shall include a statement in a section that addresses how the project conforms or is in conflict with state and county plans, policies, and controls. The statement should include a discussion of the proposed project's ability to meet all of the objectives and policies set forth in HRS § 205A-2. Where a conflict or inconsistency exists, the statement must describe the extent to which the applicant has reconciled its proposed action with this statute. These objectives and policies include: recreational resources, historic resources, scenic and open space resources, coastal ecosystems, economic uses, coastal hazards, managing development, public participation, beach protection, and marine resources.

REG 3

3. The national Coastal Zone Management Act requires direct federal activities and development projects to be consistent with approved state coastal programs to the maximum extent practicable. OP is the lead state agency to conduct this evaluation. This project may need to be evaluated on Federal Consistency requirements since the project will require United States Army Corps of Engineers Clean Water Act Section 401, 402, and 404 approval.

WAT 1

4. The information provided to our office does address storm water runoff and drainage. Please consider utilizing OP's *Stormwater Impact Assessment* to identify and evaluate information on hydrology, stressors, sensitivity of aquatic and riparian resources, and management measures to control runoff occurrences. In particular, please examine the section on Low-Impact Development Concepts, which include decentralized micro-scale controls that infiltrate, filter, store, re-use, evaporate, and detain runoff close to its source.

   This guidance document will assist in integrating stormwater impact assessment within your review process. The purpose of this document is to provide guidance on assessing stormwater impacts in the planning phase of project development. The goal is to provide a suggested framework and various tools for integrating stormwater impacts assessment. These concepts are listed on pages 14-16 of the *Stormwater Impact Assessment* guidance. This can be found at http://files.hawaii.gov/dbedt/op/czm/initiative/stomwater_imapct/final_stormwater_impact_assessments_guidance.pdf.

If you have any questions regarding this comment letter, please contact Josh Hekekia of our Hawaii CZM Program at 587-2845.

Sincerely,

Leo R. Asuncion
Acting Director

April 1, 2015 TTCES-4819-OUT-15-050

Ford N. Fuchigami
Director of Transportation
Department of Transportation
State of Hawaii
869 Punchbowl Street
Honolulu, HI 96813-5097

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments, STP 8.1725

Dear Mr. Fuchigami,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your written comments. Every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of the Proposed Action and alternatives.

Your comment submissions are attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. The following issues were raised in your submittal:

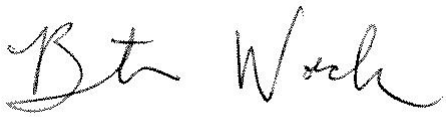
- Would like to see more detail on the Proposed Action and Project components (in text and represented graphically), including: wind turbine components, specifications, and materials needed for construction of turbines; turbine upgrades (if needed); the locations of turbines, collection lines, and point of interconnection; access road construction and maintenance; plans for turbine operations and maintenance; and plans for decommissioning and site restoration.
- The Project must be in compliance with all federal, state, and county regulations, plans, and policies, including obtaining applicable federal, state, and county permits.

Tetra Tech, Inc.
1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

We appreciate you taking the time during the public scoping period to provide feedback about the Project. These topics will be considered and addressed in the Draft EIS as applicable in the appropriate resource sections.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
Tetra Tech Inc.



Brita Woeck
Project Manager, Na Pua Makani Wind Project EIS

cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC
Alicia Oller, Tetra Tech, Inc.

DAVID Y. IGE
GOVERNOR

FORD N. FUCHIGAMI
INTERIM DIRECTOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO:
STP 8.1725

December 10, 2014

Mr. Mike Cutbirth
Tetra Tech, Inc.
737 Bishop Street, Suite 2340
Mauka Tower
Honolulu, Hawaii 96813

Dear Mr. Cutbirth:

Subject: Na Pua Makani Wind Project
Environmental Impact Statement Preparation Notice (EISPN)
Kahuku, Oahu
TMK: (1) 5-6-008:006, var.; 5-6-005:018

Our Department of Transportation's (DOT) comments on the subject project are as follows:

Airports Division

PRO 3

1. The developer should provide specific geographic locations for the wind turbines, permanent and temporary met towers, and any temporary construction equipment, such as, but not limited to cranes, so that they may be included in aeronautical charting to ensure aircraft operators are aware of the potential hazard.

REG 3

2. The developer should submit Federal Aviation Administration Advisory (FAA) Form 7460-1 "Notice of Proposed Construction or Alteration," for construction of the proposed horizontal-type wind turbine. Additionally, a copy of the FAA determination should be submitted to the Airports Division.

Highways Division

REG 3

The subject project is not expected to significantly impact the State highway facility. However, the developer and their contractors shall conform to established procedures for movement of large and oversized loads on State highway facilities.

If there are any questions, please contact Mr. Norren Kato of the DOT Statewide Transportation Planning Office at telephone number (808) 831-7976.

Sincerely,

FORD N. FUCHIGAMI
Interim Director of Transportation

April 1, 2015 TTCES-4819-OUT-15-051

Louis M. Kealoha
Chief of Police
City and County of Honolulu
801 South Beretania Street
Honolulu, HI 96813

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Mr. Kealoha,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your written comments. Every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of the Proposed Action and alternatives.

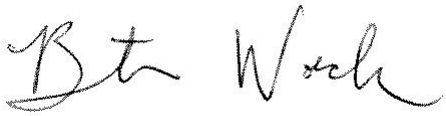
Your comment submission is attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. As there were no issues raised in your submittal that fall within the scope of the EIS analysis, your letter has been coded as "Comment Acknowledged."

Tetra Tech, Inc.
1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

We appreciate you taking the time during the public scoping period to provide feedback about the Project.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
Tetra Tech Inc.



Brita Woeck
Project Manager, Na Pua Makani Wind Project EIS

cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC
Alicia Oller, Tetra Tech, Inc.

POLICE DEPARTMENT

CITY AND COUNTY OF HONOLULU

801 SOUTH BERETANIA STREET · HONOLULU, HAWAII 96813
TELEPHONE: (808) 529-3111 · INTERNET: www.honolulupd.org

KIRK CALDWELL
MAYOR

LOUIS M. KEALOHA
CHIEF

DAVE M. KAJIHIRO
MARIE A. McCAULEY
DEPUTY CHIEFS

OUR REFERENCE MT-DK

November 18, 2014

Mr. Mike Cutbirth
c/o Tetra Tech, Inc.
Mauka Tower
737 Bishop Street, Suite 2340
Honolulu, Hawaii 96813

Dear Mr. Cutbirth:

This is in response to a letter (dated November 8, 2014) from Brita Woeck of Tetra Tech, Inc., requesting comments or concerns on an Environmental Impact Statement Preparation Notice for the Na Pua Makani Wind Project in Kahuku.

ACK

This project should have no significant impact on the services or operations of the Honolulu Police Department.

If there are any questions, please call Major Ryan J. Borges of District 4 (Kailua-Kaneohe-Kahuku) at 723-8639.

Thank you for the opportunity to review this project.

Sincerely,

LOUIS M. KEALOHA
Chief of Police

By
MARK TSUYEMURA
Management Analyst VI
Office of the Chief

Serving and Protecting With Aloha

April 1, 2015 TTCES-4819-OUT-15-052

Ernest Y. W. Lau, P.E.
Manager and Chief Engineer
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, HI 96843

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Mr. Lau,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your written comments. Every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of the Proposed Action and alternatives.

Your comment submission is attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. The following issues were raised in your submittal:

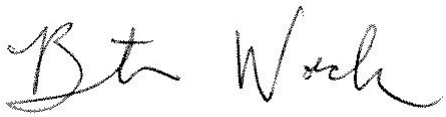
- Fire hazards associated with the Project's construction and operation including facility electrical failure and the identification of appropriate safety measure to address fire preparedness and emergency response.
- The Project must be in compliance with all federal, state, and county regulations, plans, and policies, including obtaining applicable federal, state, and county permits. The construction drawings will be submitted to the Board of Water Supply for review.

Tetra Tech, Inc.
1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8696 Fax 503.227.1287 www.tetratech.com

We appreciate you taking the time during the public scoping period to provide feedback about the Project. These topics will be considered and addressed in the Draft EIS as applicable in the appropriate resource sections.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
Tetra Tech Inc.



Brita Woeck
Project Manager, Na Pua Makani Wind Project EIS

cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC
Alicia Oller, Tetra Tech, Inc.

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

November 26, 2014

KIRK CALDWELL, MAYOR

DUANE R. MIYASHIRO, Chair
ADAM C. WONG, Vice Chair
MAHEALANI CYPHER
THERESIA C. McMURDO
DAVID C. HULIHEE

ROSS S. SASAMURA, Ex-Officio
ROSS M. HIGASHI, Ex-Officio

ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

ELLEN E. KITAMURA, P.E.
Deputy Manager and Chief Engineer

Mr. Mike Cutbirth
c/o Tetra Tech, Inc.
737 Bishop Street, Suite 2340
Honolulu, Hawaii 96813

Dear Mr. Cutbirth:

Subject: The Letter Dated November 8, 2014 on the Environmental Impact Statement Preparation Notice for the Na Pua Makani Wind Farm Project in Kahuku - Tax Map Key: 5-6-008: 006; 5-6-006: 018, 32, 33, 34, 35, 47, 48, 49, 50, 51, 52, 54, 55, 56, 5-6-005:018

Thank you for the opportunity to comment on the proposed wind farm project.

REG 3

The project is in the vicinity of Board of Water Supply (BWS) Kahuku wells, transmission mains and 228' reservoir. We have future plans to install a second reservoir at the site and will require sufficient setback around the entire facility. The construction drawings should be submitted to BWS for review.

HAS 3

The on-site fire protection requirements should be coordinated with the Fire Prevention Bureau of the Honolulu Fire Department.

If you have any questions, please contact Robert Chun, Project Review Branch of our Water Resources Division, at 748-5443.

Very truly yours,

for ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

April 1, 2015 TTCES-4819-OUT-15-053

Laura Leialoha Phillips McIntyre, AICP
Program Manager, Environmental Planning Office
Department of Health
State of Hawaii
P.O. Box 3378
Honolulu, HI 96801-3378

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments, EPO 14-242

Dear Ms. McIntyre,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your written comments. Every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of the Proposed Action and alternatives.

Your comment submissions are attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. The following issue was raised in your submittal:

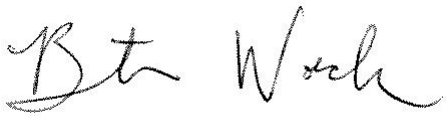
- The Project must be in compliance with all federal, state, and county regulations, plans, and policies, including obtaining applicable federal, state, and county permits.

Tetra Tech, Inc.
1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

We appreciate you taking the time during the public scoping period to provide feedback about the Project. This topic will be considered and addressed in the Draft EIS as applicable in the appropriate resource sections.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
Tetra Tech Inc.



Brita Woeck
Project Manager, Na Pua Makani Wind Project EIS

cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC
Alicia Oller, Tetra Tech, Inc.

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HI 96801-3378

LINDA ROSEN, M.D., M.P.H.
DIRECTOR OF HEALTH

In reply, please refer to:
File:
EPO 14-242

November 10, 2014

Mr. Mike Cutbirth
C/O Tetra Tech, Inc.
737 Bishop St., Suite 2340
Mauka Tower
Honolulu, Hawaii 96813
Via email to: brita.woeck@tetratech.com

Dear Mr. Cutbirth:

SUBJECT: Na Pua Makani Wind Project, Koolauloa

The Department of Health (DOH), Environmental Planning Office (EPO), acknowledges receipt of your correspondence, dated November 8, 2014 to the Department's Director's office. Thank you for allowing us to review and comment on the proposed project available for public review on the OEQC website at: http://oeqc.doh.hawaii.gov/Shared%20Documents/EA_and_EIS_Online_Library/Oahu/2010s/2014-11-08-OA-5E-Na-Pua-Makani-Wind-Project.pdf

REG 3

The document will be routed electronically to the relevant Environmental Health divisions, branches, and offices. They will provide specific comments to you if necessary. EPO recommends that you review the standard comments at: http://health.hawaii.gov/epo/home/landuse-planning-review-program/. You are required to adhere to all applicable standard comments.

REG 3

We encourage you to examine and utilize the Hawaii Environmental Health Portal. The portal provides links to our e-Permitting Portal, Environmental Health Warehouse, Groundwater Contamination Viewer, Hawaii Emergency Response Exchange, Hawaii State and Local Emission Inventory System, Water Pollution Control Viewer, Water Quality Data, Warnings, Advisories and Postings. The Portal is continually updated. Please visit it regularly at: https://eha-cloud.doh.hawaii.gov

REG 3

The EPO agrees with your Table 2 on page eight that this project may require permit/approval from the State of Hawaii Department of Health in regards to:

- Clean Water Act Compliance (Sections 401/ 402 / 404)
- Noise
- Air Quality

We are pleased that this project would encourage the use of sustainable energy and the reduction of fossil fuels.

Mahalo nui loa,

Laura Leialoha Phillips McIntyre, AICP
Program Manager, Environmental Planning Office

c: CWB, IRHB, & CAB

April 1, 2015 TTCES-4819-OUT-15-054

Steve Molmen
Supervising Land Agent
Land Division
Department of Land and Natural Resources
State of Hawaii
1151 Punchbowl Street, Suite 220
Honolulu, HI 96809-0621

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Mr. Molmen,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received the written comments you submitted from several DLNR divisions, including on December 4, 2014 from the Land Division – Oahu District, Office of Conservation & Coastal Lands, and Engineering Division, and on December 18, 2014 from the Commission on Water Resource Management. Every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of the Proposed Action and alternatives.

The DLNR comment submissions are attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. The following issues were raised in the DLNR submittal:

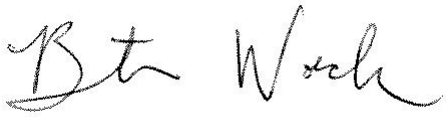
- Would like to see mitigation measures and Best Management Practices related to water resources, including water quality, landscape irrigation, and stormwater management.
- The Project must be in compliance with all federal, state, and county regulations, plans, and policies, including obtaining applicable federal, state, and county permits.
- Water resources impacts including water sources for the Project, sediment run-off, and potential effects to coastal zones should all be analyzed in the Environmental Impact Statement.

Tetra Tech, Inc.
1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

We appreciate you taking the time during the public scoping period to provide feedback about the Project. These topics will be considered and addressed in the Draft EIS as applicable in the appropriate resource sections.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
Tetra Tech Inc.



Brita Woeck
Project Manager, Na Pua Makani Wind Project EIS

cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC
Alicia Oller, Tetra Tech, Inc.

From: Steve.Molmen@hawaii.gov [mailto:Steve.Molmen@hawaii.gov]
Sent: Thursday, December 18, 2014 4:19 PM
To: Woeck, Brita
Cc: William.Tam@hawaii.gov; Roy.Hardy@hawaii.gov
Subject: Public Release of Environmental Impact Statement Preparation Notice (EISPN) for the Na Pua Makani Wind Farm Project, Kahuku, Hawai`i - additional comments

Dear Mr. Cutbirth,

Attached, please find additional comments on the subject project. Again, no hard copy will be sent.

Best regards,

Steve Molmen, Supervising Land Agent
Land Division
Department of Land and Natural Resources
State of Hawaii
1151 Punchbowl Street, Suite 220
Honolulu, HI 96809-0621
Tel.: (808) 587-0439
Fax: (808) 312-6357
Email: steve.molmen@hawaii.gov

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From: Steve Molmen/DLNR/StateHiUS
To: brita.woeck@tetratech.com
Date: 12/04/2014 03:54 PM
Subject: Public Release of Environmental Impact Statement Preparation Notice (EISPN) for the Na Pua Makani Wind Farm Project, Kahuku, Hawai`i

---

Dear Mr. Cutbirth,

Attached, please find our comments on the subject project. No hard copy will be sent.

[attachment "DOC314.pdf" deleted by Steve Molmen/DLNR/StateHiUS]

Best regards,

Steve Molmen, Supervising Land Agent
Land Division
Department of Land and Natural Resources
State of Hawaii

1151 Punchbowl Street, Suite 220
Honolulu, HI 96809-0621
Tel.: (808) 587-0439
Fax: (808) 312-6357
Email: steve.molmen@hawaii.gov

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NEIL ABERCROMBIE
GOVERNOR OF HAWAII

WILLIAM J. AILA, JR.
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

December 4, 2014

Mr. Mike Cutbirth
c/o Tetra Tech, Inc.
737 Bishop St., Suite 2340, Mauka Tower
Honolulu, HI 96813

via email: brita.woeck@tetratech.com

Dear Mr. Cutbirth,

SUBJECT: Public Release of Environmental Impact Statement Preparation Notice (EISPN) for the Na Pua Makani Wind Farm Project, Kahuku, Hawai`i

Thank you for the opportunity to review and comment on the subject matter. The Department of Land and Natural Resources' (DLNR) Land Division distributed or made available a copy of your report pertaining to the subject matter to DLNR Divisions for their review and comments.

At this time, enclosed are comments from (1) Land Division – Oahu District; (2) Office of Conservation & Coastal Lands; and (3) Engineering Division. No other comments were received as of our suspense date. Should you have any questions, please feel free to call Supervising Land Agent Steve Molmen at 587-0439. Thank you.

Sincerely,

Russell Y. Tsuji
Land Administrator

Enclosure(s)

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

WILLIAM J. AILA, JR.
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

November 13, 2014

MEMORANDUM

TO:

DLNR Agencies:
__Div. of Aquatic Resources
__Div. of Boating & Ocean Recreation
X Engineering Division
X Div. of Forestry & Wildlife
X Div. of State Parks
X Commission on Water Resource Management
X Office of Conservation & Coastal Lands
X Land Division – Oahu District
X Historic Preservation

FROM: Russell Y. Tsuji, Land Administrator

SUBJECT: Public Release of Environmental Impact Statement Preparation Notice (EISPN) for the Na Pua Makani Wind Farm Project, Kahuku, Hawai`i

LOCATION: Kahuku, Koolauloa District, Oahu, Hawaii; Tax Map Keys: (1) 5-6-008:006 (portion); (1) 5-6-006: 018, 32, 33, 34, 35, 47, 48, 49, 50, 51, 52, 54, 55, 56 (portions); (1) 5-6-005:018 (portion)

APPLICANT: Na Pua Makani Power Partners, LLC, a wholly owned subsidiary of Champlin Hawaii Wind Holdings, LLC, by consultant Tetra Tech Inc.

Transmitted for your review and comment on the above-referenced document. If we have not provided you with one of the limited number bound documents, the document can be found here:

1. Go to: https://sp01.ld.dlnr.hawaii.gov/LD
2. Login: Username: LD\Visitor Password: 0pa$$word0 (first and last characters are zeros)
3. Click on: Requests for Comments
4. Click on the subject file "Public Release of Environmental Impact Statement Preparation Notice (EISPN) for the Na Pua Makani Wind Farm Project, Kahuku, Hawai`i" then click on "Files" and "Download a copy". ". (Any issues accessing the document should be directed to Jonathan Real, Applications/Systems Analyst at 587-0427 or Jonathan.C.Real@hawaii.gov)

We would appreciate your comments on this document. Please submit any comments by December 4, 2014. If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact Supervising Land Agent Steve Molmen at (808) 587-0439. Thank you.

Attachments

( ) We have no objections.
( ) We have no comments.
( ) Comments are attached.

Signed: _____
Print Name: _____
Date: _____

REG 3

Comments:

At its meeting on August 8, 2008, under agenda item D-10, the Board approved in principle, the issuance of a direct lease to the applicant over TMK (1) 5-6-008:006. The proposed project now includes the addition of new TMK parcels for access purposes. Portions of TMK (1) 5-6-006 and (1) 5-6-005:018 have now been added into the proposed project.

Upon the finalization of the parcel/acreage/access roads, the applicant is required to provide a map and legal description of the State lands affected, as a part of the disposition process. The requested material is relevant to the final approval for the issuance of a direct lease, if appropriate, before the Land Board.

1A-15-80

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

WILLIAM J. AILA, JR.
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RECEIVED
OFFICE OF CONSERVATION
AND COASTAL LANDS
2014 NOV 14 P 3:13

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

DEPT. OF LAND &
NATURAL RESOURCES
STATE OF HAWAII

November 13, 2014

MEMORANDUM

RECEIVED
LAND DIVISION
2014 NOV 17 AM 10:51
DEPT. OF LAND & NATURAL RESOURCES STATE OF HAWAII

TO: **DLNR Agencies:**
__Div. of Aquatic Resources
__Div. of Boating & Ocean Recreation
X Engineering Division
X Div. of Forestry & Wildlife
X Div. of State Parks
X Commission on Water Resource Management
X Office of Conservation & Coastal Lands
X Land Division – Oahu District
X Historic Preservation

FROM: Russell Y. Tsuji, Land Administrator
SUBJECT: Public Release of Environmental Impact Statement Preparation Notice (EISPN) for the Na Pua Makani Wind Farm Project, Kahuku, Hawai`i
LOCATION: Kahuku, Koolauloa District, Oahu, Hawaii; Tax Map Keys: (1) 5-6-008:006 (portion); (1) 5-6-006: 018, 32, 33, 34, 35, 47, 48, 49, 50, 51, 52, 54, 55, 56 (portions); (1) 5-6-005:018 (portion)
APPLICANT: Na Pua Makani Power Partners, LLC, a wholly owned subsidiary of Champlin Hawaii Wind Holdings, LLC, by consultant Tetra Tech Inc.

Transmitted for your review and comment on the above-referenced document. If we have not provided you with one of the limited number bound documents, the document can be found here:

1. Go to: https://sp01.ld.dlnr.hawaii.gov/LD
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We would appreciate your comments on this document. Please submit any comments by December 4, 2014. If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact Supervising Land Agent Steve Molmen at (808) 587-0439. Thank you.

Attachments

( ) We have no objections.
(✓) We have no comments. * Not in Conservation
( ) Comments are attached.

Signed: A. Yasaka
Print Name: Lauren Yasaka
Date: 11/17/14

ACK

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

WILLIAM J. AILA, JR.
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

'14 NOV 14 PM 2:33 ENGINEERING

November 13, 2014

MEMORANDUM

RECEIVED LAND DIVISION 2014 NOV 26 PM 2:51 DEPT. OF LAND & NATURAL RESOURCES STATE OF HAWAII

TO: PR.

DLNR Agencies:
__Div. of Aquatic Resources
__Div. of Boating & Ocean Recreation
X Engineering Division
X Div. of Forestry & Wildlife
X Div. of State Parks
X Commission on Water Resource Management
X Office of Conservation & Coastal Lands
X Land Division – Oahu District
X Historic Preservation

FROM: Russell Y. Tsuji, Land Administrator
SUBJECT: Public Release of Environmental Impact Statement Preparation Notice (EISPN) for the Na Pua Makani Wind Farm Project, Kahuku, Hawai`i
LOCATION: Kahuku, Koolauloa District, Oahu, Hawaii; Tax Map Keys: (1) 5-6-008:006 (portion); (1) 5-6-006: 018, 32, 33, 34, 35, 47, 48, 49, 50, 51, 52, 54, 55, 56 (portions); (1) 5-6-005:018 (portion)
APPLICANT: Na Pua Makani Power Partners, LLC, a wholly owned subsidiary of Champlin Hawaii Wind Holdings, LLC, by consultant Tetra Tech Inc.

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We would appreciate your comments on this document. Please submit any comments by December 4, 2014. If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact Supervising Land Agent Steve Molmen at (808) 587-0439. Thank you.

Attachments

( ) We have no objections.
(✓) We have no additional comments.
( ) Comments are attached.

Signed: _____
Print Name: Carty S. Chang, Chief Engineer
Date: 11/20/14

ACK

DAVID Y. IGE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

WILLIAM J. AILA, JR.
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

JESSE K. SOUKI
FIRST DEPUTY

WILLIAM M. TAM
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

December 17, 2014

Mr. Mike Cutbirth
c/o Tetra Tech, Inc.
737 Bishop St., Suite 2340, Mauka Tower
Honolulu, HI 96813

via email: brita.woeck@tetratech.com

Dear Mr. Cutbirth,

SUBJECT: Public Release of Environmental Impact Statement Preparation Notice (EISPN) for the Na Pua Makani Wind Farm Project, Kahuku, Hawai`i

Thank you for the opportunity to review and comment on the subject matter. In addition to the comments sent to you dated December 4, 2014, enclosed are additional comments from the Commission on Water Resource Management on the subject matter. Should you have any questions, please feel free to call Supervising Land Agent Steve Molmen at (808) 587-0439. Thank you.

Sincerely,

Russell Y. Tsuji
Land Administrator

Enclosure(s)

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

WILLIAM J. AILA, JR.
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

November 13, 2014

MEMORANDUM

2014 DEC 17 PM 1:37
DEPT. OF LAND & NATURAL RESOURCES
STATE OF HAWAII

RECEIVED
LAND DIVISION

TO: **DLNR Agencies:**
__Div. of Aquatic Resources
__Div. of Boating & Ocean Recreation
X Engineering Division
X Div. of Forestry & Wildlife
X Div. of State Parks
X Commission on Water Resource Management
X Office of Conservation & Coastal Lands
X Land Division – Oahu District
X Historic Preservation

FROM: Russell Y. Tsuji, Land Administrator

SUBJECT: Public Release of Environmental Impact Statement Preparation Notice (EISPN) for the Na Pua Makani Wind Farm Project, Kahuku, Hawai`i

LOCATION: Kahuku, Koolauloa District, Oahu, Hawaii; Tax Map Keys: (1) 5-6-008:006 (portion); (1) 5-6-006: 018, 32, 33, 34, 35, 47, 48, 49, 50, 51, 52, 54, 55, 56 (portions); (1) 5-6-005:018 (portion)

APPLICANT: Na Pua Makani Power Partners, LLC, a wholly owned subsidiary of Champlin Hawaii Wind Holdings, LLC, by consultant Tetra Tech Inc.

Transmitted for your review and comment on the above-referenced document. If we have not provided you with one of the limited number bound documents, the document can be found here:

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We would appreciate your comments on this document. Please submit any comments by December 4, 2014. If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact Supervising Land Agent Steve Molmen at (808) 587-0439. Thank you.

Attachments

( ) We have no objections.
( ) We have no comments.
(x) Comments are attached. (Please see January 15, 2014 comments attached).

Signed:
Print Name: WILLIAM M. TAM, Deputy Director
Date: December 17, 2014

FILE ID: RFD.3893.3
DOC ID: 11885

COPY

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

WILLIAM J. AILA, JR.
CHAIRPERSON

WILLIAM D. BALFOUR, JR.
KAMANA BEAMER
GARY L. GILL
MILTON D. PAVAO
JONATHAN STARR
TED YAMAMURA

WILLIAM M. TAM
DEPUTY DIRECTOR

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P.O. BOX 621
HONOLULU, HAWAII 96809

January 15, 2014

REF: RFD.3893.3

TO: Russell Tsuji, Administrator
Land Division

FROM: William M. Tam, Deputy Director
Commission on Water Resource Management

SUBJECT: Public Release of Environmental Impact Statement Preparation Notice (EISPN) for the Na Pua Makani Wind Farm Project, Kahuku, Hawaii

LOCATION: Kahuku, Hawaii
TMK NO.:

Thank you for the opportunity to review the subject document. The Commission on Water Resource Management (CWRM) is the agency responsible for administering the State Water Code (Code). Under the Code, all waters of the State are held in trust for the benefit of the citizens of the State, therefore, all water use is subject to legally protected water rights. CWRM strongly promotes the efficient use of Hawaii's water resources through conservation measures and appropriate resource management. For more information, please refer to the State Water Code, Chapter 174C, Hawaii Revised Statutes, and Hawaii Administrative Rules, Chapters 13-167 to 13-171. These documents are available via the Internet at http://www.hawaii.gov/dlnr/cwrm.

Our comments related to water resources are checked off below.

☐ 1. We recommend coordination with the county to incorporate this project into the county's Water Use and Development Plan. Please contact the respective Planning Department and/or Department of Water Supply for further information.

☐ 2. We recommend coordination with the Engineering Division of the State Department of Land and Natural Resources to incorporate this project into the State Water Projects Plan.

☐ 3. We recommend coordination with the Hawaii Department of Agriculture (HDOA) to incorporate the reclassification of agricultural zoned land and the redistribution of agricultural resources into the State's Agricultural Water Use and Development Plan (AWUDP). Please contact the HDOA for more information.

☒ 4. We recommend that water efficient fixtures be installed and water efficient practices implemented throughout the development to reduce the increased demand on the area's freshwater resources. Reducing the water usage of a home or building may earn credit towards Leadership in Energy and Environmental Design (LEED) certification. More information on LEED certification is available at http://www.usgbc.org/leed. A listing of fixtures certified by the EPA as having high water efficiency can be found at http://www.epa.gov/watersense/.

☒ 5. We recommend the use of best management practices (BMP) for stormwater management to minimize the impact of the project to the existing area's hydrology while maintaining on-site infiltration and preventing polluted runoff from storm events. Stormwater management BMPs may earn credit toward LEED certification. More information on stormwater BMPs can be found at http://hawaii.gov/dbedt/czm/initiative/lid.php.

☒ 6. We recommend the use of alternative water sources, wherever practicable.

☐ 7. We recommend participating in the Hawaii Green Business Program, that assists and recognizes businesses that strive to operate in an environmentally and socially responsible manner. The program description can be found online at http://energy.hawaii.gov/programs/achieving-efficiency/green-business-program

MIT 2

MIT 2

MIT 2

FILE ID: RFD.3893.3
DOC ID: 11416

DRF-IA 03/20/2013

MIT 2

☒ 8. We recommend adopting landscape irrigation conservation best management practices endorsed by the Landscape Industry Council of Hawaii. These practices can be found online at http://landscapehawaii.org/_library/documents/lich_irrigation_conservation_bmps.pdf

REG 3

☒ 9. There may be the potential for ground or surface water degradation/contamination and recommend that approvals for this project be conditioned upon a review by the State Department of Health and the developer's acceptance of any resulting requirements related to water quality.

Permits required by CWRM:
Additional information and forms are available at http://hawaii.gov/dlnr/cwrm/info_permits.htm.

REG 3

☒ 10. The proposed water supply source for the project is located in a designated water management area, and a Water Use Permit is required prior to use of water. The Water Use Permit may be conditioned on the requirement to use dual line water supply systems for new industrial and commercial developments.

☐ 11. A Well Construction Permit(s) is (are) required before any well construction work begins.

☐ 12. A Pump Installation Permit(s) is (are) required before ground water is developed as a source of supply for the project.

REG 3

☒ 13. There is (are) well(s) located on or adjacent to this project. If wells are not planned to be used and will be affected by any new construction, they must be properly abandoned and sealed. A permit for well abandonment must be obtained.

☐ 14. Ground water withdrawals from this project may affect streamflows, which may require an instream flow standard amendment.

REG 3

☒ 15. A Stream Channel Alteration Permit(s) is (are) required before any alteration(s) can be made to the bed and/or banks of a stream channel.

☐ 16. A Stream Diversion Works Permit(s) is (are) required before any stream diversion works is (are) constructed or altered.

☐ 17. A Petition to Amend the Interim Instream Flow Standard is required for any new or expanded diversion(s) of surface water.

☐ 18. The planned source of water for this project has not been identified in this report. Therefore, we cannot determine what permits or petitions are required from our office, or whether there are potential impacts to water resources.

WAT 1

☒ OTHER:
Projected potable and non-potable water demands and the calculations for these estimates should be disclosed. The proposed source of water supply should be identified.

REG 3

There are 8 existing wells in on TMK 5-6-006:018, 4 of which are used for agriculture. If the Wind Farm requires use from any of these or other well sources in the area then existing ground water use permits will need to be modified or new ground water use permits obtained.

If there are any questions, please contact Roy Hardy at 587-0225.

April 1, 2015 TTCES-4819-OUT-15-055

Michele K. Nekota
Director
Department of Parks & Recreation
City and County of Honolulu
1000 Uluohia Street, Suite 309
Kapolei, HI 96707

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Ms. Nekota,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your written comments. Every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of the Proposed Action and alternatives.

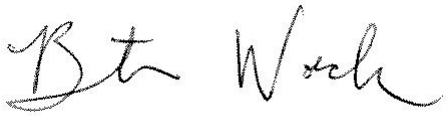
Your comment submission is attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. As there were no issues raised in your submittal that fall within the scope of the EIS analysis, your letter has been coded as "Comment Acknowledged."

Tetra Tech, Inc.
1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

We appreciate you taking the time during the public scoping period to provide feedback about the Project.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
Tetra Tech Inc.



Brita Woeck
Project Manager, Na Pua Makani Wind Project EIS

cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC
Alicia Oller, Tetra Tech, Inc.

DEPARTMENT OF PARKS & RECREATION

CITY AND COUNTY OF HONOLULU

1000 Uluohia Street, Suite 309, Kapolei, Hawaii 96707
Phone: (808) 768-3003 • Fax: (808) 768-3053
Website: www.honolulu.gov

KIRK CALDWELL
MAYOR

MICHELE K. NEKOTA
DIRECTOR

JEANNE C. ISHIKAWA
DEPUTY DIRECTOR

December 17, 2014

Mr. Mike Cutbirth
C/O Tetra Tech, Inc.
737 Bishop Street, Suite 2340
Mauka Tower
Honolulu, Hawaii 96813

Dear Mr. Cutbirth:

SUBJECT: Public Release of Environmental Impact Statement Preparation Notice (EISPN) for the Na Pua Makani Wind Project, Kahuku, Hawaii

Thank you for the opportunity to review and comment on the EISPN for the subject project.

ACK

The Department of Parks and Recreation has no comment. As the proposed project will have no impact on any program or facility of the department, you may remove us a consulted party to the balance of the EIS process.

Should you have any questions, please contact Mr. John Reid, Planner at 768-3017.

Sincerely,

Michele K. Nekota
Director

MKN:jr
(587378)

April 1, 2015 TTCES-4819-OUT-15-056

Roger Pukahi
Colonel
Hawaii Army National Guard
55-101 Naupaka St
Laie, Hawaii 96762

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Col. Pukahi,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your written comments. Every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of the Proposed Action and alternatives.

Your comment submission is attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. The following issue was raised in your submittal:

- Potential negative impacts to U.S. Army training facilities located adjacent to the wind farm site should be analyzed.

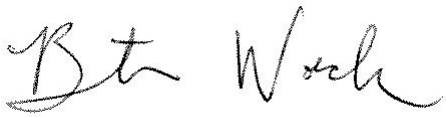
Tetra Tech, Inc.
1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

We appreciate you taking the time during the public scoping period to provide feedback about the Project. This topic will be considered and addressed in the Draft EIS as applicable in the appropriate resource sections.

As you are aware, we are engaging in ongoing coordination with the Department of Army.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
Tetra Tech Inc.



Brita Woeck
Project Manager, Na Pua Makani Wind Project EIS

cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC
Alicia Oller, Tetra Tech, Inc.

Woeck, Brita

From: Pukahi, Roger T COL USARMY NG HIARNG (US) <roger.t.pukahi.mil@mail.mil>
Sent: Wednesday, January 07, 2015 4:00 PM
To: Woeck, Brita
Subject: FW: SAAO: Kahuku Training Area Windfarm Mitigation Response Team (UNCLASSIFIED)
Attachments: SAAO: Kahuku Training Area Windfarm Mitigation Response Team (UNCLASSIFIED); Na Pua_Republished EISPN 10-24-14.pdf; Tetra Tech Letter 11-08-14.pdf

Importance: High

Aloha Brita,

I left a phone message regarding comments to the Wind Farm Projects.

I am COL Roger Pukahi, I am the State Army Aviation Officer for the Hawaii Army National Guard. The National Guard currently operates numerous helicopters from Wheeler AAF. Although our missions are similar to the 25th Combat Aviation Brigade, we have a unique responsibility to the citizens of Hawaii and as you know we provide numerous support by way of aviation to all Island's in the State.

LAN 3

The Hawaii Army National Guard (HIARNG) aviation program reaches back to the 1960's and have developed into the most modern National Guard aviation unit in the nation. Throughout all these years we have operated and trained in the Tactical Flight Training Area (TFTA) and Kahuku Training Area. We are aware of the current improvements in technology toward sustainability and applaud these efforts. However, the impact of building windmills along the ridgeline fronting the town of Kahuku (Project #1-5) directly impacts the TFTA and limits the amount of training area available to our aircrews. The TFTA provides HIARNG with the ability to conduct training in a controlled environment that mirrors wartime situations. It also provides us the opportunity to develop aircrews through a series of individual and collective tasks that support aircrew and unit readiness. Our ability to be ready, affords us the ability to respond to natural disaster, State emergencies and wartime response. It is important that we retain the ability to train in the areas with minimal impact from surrounding areas. This is the only designated aviation training area on the island of Oahu.

LAN 3

I ask that you consider the impacts to the Hawaii Army National Guard and provide a means to support our efforts to the State of Hawaii.

Please let me know if you have any questions or would like to discuss it further.

Thank you.

COL Roger Pukahi
(808) 230-5498

-----Original Message-----
From: Lloyd Maki [mailto:lmaki@dod.hawaii.gov]
Sent: Thursday, December 18, 2014 3:00 PM
To: Pukahi, Roger T COL USARMY NG HIARNG (US)
Cc: Neal Mitsuyoshi
Subject: FW: SAAO: Kahuku Training Area Windfarm Mitigation Response Team (UNCLASSIFIED)
Importance: High

April 1, 2015 TTCES-4819-OUT-15-057

Ross S. Sasamura, P.E.
Director and Chief Engineer
Department of Facility Maintenance
City and County of Honolulu
1000 Uluohia Street, Suite 215
Kapolei, HI 96707

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments, DRM 14-1013

Dear Mr. Sasamura,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your written comments. Every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of the Proposed Action and alternatives.

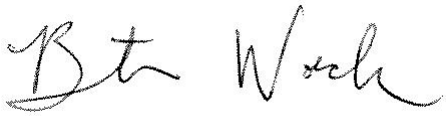
Your comment submission is attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. As there were no issues raised in your submittal that fall within the scope of the EIS analysis, your letter has been coded as "Comment Acknowledged."

Tetra Tech, Inc.
1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

We appreciate you taking the time during the public scoping period to provide feedback about the Project.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
Tetra Tech Inc.



Brita Woeck
Project Manager, Na Pua Makani Wind Project EIS

cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC
Alicia Oller, Tetra Tech, Inc.

DEPARTMENT OF FACILITY MAINTENANCE

CITY AND COUNTY OF HONOLULU

1000 Ulu'ohia Street, Suite 215, Kapolei, Hawaii 96707
Phone: (808) 768-3343 • Fax: (808) 768-3381
Website: www.honolulu.gov

KIRK CALDWELL
MAYOR

ROSS S. SASAMURA, P.E.
DIRECTOR AND CHIEF ENGINEER

EDUARDO P. MANGLALLAN
DEPUTY DIRECTOR

IN REPLY REFER TO:
DRM 14-1013

November 20, 2014

Mr. Mike Cutbirth
c/o Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Mauka Tower
Honolulu, Hawaii 96813

Dear Mr. Cutbirth:

SUBJECT: Public Release of Environmental Impact Statement Preparation Notice (EISPN) for the Na Pua Makani Wind Project, Kahuku, Hawaii

ACK

Thank you for the opportunity to review and comment on the subject project. We have no comments. The City does not have any facilities or easements on the subject property.

If you have any questions, please call Mr. Kyle Oyasato of the Division of Road Maintenance at 768-3697.

Sincerely,

Ross S. Sasamura, P.E.
Director and Chief Engineer

April 1, 2015 TTCES-4819-OUT-15-058

Dean H. Seki
Comptroller
Department of Accounting and General Services
State of Hawaii
P.O. Box 119
Honolulu, HI 96810-0119

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Mr. Seki,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your written comments. Every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of the Proposed Action and alternatives.

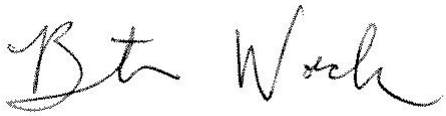
Your comment submission is attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. As there were no issues raised in your submittal that fall within the scope of the EIS analysis, your letter has been coded as "Comment Acknowledged."

Tetra Tech, Inc.
1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

We appreciate you taking the time during the public scoping period to provide feedback about the Project.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
Tetra Tech Inc.



Brita Woeck
Project Manager, Na Pua Makani Wind Project EIS

cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC
Alicia Oller, Tetra Tech, Inc.

NEIL ABERCROMBIE
GOVERNOR

Dean H. Seki
Comptroller

Maria E. Zielinski
Deputy Comptroller

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810-0119

(P)1353.4

NOV 18 2014

Ms. Brita Woeck
Tetra Tech, Inc.
737 Bishop Street, Suite 2340
Mauka Tower
Honolulu, Hawaii 96813

Dear Ms. Woeck:

Subject: Draft Environmental Impact Statement Preparation Notice
Na Pua Makani Wind Project, Kahuku, Hawaii

ACK

Thank you for the opportunity to provide comments for the subject project. This project does not impact any of the Department of Accounting and General Services' projects or existing facilities in this area, and we have no comments to offer at this time.

If you have any questions, please call me at 586-0400, or your staff may call Mr. Alva Nakamura of the Public Works Division at 586-0488.

Sincerely,

DEAN H. SEKI
Comptroller

c: Mr. Mike Cutbirth, Champlin Hawaii Wind Holdings, LLC
Mr. Russell Tsuji, DLNR Land Div

April 1, 2015 TTCES-4819-OUT-15-059

Gordon Wong
Honolulu Airports District Office
Federal Aviation Administration
P.O. Box 50244
Honolulu, HI 96850-0001

RE: Na Pua Makani Wind Project Environmental Impact Statement Scoping Comments

Dear Mr. Wong,

Thank you for providing comments on the Na Pua Makani Wind Project (Project) during the public scoping period. We received your written comments. Every letter from the public was read thoroughly, and substantive comments were grouped into general issue categories. In response to the comments made in each letter, summary statements were then created to identify the overarching issues that were raised during the scoping period from all commenters. Your comments have been coded to correspond to an issue category and a summary statement. These overarching issues identified during the scoping period helped identify a reasonable range of alternatives that met the purpose and need of the Project and considered a full spectrum of positions expressed by participants in the scoping process. The issue categories identified during scoping will be evaluated in the analysis of potential effects of the Proposed Action and alternatives.

Your comment submission is attached to this letter, along with the issue categories and summary statements so that you can view the complete list of issues that were raised. The following issue was raised in your submittal:

- The Project must be in compliance with all federal, state, and county regulations, plans, and policies, including obtaining applicable federal, state, and county permits.

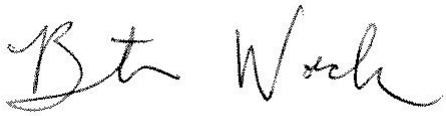
Information related to the proposed Project's FAA determination will be corrected and updated in the Draft EIS.

Tetra Tech, Inc.
1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

We appreciate you taking the time during the public scoping period to provide feedback about the Project.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
Tetra Tech Inc.



Brita Woeck
Project Manager, Na Pua Makani Wind Project EIS

cc: Mike Cutbirth, Na Pua Makani Power Partners, LLC
Alicia Oller, Tetra Tech, Inc.

Woeck, Brita

From: Gordon.Wong@faa.gov
Sent: Monday, November 10, 2014 4:41 PM
To: Woeck, Brita
Cc: kimberly.k.evans@hawaii.gov; lynn.becones@hawaii.gov; Lynette.Kawaoka@hawaii.gov
Subject: EIS - Na Pua Makani Wind Project (FAA COMMENT)

We have reviewed the EIS Preparation Notice dated November 2014 for the Na Pua Makani Wind Project and offer the following comment:

REG 3

1. Page 8, Table 2, states FAA "Determination of No Hazard issued 03/04/2014 and 10/17/2014." To clarify, the FAA has not issued a no hazard determination on the subject airspace cases yet. Those dates (03/04/2014 and 10/17/2014) are merely the dates the information/data was provided to the FAA. A determination on the cases has not been issued yet.

Gordon Wong
FAA Honolulu Airports District Office
Tel: 808-541-3565
Fax: 808-541-3566

APPENDIX B
TRAFFIC ASSESSMENT REPORT

TRAFFIC ASSESSMENT REPORT
NĀ PUA MAKANI WIND FARM

Kahuku, O‘ahu, Hawai‘i
Tax Map Keys: 5-6-006:018, 047, 051, 055, 5-6-005:018, and 5-6-008:006

January 2015
Revised January 2016

Prepared for:
Champlin Oahu Wind Holdings LLC
2020 Alameda Padre Serra, Suite 123
Santa Barbara, CA 93102

Prepared by:
BELT COLLINS HAWAII LLC
2153 North King Street, Suite 200
Honolulu, Hawai‘i 96819

2014-33-1000

1 INTRODUCTION

This report summarizes the analysis and findings of a traffic assessment for the Nā Pua Makani Wind Farm. This traffic assessment describes the potential traffic impacts during construction and when the project is completed under seven (7) different scenarios, which are based upon the type and quantity of wind turbine generators (WTG) that could be installed.

2 PROJECT DESCRIPTION

The Nā Pua Makani Wind Farm project (Project) is located at the northeast coast of Oʻahu, in Kahuku Town, Tax Map Key (TMK) 5-6-006:018, 047, 051, 055, 5-6-005:018, and 5-6-008:006. See Figure 1 – Location Map. The 707 acre project area is approximately 9,000 feet inland from the coast on a steep sloping ridge with elevations ranging from 13- to 400-feet above mean sea level. There are two proposed access points to the project site off the mauka side of Kamehameha Highway; one will be off an existing paved road owned by the State of Hawaiʻi, Department of Agriculture, just south of Kiʻi Stream Bridge (Proposed Access 1) and the other off a private dirt road between Enos Road and the Mālaekahana Stream Bridge (Proposed Access 2).

Three alternatives evaluated in the Project EIS: Alternative 1 – No Action, Alternative 2 – Proposed Action Wind Project of up to 10 turbines (up to approximately 25 megawatts (MW)), and Alternative 3 – Larger Generation Wind Project of up to 12 turbines (up to 42-MW). Under Alternative 1, there will be no new construction of wind turbines, meteorological towers, supporting structures, and access roadways. Thus, the main focus of this report will only discuss Alternative 2 and 3.

Alternative 2 entails the construction and operation of an approximately 25 MW wind generation facility, consisting of 8 to 10 wind turbines, meteorological tower, operations and maintenance facility, electrical collections system, transmission line, and 16 foot-wide internal access roads. This alternative evaluates construction traffic impacts for three different scenarios (scenarios 1-3), each of which use a specific WTG. Construction would begin in the fourth quarter of 2016 and would be in full operation by the end of 2017. In response to public comments, the Project proponent also evaluated a Modified Proposed Action option (Scenario 2a), which reduces the maximum number of turbines to 9 based on usage of an uprated Siemens turbine model with greater generating capacity. All other project components and details would be the same as under the Proposed Action. The following lists the quantity and models to be evaluated under all 4 scenarios.

Scenario	WTG Manufacturer	Model	Quantity
1	General Electric (GE)	GE 2.85-103	10
2	Siemens	3.0-108	10
2a	Siemens	3.3-130	9
3	Vestas	V110 V117	3 5

Alternative 3 entails the construction and operation of an approximately 42 MW wind generation facility, consisting of up to 12 wind turbines, meteorological tower, operations and maintenance

facility, electrical collections system, transmission line, and 16-foot-wide access roads using compacted gravel. It evaluates the impacts for a phased build out plan, whereby phase 1 would begin construction on one of the scenarios by 2016 similar to Alternative 2; then phase 2 would construct additional WTG's of the same manufacturer. Construction of the second phase would start at the beginning of 2020 with operation of those WTGs starting towards the end of 2020. The following lists the number and model of each WTG constructed in each phase for the four scenarios.

Scenario	WTG Manufacturer	Model	Phase 1 Quantity	Phase 2 Quantity	TOTAL
1	General Electric (GE)	GE 2.85-103	10	2	12
2	Siemens	3.0-108	10	2	12
2a	Siemens	3.3-130	9	0	9
3	Vestas	V110 V117	3 5	0 4	12

3 EXISTING TRAFFIC CONDITIONS

Kamehameha Highway (Highway 83) is a two-lane undivided State highway that provides the only access around the north side of Oʻahu from Haleʻiwa to Kahaluʻu. The lanes on this highway are 12' wide and have mostly grassed shoulders with some paved shoulders. Posted speed limits along the roadway vary between 25 and 45 miles per hour (mph) and generally have lower speed limits near towns and schools. The posted speed limit at the entrance to the project site is 35 mph.

Existing traffic volume data was retrieved from the State of Hawaiʻi Department of Transportation (HDOT), which collects 24-hour traffic count volumes at various locations throughout the island. The nearest HDOT count station to the project site is along Kamehameha Highway at the Mālaekahana Stream bridge and was conducted in 2013. The following table provides the morning and afternoon peak hour volumes as well as the 24 hour volumes at this station. The morning peak hour was between 7:00 to 8:00 a.m. and the afternoon peak was between 3:45 and 4:45 p.m.

Existing 2013 Traffic Counts

Time	Total Traffic Volume (Both Directions)
AM Peak Hour (7:00 – 8:00 a.m.)	1,095
PM Peak Hour (3:45 – 4:45 p.m.)	1,012
24 hour	12,187

Source: State of Hawaiʻi, Department of Transportation, Highways Division.

Traffic volumes taken by HDOT on previous years are also included in Appendix A and shows that the 2013 data is in line with previous years. The morning peak has also been consistent, while the afternoon peak is trending later. The 24 hour volumes are also showing the modest increase in traffic over the 12 years of available data.

4 FUTURE BASELINE TRAFFIC CONDITIONS

Future baseline conditions have been established for the year 2017 and 2020, when full operations of the project alternatives are expected. Based on the Oʻahu Regional Transportation Plan, other Traffic Impact Reports obtained from projects in the area, and the historical HDOT traffic data the average regional traffic for Kahuku is expected to increase 1.23% annually. Therefore, the future baseline traffic volumes, which are also considered Alternative 1, at the Mālaekahana Bridge are anticipated to be the following:

Future Baseline Traffic

Time	2017 Total Traffic Volume (Both Directions)	2020 Total Traffic Volume (Both Directions)
AM Peak Hour (7:00 – 8:00 a.m.)	1,150	1,193
PM Peak Hour (3:45 – 4:45 p.m.)	1,063	1,102
24 Hour	12,797	13,275

5 PROJECT TRAFFIC

The proposed project would generate vehicle traffic on roadways in the vicinity throughout the estimated 6 to 12 month construction period as well as once the WTGs are in full operation. Access to the project site is from the mauka side of Kamehameha Highway just south of Kiʻi Stream Bridge (Proposed Access 1) as well as just north of the Mālaekahana Stream Bridge (Proposed Access 2). The first 5 WTG's would likely use the access just south of Kiʻi Stream Bridge, while the rest of the WTG's would utilize the access north of Mālaekahana Stream Bridge.

5.1 CONSTRUCTION RELATED TRAFFIC

Construction related traffic to build the proposed project would include the transporting of the major components to build the WTGs from Kalaeloa Harbor, hauling in cement and aggregate for the foundations, other miscellaneous deliveries, and employee related traffic.

The major components to build the WTGs include the blade, tower, nacelles, and electrical transformer. These will be transported by sea and offloaded at Kalaeloa Harbor, which is a heavy lift berthing facility located on the Western Coast of Oʻahu. Due to the size and weight of these components permits to transport these oversized and/or overweight loads would need to be obtained from both HDOT and the City and County of Honolulu. The following are anticipated requirements of the permit:

- The roundtrips must be performed Monday through Saturday between the hours of 9:00 p.m. and 5:00 a.m. with all equipment off the roadways between the hours of 5:00 a.m. and 9:00 p.m.
- No oversized loads are allowed to be transported on Sundays or holidays.
- A minimum of 4 police escorts per load are required to help the oversized load navigate turns.

- Police escorts and/or flagmen must provide traffic direction at the entrance to the wind farm site during construction.

The following is a table noting the number of nighttime roundtrips and how many days it would take in order to get all the equipment to the project site.

Anticipated Nighttime Roundtrip Oversized Truck Trips

Alternative	Construction Related Oversized Truck Trips between 9 p.m. to 5 a.m.	Total Days
Alternative 1 – No Action	0	0
Alternative 2 – 10 GE WTGs	100	20
Alternative 2 – 10 Siemens WTGs	90	18
Alternative 2 – 8 Vestas WTGs	77	16
Alternative 2a – 9 Siemens WTGs	108	22
Alternative 3 – 12 GE WTGs	Phase 1 – 100 Phase 2 – 20	Phase 1 – 20 Phase 2 – 4
Alternative 3 – 12 Siemens WTGs	Phase 1 – 90 Phase 2 – 20	Phase 1 – 18 Phase 2 – 4
Alternative 3 – 12 Vestas WTGs	Phase 1 – 77 Phase 2 – 40	Phase 1 – 16 Phase 2 – 8

Note: Assume an average of 5 truck trips could be made each day.

Three proposed routes from Kalaeloa Harbor to the project site were identified by ATS International in transporting the WTG's oversized nacelle component, the tower section or nacelle components, and the blade components (see Figure 2 – Proposed Truck Routes).

The following directions for route 1 would be used to transport the oversized nacelle components, which would be transported using a 19-axel trailer. In their January 2016 route study update ATS concluded that this route could be eliminated unless a 19 axel truck is required to transport a part, otherwise the tower and nacelle parts could utilize route 2.

1. Continue straight out of the Grace Pacific gate onto Hanua Street
2. Turn left on Kauhi Street toward Kalaeloa Boulevard
3. Turn left on Kalaeloa Boulevard
4. Merge onto H-1 East
5. Take Exit 5 to Kunia Waipahu/'Ewa
6. Turn left onto Kunia Road
7. Continue on Kunia Road to Wilikina Drive
8. Turn left on Wilikina Drive
9. Turn right on Kamananui Road
10. Continue north on Kamehameha Highway
11. Continue on Kamehameha Highway to Joseph P. Leong Highway (Highway 99)
12. Continue on Highway 99 to Kamehameha Highway East (Highway 83)

13. Continue on Highway 83 to proposed entrance to the wind farm

The following direction for route 2 would be used to transport the taller tower section and nacelle components.

1. Continue straight out of the Grace Pacific gate onto Hanua Street
2. Turn left on Kauhi Street toward Kalaeloa Boulevard
3. Turn left on Kalaeloa Boulevard
4. Merge onto H-1 East
5. Continue on H-1 East and stay in the right lane
6. Take Exit 8C for Kamehameha Highway North
7. Turn right on Ka Uka Boulevard
8. Turn left onto H-2 North
9. Continue on H-2 North to Wilikina Drive
10. Continue on Wilikina Drive to Kamananui Road
11. Turn right on Kamananui Road
12. Continue north on Kamehameha Highway
13. Continue on Kamehameha Highway to Joseph P. Leong Highway (Highway 99)
14. Continue on Highway 99 to Kamehameha Highway East (Highway 83)
15. Continue on Highway 83 to proposed entrance to the wind farm.

And finally, the following directions for route 3 would be used to transport the wind turbine blade components.

1. Continue straight out of the Grace Pacific gate onto Hanua Street
2. Turn left on Kauhi Street toward Kalaeloa Boulevard
3. Turn left on Kalaeloa Boulevard
4. Merge onto H-1 East
5. Continue on H-1 East and stay in the left lane to merge onto the H-2 North
6. Take Exit 8B for H-2 North to Mililani and Wahiawā
7. Continue on H-2 North to Wilikina Drive
8. Continue on Wilikina Drive to Kamananui Road
9. Turn right on Kamananui Road
10. Continue north on Kamehameha Highway
11. Continue on Kamehameha Highway to Joseph P. Leong Highway (Highway 99)
12. Continue on Highway 99 to Kamehameha Highway East (Highway 83)
13. Continue on Highway 83 to the proposed entrance to the wind farm.

Transport of the oversized components would require tree trimming, sign relocation, and overhead utility lines adjustments in order to provide a clear route. ATS has identified Kalaeloa Boulevard, Kauhi Street, Ka Uka Boulevard, and Kamehameha Highway as having trees that may need trimming to a clearance height minimum of 16 feet and 6 inches prior to transport of the equipment. The left turn onto Kamehameha Highway at Kamananui Road, the left turn onto Wilikina Drive, and the right turn at Ka Uka Boulevard would require police escorts to block traffic

in order for the truck to make the turns. Additionally, based upon the type of WTG chosen, some temporary roadway improvements like asphalt curb removal, guardrail relocation, or relocation of a traffic signal and roadway signs may be required since transport dimensions of each part vary by manufacturer and model. After all deliveries are made all temporary improvements shall be restored to previous existing conditions. ATS also recommended that prior to transport of the oversized components that a "high pole" survey be conducted to confirm and identify any new trees or wires that need to be trimmed or raised, respectively, that were not identified in their January 2016 report.

ATS was also informed by HDOT that the Paumalu Bridge along Kamehameha Highway near Sunset Beach had been derated and no overweight loads would be allowed to cross the structure. Per further discussions with HDOT a longer truck with more axels to spread the load or a structural analysis on the bridge would need to be analyzed further for use of the Paumalu Bridge. At the access roads to the proposed site additional improvements to the entrance roadways to clean,fill, and smooth out the grades would be needed along with tree trimming.

Traffic estimates that include passenger vehicles, such as those due to construction workers arriving or departing the work site, as well as cement or aggregate deliveries, and building component or substation deliveries were developed based upon estimated quantities for materials. Cement and aggregate deliveries would come from Hālawa, while other deliveries are also expected to originate from Honolulu. Construction workers are also expected to work between the hours of 7:00 a.m. and 3:30 p.m. with approximately 90% arriving to the site before the morning peak hour and the remaining 10% during the peak. It was also assumed that approximately 90% of the construction trips would occur just before the pm peak hour at 3:30 p.m. when they would be leaving work and 10% during the peak. During daylight hours the following average and maximum daytime round trips are anticipated during construction for all scenarios of Alternatives 2 and 3.

Anticipated Average Daytime Trips

Construction Trips	Average Number of Round Trips Per Day	AM Peak Hour Trips (7-8am)	PM Peak Hour Trips (3:45-4:45pm)
Cement	50	5	5
Aggregate	50	5	5
Substation	1	0	0
Building Components	2	1	0
Miscellaneous Deliveries	1	0	0
Construction Workers	40	4	4
TOTAL TIRPS	**144**	**15**	**14**

Note: Assumed 10% of the daytime truck trips would occur during the peak hours.

Anticipated Maximum Daytime Trips

Construction Trips	Average Number of Round Trips Per Day	AM Peak Hour Trips (7-8am)	PM Peak Hour Trips (3:45-4:45pm)
Cement	50	5	5
Aggregate	50	5	5
Substation	1	0	0
Building Components	2	1	0
Miscellaneous Deliveries	1	0	0
Construction Workers	100	10	10
TOTAL TIRPS	**154**	**21**	**20**

Note: Assumed 10% of the daytime truck trips would occur during the peak hours.

Assuming the rate at which the WTGs are constructed is the same for 2016 and 2019, all scenarios in both alternatives would have similar anticipated average and maximum daytime construction trips. The following table provides a comparison of the anticipated volumes to the baseline traffic volumes in the morning and afternoon peak hours and for a 24 hour period for construction in 2017 and 2020.

Percentage of Peak Project Construction Trips to Baseline Traffic

Time	2017	2020
AM Peak Hour (7:00 – 8:00 a.m.)	1.8%	1.8%
PM Peak Hour (3:15 – 4:15 p.m.)	1.9%	1.8%
24 Hour	2.4%	2.3%

Based upon the HDOT's Best Practices for Traffic Impact Reports (TIR), a typical trigger for preparing a TIR is 100 or more new peak hour trips or 500 daily trips. Based upon the trip numbers calculated and the percentage of the total traffic along Kamehameha Highway, the project will not meet this trigger and is therefore not expected to cause a significant impact.

5.2 PROJECT TRAFFIC

When the WTGs are in full operation there will be approximately three to six full time operations and maintenance employees on the site. Their typical work hours would be between 7:00a.m. and 5:00 p.m. and at the most would result in 6 round trips per day. These employees were estimated to be sufficient manpower to handle daily maintenance for up to 12 WTGs on the site. Their total daily trips would account for less than 0.6% of the future 2017 and 2020 traffic loads on Kamehameha Highway for all alternatives.

Percentage of Project Trips to Baseline Traffic

Time	2017	2020
AM Peak Hour (7:00 – 8:00 a.m.)	0.52%	0.50%
PM Peak Hour (3:45 – 4:45 p.m.)	0.56%	0.54%
24 Hour	0.09%	0.09%

6 CONCLUSION

The proposed project will result in minor construction related impacts due to the transportation of large equipment and materials. The net effects of these impacts were found to be minimal because the oversized WTG components would be delivered at night. A less than 3% increase in traffic on Kamehameha Highway due to construction during the morning and afternoon peaks would not result in a significant increase and would be temporary. Project related traffic once the WTGs are in full operation is also not expected to have any significant impacts to Kamehameha Highway due to the low volume of employees that would access the site. The following table summarizes the traffic impacts showing the percentage of project trips to the estimated base year traffic volumes.

Summary of Impacts – Percentage of Project Trips to Baseline Traffic

		Alternative 1 No Action	Alternative 2 (All 4 scenarios)	Alternative 3 (All 4 scenarios)
Construction Impacts	AM Peak	0	1.8%	Phase 1 – 1.8% Phase 2 – 1.8%
	PM Peak	0	1.9%	Phase 1 – 1.9% Phase 2 – 1.8%
	24 Hour	0	2.4%	Phase 1 – 2.4% Phase 2 – 2.3%
Project Impacts	AM Peak	0	0.53%	Phase 1 – 0.52% Phase 2 – 0.50%
	PM Peak	0	0.57%	Phase 1 – 0.56% Phase 2 – 0.54%
	24 Hour	0	0.09%	Phase 1 – 0.09% Phase 2 – 0.09%

7 REFERENCES

Anderson Trucking Services, Inc*, Nā Pua Makani Transport Route Review*, June 6, 2014.

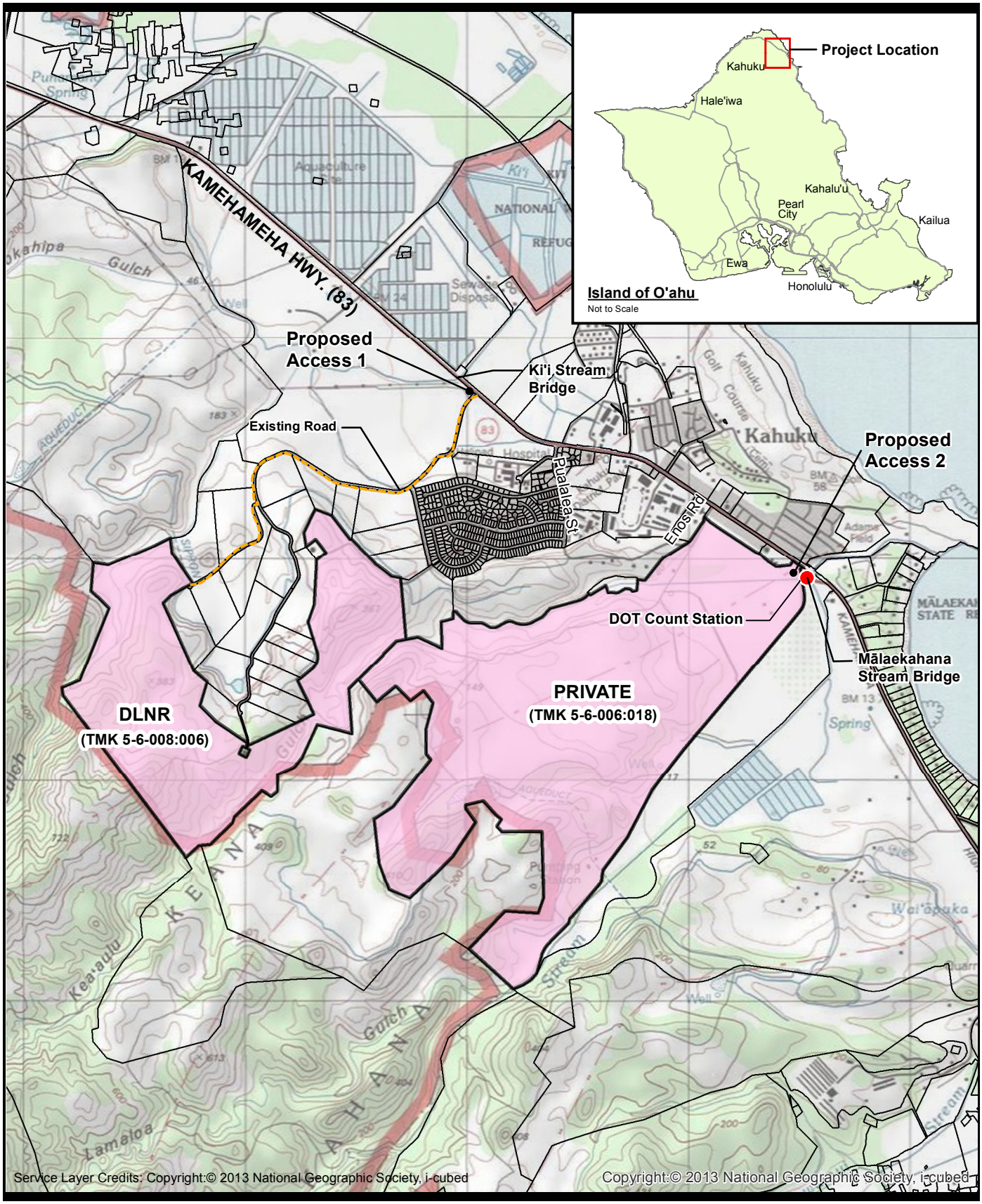
Anderson Trucking Services, Inc*, Nā Pua Makani Wind Farm*, January 19, 2016.

Hawaiʻi Department of Transportation, *Hawaii Department of Transportation Best Practices for Traffic Impact Reports,* May 2011.

Oʻahu Metropolitan Planning Organization, *Oahu Regional Transportation Plan 2035,* April 2011.

The Traffic Management Consultant, *Revised Traffic Impact Analysis Report for the Proposed Turtle Bay Resort Master Plan,* November 2012, amended May 2013.

Document Path: M:\Na Pua Makani Wind Farm\2014331001 Drainage Study\04 Graphics\GIS\Location Map_2.mxd



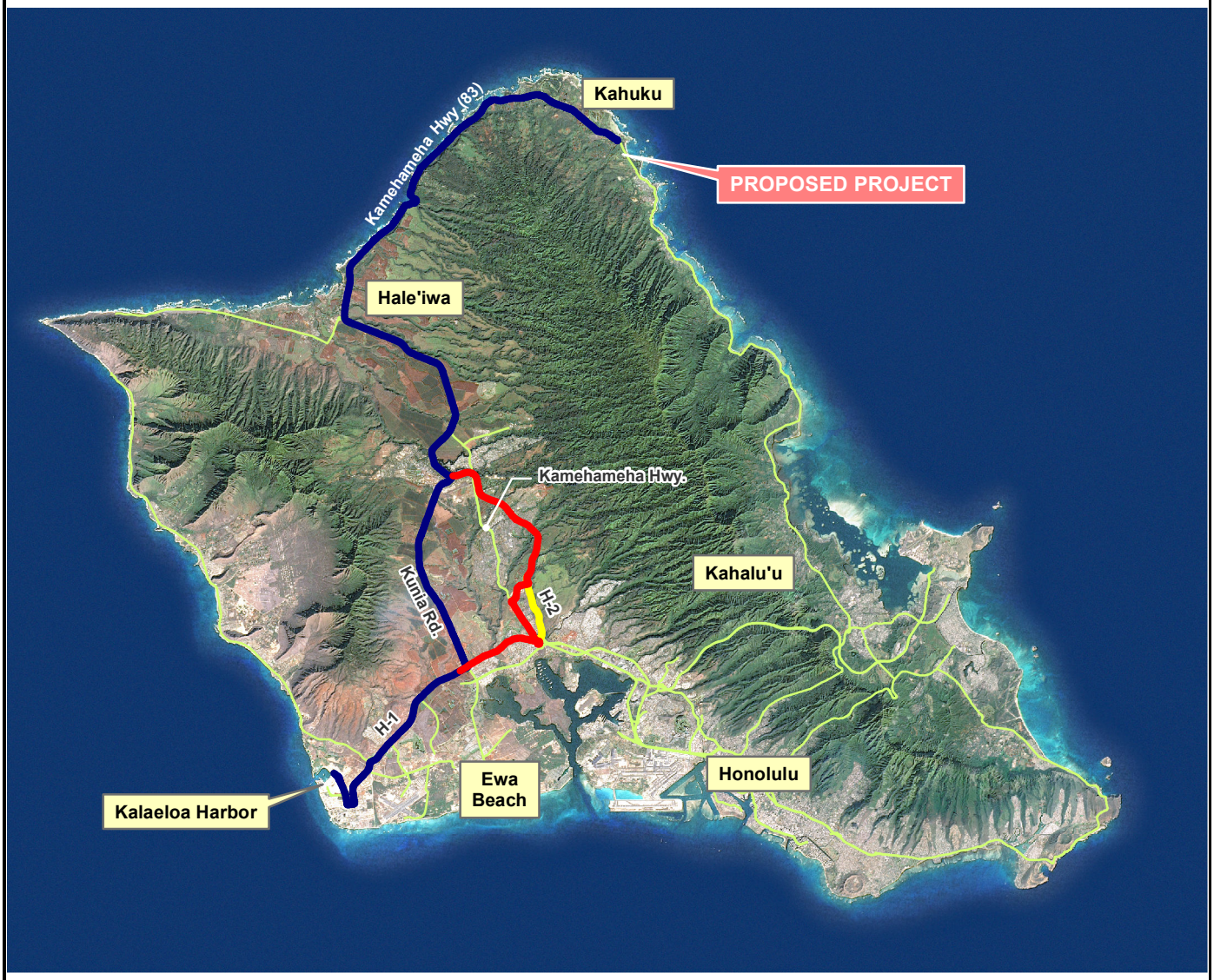
NORTH

0 500 1,000 2,000
SCALE IN FEET

Figure 1

LOCATION MAP

Nā Pua Makani Wind Farm
Champlin Hawaii Wind Holdings LLC
January 2015



LEGEND

- Route 1
- Route 2
- Route 3

BELT COLLINS

NORTH

0 7,500 15,000 30,000

SCALE IN FEET

Figure 2

PROPOSED TRUCK ROUTES

Nā Pua Makani Wind Farm
Champlin Hawaii Wind Holdings LLC
January 2015

APPENDIX A – DOT TRAFFIC COUNT DATA

	PROJECT:	Nā Pua Makani Wind Farm		JOB NO:	2014-33-1000	
	CLIENT:	Champlin Hawaii Wind Holdings LLC		DATE:	7-May-14	
	SUBJECT:	DOT Count Data		BY:	LN	
	FILE:	M:\Na Pua Makani Wind Farm\2014331000 Traffic Study\05 Basis of Design\Reference Docs\DOT Traffic Count Stations\[DOT Count Data.xlsx]Malaekahana Bridge				
Site ID:	B72008301618, 26-E					
Location:	Kamehameha Highway at Malaekahana Bridge					
	AM Peak		PM Peak		24 Hour	
YEAR	Volume	Peak Hour	Volume	Peak Hour	Volume	Rate/year
2001	617	n/a	764	n/a	9,240	
2004	685	n/a	1,018	n/a	11,340	7.6%
2005	845	n/a	1,070	n/a	12,112	6.8%
2006	654	n/a	934	n/a	10,867	-10.3%
2007	689	7:00am	865	3:00pm	10,640	-2.1%
2009	875	7:15am	944	3:15pm	10,943	1.4%
2011					12,200	5.7%
2012	1,055	7:00am	1,014	3:30pm	12,335	1.1%
2013	1,095	7:15am	1,012	3:45pm	12,187	-1.2%
				Average growth per year=		1.1%

APPENDIX C
FIRE MANAGEMENT PLAN

Author: Andrew M. Beavers
Fire Ecology and Management Specialist
Center for Environmental Management of Military Lands
Colorado State University, Fort Collins, CO 80523-1490

Date of Draft: 3-18-14

Na Pua Makani Fire Management Sections

Goals and Objectives

The goal of the fire measures outlined below is to mitigate the fire risk posed by construction and operation of the Na pua Makani Wind Farm. To achieve this goal, the following objectives have been defined:

1. Use engineering and maintenance of the wind farm infrastructure to limit fire ignitions from the wind farm infrastructure to an average of less than one per decade.
2. Use industry accepted best management practices to minimize the probability of ignitions during construction.

Background

The Na Pua Makani Wind Farm will introduce additional machinery, electrical infrastructure, and human activity to the project area. Parts of the project area have historically been exposed to very little human presence and this additional activity will potentially slightly increase the fire risk. The following sections are intended to mitigate the additional fire threat posed by construction and operation of the wind farm. Fire mitigation may occur via education; mechanical, chemical, or biological manipulation of the vegetation (hereafter 'fuels'); or construction of barriers to fire such as firebreaks. Fire mitigation should always be commensurate with the threat posed by the activity in question and the values at risk.

Fire Weather Analysis

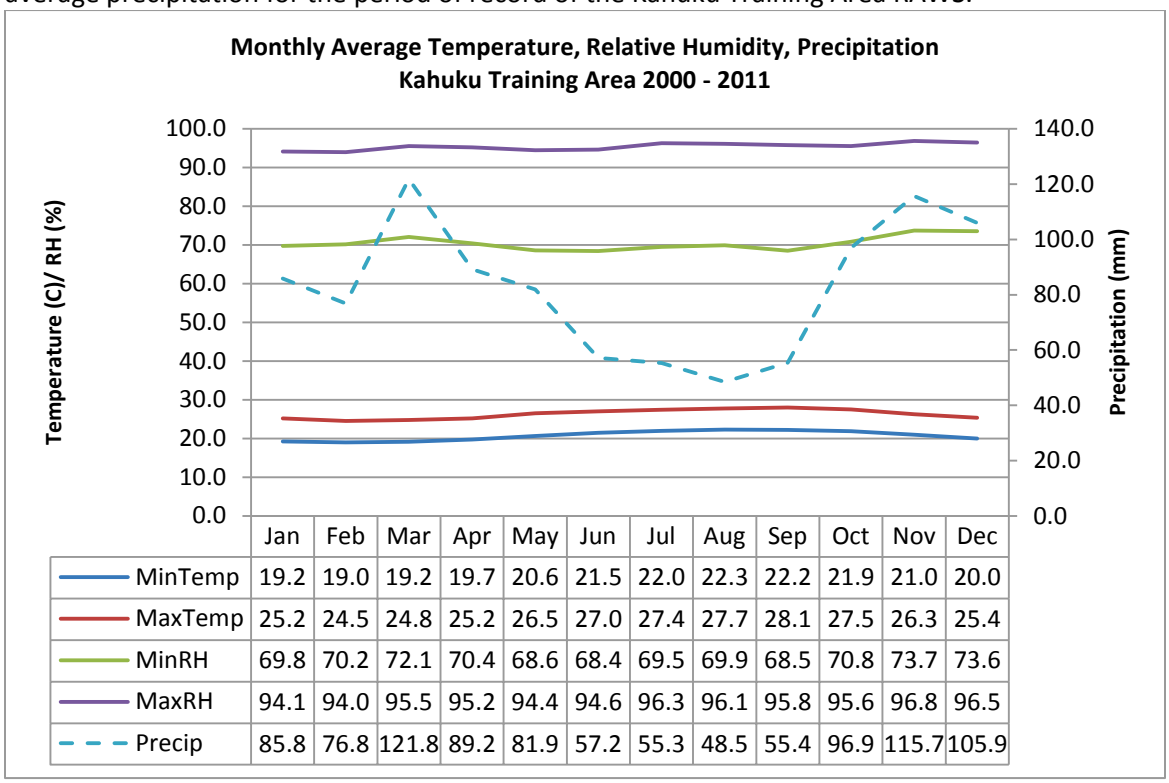
Period of record weather data was collected from the meteorological towers installed for the wind farm project as well as from the Kahuku Training Area Remote Automated Weather Station (RAWS). Wind analyses were run with data from the meteorological towers. These towers do not provide a full suite of weather data, so all other analyses were run using data from the Kahuku Training Area RAWS. Wind monitoring heights at the wind farm towers are higher (10 m) than typically used for fire weather analyses (6.09 m), so a power law correction factor was used to adjust wind speeds for the drag factors associated with interaction with surface features (Masters 2013).

Maximum and minimum temperature and maximum and minimum relative humidity are nearly constant throughout the year (Figure 1). Average nighttime humidity recovery is very good, as demonstrated by maximum relative humidity levels in excess of 90%. This indicates that most fires will either go out or become inactive at night. Average minimum relative humidity is very high as well, with monthly average minimum relative humidity never dropping below 65%. This usually translates into dead fuel moisture that remains quite high the majority of the time, minimizing the potential for fire spread. However, in this case high wind speeds increase the drying effect of the air and therefore decrease fine fuel moisture measurements. Wind speeds are very high throughout the year and wind

direction is overwhelmingly dominated by the easterly trade winds (Figure 2). It is the effect of these high winds that results in lower than expected 1 hour fuel moisture measurements (Table 1).

Precipitation is concentrated in the winter months with a drier, though still quite moist, period from June through September. Even during this period, average rains are > 4 cm per month. Live herbaceous moisture is high (> 120%) virtually without exception (Table 1) indicating that fire behavior will generally be dampened by the presence of live fuels.

Figure 1. Monthly average minimum and maximum temperature and relative humidity and monthly average precipitation for the period of record of the Kahuku Training Area RAWS.

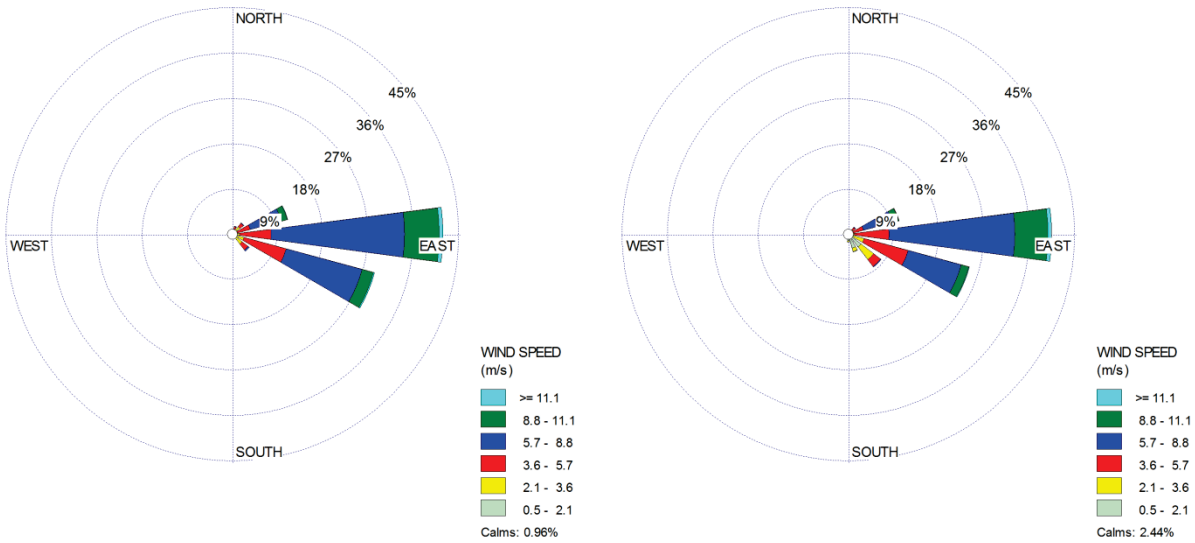


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
MinTemp	19.2	19.0	19.2	19.7	20.6	21.5	22.0	22.3	22.2	21.9	21.0	20.0
MaxTemp	25.2	24.5	24.8	25.2	26.5	27.0	27.4	27.7	28.1	27.5	26.3	25.4
MinRH	69.8	70.2	72.1	70.4	68.6	68.4	69.5	69.9	68.5	70.8	73.7	73.6
MaxRH	94.1	94.0	95.5	95.2	94.4	94.6	96.3	96.1	95.8	95.6	96.8	96.5
Precip	85.8	76.8	121.8	89.2	81.9	57.2	55.3	48.5	55.4	96.9	115.7	105.9

Table 1. Percentile weather data for the period of record of the Kahuku Training Area RAWS.

Percentile	Temperature (°C)	RH (%)	Windspeed (m/s)	1 hr. Moist. (%)	Live Herb. Moist. (%)
97	28	56	10.3	7	131
90	28	61	8.9	8	162
80	27	65	8.0	9	180
50	26	74	6.3	10	231

Figure 2. Daytime (0700 – 1800, left) and nighttime (1800 – 0700, right) wind roses for the period of record of the Na Pua Makani Wind Farm meteorological towers. Wind speeds have been adjusted for surface drag from 10 m to 6.09 m.



Fuels

Fuels within the project area include a variety of grass, grass/shrub, and shrub fuel matrices as well as small patches of timber. The substation, construction staging area, operations and maintenance building and storage yard, and two of the nine Phase I wind turbines are located in the midst of existing agricultural fields, which are generally unburnable as currently utilized. The remaining seven turbines are located within grass, grass/shrub, and timber fuels. All of the wind farm infrastructure will be on concrete or gravel pads.

Even in the timber and shrub fuels, grasses comprise a substantial portion of the surface fuels which tend to be primarily responsible for the forward spread of a fire. The grasses are mostly guinea grass (*Megathyrsus maximus*) and California grass (*Urochloa mutica*). These grasses can be highly flammable when cured. There are some pockets of ironwood (*Casuarina equisetifolia*) and eucalyptus (*Eucalyptus spp.*) which both are capable of contributing to fire control problems under dry conditions. However, the climatic conditions necessary to produce problematic fire behavior in these vegetation types are rare on this part of Oahu due to the previously noted substantial precipitation and high relative humidity throughout the year.

Fire History

The Kahuku Training Area abuts the proposed project area to the west and covers 3,680 ha. Military training there has resulted in a total of 10 wildfire ignitions since 2000. The largest of these fires grew to 1.4 ha and the average fire size was 0.46 ha. However, military training is far more ignition-prone than wind turbine construction or operation and access in Kahuku Training Area for firefighters is far more difficult than it will be within the proposed project area. As a result, fires at Kahuku Training area have additional time to grow prior to any suppression action relative to what is predicted for the project area.

Outside of Kahuku Training Area, but within five kilometers of the project area on the east side of the Koolau Mountains ridgeline, there have been a total of 104 recorded fires since 2001. These have averaged 0.42 ha in size. The largest three fires were 10.1, 4, and 3.2 ha.

Values at Risk

There is a community of homes to the north of the project area, due north of the proposed substation. The closest homes are 450 m away from the nearest possible ignition source.

A United States Fish and Wildlife Service data layer depicting federally listed species density indicates that approximately half of the proposed project area lies in the 'little or no' federally listed species zone. The other half lies in the 'low concentration' of federally listed species zone. The shortest distance between a possible ignition source within the project area and the 'medium concentration' of federally listed species zone is 1.5 km. The shortest distance between a possible ignition source within the project area and the 'high concentration' of federally listed species zone is 2.6 km.

Fire Risk Analysis

Fire behavior within the project area is mitigated by the moist conditions. Using weather data from the Kahuku RAWS, an analysis of potential fire behavior under 50th, 80th, and 97th percentile weather conditions found minimal fire activity (Table 2). Even under 97th percentile conditions, probability of ignition is extremely low at 43%; weather at this extreme normally produces ignition probabilities in excess of 90%. These conclusions are corroborated in the fire history by the relatively few fires in the area (on average 10 per year in an area of roughly 50 km^2) and their small size (<1 ha on average).

Table 2. Fire behavior outputs from BehavePlus (Andrews and Chase 1989) under 50th, 80th, and 97th percentile weather conditions for fuels found within the project area. Fuel model identifiers (in parentheses) are per Scott and Burgan 2005.

Fuels		Fire Behavior (Rate of Spread (km/hr))/Flame Length (m)/Probability of Ignition (%))		
Fuel Model	Vegetation Represented	50th Percentile Weather	80th Percentile Weather	97th Percentile Weather
High load, coarse humid climate grass (GR8)	Heavy grass fuels	0.024/0.24/31	0.036/0.30/36	0.048/0.34/43
Moderate load, humid climate timber-shrub (TU2)	Christmas Berry shrublands and broadleaf forest	0.150/0.82/31	0.217/0.98/36	0.314/1.19/43
Long-needle litter (TL8)	Ironwood forest	0.066/0.73/31	0.087/0.82/36	0.115/0.94/43

The likelihood of a wildfire ignition during construction or operation of the project is very low. Sparks from welding and other construction activities are the most likely source. Once operating, all electrical lines will be below ground making an ignition from transmission lines impossible. There are very rare instances in which a wind turbine may catch fire, but these cases are exceptional, in part because there is a very large financial incentive for the operator to avoid this scenario.

Should a fire start, even under 97th percentile conditions it is exceedingly unlikely that it would harm any resources at risk. Despite their relative proximity, homes in the area are at very little risk due to the

highly consistent wind direction which would blow any fire westward, away from the homes to the north (see Figure 2). Rates of spread on the flanks of the fire would be a fraction of those enumerated in Table 2, which lists the rate of spread at the head of the fire (the fastest spreading portion of the fire). The 'medium density' federally listed species zone that lies downwind from the project area is 1.5 km away from the closest proposed turbine pad. Under 97th percentile conditions, it would take over 4.5 hours for a fire to reach the edge of this zone. However, 97th percentile conditions rarely persist for more than two or three hours resulting in even longer travel times to these sensitive resources. Based on an assumption of an elliptical fire shape with a length 4 times the width (very likely a substantial over-estimation of the distance traveled), the largest fire recorded fire in the Kahuku area would have traveled 717 meters indicating that the resources in the area are at little to no risk.

Considering the low probability of an ignition source from construction or operation activities, the low probability of ignition should a firebrand (spark, cigarette, etc.) come into contact with the fuels (Table 2), the low probability of conditions conducive to rapid fire spread (Table 2), and the lack of persistence of such weather conditions over a period of more than a few hours, the overall likelihood of a fire impacting any resource in the area is very small. Probabilities such as these are multiplicative, such that small probabilities compound one another and in a situation such as this, the overall probability becomes very small.

Fire Prevention Requirements

Because the probability of wildfire is so low, no measures beyond normal construction best management practices are required to mitigate the threat. The below measures are specific to fire and shall be practiced throughout the life of the project.

- All heavy equipment and construction vehicles will carry a fire extinguisher as part of their standard equipment. These will allow employees to combat vehicle fires and prevent spread to vegetative fuels.
- Gas powered (non-diesel) vehicles will not be parked in vegetation greater than 10 cm (4 inches) in height. This will prevent catalytic converters from contacting vegetation and igniting a wildfire.
- Smoking will be prohibited on the work site except unvegetated areas and no less than 5 m (~16 ft) from the nearest vegetation or inside a vehicle. Cigarettes smoked in vehicles will be disposed of within the vehicle.
- All internal combustion engines will utilize spark arrestors.
- All welding, grinding, and other spark producing activities will occur no less than 5 m (~16 ft) from the nearest vegetation.
- Exposed aerial welding (e.g. not inside the tower or the nacelle) at more than 15 m (~50 ft) above the ground will be restricted to times when sustained winds are less than 11 m/s (~25 mph) OR when relative humidity is greater than 80%.
- Maintenance of mechanical and electrical systems within the turbine and nacelle will occur regularly, as recommended by the manufacturer, to limit mechanical failures that can result in equipment fires which could then spread to nearby vegetation.

Fuels Management Requirements

Due to the very low probability of ignition and the minimal fire behavior expected should an ignition occur, no special fuels management is justified. Fuels management around the turbine towers and other infrastructure will be carried out per operations procedures identified elsewhere in this EIS. These measures will benefit fire risk mitigation goals by eliminating or reducing vegetation near wind farm infrastructure.

Description of Fire Fighting Resource Availability

The project area falls within the response area of Station 13 of the City and County of Honolulu Fire Department (HFD), Kahuku Fire Department. The department maintains a 24 hour response capability and is staffed and equipped in accordance with HFD protocols. Assuming a rate of travel of 24 kmh (15 mph), response time to the project boundary is estimated to be less than 3 minutes, to the substation less than 5 minutes, and to the furthest turbine location less than 12 minutes.

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APPENDIX D
NOISE IMPACT ASSESSMENT

Na Pua Makani Wind Farm

Honolulu County, Hawaii

Prepared for

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2020 Alameda Padre Serra, Ste. 123
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July 2014

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Appendix A – Field Equipment Calibration Sheets

1.0 INTRODUCTION

Champlin/GEI Wind Holdings, LLC (Champlin) is proposing to construct and operate the Na Pua Makani Wind Energy Project (the "Project") in Honolulu County, Hawaii. The proposed Project would implement one of two wind turbine generator (WTG) models, quantity, mega-watt (MW), hub-height and rotor diameter as shown in Table 1:

Table 1. Project WTGs under Consideration

Model	Quantity Alt. 2	Quantity Alt. 2a	Quantity Alternative 3	MW Output per WTG	Hub-height (m)	Rotor Diameter (m)
Vestas V110-2.0	2		2	2.0	80	110
Siemens SWT 3.0-113	8		10	3.0	92.5	113
Siemens SWT 3.3-130	-	9		3.3	85, 115, or 135	130

Vestas 2013, Siemens 2013, Siemens 2015

The Project design configurations under consideration translate to a potential power output of approximately 26 (Alternative 2) to 30 (Alternative 3) MW, depending on WTG type and quantity. This noise impact assessment provides a description of the existing acoustic environment, noise impact criteria, acoustic analysis methodology, construction and operational noise levels, and conclusions and mitigation recommendations.

1.1 Environmental Noise Descriptors

Sound levels are presented on a logarithmic scale to account for the large range of acoustic pressures that the human ear is exposed to and is expressed in units of decibels (dB). A decibel is defined as the ratio between a measured value and a reference value usually corresponding to the lower threshold of human hearing defined as 20 micropascals (μPa). Broadband sound includes sound energy summed across the entire audible frequency spectrum. In addition to broadband sound pressure levels, analysis of the various frequency components of the sound spectrum can be completed to determine tonal characteristics. The unit of frequency is Hertz (Hz), and the limit of human hearing is from 20 Hz to 20,000 Hz. WTGs generally produce mechanical sound at a frequency of 20-30 Hz and a "whooshing" aerodynamic sound in the range of 200-1000 Hz (National Health and Medical Research Council 2013). Typically the frequency analysis for an industrial noise source, such as WTGs, examines 11 octave (or 33 1/3-octave) bands ranging from 16 Hz (low) to 16,000 Hz (high). One third (1/3) octave bands take these octave bands and split them into three, providing a higher resolution and a more detailed description of the frequency content of the sound. Since the human ear does not perceive every frequency with equal loudness, spectrally varying sounds are often adjusted with a weighting filter. The A-weighted filter is applied to compensate for the frequency response of the human auditory system. Existing sound exposure in the Na Pua Makani Wind Farm acoustic analysis area are reported in A-weighted decibels (dBA).

An inherent property of the logarithmic decibel scale is that the sound pressure levels of two separate sources are not directly additive. For example, if a sound of 50 dBA is added to another sound of 50 dBA, the result is a 3-decibel increase (or 53 dBA), not an arithmetic doubling of 100

dBA. The human ear does not perceive changes in the sound pressure level as equal changes in loudness. Scientific research demonstrates that the following general relationships hold between sound level and human perception for two sound levels with the same or very similar frequency characteristics:

1. 1 dBA is the practically achievable limit of the accuracy of sound measurement systems and corresponds to an approximate 10 percent variation in sound pressure. A 1 dBA increase or decrease is a non-perceptible change in sound.
2. 3 dBA increase or decrease is a doubling (or halving) of acoustic energy and it corresponds to the threshold of perceptibility of change in a laboratory environment. In practice, the average person is not able to distinguish a 3 dBA difference in environmental sound outdoors.
3. 5 dBA increase or decrease is described as a perceptible change in sound level and is a discernable change in an outdoor environment.
4. 10 dBA increase or decrease is a tenfold increase or decrease in acoustic energy but is perceived as a doubling or halving in sound (i.e., the average person will judge a 10 dBA change in sound level to be twice or half as loud).

To account for the time-varying nature of environmental noise, a single descriptor known as the equivalent sound level (L_{eq}) is often used. The L_{eq} value is the sound energy average over the complete measurement period. It is defined as the steady, continuous sound level over a specified time that has the same acoustic energy as the actual varying sound levels over the same time. The metrics commonly used for environmental sound studies, including the L_{eq}, are reported as dBA (A-weighted decibels) which is a frequency weighting curve that reflects the response of the human ear to sound frequencies across the entire audible frequency range. The equivalent sound level has been shown to provide both an effective and uniform method for describing time-varying sound levels and is widely used in acoustic assessments of wind energy facilities.

Several other statistical descriptors can also be assessed to provide additional understanding of the existing soundscapes. The statistical sound levels (L_n) provide the sound level exceeded for that percentage of time over the given measurement period. An L_{10} level is often referred to as the intrusive noise level and is the A weighted sound level that is exceeded for 10 percent of the time during a specified measurement period. Perhaps more useful is the L_{90} level, which is the A-weighted sound level that is exceeded for 90 percent of the time during the measurement time period. The L_{90} can be thought of as the quietest 10 percent of any time period and is often referred to as the residual sound level and can be an indicator of the potential of audibility for a new sound source. The L_{max} is the maximum sound level during the measurement period and the L_{min} is the minimum sound levels during the measurement period. Estimates of noise sources and outdoor acoustic environments, and the comparison of relative loudness are presented in Table 2. Table 3 provides additional reference information on acoustic terminology.

Table 2. Sound Pressure Levels (L_P) and Relative Loudness of Typical Noise Sources and Soundscapes

Noise Source or Activity	Sound Level (dBA)	Subjective Impression	Relative Loudness (perception of different sound levels)
Jet aircraft takeoff from carrier (50 ft)	140	Threshold of pain	64 times as loud
50-hp siren (100 ft)	130		32 times as loud
Loud rock concert near stage or Jet takeoff (200 ft)	120	Uncomfortably loud	16 times as loud
Float plane takeoff (100 ft)	110		8 times as loud
Jet takeoff (2,000 ft)	100	Very loud	4 times as loud
Heavy truck or motorcycle (25 ft)	90		2 times as loud
Garbage disposal, food blender (2 ft), or Pneumatic drill (50 ft)	80	Loud	Reference loudness
Vacuum cleaner (10 ft)	70	Moderate	1/2 as loud
Passenger car at 65 mph (25 ft)	65		
Large store air-conditioning unit (20 ft)	60		1/4 as loud
Light auto traffic (100 ft)	50	Quiet	1/8 as loud
Quiet rural residential area with no activity	45		
Bedroom or quiet living room or Bird calls	40	Faint	1/16 as loud
Typical wilderness area	35		
Quiet library, soft whisper (15 ft)	30	Very quiet	1/32 as loud
Wilderness with no wind or animal activity	25	Extremely quiet	
High-quality recording studio	20		1/64 as loud
Acoustic test chamber	10	Just audible	
	0	Threshold of hearing	
Adapted from: Beranek (1988) and USEPA (1971a)			

Table 3. Acoustic Terms and Definitions

Term	Definition
Noise	Unwanted sound dependent on level, character, frequency or pitch, time of day, and sensitivity and perception of the listener. This word adds the subjective response of humans to the physical phenomenon of sound. It is commonly used when negative effects on people are known to occur.
Sound Pressure Level (L_P)	Pressure fluctuations in a medium. Sound pressure is measured in decibels referenced to 20 micropascals, the approximate threshold of human perception to sound at 1000 Hz.
Sound Power Level (L_W)	The total acoustic power of a noise source measured in decibels referenced to picowatts (one trillionth of a watt). Equipment specifications are provided by equipment manufacturers as sound power as it is independent of the environment in which it is located. A sound level meter does not directly measure sound power.
Frequency (Hz)	The rate of oscillation of a sound, measured in units of Hertz (Hz) or kilohertz (kHz). One hundred Hz is a rate of one hundred times (or cycles) per second. The frequency of a sound is the property perceived as pitch. For comparative purposes, the lowest note on a full range piano is approximately 32 Hz and middle C is 261 Hz.
A-Weighted Decibel (dBA)	Environmental sound is typically composed of acoustic energy across all frequencies (Hz). To compensate for the auditory frequency response of the human ear, an A-weighting filter is commonly used for describing environmental sound levels. Sound levels that are A-weighted are presented as dBA in this report.
Propagation and Attenuation	Propagation is the decrease in amplitude of an acoustic signal due to geometric spreading losses with increased distance from the source. Additional sound attenuation factors include air absorption, terrain effects, sound interaction with the ground, diffraction of sound around objects and topographical features, foliage, and meteorological conditions including wind velocity, temperature, humidity and atmospheric conditions.
Octave Bands	The audible range of humans spans from 20 to 20,000 Hertz and is typically divided into octave band center frequencies (Hz) ranging from 31 to 8,000 Hz.
Broadband Sound	The audible range of humans spans from 20 to 20,000 Hz and is typically divided into center frequencies ranging from 31 to 8,000 Hz.

Table 3. Acoustic Terms and Definitions

Term	Definition
Masking	Interference in the perception of one sound by the presence of another sound. At elevated wind speeds, leaf rustle and noise made by the wind itself can mask wind turbine sound levels, which remain relatively constant.
Low Frequency Noise (LFN)	The frequency range of 20 to 200 Hz is typically defined as low frequency noise. Studies have shown that low frequency sound from modern wind turbines is generally below the threshold of human perception at standard setback distances.
Infrasound (IS)	The frequency range of infrasound is normally defined as below 20 Hz. Infrasound from wind turbines are significantly below recognized thresholds for both human perceptibility and standardized health.
Note: Compiled by Tetra Tech from multiple technical and engineering resources.	

1.2 Low Frequency noise and Infrasound

Low frequency noise (LFN) and infrasound (IS) are defined by the frequency ranges they represent. LFN comprises noise in the audible human frequency ranges from 20 Hz to 200 Hz. IS represents the frequencies below 20 Hz that while typically inaudible to humans, if the amplitude of IS is very high, for example at least 80 or above for frequencies under 20 Hz and 103 dB or above for 5 Hz, it may be detectible to humans (Massachusetts Department of Public Health or MDPH 2012). Studies have shown that pain from infrasound can result when sound levels are 165 dB or above at 2 Hz and 145 dB or above at 20 Hz (MDPH 2012).

Existing non-WTG related LFN and IS are apparent in most, if not all, environmental settings. The magnitude of these existing background LFN/IS varies, but can be of sufficient strength in to mask much, or all of the LFN and IS from WTGs. Common background natural sound sources of LFN and IS include wind interacting with vegetation in the surrounding environment and ocean waves hitting shores. Additionally, a common anthropogenic sound source with LFN and IS components is roadway noise.

Outside of sleep disturbance from audible noise from WTGs, health effects have not been scientifically demonstrated as a result of low frequency noise from WTGs (MDPH 2012). Additionally, available evidence demonstrates there are no health effects from WTGs infrasound (NHMRC 2013).

2.0 PROJECT NOISE CRITERIA AND GUIDELINES

A review of noise regulations and guideline criteria applicable to the Project was completed at the federal, state, and county level. The Noise Control Act of 1972, along with its subsequent amendments (Quiet Communities Act of 1978 [42 USC 4901-4918]), delegates the authority to regulate environmental noise to each state. No county regulations were found but federal EPA guidelines and the State of Hawaii provide noise thresholds and guidelines applicable to the Project. Additionally, there are no federal, state, or local regulations or guidelines for LFN and IS; however, to provide a framework for assessing potential impacts from operational LFN and IS American National Standards Institute (ANSI) have been identified. Additionally, the United Kingdom (UK) Department of Environment, Food, and Rural Affairs (DEFRA) has proposed LFN 1/3-octave band

criteria guidelines which are included in this report to provide another set of guidelines for which to compare against.

2.1 U.S. Environmental Protection Agency

In 1974, the U.S. Environmental Protection Agency (EPA) published Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety (EPA 1974). This report represents the only published study that includes a large database of community reaction to noise to which a proposed project can be readily compared. The EPA has developed widely accepted recommendations for long term exposure to environmental noise with the goal of protecting public health and safety. The publication evaluates the effects of environmental noise with respect to health and safety, and provides information for state and local governments to use in developing their own ambient noise standards. For outdoor residential areas and other locations in which quiet is a basis for use, the recommended EPA guideline is a day-night sound level (L_{dn}) of 55 dBA. The EPA also suggests an $L_{eq}(24)$ of 70 dBA (24-hour) limit to avoid adverse effects on public health and safety at publicly accessible property lines or extents of work areas where extended periods of public exposure are possible. The EPA cause-and-effect criteria limits are summarized in Table 4.

Table 4. Summary of EPA Cause and Effect Noise Levels

Location	Level	Effect
All public accessible areas with prolonged exposure	70 dBA $L_{eq(24)}$	Safety
Outdoor at residential structure and other noise sensitive receptors where a large amount of time is spent	55 dBA L_{dn}	Protection against annoyance and activity interference
Outdoor areas where limited amounts of time are spent, e.g., park areas, school yards, golf courses, etc.	55 dBA $L_{eq(24)}$	
Indoor residential	45 dBA L_{dn}	
Indoor non-residential	55 dBA $L_{eq(24)}$	
Source: EPA 1974.		

2.2 State of Hawaii Community Noise Regulations

The state of Hawaii regulates noise through the Hawaii Administrative Rule (HAR), Title 11, Chapter 46, and "Community Noise Control", promulgated on September 11, 1996 and limits sound generated by new or expanded developments. The Hawaii Community Noise Regulations (HAR 11-46) provide for the prevention, control, and abatement of noise pollution in the State. The purpose of these rules is to "provide for the prevention, control, and abatement of noise pollution in the State from the following noise sources: stationary noise sources; and equipment related to agricultural, construction, and industrial activities" (HAR 11-46). Sound from routine ongoing maintenance activities is considered part of routine operation and the combined total of the ongoing maintenance and routine operation are subject to the sound level limits. However, the Community Noise Control Regulation is not applicable to most moving sources, i.e. transportation and vehicular movements. Sound from Project construction and the occasional, major equipment overhauls is regulated as construction activity.

The Hawaii noise limits applicable to stationary sources are provided by three receiving zoning class districts and time periods and are enforceable at the facility property boundaries. For mixed

zoning districts, the primary land use designation is used to determine the applicable zoning district class and maximum permissible sound level. For the purposes of identifying impact conditions, Class A use on Class C Land has been defined at the residential structure, i.e. agricultural portions of the surrounding properties were considered Class C receivers and the residences considered Class A receivers. This is considered a conservative regulatory assessment approach.

As wind energy generation projects may operate at any time during the day or night, the more stringent nighttime permissible sound level will become the controlling limit. The daytime and nighttime maximum permissible noise limits are provided in dBA according to zoning districts in Table 5. The Hawaii noise limits are assumed to be absolute and independent of the existing acoustic environment; therefore, no baseline sound survey is required to assess conformity.

Table 5. Hawaii Maximum Permissible Sound Levels by Zoning District

Receiving Zoning Class District	Maximum Permissible Sound Level	
	Daytime (7:00am – 10:00pm)	Nighttime (10:00pm – 7:00am)
Class A Zoning districts include all areas equivalent to land zoned residential, conservation, preservation, public space, or similar type.	55	45
Class B Zoning districts include all areas equivalent to lands zoned for multi-family dwellings, apartment, business, commercial, hotel, resort, or similar type.	60	50
Class C Zoning districts include all areas equivalent to lands zoned agriculture, county, industrial, or similar type.	70	70
Source: Hawaii Administrative Rules §11-46, "Community Noise Control"		

The maximum permissible sound levels are assessed and at any point at or beyond the property line of the facility. Noise levels may exceed the prescribed limits up to 10 percent of the time within any 20-minute period. Sound level for impulsive noise, as measured with a fast meter response, is 10 dBA above the maximum permissible sound levels for the given receiving zoning class district. Pursuant to HAR 11-46-7, and HAR 11-48-8 a permit may be obtained for operation of an excessive noise source beyond the maximum permissible sound levels. Factors that are considered in granting of such permits include whether the activity is in the public interest and whether the best available noise control technology is being employed. The standard provides further exemptions to these limits and further guidance on application, compliance procedures and penalties. The State Department of Health (SDOH) is responsible for the implementation, administration, and enforcement of the statutes.

2.3 Low Frequency Noise and Infrasound guidelines

In the absence of LFN and IS noise regulations or guidelines some wind turbine acoustic studies have referenced a variety of guidelines and other country's regulations to assess the potential for impacts (O'Neal 2011). The World Health Organization (WHO) provides a crude method for identifying potential LFN/IS noise issues by comparing the predicted dBA to the predicted C-weighted (dBC). If the dBC is 10 dB greater than the dBA level the WHO indicates that a there is potential for a LFN/IS issue and that more detailed analysis should be conducted. However, since the WHO does not provided a more detailed method Champlin elected to use ANSI and DEFRA

guidelines. ANSI provides guidelines for outdoor LFN and IS levels via ANSI S12.9 Parts 4 and 5. Additionally, DEFRA provides guidelines for LFN that are used in the UK.

2.3.1 15BANSI S12.9 Part 4

The ANSI S12.9 Part 4 (ANSI 2005) provides guidelines for determining annoyance from sound propagating outdoors. Annex D of ANSI S12.9 Part 4 includes methods for assessing environmental sounds with strong low-frequency content. Annoyance is found to be minimal when sound levels in the low frequency midband frequencies of 16 – 63 Hz are less than 65 dB, which corresponds to the threshold for the onset of impacts in these lower frequencies. Part 4 also states that LFN passes through structures with relative ease and is nearly equal to outdoor predicted sound levels. For the Project an indication of annoyance would be used as an indication of a LFN impact.

2.3.2 UK Department of Environment, Food, and Rural Affairs (DEFRA)

In February 2005 DEFRA published their *"Procedure for the assessment of low frequency noise disturbance"* which provides indoor LFN thresholds for disturbance. The DEFRA guidelines are based upon existing low frequency noise criteria from several countries (e.g., Sweden, Denmark, Netherlands, Germany, and Poland) and upon complaints of disturbance from LFN. DEFRA provides thresholds for 1/3-octave bands from 10 to 160 Hz for both non-steady and steady outdoor received sound levels in using the L_{eq} metric. The thresholds are generally 5 dB lower than the threshold of hearing to avoid disturbance. Recent studies have used these guidelines to establish outdoor equivalent sound levels for use in impact assessments (O'Neal 2011). Table 6 provides the outdoor non-stead and steady 1/3-octave LFN thresholds in dB L_{eq}. As indicated, there are no laws or regulations pertaining to LFN and IS from wind energy projects; however, the DEFRA guidelines provide thresholds from which an assessment of potential impact can be made.

Table 6. DEFRA Equivalent Outdoor dB L_{eq} 1/3-Octave Band Sound Pressure Thresholds

Location	1/3-Octave Band Center Frequency (Hz)												
	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
Non-Steady Outdoor	94	89	86	78	68.5	61	56	51	51	49	47	45	43
Steady Outdoor	99	94	91	83	73.5	66	61	56	56	54	52	50	48
Source: DEFRA 2005, O'Neal 2011													

3.0 EXISTING CONDITIONS

The acoustic analysis area for the Project includes Tax Map Keys (TMKs), or commonly referred to as parcels, located within 2 kilometers (km) or 1.2 miles of the Project. The mitigation areas for the Project are habitat areas for wildlife that may be affected by the Project. These areas are located beyond the 2 km (1.2 mile) analysis area; however, because no operational or construction noise would result in these areas they are not included in the noise analysis area. Project components, such as WTGs and the substation, would be located on agriculturally zoned TMKs or HAR 11-46 Class C districts. The remaining TMKs within the noise analysis area are mostly agriculturally zoned; however, north and west of Project there are Class A (mostly residential) and Class B (mostly commercial) TMKs. Table 2 provides descriptions for each of the HAR 11-46 zoning Class

Districts. The most restrictive land use from a noise compliance perspective with HAR 11-46 are the Class A TMKs located approximately 480 meters (1,575 feet) from the nearest Project WTG.

3.1 Baseline Sound Survey

While HAR 11-46 limits are absolute, Champlin elected to conduct a baseline sound survey to respond to public comments received during the scoping process. A long term and short term baseline sound survey was completed in support of Project permitting, which provided a statistically relevant data set, covering the full range of wind speeds and future operational scenarios. The objective of the baseline sound survey was to establish the existing ambient sound environment of the Project Area. To fulfill this objective Tetra Tech completed the following steps:

1. A measurement program was developed and reviewed by Champlin including instrument selection and setup;
2. Measurement positions (MPs) for the sound survey were pre-selected to give a representative evaluation of baseline sound conditions over the entire Project Area. Landowner permissions were secured prior to the survey and locations were screened on the day of deployment to determine final measure positions;
3. Execution of baseline sound survey, which consisted of a two week monitoring period from April 22, 2014 to May 7, 2014 with data logging for the entire period at three long-term locations;
4. Long term 2-week measurements were supplemented by in-situ short-term (30-minute) measurements;
5. Analysis of baseline data, correlation with the Project's meteorological station representative of wind speed data at hub height of WTGs and presentation of typical values; and
6. Evaluation of masking of wind turbine noise by wind-induced background noise.

3.1.1 Instrumentation

Measurements were completed with either a Larson Davis 831 real-time sound level analyzer equipped with a PCB model 377B02 ½-inch precision condenser microphone or a Norsonic Model Nor140 precision sound analyzer with a Norsonic 1225 ½-inch precision condenser microphone. The Larson Davis 831 instrument has an operating range of 5 dB to 140 dB, and an overall frequency range of 8 to 20,000 Hz and the Norsonic Nor140 has the same operating range but also extends monitoring to lower frequencies with an overall frequency range of 1 to 20,000 Hz. Both devices meet or exceed all requirements set forth in the American National Standards Institute (ANSI) standards for Type 1 sound level meters for quality and accuracy (precision). All real-time sound level analyzers and instrumentation were calibrated per ANSI specifications to ensure the highest data accuracy possible. Laboratory calibrations occurred within the previous 12 month period with calibration documentation provided in Appendix A.

The sound level meters utilized are designed for service as a long-term environmental sound level data logger measuring the A-weighted sound level. Each unattended and weatherproof sound level monitoring position included a sound analyzer enclosed in a weatherproof case and equipped with a self-contained microphone tripod. The microphone and windscreen were tripod-mounted at an approximate height of 1.5 to 1.7 meters (4.9 to 5.6 feet) above grade away from effects of ground level rustling vegetation and fallen leaves. When sound measurements are attempted in the presence of elevated wind speeds, extraneous noise can be self-generated across the microphone. Air blowing over a microphone diaphragm creates a pressure differential and turbulence. All sound level analyzer microphones were protected from wind-induced extraneous noise effects by a 7 inch (180 millimeter) diameter foam windscreen made of specially prepared open-pored polyurethane. By using this microphone protection, the pressure gradient and turbulence is effectively moved further away from the microphone to ensure accurate collection of baseline data.

In addition, weather data were collected at or near the MPs using Vaisala portable weather transmitters, which operated over the full measurement period. Additional information on the Vaisala units is provided in Section 3.1.3.

3.1.2 Measurement Methodology

The baseline sound survey was conducted during a time of year that is representative of typical human activity in the area. Additionally, sounds produced by leaf and crop rustle as well as insect noise can elevate background sound levels and make correlation of background sound levels to wind speed difficult. Because there is little variation seasonally in vegetative cover, agricultural operations, and insect or other wildlife activity, baseline sound monitoring in the noise analysis area is considered to be typical of any time during the year. The lowest background sound levels typically occur on windless nights when the Project would not be operating. Thus, it is important that baseline sound level monitoring document the existing sound levels, day and night, for wind speeds in the range between WTG cut-in and the maximum rated power.

Using mapping and aerial photography of the Project Area, Tetra Tech selected three long term MP locations along the Project's site limit to be representative of noise sensitive receptors (NSRs) nearest to the Project. Tetra Tech attempted to locate monitoring equipment at the structures of the nearest NSR; however, when Champlin requested access from property owners or leases for deployment of monitoring equipment none were agreeable. As a result, Tetra Tech was restricted to placing long-term monitoring equipment at the Project site limit where Champlin had already obtained landowner permission and which was accessible to Tetra Tech. To supplement the long-term data collection short-term measurements were made from public rights-of-way, such as sidewalks, that did not require landowner access permission.

For each long-term measurement, a sound level meter was set up, calibrated, and run continuously in 1-hour and 10-minute intervals during daytime (7:00 am to 10:00 pm) and nighttime (10:00 p.m. to 7:00 a.m.) periods for the two week survey. The maximum observed calibration drift ranged from -0.1 dB to +0.1 dB, which is well within acceptable tolerances for long term baseline sound measurements. Each sound analyzer was programmed to measure and log broadband A-weighted

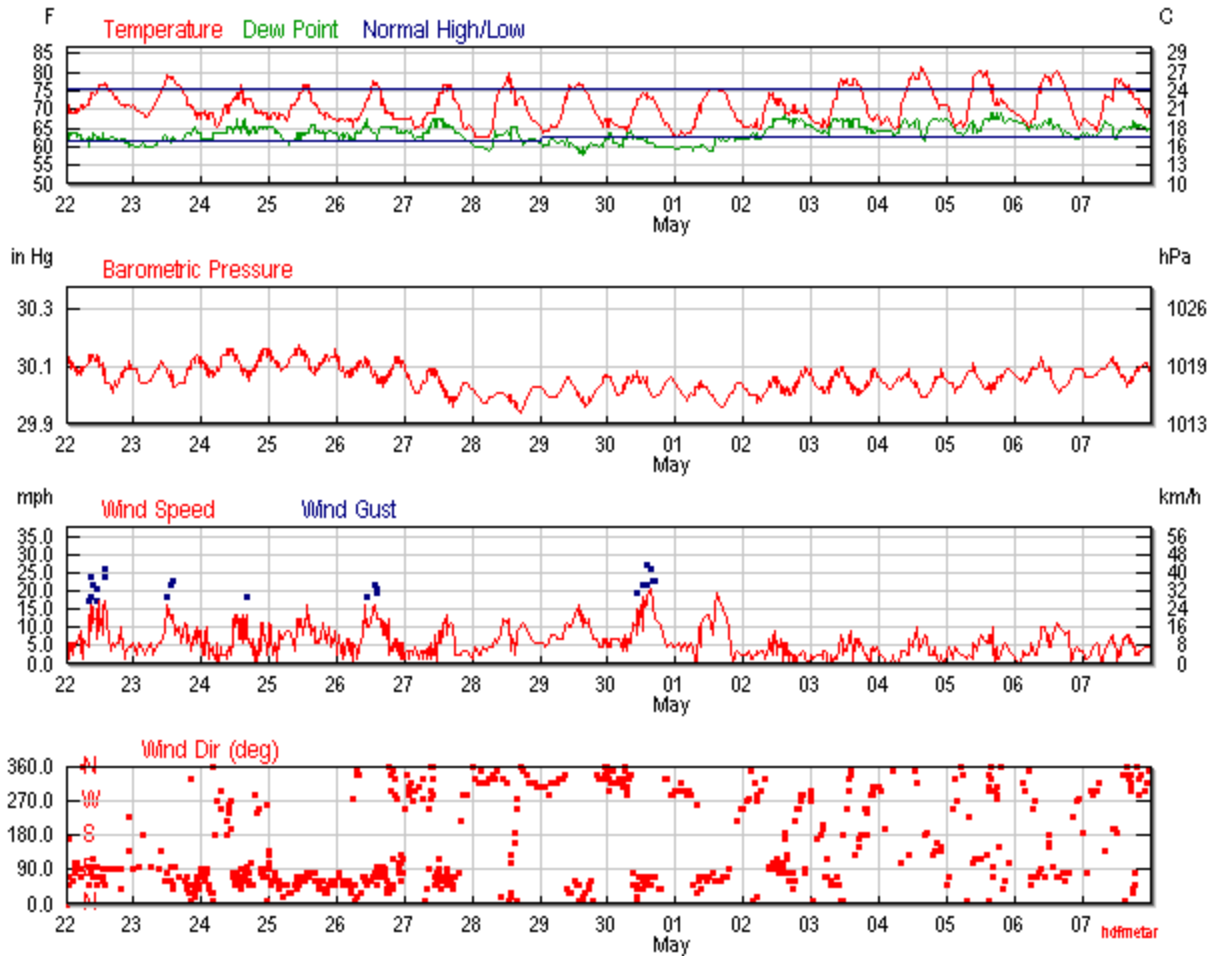
sound pressure levels including a number of statistical parameters such as the average equivalent (L_{eq}), intrusive (L_{10}), median (L_{50}), and residual (L_{90}) sound levels. These data were logged for the duration of the baseline monitoring period to fully characterize the ambient acoustic environment of the Project Area. In addition, full (1/1) and third (1/3) octave band data were collected. All long-term monitoring stations were anchored in a manner that avoided interference from any large vertical reflective surfaces.

Short-term measurements were conducted with the Nor140 sound level meter at selected locations to provide additional information about the acoustical environment. The Nor140 is capable of monitoring to a lower frequency range (e.g., down to 1 Hz) which is useful for describing the LFN and IS content of the existing acoustic environment. Each short-term measurement was conducted for 30-minutes collected in 1-minute intervals, at least once during midday (10:00 a.m. to 3:00 p.m.) to avoid peak hours of traffic noise on area roadways and/or during nighttime hours (12:00 a.m. to 4:00 a.m.), depending on access and safety. The same metrics and octave band data were collected during the short-term measurements as that for the long-term measurements.

Following the completion of the measurement period, all measured data were downloaded and analyzed. Long-term monitoring data were correlated with hub height (approximately 80 meters) wind speed data using a standardized statistical regression analysis methodology. In addition, daytime and nighttime observations were documented during equipment deployment, retrieval, and short-term measurements to identify sound sources with the nighttime period of particular interest as this is a time period of heightened sensitivity to noise (i.e., sleep interruption).

3.1.3 Meteorological Conditions

Champlin provided Tetra Tech wind speed and direction data from their on-site meteorological (MET) towers for the period of the baseline sound survey, given in 10-minute increments. In addition weather data were collected at the long-term MPs using the Vaisala units. The Vaisala unit monitors wind speed and direction via its ultrasonic anemometer, and also measures barometric pressure, temperature and humidity, total rainfall, intensity, and duration of rainfall. The Vaisala unit is also able to distinguish between precipitation type such as rain, hail, and snow. When required, data gaps from the Champlin's MET data were supplemented with the data from the Vaisala units. Figure 1 shows general weather conditions during the baseline sound survey in the vicinity of the Project Area.



Source: Weather Underground, 2014

Figure 1. Baseline Sound Survey Weather Conditions

3.1.4 Sound Survey Results

The three long-term sound monitoring stations were deployed at the Project site limit at locations closest to the nearest NSRs. Table 7 summarizes the UTM coordinates, distance to the nearest proposed WTG, and sound level meter's serial number (S/N) used to collect data for each long-term MP. Figure 2 provides a map of the MPs and acoustic analysis area HAR 11-46 zoning classes.

Table 7. Long-Term Monitoring Position Location Summary

Monitoring Position	UTM Coordinates (NAD83 UTM Zone 14 N)		Distance to Nearest Project WTG (m)	Distance to Nearest Existing Kahuku WTG (m)	SLM Serial Number
	Easting (m)	Northing (m)			
LT-1	606,540.04	2,396,927.75	68.1	326.7	1350 & 14027964
LT-2	607,962.82	2,396,713.27	495.8	1,674.2	3140
LT-3	608,537.47	2,396,811.61	220.6	2,197.0	1403045

Table 8 provides the summary of short-term monitoring locations conducted from public rights-of-way near selected NSRs in the acoustic analysis area.

Table 8. Short-Term Monitoring Position Location Summary

Monitoring Position	UTM Coordinates (NAD83 UTM Zone 14 N)		Distance to the Nearest WTG (m)	Distance to Nearest Existing Kahuku WTG (m)	Serial Number
	Easting (m)	Northing (m)			
ST-1	607,030.73	2,397,241.57	640.6	670.6	1403045
ST-2	607,875.34	2,396,999.59	783.1	1,517.3	1403045
ST-3	608,444.81	2,397,077.41	496.2	2,017.1	1403045
ST-4	609,940.67	2,395,748.07	1,270.4	3,863.1	1403045
ST-5	606,075.81	2,399,058.66	2,235.9	474.6	14027964 & 1403045
ST-6	606,962.96	2,396,334.02	349.2	1,055.4	14027964

Figure 2. Acoustic Monitoring Positions and HAR 11-46 Zoning Classes

Figure 2 page 2 of 2

The baseline sound survey measurement data incorporate all sounds at the MP including contributions from road traffic, sounds of nature, existing industrial facilities, and other human related activities. Long-term monitoring data points below the cut-in wind speed of three meters per second (m/s) for the proposed WTGs and any adversely affected data (external extraneous noise sources) were excluded from the analysis. The refined dataset was evaluated using a regression analysis for each MP as well as all MPs cumulatively grouped for the entire Project Area. Short-term measurements were all conducted during wind speed conditions where the Project would be in operation according to the Project's MET tower with wind speeds ranging from 6 m/s to 11 m/s.

The acoustic monitoring data collected at each MP were matched to Champlin's MET station which monitors wind speeds at 50 meters and that Champlin scaled up to 80 meters, roughly the hub height of the WTGs under consideration. Additionally, each MP's respective Vaisala unit was also matched to the acoustic monitoring data. These two wind speed datasets accurately characterize wind speed conditions at each MP. The 10-minute L_{eq} sound levels were correlated to wind speed (m/s) at an 80 meter (262 feet) hub height with a regression analysis and the best fit correlation coefficient using a second order polynomial equation. The 10-minute L_{eq} sound levels were divided into daytime (7:00 am to 10:00 pm) and nighttime (10:00 pm to 7:00 am) periods to show diurnal variation at each MP. The following subsections present results by MP. Table 9 provides the broadband dBA L_{eq} tabular results of the baseline monitoring survey at integer wind speeds, which is consistent with the limits prescribed in HAR 11-46, which are also given in dBA L_{eq}. The subsections that follow provide 1/3-octave band data results in dB L_{eq} for use with the LFN DEFRA limits.

Table 9. Baseline Monitoring Results at Integer Wind Speeds

Monitoring Position*	Time of Day	dBA L_{eq} by Wind Speed (m/s)								
		Calm	3	4	5	6	7	8	9	10+
LT-1	7AM-10PM	40	45	47	50	50	49	51	52	55
	10PM-7AM	N/A***	43	43	44	47	48	49	50	52
LT-2	7AM-10PM	46	41	45	50	47	46	47	46	48
	10PM-7AM	47	51	42	46	48	46	44	47	45
LT-3	7AM-10PM	42	45	45	44	46	45	45	45	49
	10PM-7AM	44	44	43	40	42	43	43	45	45

Note: *short-term measurements were conducted for 30-minute periods which do not include all operational wind speed conditions. **Vehicle pass-by events removed. ***No "calm" time periods during monitoring.

Monitoring Position: LT-1

LT-1 was located within the Project site along the northwest Project site limits 68m from the Project's proposed WTG #1 and 327m from the nearest existing Kahuku Wind Farm WTG. Deployment occurred on April 23, 2012 at approximately 10:00 AM during sunny and warm (77°F) weather conditions. The elevation at LT-1 is approximately 20 m above sea level (ASL). Noise sources observed during deployment included the existing Kahuku Wind Farm, wind interacting with vegetation, helicopter and fixed-wing aircraft flyovers, and nearby agricultural activities involving small combustion engine equipment. LT-1 included the two sound level meters, one LD831 and one Norsonic 140 for redundancy. Redundancy was desirable at this location because Tetra Tech wanted to collect sound data generated from the existing Kahuku Wind Farm. At the

Kahuku Wind Farm, all but one of that wind energy development's WTGs were operating. Via informal conversations with maintenance personal it was learned by Tetra Tech's scientists that typically one Kahuku Wind Farm WTG is down at any given time for maintenance. Therefore, this operational scenario for the Kahuku Wind Farm is considered "typical". During deployment and retrieval of the monitoring equipment it was observed that the existing WTGs nearest to the Project were all operating. During the course of the survey the Norsonic 140 experienced technical issues; however, these issues did not prevent collection of a statistically significant dataset that is appropriate for establishing baseline conditions. Figure 3 presents a photograph of the two sound level meters deployed relative to the existing Kahuku Wind Farm from the viewpoint of the Project's site limit. Figure 4 provides the time history and Figure 5 provides the regression analyses of ambient sound levels during daytime and nighttime monitoring periods. Figure 6 provides the 1/3-octave band spectral data at cut-in (3 m/s) and maximum rotational (8 m/s) wind speeds relative to the threshold of human hearing. None of the infrasound levels monitored were above the threshold of human hearing. Table 10 provides the 1/3-octave band monitoring results spanning the frequencies from 4Hz to 5000 Hz.

Figure 3. Photo of LT-1

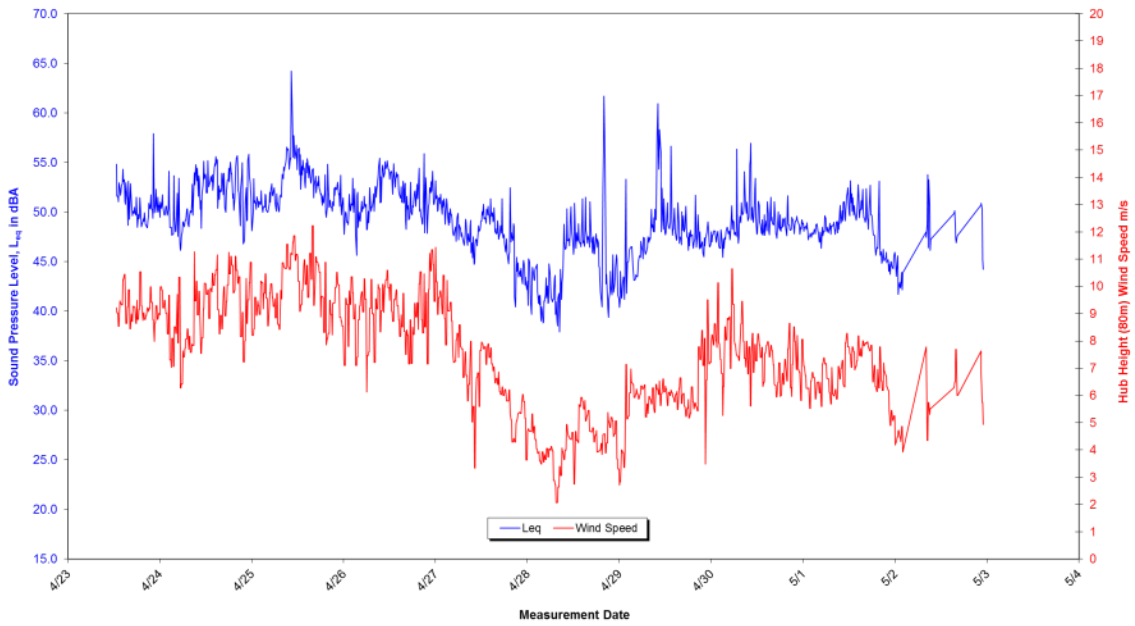


Figure 4. LT-1 Time History Plot

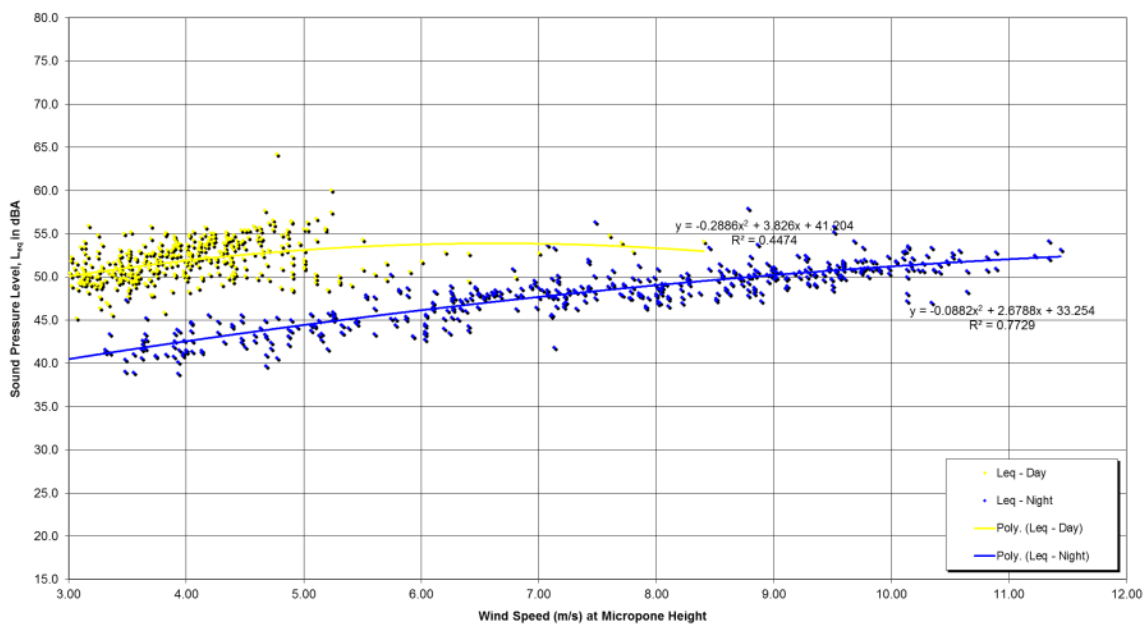


Figure 5. LT-1 Regression Analysis

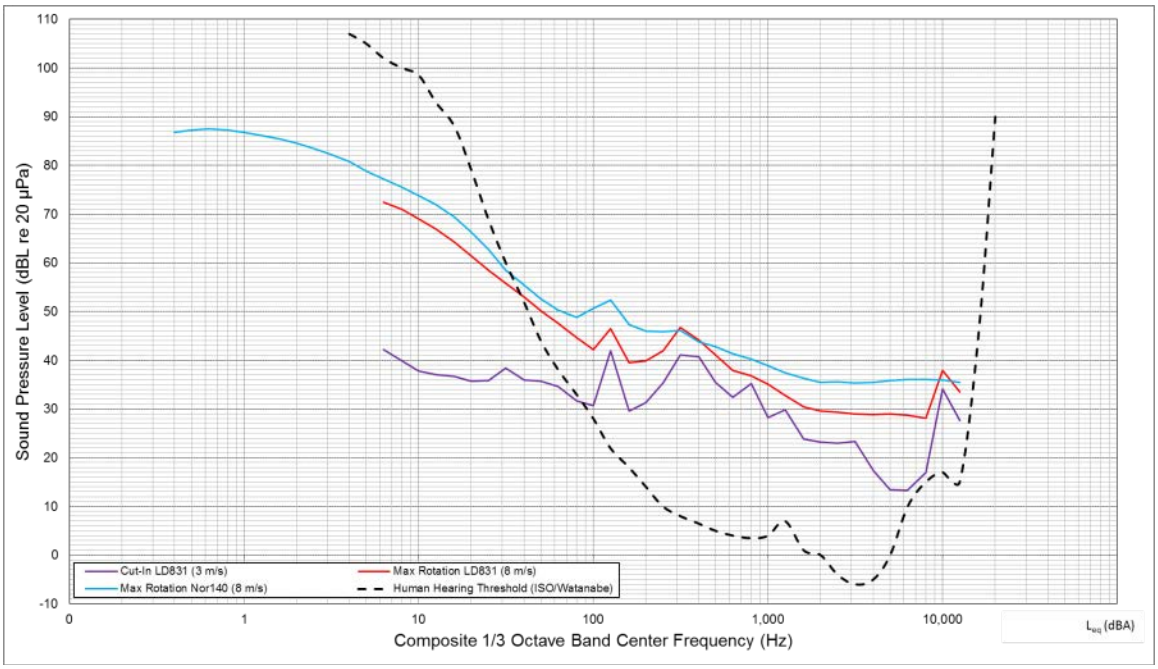


Figure 6. LT-1 1/3-Octave Band Spectral Plot

Table 10. LT-1 1/3-Octave Band Baseline Monitoring Results at Integer Wind Speeds

Frequency Range	1/3-Octave Band (Hz)	dBA L_{eq} by Wind Speed (m/s)							
		3	4	5	6	7	8	9	10
Infrasound	4.0*	-	-	-	74	77	81	82	85
	5.0*	-	-	-	72	75	79	80	83
	6.3	60	60	64	69	71	73	74	75
	8.0	58	58	62	67	70	72	73	74
	10.0	55	56	59	65	68	70	71	72
	12.5	52	53	56	62	66	68	69	71
	16.0	49	50	53	59	63	65	67	69
Low Frequencies	20.0	50	51	52	57	60	63	65	66
	25.0	49	47	48	53	57	60	62	64
	31.5	44	45	48	51	54	57	59	61
	40.0	43	43	45	49	51	54	57	59
	50.0	44	45	45	47	49	52	54	56
	63.0	42	41	42	45	46	49	51	53
	80.0	43	40	40	44	44	47	48	50
	100	41	39	39	43	42	44	46	48
	125	44	45	46	47	47	48	48	48
	160	39	39	38	43	40	42	43	44
	200	37	38	37	43	40	42	42	42
Selected Mid Frequencies	250	38	40	41	42	42	43	44	44
	315	41	43	45	47	47	46	47	47
	400	41	42	43	45	45	44	44	44
	500	38	39	40	42	42	42	41	41
	630	34	35	37	40	38	39	39	39
	800	36	37	37	40	38	38	38	38
	1000	31	32	33	37	36	36	37	37
	1250	30	31	32	35	34	35	35	35
	1600	26	28	29	33	32	32	33	34
	2000	27	28	28	32	31	32	32	33

Table 10. LT-1 1/3-Octave Band Baseline Monitoring Results at Integer Wind Speeds

Frequency Range	1/3-Octave Band (Hz)	dBA L_{eq} by Wind Speed (m/s)							
		3	4	5	6	7	8	9	10
	2500	28	28	27	31	31	32	32	34
	3150	28	27	26	30	31	32	32	34
	4000	22	24	23	29	30	32	33	34
	5000	20	23	23	29	30	32	33	35
Note: *Data monitored using Norsonic 140. All other data monitored with Larson Davis 831									

Monitoring Position: LT-2

LT-2 was located within the Project site along the north central Project site limits 496m from the Project's proposed WTG #6 and 1,674m from the nearest existing Kahuku Wind Farm WTG. The location of LT-2 was chosen to represent a cluster of single-family housing 204m north. Deployment occurred on April 23, 2012 at approximately 11:10 AM during sunny and warm (80°F) weather conditions. The elevation at LT-2 is approximately 5m ASL. Sound sources observed during deployment included the light wind interacting with vegetation, distant agricultural equipment, helicopter and fixed-wing aircraft flyovers, and periodic wildlife including insects and stray dogs. The area is relatively sheltered from wind being surrounded by a tree line separating it from other agricultural lands to the south and the residential area to the north. The location is also slightly lower in elevation than the houses in the nearby development which are 34m ASL. Monitoring at LT-2 was accomplished using a LD831 which operated for the entire two week monitoring period providing a statistically significant dataset appropriate for establishing baseline conditions. Figure 7 presents a photograph of the two sound level meters deployed taken in the direction of the residential development. Figure 8 provides the time history and Figure 9 provides the regression analyses of ambient sound levels during daytime and nighttime monitoring periods. As the time history and regression analysis shows there is little variation in sound level when hub height wind speeds are elevated which confirms that the area is relatively sheltered from the wind. Short-term monitoring in the neighborhood was necessary to ascertain wind effects at the slightly higher elevation which was accomplished via ST-2. Figure 10 provides the 1/3-octave band spectral data at cut-in (3 m/s) and maximum rotational (8 m/s) wind speeds relative to the threshold of human hearing. None of the infrasound levels monitored were above the threshold of human hearing. Table 11 provides the 1/3-octave band monitoring results spanning the frequencies from 6.3Hz to 5000 Hz.

Figure 7. Photo of LT-2

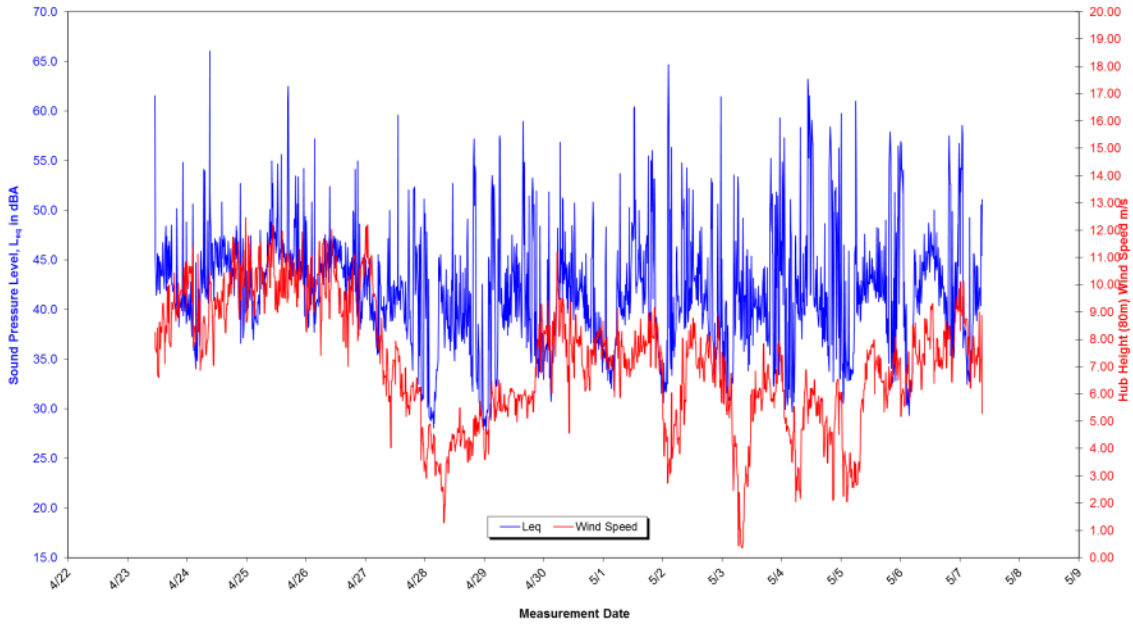


Figure 8. LT-2 Time History Plot

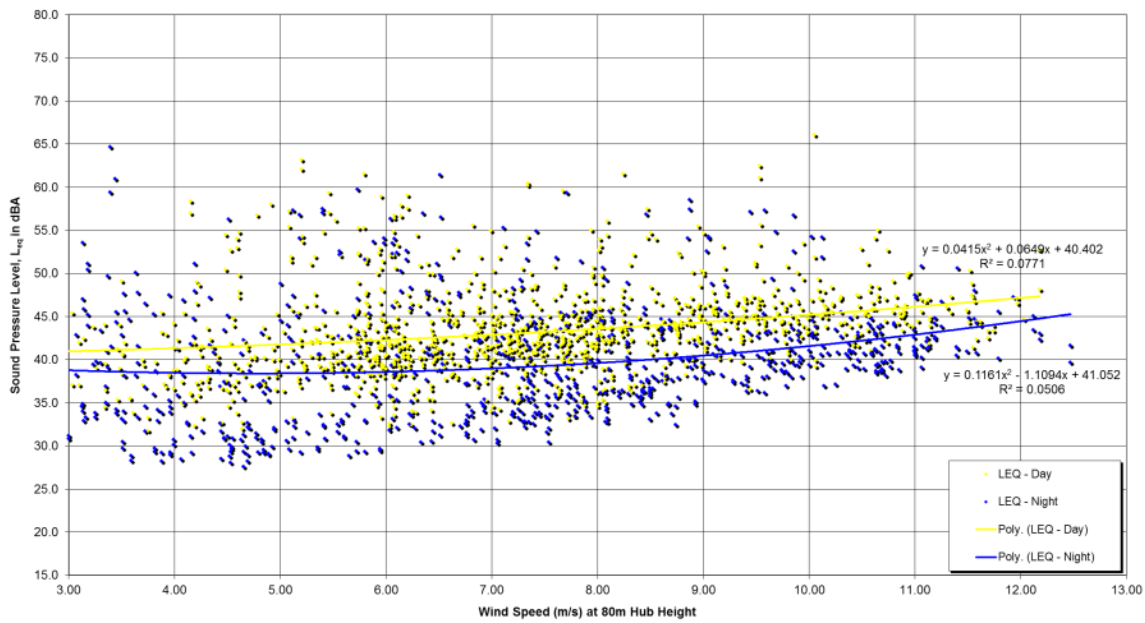


Figure 9. LT-2 Regression Analysis

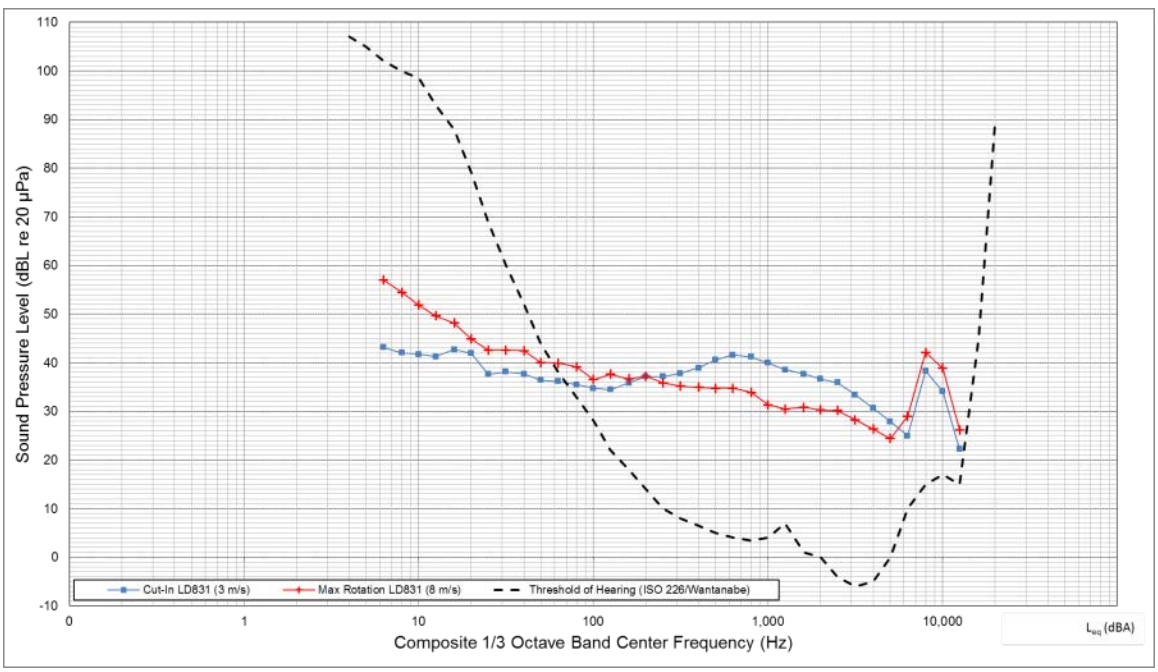


Figure 10. LT-2 1/3-Octave Band Spectral Plot

Table 11. LT-2 1/3-Octave Band Baseline Monitoring Results at Integer Wind Speeds

Frequency Range	1/3-Octave Band (Hz)	dBA L_{eq} by Wind Speed (m/s)							
		3	4	5	6	7	8	9	10
Infrasound	4.0*	-	-	-	-	-	-	-	-
	5.0*	-	-	-	-	-	-	-	-
	6.3	43	47	50	54	56	57	59	60
	8.0	42	45	48	51	54	54	57	58
	10.0	42	43	46	49	51	52	54	55
	12.5	41	43	44	47	49	50	52	52
	16.0	43	46	45	47	48	48	50	51
Low Frequencies	20.0	42	39	40	43	44	45	46	48
	25.0	38	37	39	42	43	43	44	45
	31.5	38	40	41	44	44	43	44	45
	40.0	38	36	39	44	46	42	45	45
	50.0	36	36	39	43	43	40	41	43
	63.0	36	35	41	44	43	40	40	46
	80.0	36	32	43	44	42	39	41	47
	100	35	31	39	41	40	37	38	42
	125	34	32	35	43	42	38	38	40
	160	36	32	36	37	36	37	38	39
	200	37	32	37	37	37	37	38	40
Selected Mid Frequencies	250	37	32	38	37	36	36	37	38
	315	38	31	37	35	35	35	36	37
	400	39	29	37	36	35	35	35	37
	500	41	30	37	36	36	35	36	36
	630	42	30	37	36	35	35	36	36
	800	41	29	37	36	34	34	34	35
	1000	40	27	35	34	32	31	32	36
	1250	39	27	33	32	30	30	31	33
	1600	38	30	34	31	30	31	32	37
	2000	37	29	34	32	30	30	33	35
	2500	36	29	37	33	30	30	34	37
	3150	33	24	34	31	28	28	30	35
	4000	31	22	31	28	26	26	28	32
	5000	28	19	29	26	24	24	28	27

Note: *The LD831 has a functional monitoring limit of 6.3Hz lower frequencies were not monitored at LT-2.

Monitoring Position: LT-3

LT-3 was located within the Project site along the northeastern Project site limits 221m from the Project's proposed WTG #10 and 2,197m from the nearest existing Kahuku Wind Farm WTG. The location of LT-3 was chosen to represent the Kahuku Elementary and High Schools as well as residential areas adjacent to them which are approximately 230m north. Deployment occurred on April 23, 2012 at approximately 11:40 AM during sunny and warm (80°F) weather conditions. The elevation at LT-3 is approximately two meters ASL. Sound sources observed during deployment included the light wind interacting with vegetation, distant agricultural equipment, helicopter and fixed-wing aircraft flyovers, and periodic wildlife including insects. Like LT-2 the area is relatively sheltered from wind being surrounded by a tree line separating it from other agricultural lands to the south and the schools/residential area to the north. The location is also slightly lower in elevation than the schools/residential area which are five meters ASL. Monitoring at LT-3 was accomplished using a Norsonic 140 which operated for the entire two week monitoring period providing a statistically significant dataset appropriate for establishing baseline conditions. Figure

11 presents a photograph of the two sound level meters deployed taken in the direction of the residential development. Figure 12 provides the time history and Figure 13 provides the regression analyses of ambient sound levels during daytime and nighttime monitoring periods. As the time history and regression analysis shows there is little variation in sound level when hub height wind speeds are elevated which confirms that the area is relatively sheltered from the wind. Short-term monitoring in the neighborhood was necessary to ascertain wind effects at the slightly higher elevation which was accomplished via ST-3. Figure 14 provides the 1/3-octave band spectral data at cut-in (3 m/s) and maximum rotational (8 m/s) wind speeds relative to the threshold of human hearing. None of the infrasound levels monitored were above the threshold of human hearing. Table 12 provides the 1/3-octave band monitoring results spanning the frequencies from 6.3Hz to 5000 Hz.

Figure 11. Photo of LT-3

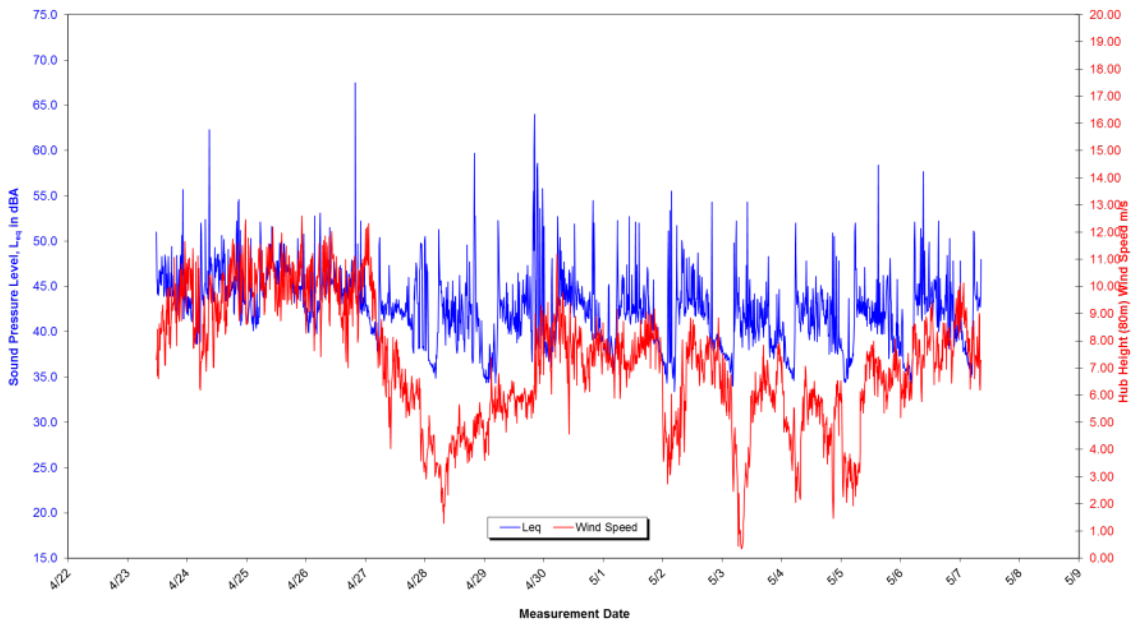


Figure 12. LT-3 Time History Plot

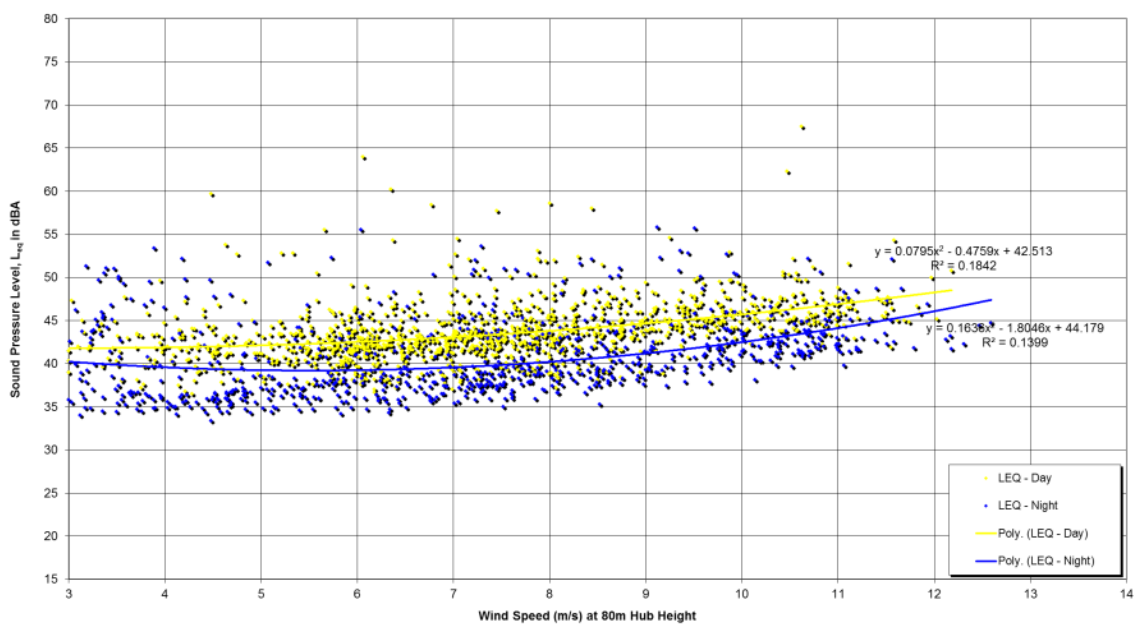


Figure 13. LT-3 Regression Analysis

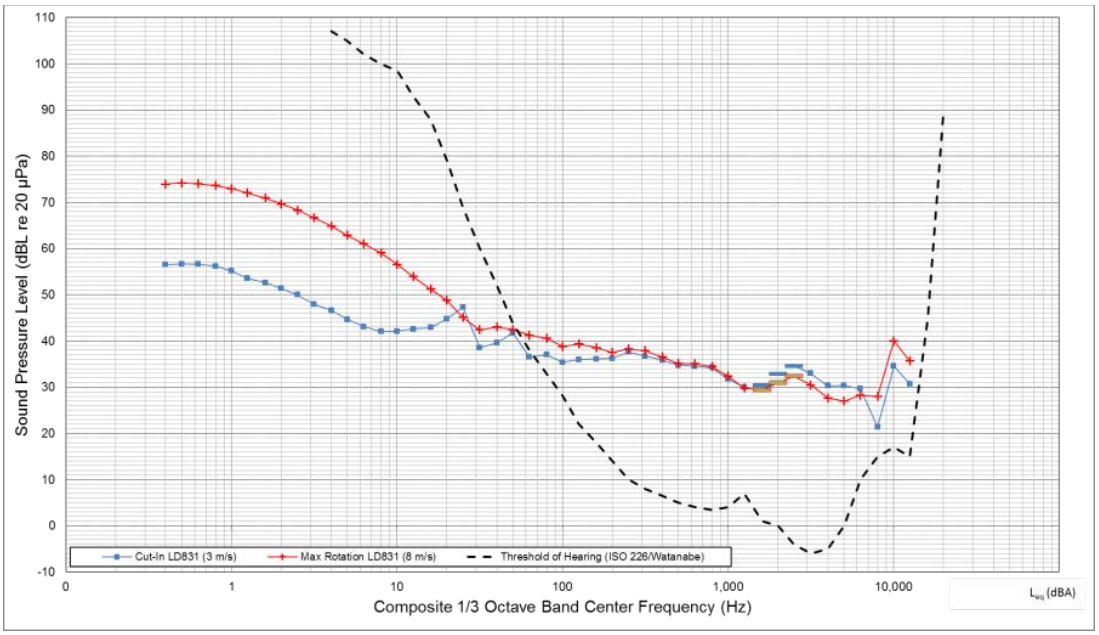


Figure 14. LT-3 1/3-Octave Band Spectral Plot

Table 12. LT-3 1/3-Octave Band Baseline Monitoring Results at Integer Wind Speeds

Frequency Range	1/3-Octave Band (Hz)	dBA L_{eq} by Wind Speed (m/s)							
		3	4	5	6	7	8	9	10
Infrasound	4.0	47	53	56	60	62	65	69	71
	5.0	45	51	54	58	60	63	67	69
	6.3	43	49	52	56	58	61	65	67
	8.0	42	47	50	54	56	59	64	66
	10.0	42	45	47	51	53	57	61	64
	12.5	43	43	45	48	51	54	59	61
	16.0	43	43	44	47	48	51	56	58
Low Frequencies	20.0	45	43	43	46	47	49	53	55
	25.0	47	39	39	41	46	45	49	52
	31.5	39	38	39	40	42	42	46	48
	40.0	40	39	39	41	42	43	45	46
	50.0	42	38	36	39	42	42	44	44
	63.0	37	37	38	37	44	41	43	44
	80.0	37	35	37	38	43	41	42	42
	100	35	34	35	35	41	39	40	41
	125	36	33	33	35	40	39	40	41
	160	36	34	34	36	38	39	40	41
	200	36	33	33	35	38	38	39	41
Selected Mid Frequencies	250	38	34	34	36	38	38	40	42
	315	37	34	34	36	38	38	39	40
	400	36	33	33	35	37	37	37	39
	500	35	32	32	33	36	35	36	38
	630	35	32	31	33	36	35	36	37
	800	34	32	30	32	35	34	35	37
	1000	32	30	28	30	32	32	34	36
	1250	30	28	26	28	30	30	32	34
	1600	30	28	27	28	29	29	31	32
	2000	33	31	29	30	31	31	32	32
	2500	35	33	31	32	32	32	33	35

Table 12. LT-3 1/3-Octave Band Baseline Monitoring Results at Integer Wind Speeds

Frequency Range	1/3-Octave Band (Hz)	dBA L_{eq} by Wind Speed (m/s)							
		3	4	5	6	7	8	9	10
	3150	33	31	29	31	31	30	31	33
	4000	30	28	25	26	28	28	29	33
	5000	30	28	25	24	27	27	29	30

Monitoring Position: ST-1

The ST-1 measurement was conducted on April 23, 2014 from 5:00PM to 5:30PM along public ROW near leased Hawaii Department of Agriculture (DOA) parcels that have single-family residences. The measurement was conducted to capture monitoring data at these residences where long-term equipment deployment was not allowed. Data collected at ST-1 are meant to provide additional information to characterize the DOA parcels that are located closest to the existing Kahuku Wind Farm. A daytime measurement was conducted at ST-1 with observed sound sources including the existing WTGs at the Kahuku Wind Farm, wind interacting with vegetation, periodic aircraft flyovers, and periodic small combustion engine agricultural equipment. Traffic noise along the Kamehameha Highway was not audible during the measurement or was masked by other sounds including the existing WTGs. Figure 15 provides the 1/3-octave band spectral data for the monitoring period which included hub height wind speeds of 10 m/s. At no time were infrasound levels of sufficient strength to be above the threshold of human hearing.

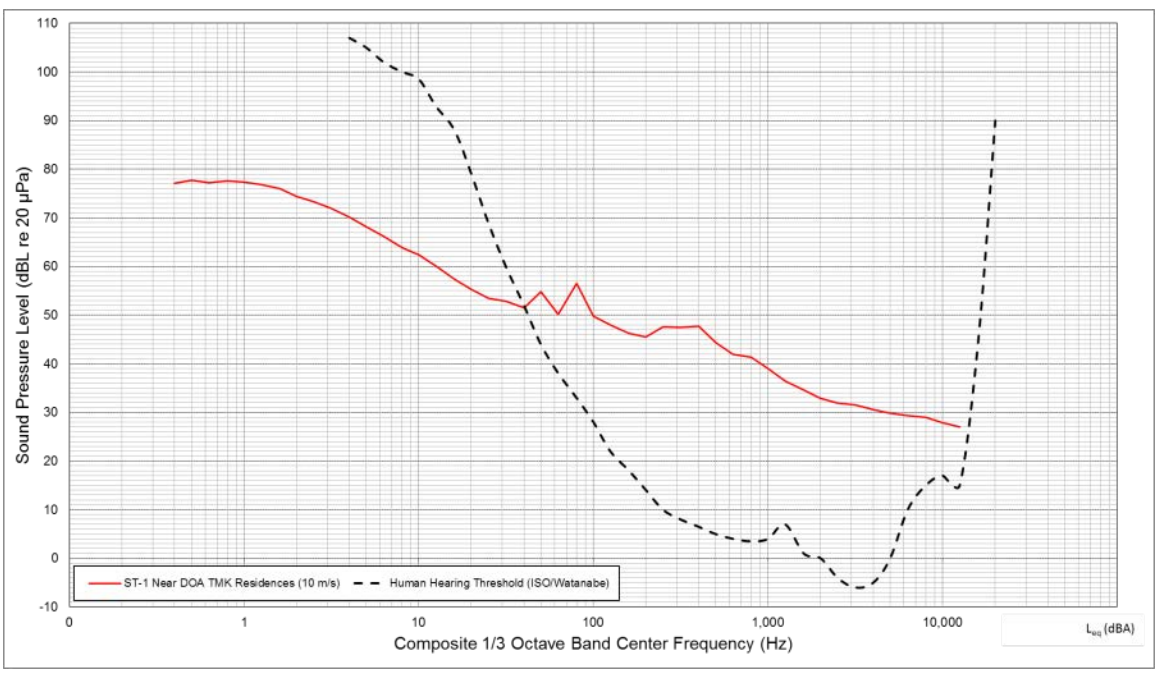


Figure 15. ST-1 1/3-Octave Band Spectral Plot

Monitoring Position: ST-2

The ST-2 measurement was conducted on April 22, 2014 from 2:05PM to 2:35PM along public ROW in the southwest portion of a relatively densely populated housing development referred to as the "Mauka Village". The measurement was conducted to capture monitoring data at these residences

where long-term equipment deployment was not allowed. ST-2 is meant to provide additional support data to characterize ambient conditions at these residences which are also represented by LT-2. A daytime measurement was conducted at ST-2 with observed sound sources including the roadway traffic, wind interacting with structures, dogs periodically barking during set up of the meter, people conversing, and periodic helicopter and fixed-wing aircraft flyovers. Figure 16 provides the 1/3-octave band spectral data for the monitoring period which included hub height wind speeds of 10 m/s. At no time were infrasound levels of sufficient strength to be above the threshold of human hearing.

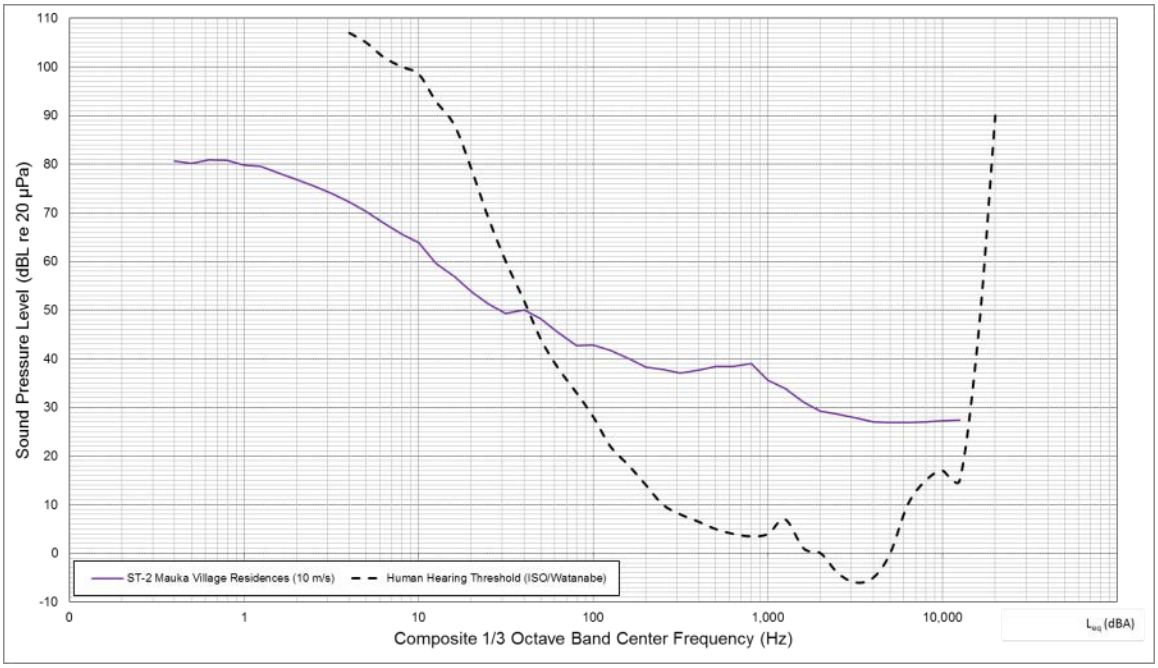


Figure 16. ST-2 1/3-Octave Band Spectral Plot

Monitoring Position: ST-3

Measurements at ST-3 were conducted on April 22, 2014 along public ROW adjacent to the northwest fence line of the Kahuku Elementary School and are representative of the acoustic environment of the schools and residences nearby which are also included in the "Mauka Village". The measurement was conducted to capture monitoring data where long-term equipment deployment was not allowed. ST-3 is meant to provide additional support data to characterize ambient conditions at the schools and residences which are also represented by LT-3. A daytime measurement was conducted from 2:45PM to 3:15PM and a nighttime measurement was conducted from 11:02PM to 11:32PM. Observed daytime sound sources included local roadway traffic, wind interacting with structures and vegetation, distant yard maintenance, people conversing, and periodic helicopter and fixed-wing aircraft flyovers. Nighttime observations included periodic traffic, people conversing at nearby residences, wind interacting with structures and vegetation, and minimal insect noise. Hub height wind speeds during the daytime measurement were 11 m/s and were 9 m/s at night. Figure 17 provides the 1/3-octave band

spectral data for the daytime and nighttime monitoring periods. At no time were infrasound levels of sufficient strength to be above the threshold of human hearing.

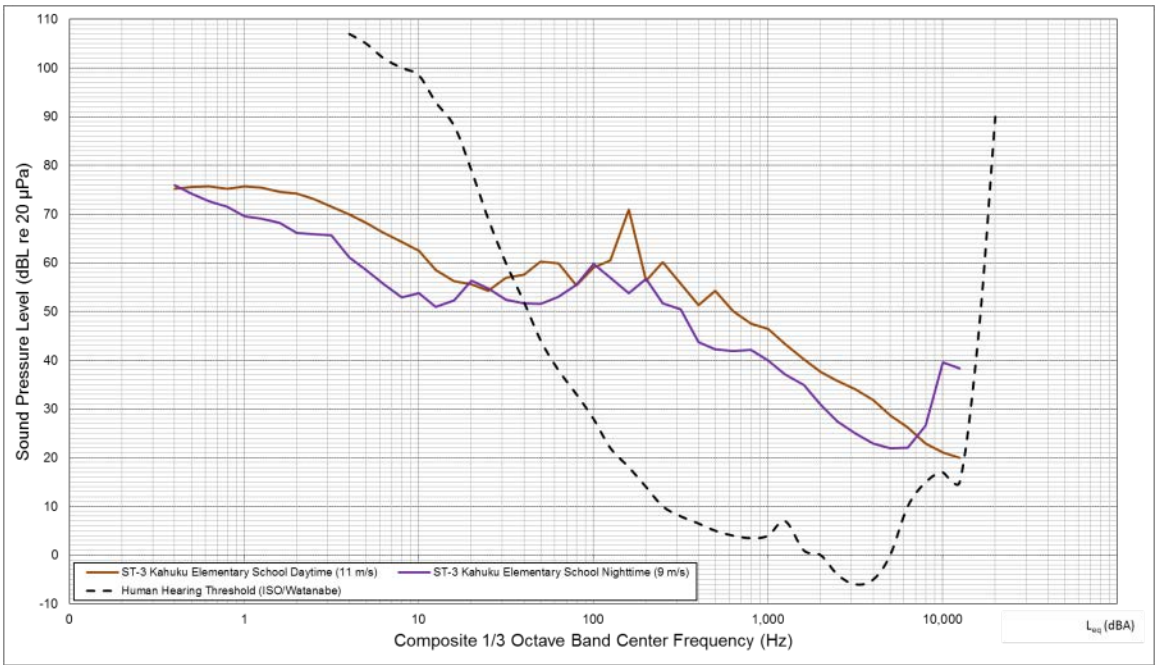


Figure 17. ST-3 1/3-Octave Band Spectral Plot

Monitoring Position: ST-4

Measurements at ST-4 were conducted on April 22, 2014 along limited public ROW near the Gunstock Ranch and are representative of the ranch and nearby rural residences located approximately one kilometer from the Project. The measurement was conducted to capture monitoring data where long-term equipment deployment was not allowed and to verify that long-term monitors at LT-2 and LT-3 are sufficiently representative of this area as well. A daytime measurement was conducted from 3:24PM to 4:03PM and a nighttime measurement was conducted from 10:26PM to 10:56PM. Because the landowners were in the process of locking the limited public access dirt road when field engineers arrived to conduct the nighttime measurement an alternate location was utilized at the entrance off of the Kamehameha Highway. Observed daytime sound sources included periodic local roadway traffic, traffic on the Kamehameha Highway, wind interacting vegetation, distant yard maintenance, people conversing, and periodic helicopter and fixed-wing aircraft flyovers. Nighttime observations included limited traffic on the Kamehameha Highway, wind interacting vegetation, and minimal insect noise. Hub height wind speeds during the daytime measurement were 11 m/s and were 9 m/s at night. Figure 18 provides the 1/3-octave band spectral data for the daytime and nighttime monitoring periods. At no time were infrasound levels of sufficient strength to be above the threshold of human hearing.

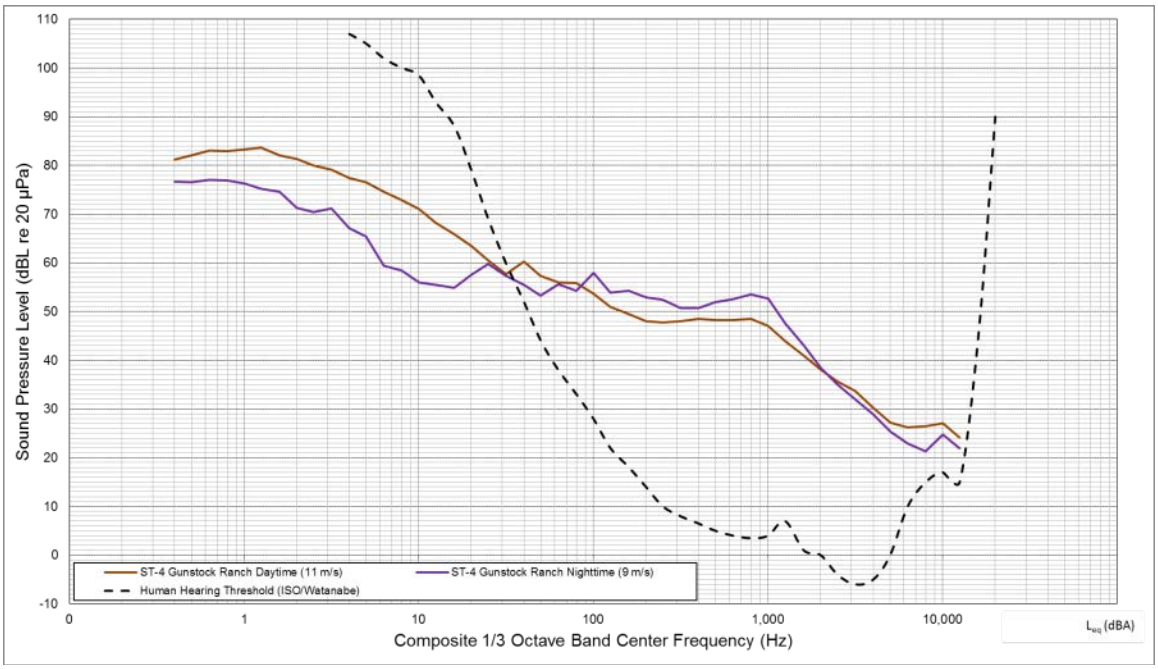


Figure 18. ST-4 1/3-Octave Band Spectral Plot

Monitoring Position: ST-5

Measurements at ST-5 were conducted on May 7, 2014 at the military entrance to the property which contains the Kahuku Wind Farm. The measurement was conducted to capture downwind sound levels from the Kahuku Wind Farm WTGs which are typically louder than in the upwind direction where the Project would be located. A daytime measurement was conducted from 10:00AM to 10:30AM and a nighttime measurement was conducted from 3:11AM to 3:41AM. Observed daytime sound sources included traffic on the Kamehameha Highway, the Kahuku Wind Farm WTGs, wind interacting vegetation, and periodic helicopter and fixed-wing aircraft flyovers. Nighttime observations included minimal traffic on the Kamehameha Highway, the Kahuku Wind Farm WTGs, wind interacting vegetation, and minimal insect noise. Hub height wind speeds during the daytime measurement were 5 m/s and were 6 m/s at night. The dominant sound source at night was from WTGs with the nearest WTG located 476m southwest. To characterize sound levels from just the WTGs to the extent possible was achieved by excluding one minute intervals which included a vehicle pass-by on the Kamehameha Highway. Figure 19 provides the 1/3-octave band spectral data for the daytime and nighttime monitoring periods as well as the nighttime period excluding vehicle pass-bys. At no time were infrasound levels of sufficient strength to be above the threshold of human hearing.

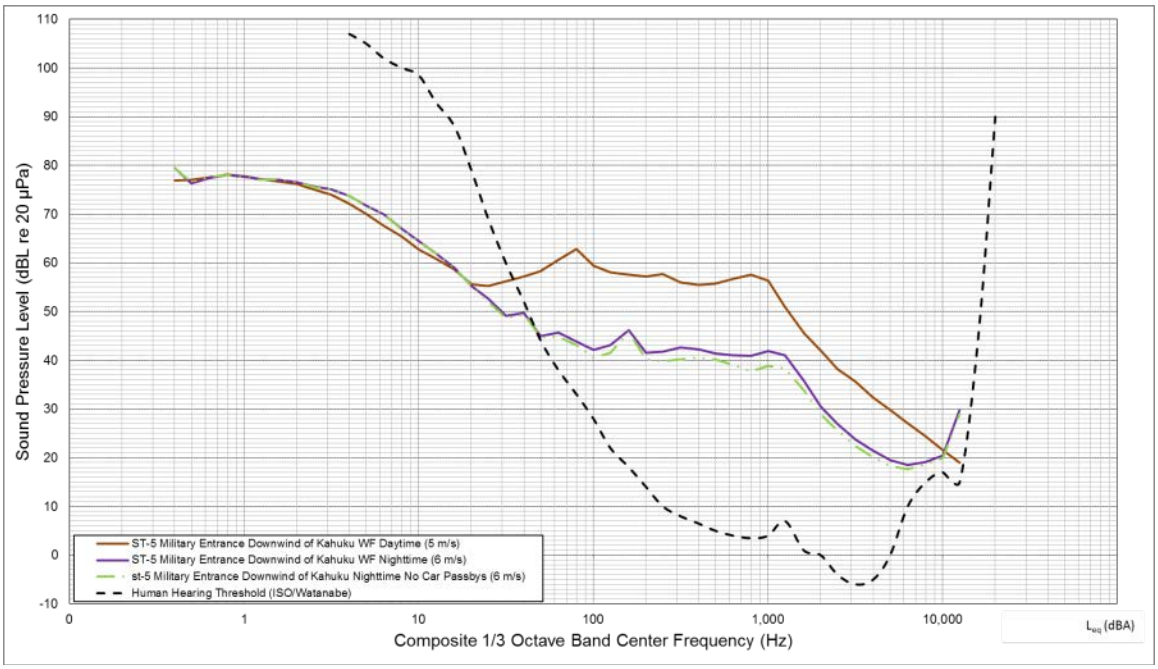


Figure 19. ST-5 1/3-Octave Band Spectral Plot

Monitoring Position: ST-6

The ST-6 measurement was conducted on May 7, 2014 3:54AM to 4:24AM along public ROW near leased DOA parcels that have single-family residences. The measurement was conducted to capture monitoring data at these residences where long-term equipment deployment was not allowed. ST-6 is meant to provide additional support data to characterize these DOA parcels that are located further from the existing Kahuku Wind Farm than those represented by ST-1. A nighttime measurement was conducted at ST-6 with observed sound sources including the existing WTGs at the Kahuku Wind Farm, wind interacting with vegetation, and limited insect noise. Traffic noise along the Kamehameha Highway was not audible during the measurement or was masked by other sounds including the existing WTGs. Figure 20 provides the 1/3-octave band spectral data for the monitoring period which included hub height wind speeds of 10 m/s. At no time were infrasound levels of sufficient strength to be above the threshold of human hearing.

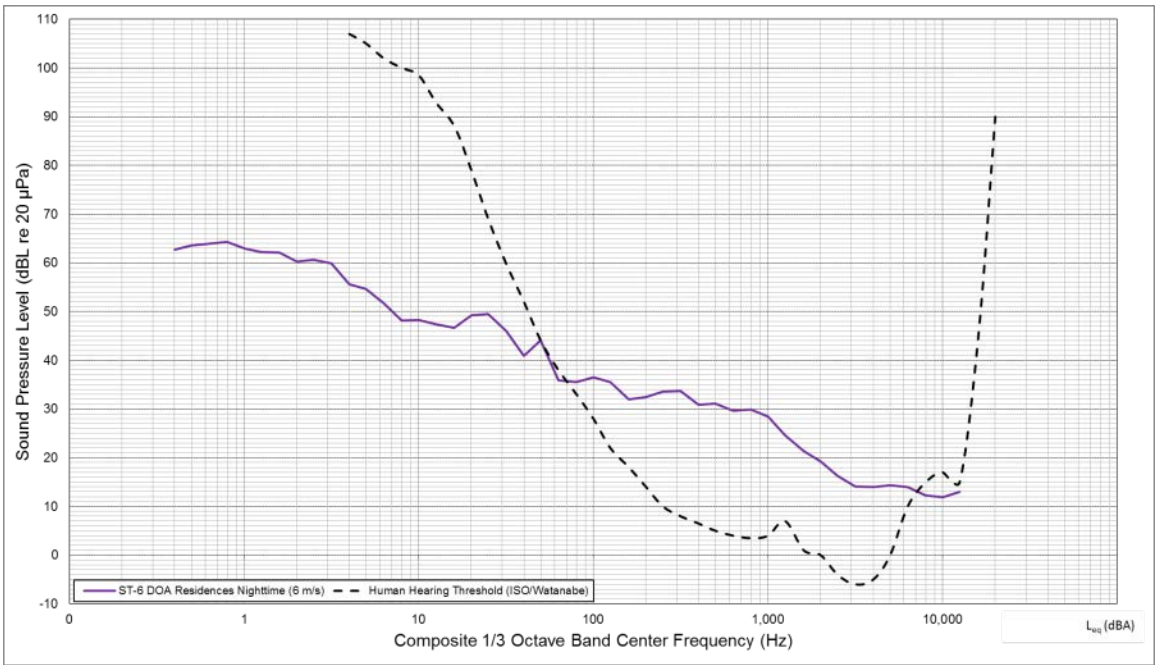


Figure 20. ST-6 1/3-Octave Band Spectral Plot

4.0 ACOUSTIC ANALYSIS METHODOLOGY

Each build alternative was evaluated for construction and operational noise impacts. The No Action Alternative, or Alternative 1, is not discussed here because there would be no noise, other than continued existing sound sources, associated with that alternative. There are two build alternatives under consideration, Alternative 2 (up to 25 MW), Alternative 2a (up to 29.7 MW) and Alternative 3 (up to 39 MW). Noise generated during Project construction and operation was evaluated at the property lines for each TMK per HAR 11-46 and at some of the closest sensitive receptors (i.e., residences) evaluated at outdoors at these structures. Sound levels were not predicted inside homes; however, it should be noted that studies have shown (FHWA 2011) that sound levels are generally 10 dB less inside structures with windows open, which may be common at residences near the Project. Project construction was assessed in a semi-qualitative manner using information available at this stage of the design process and using representative equipment information where necessary. The operational acoustic assessment was completed using DataKustic GmbH's CadnaA, the computer-aided noise abatement program (v 4.4.145).

CadnaA is a comprehensive 3-dimensional acoustic software model that conforms to the Organization for International Standardization (ISO) standard ISO 9613-2 "Attenuation of Sound during Propagation Outdoors." The engineering methods specified in this standard consist of full (1/1) octave band algorithms that incorporate geometric spreading due to wave divergence, reflection from surfaces, atmospheric absorption, screening by topography and obstacles, ground effects, source directivity, heights of both sources and receptors, seasonal foliage effects, and meteorological conditions.

Atmospheric absorption depends on temperature and humidity and is most important at higher frequencies. Over short distances, the effects of atmospheric absorption are minimal. The ISO 9613-2 calculation calculates attenuation for meteorological conditions favorable to propagation, i.e., downwind sound propagation or what might occur typically during a moderate atmospheric ground level inversion, which is assumed to be regulatory worst case. An average temperature of 24° Celsius (75° Fahrenheit) and relative humidity of 67 percent was assumed, based on available yearly climate information for the Project Area. While site-specific meteorological data was considered in the acoustic assessment, it is important to note that atmospheric attenuation is not strongly dependent on temperature. Though a physical impracticality, the ISO 9613-2 standard simulates omnidirectional downwind propagation and maximum WTG source directivities. For receivers located between discrete WTG locations or WTG groupings, the acoustic model may result in over-prediction in sound level at receivers.

In addition to geometrical divergence, attenuation factors (A) include topographical features, terrain coverage, and/or other natural or anthropogenic obstacles that can affect sound attenuation and result in acoustical screening. Topographical information was imported into the acoustic model using the official U.S. Geological Survey (USGS) digital elevation dataset to accurately represent terrain in three dimensions. Terrain conditions, vegetation type, ground cover, and the density and height of foliage can also influence the absorption that takes place when sound waves travel over land. A mixed ground absorption rate was assumed with semi-reflective value of G=0.5 to represent the average ground absorption of the Project Area. Due to land elevation variability in proximity to the Project, additional conservative factors for sound propagation in complex terrain were also taken into account. Sound attenuation through foliage and diffraction around and over existing anthropogenic structures such as buildings were ignored under all acoustic modeling scenarios.

4.1 Wind Turbine sound characteristics

There are two principal sound sources from an operating wind turbine: mechanical and aerodynamic sound. Mechanical sound is generated at the gearbox, generator, and cooling fan and is radiated from the surfaces of the nacelle and machinery enclosure and by openings in the nacelle casing. Aside from upset conditions that may result in abnormal mechanical noise emissions, the dominant noise generating component of utility scale wind turbines is aerodynamic.

Aerodynamic sound is related to air flow and the interaction with the tower structure and rotor blades when in motion and is the largest component of acoustic emissions for modern wind turbines. Sound originates from the flow of air around the air foils which is very strongly influenced by the tip speed of the blades. Tip speed is the speed of the tip of a rotor blade as it travels along the circumference of the rotor-swept area. The tip speed is directly related to the rotor size, which is fixed, and to the rotor rotational speed. The tip speed ratio is defined as the ratio of the speed of the tip of a rotating blade to the speed of the wind. Aerodynamic noise will vary primarily as a function of rotor rotational speed.

Air flow occurring across the blade produces turbulence at the surface boundary layer, which results in trailing edge boundary sound. Trailing edge sound is considered the principal

aerodynamic noise source component of wind turbines. In addition to trailing edge, tip sound is created by vortex shedding as the blade tips pass through the air when in motion. Wind turbine manufacturers have instituted several measures to both reduce aerodynamic sound and increase power generation efficiency by reducing trailing edge and tip sound generation. Efforts to reduce aerodynamic sounds have included the use of upwind rotor designs, noise-reduced nacelle, variable speed operation resulting in lower tip speed ratios, and the use of specially modified rotor blades designed and fabricated to reduce trailing edge noise. Earlier wind turbine designs had the blades located downwind of the support structure. As the blades passed through the vortex shed behind the support tower, the blade would be momentarily displaced, resulting in a pressure pulse. This becomes the mechanism for the generation of excessive acoustic modulation and low frequency sound. The downwind rotor design is rarely used in modern utility-scale wind turbines that employ the now-standard upwind rotor design with blades upstream of the tower structure. This change in rotor location has greatly reduced many issues associated with the downwind design and resulted in a decrease of 10 dB or greater, which corresponds to a perceived decrease in loudness by a factor of two.

A somewhat unique acoustic characteristic of wind energy facilities is that the sound generated by each individual wind turbine will increase as the wind speed across the site increases, up to a certain maximum sound level reached at full rotation of the rotor blades (i.e., greater than approximately 8 meters per second [m/s]). All wind turbines under consideration for the Na Pua Makani Wind Farm are variable speed-type with sound predominantly determined by the aerodynamic broadband sound of the rotor blades, which is directly related to the circumferential or blade tip speed. Wind turbine sound is negligible when the rotor is at rest, increases as the rotor tip speed increases, and is generally constant once rated power output and full rotational speed is reached. As an offset, as wind speeds increase, the background ambient sound levels likely will continue to increase by the normal sound of wind blowing through trees and around buildings, resulting in acoustic masking effects. Aerodynamic noise is usually only perceived when the turbine rotor is moving and wind speeds are relatively low at ground level.

In order to assist project developers and acoustical engineers wind turbine manufacturers report WTG sound power levels at integer wind speeds referenced to the effective hub height, ranging from cut-in to full rated power per the International Electrotechnical Commission (IEC) 61400-11:2006 Wind Turbine Generator Systems – Part 11: Acoustic Noise Measurement Techniques. Table 13 presents a summary of sound power levels during normal mode operation. Sound power levels presented are inclusive of both mechanical and aerodynamic source components. The Vestas and Siemens specification present an expected warranty confidence interval (k-factor) of k=2 dB and k=1.5 dB, respectively. These k-factors were included in all acoustic modeling calculations and incorporates the uncertainty in independent sound power level measurements conducted, the applied probability level and standard deviation for test measurement reproducibility, and product variability. It is expected that the Vestas and Siemens WTGs installed would have similar sound profiles to what was used in the acoustic modeling analysis; however, it is possible that the final warranty sound data could vary slightly.

Table 13. Broadband Sound Power Levels (dBA) Reported in Accordance with IEC 61400-11

Wind Speed at Hub Height (AGL)	WTG Sound Power Level (LW) at Reference Wind Speed										
	7 mph (3 m/s)	9 mph (4 m/s)	11.2 mph (5 m/s)	13.4 mph (6 m/s)	15.9 mph (7 m/s)	17.9 mph (8 m/s)	20.1 mph (9 m/s)	22.4 mph (10 m/s)	24.6 mph (11 m/s)	26.8 mph (12 m/s)	29.1 mph (13 m/s)
Vestas V110-2.0	97.3	99.6	103.8	107.5	106.1	106.1	106.1	106.3	106.5	106.7	107
Siemens SWT 3.0-113	N/A	N/A	N/A	105	107.4	107.5	107.5	107.5	N/A	N/A	N/A
Siemens SWT 3.3-130	91.9	96.1	101.0	105.2	106.0	106.0	106.0	106.0	106.0	106.0	106.0
Source: Vestas 2013, Siemens 2013, Siemens 2015											

A summary of sound power levels during full rotation for each turbine by octave band center frequency are presented in Table 14.

Table 14. Representative Octave Band 1/1 Center Frequencies

Frequency (Hz)	Octave Band Sound Power Level (dBA)								Broadband (dBA)
	63	125	250	500	1000	2000	4000	8000	
Vestas V110-2.0	89.9	94.5	97.2	99.6	102.2	100.7	99.1	92.3	107.5
Siemens SWT 3.0-113	85.5	93.0	100.4	103.7	100.4	92.5	81.6	78.3	107.0
Siemens SWT 3.3-130	86.6	94.3	96.3	100.4	101.6	97.2	92.4	82.9	106.0
Source: Vestas 2013, Siemens 2013, Siemens 2015									

Predictions of WTG LFN and IS were conducted to identify potential impacts; however, these predictions are difficult for a number of reasons. For example, WTG manufacturers do not publish LFN and IS sound levels via their IEC 61400-11 testing reports; therefore, surrogate sound levels were needed to conduct the analysis. These surrogate values are the best available data, obtained from other published studies on Siemens WTGs. No data is known to exist on low LFN or IS source levels for Vestas wind turbines, but because the bulk of LFN and IS noise is a result of WTG blades the Siemens data is thought to be representative of the Vestas WTG as well. Additionally, attempts were made to scale the surrogate data to more closely match the Project WTG octave band spectra. Values used in the analysis of Project LFN and IS are given in Table 15.

Table 15. Representative Octave Band 1/1 LFN/IS Frequencies

Frequency (Hz)	Octave Band Sound Power Level (dBA)		
	8	16	31.5
Siemens SWT 3.0-113/SWT 3.3-130	59.8	73.7	84.8
Source: Scaled up from data in Epsilon 2010 using Siemens 2013 and 2015 sound power data.			

Another complication of LFN and IS prediction is that standard propagation modeling methodologies (e.g., ISO 9613-2) are not always appropriate because low frequency sounds attenuate at different rates with distance than the mid to high frequencies. Additionally, existing ambient LFN and IS are often already relatively high from the sounds of wind interacting with the environment vegetation or structures, vehicles on roadways, existing wind turbine noise from the

Kahuku Wind Farm, and ocean waves crashing on shore. However, comparisons were made to existing LFN and IS levels to ascertain the net increase, if any, with the Project.

4.2 Construction Noise

Construction noise analysis was evaluated for two Project build alternatives under consideration. Alternative 2 would implement two Vestas V110-2.0 and eight Siemens 3.0-113 WTGs. Alternative 2a would implement nine Siemens 3.3-130 WTGs. Alternative 3 would implement two Vestas V110-2.0 and 10 Siemens 3.0-113 WTGs.

4.2.1 Alternative 2

Construction of Alternative 2 would involve constructing of access roads, excavating and forming WTG foundations, works associated with preparing the site for crane-lifting, and actual WTG assembly and commissioning. Typically wind energy projects are constructed in four phases consisting of the following:

1. **Site Clearing:** The initial site mobilization phase includes the establishment of temporary site offices, workshops, stores, and other on-site facilities. Installation of erosion and sedimentation control measures will be completed as well as the preparation of initial haulage routes.
2. **Excavation:** This phase would begin with the excavation and formation of access roads and preparation of laydown areas. Excavation for the concrete WTG foundations would also be completed.
3. **Foundation Work**: Construction of the reinforced concrete WTG foundations would take place in addition to installation of the internal transmission network.
4. **Wind Turbine Installation**: Delivery of the WTG components would occur followed by their installation and commissioning.

Work on these construction activities is expected to overlap. It is likely that the WTGs would be erected in small groupings. Each grouping may undergo testing and commissioning prior to commencement of full commercial operation. Other construction activities include those for the supporting infrastructure such as the collection substation, maintenance building, and the overhead transmission lines. The construction of the Project may cause short-term but unavoidable noise impacts depending on the construction activity being performed and the distance to receiver. The sound levels resulting from construction activities vary significantly depending on several factors such as the type and age of equipment, the specific equipment manufacturer and model, the operations being performed, and the overall condition of the equipment and exhaust system mufflers. The list of construction equipment that may be used on the Project and estimates of near and far sound source levels are presented in Table 16.

Table 16. Alternative 2 Estimated L_{max} Sound Pressure Levels from Construction Equipment

Equipment*	Estimated Sound Pressure Level at 50 feet (dBA)	Estimated Sound Pressure Level at 2000 feet (dBA)
Forklift	80	48
Backhoe	80	48
Grader	85	53
Man basket	85	53
Dozer	83 - 88	51 - 56
Loader	83 - 88	51 - 56
Scissor Lift	85	53
Truck	84	52
Welder	73	41
Compressor	80	48
Concrete Pump	77	45

Sources: Federal Highway Administration, "Roadway Construction Noise Model User's Guide," Report FHWA-HEP-05-054 / DOT-VNTSC-FHWA-05-01, January 2006. Power Plant Construction Noise Guide, Bolt Beranek and Newman, Inc. 1977. Federal Highway Administration, "Procedures for Abatement of Highway Traffic Noise and Construction Noise." Code of Federal Regulations, Title 23, Part 772, 1992.

Sounds generated by construction activities would likely require a permit, to be obtained from the DOH, to allow for the operation of construction equipment that result in exceedances of the maximum permissible at property line locations. While the permit and permitting procedures do not limit the sound level generated at the construction site, time restrictions may be placed on time periods when the loudest construction activities are likely to occur, i.e. 7:00 a.m. and 7:00 p.m., Monday through Friday and between 9:00 a.m. and 6:00 p.m. on Saturday. The DOH would require reasonable and standard practices be employed to minimize the impact of noise resulting from construction activities. Provisions to conduct noise monitoring and community meetings may also be required, but will likely be deemed unnecessary given the remote location. The Project would proactively work with the community and attempt to resolve any complaints or concerns due to noise from construction by coordinating activities and informing the community of the timing of the expected construction noise at the closest NSRs to avoid conflicts, i.e., if blasting for foundation or removal of ledge or other potentially noisy activities are required during the construction period, nearby residents shall be notified in advance.

Construction activity would generate traffic having potential noise effects, such as trucks travelling to and from the site on public roads. Traffic noise is categorized into two categories: (1) the noise that will occur during the initial temporary traffic movements related to turbine delivery, haulage of components and remaining construction; and (2) maintenance and ongoing traffic from staff and contractors, which is expected to be minor. At the early stage of the construction phase, equipment and materials would be delivered to the site, such as hydraulic excavators and associated spreading and compacting equipment needed to form access roads and foundation platforms for each turbine. Once the access roads are constructed, equipment for lifting the towers and turbine components would arrive. Concrete would be mixed offsite and delivered to the Project site, rather than produced by an on-site concrete batch plant.

Federal laws prohibit state and local governments from regulating off-site sound levels generated by trucks and automobiles operating on a private site or public roadways. This federal regulatory preemption is specified in the Federal Noise Control Act of 1972 and in the Surface Transportation

Assistance Act of 1982, both of which prohibit states and local authorities from regulating the noise emitted by trucks engaged in interstate commerce, i.e., truck deliveries. A federal OSHA preemption also prohibits local and state governments from regulating safety signals on trucks and construction equipment. Alternative 2 construction would be coordinated with individual landowners regarding the operation of trucks, cars and other vehicles on private site access roadways as necessary to prevent the occurrences of unexpected noise resulting from construction and transport related vehicle movements.

4.2.2 Alternative 2a

Construction noise under Alternative 2a would be almost the same as Alternative 2, implementing an identical method of construction. The variation in construction noise between the two alternatives is a result of where construction would take place since the locations of WTGs are slightly different. Like Alternative 2, construction noise is likely to exceed HAR 11-46 limits at some TMKs in the Project Area and therefore a permit from the DOH would likely be required. Mitigation of construction noise would be the same for Alternative 2a as that for Alternative 2.

4.2.3 Alternative 3

The first phase of construction of Alternative 3 would be identical to Alternative 2 and the second phase of Alternative 3 would use an identical method as that for the first phase of construction. The variation in construction noise between phases one and two of construction are a result of where construction would take place and that construction would occur at least two years later for the second phase. Like Alternative 2, construction noise is likely to exceed HAR 11-46 limits at some TMKs in the Project Area and therefore a permit from the DOH would likely be required. Mitigation of construction noise would be the same for Alternative 3 as that for Alternative 2.

4.3 Operational Noise

Operational noise analysis was conducted for the same two Project alternatives under consideration (e.g., Alternatives 2 and 3) and for the two WTG types under consideration.

4.3.1 Alternative 2

Operational noise with implementation of Alternative 2 would result from the WTGs and to a lesser extent the proposed substation 50 MVA transformer. Operational broadband (dBA) sound pressure levels were calculated assuming that all Alternative 2 WTGs would be operating continuously and concurrently at the highest manufacturer-rated sound level at the given operational condition. The sound energy was then summed to determine the equivalent continuous A-weighted downwind sound pressure level at a point of compliance with HAR 11-46, in this case the property or TMK limit. Calculations were completed along each property limit in the acoustic analysis area at a height of 5 ft (1.52 m) above ground (the approximate height of ears of a standing person). This is also the standard height at which testing for compliance with the State Community Noise Control Rule is completed. Table 17 presents the range of sound levels received at each TMK zoning class along the property line in the acoustic analysis area. These predictions demonstrate that compliance with

HAR 11-46 is achieved since Project operational sound levels at the receiving property lines are at or below the controlling noise limit for each zone. Figure 21 provides a map of received sound levels in the acoustic analysis area for Alternative 2.

Table 17. Alternative 2 Range of Property Line Received Sound Levels by HAR 11-46 Zoning Class

HAR 11-46 Zoning Class	Controlling HAR 11-46 Zoning Limit (dBA L_{eq})	Range of Received Sound Levels dBA L_{eq}
Class A	45	8 – 44
Class B	50	38 – 41
Class A (Day Only)*	55	31 – 44
Class C	70	10 - 58
Note: *Class A (Day Only) uses include those at the area schools and golf course.		

Figure 21. Alternative 2 Operational Sound Level Isopleths

Figure 21 page 2 of 2

LFN/IS Predictions

As indicated in the regulatory environment description in this document (Section 2.0) there are no federal, state, or local regulations that stipulate LFN/IS noise level limits. Nevertheless, because the community has indicated concern via comments received during scoping, Champlin elected to analyze the contribution of predicted Project LFN/IS to existing LFN/IS levels in order to ascertain if there could be potential Project-related LFN/IS impacts. The first level of analysis utilized the WHO comparison guidance to identify locations where the predicted dBC was 10 dB greater than the predicted dBA. The next level of analysis was conducted at the nearest NSRs to the Project's WTGs, where the WHO guideline showed that received dBC were 10 dB higher than the predicted dBA to determine if LFN/IS would exceed the threshold of human hearing, the DEFRA limits, and/or the ANSI S12.9 Part 4 guidelines. The nearest residence is located approximately 673 feet (205 meters) a proposed WTG. Received LFN/IS are predicted to be 83 dB at 8 Hz and 76 dB at 16 Hz which are both well below the threshold of human hearing and the DEFRA limits but higher than the ANS S12.9 Part 4 guideline of 65 dB at 16 Hz. Monitored sound levels in this area would be similar to those monitored at positions LT-1 and ST-1 which shows that existing LFN/IS sound levels range from 69-76 dB at 8 Hz and 63-71 at 16 Hz, all below the threshold of human hearing, but at 16 Hz baseline sound levels are on average above the ANSI S12.9 Part 4. The Project would result in an increase in LFN/IS of but much of this would be masked by existing sound levels. Regardless, because it is unlikely that Project LFN/IS would be audible at these frequencies even the highest increases of LFN/IS would not result in an impact at the nearest residence. With regard to the 65 dB ANSI S12.9 Part 4 guideline, because the baseline sound levels are already above this threshold the likelihood of complaints is low given that Project LFN/IS would also be partially masked. Therefore, there is no anticipated LFN/IS impact from Alternative.

4.3.2 Alternative 2a

Operational noise with implementation of Alternative 2a would result from WTGs and to a lesser extent the proposed substation 50 MVA transformer. Additionally, the worst case LFN/IS noise levels would be the same under Alternative 2a as they are under Alternative 2 because the nearest residence is the same for the alternative being located 205 meters from the nearest proposed turbine. Refer to the Alternative 2 discussion of LFN/IS for results.

Operational broadband (dBA) sound pressure levels were calculated assuming that all Alternative 2a WTGs (a total of 9) would be operating continuously and concurrently at the maximum manufacturer-rated sound level at the given operational condition. The sound energy was then summed to determine the equivalent continuous A-weighted downwind sound pressure level at a point of compliance with HAR 11-46, in this case the property or TMK limit. Calculations were completed using receptor points along each property limit in the acoustic analysis area at a height of 5 ft (1.52 m) above ground (the approximate height of ears of a standing person). This is also the standard height at which testing for compliance with the State Community Noise Control Rule is completed. Table 18 presents the range of sound levels received at each TMK zoning class along the property line in the acoustic analysis area. Compliance with HAR 11-46 is achieved if Project operational sound levels at the receiving property line are at or below the controlling noise limit for

each zone. Because sound levels for operation of the Project are all below the controlling HAR 11-46 limit the Project is anticipated to be in compliance. Figure 22 is a map of received sound levels from operation of Alternative 2a.

Table 18. Alternative 2a Range of Property Line Received Sound Levels by HAR 11-46 Zoning Class

HAR 11-46 Zoning Class	Controlling HAR 11-46 Zoning Limit (dBA L_{eq})	Range of Received Sound Levels dBA L_{eq}
Class A	45	8 - 43
Class B	50	35 – 38
Class A (Day Only)*	55	27 – 43
Class C	70	8 - 56
Note: *Class A (Day Only) uses include those at the area schools and golf course.		

4.3.3 Alternative 3

Operational noise with implementation of Alternative 3 would result from WTGs and to a lesser extent the proposed substation 50 MVA transformer. Additionally, the worst case LFN/IS noise levels would be the same under Alternative 3 as they are under Alternative 2 because the nearest residence is the same for the alternative being located 205 meters from the nearest proposed turbine. Refer to the Alternative 2 discussion of LFN/IS for results.

Operational broadband (dBA) sound pressure levels were calculated assuming that all Alternative 3 WTGs (a total of 12) would be operating continuously and concurrently at the maximum manufacturer-rated sound level at the given operational condition. The sound energy was then summed to determine the equivalent continuous A-weighted downwind sound pressure level at a point of compliance with HAR 11-46, in this case the property or TMK limit. Calculations were completed using receptor points along each property limit in the acoustic analysis area at a height of 5 ft (1.52 m) above ground (the approximate height of ears of a standing person). This is also the standard height at which testing for compliance with the State Community Noise Control Rule is completed. Table 19 presents the range of sound levels received at each TMK zoning class along the property line in the acoustic analysis area. Compliance with HAR 11-46 is achieved if Project operational sound levels at the receiving property line are at or below the controlling noise limit for each zone. Because sound levels for operation of the Project are all below the controlling HAR 11-46 limit the Project is anticipated to be in compliance. Figure 23 is a map of operational noise isopleths for Alternative 3.

Table 19. Alternative 3 Range of Property Line Received Sound Levels by HAR 11-46 Zoning Class

HAR 11-46 Zoning Class	Controlling HAR 11-46 Zoning Limit (dBA L_{eq})	Range of Received Sound Levels dBA L_{eq}
Class A	45	8 – 44
Class B	50	38 – 41
Class A (Day Only)*	55	31 – 44
Class C	70	10 – 58
Note: *Class A (Day Only) uses include those at the area schools and golf course.		

Figure 22. Alternative 2a Operational Sound Level Isopleths

Figure 22 page 2 of 2

Figure 23. Alternative 3 Operational Sound Level Isopleths

Figure 23 page 2 of 2

5.0 CONCLUSIONS

To conclude, Alternative 2 and Alternative 2a results in lower overall sound levels than Alternative 3 due to the smaller number of WTGs being constructed and operated. All Project Alternatives would be able to be constructed in compliance with HAR 11-46, but only if the construction contractor obtains a noise permit from DOH. Operationally neither Alternative is predicted to exceed the HAR 11-46 sound level limits, but all of the alternatives are predicted to increase sound levels in the acoustic analysis area by greater than 2 dBA at some Zone A or B TMKs, therefore operationally all of the Alternatives are similar although Alternative 3 results in slightly higher noise levels than Alternatives 2 and 2a. LFN/IS are not predicted to be a concern for the Project and are predicted to be below the threshold of human hearing. Additionally, there have been no known scientifically peer reviewed studies to date concluding a relationship between LFN and IS to health effects. Even so, the LFN/IS sound levels predicted with the Project are considered low level as they are below the threshold of human hearing and are not thought to pose a health risk to humans. Furthermore, monitored ambient LFN/IS levels would mask some of the Project LFN/IS further reducing the potential for public complaint. Nevertheless, to respond to potential future public concerns Champlin will implement a noise complaint resolution process. This process might include a post construction sound survey to ascertain the net increase, if any, in sound levels in the acoustic analysis area. Regardless, because there are no predicted operational noise impacts, mitigation of operational noise is not necessary.

6.0 REFERENCES

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2015 SWT-3.3-130 rev 0, Hub Heights 85, 115, 135 Standard Acoustic Emission

APPENDIX A Calibration Sheets

Certificate of Calibration and Conformance

This document certifies that the instrument referenced below meets published specifications per Procedure PRD-P263; ANSI S1.4-1983 (R 2006) Type 1; S1.4A-1985; S1.43-1997 Type 1; S1.11-2004 Octave Band Class 0; S1.25-1991; IEC 61672-2002 Class 1; 60651-2001 Type 1; 60804-2000 Type 1; 61260-2001 Class 0; 61252-2002.

Manufacturer:	Larson Davis	Temperature:	72.6	°F
Model Number:	831		22.56	°C
Serial Number:	3140	Rel. Humidity:	10.9	%
Customer:	TMS Rental	Pressure:	1004.1	mbars
Description:	Sound Level Meter		1004.1	hPa

Note: As Found / As Left: In Tolerance

Upon receipt for testing, this instrument was found to be:

Within the Stated tolerance of the manufacturer's specification

Calibration Date: 29-Jan-14 Calibration Due:

Calibration Standards Used:

Manufacturer	Model	Serial Number	Cal Due	Traceability No.
Larson Davis	LDSigGen/2239	0760/0109	4/12/2014	2012-161465

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at The Modal Shop and/or Larson Davis Corporate Headquarters. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. Calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of The Modal Shop.

Technician: Wayne Underwood Signature:

THE MODAL SHOP INC. A PCB GROUP CO.

The Modal Shop, Inc.
3149 East Kemper Road
Cincinnati, OH 45241
Phone: (513) 351-9919
(800) 860-4867
www.modalshop.com

PRD-F242 revNR December 2, 2008 Page 1 of 1

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2013-175223

Instrument Model 831, Serial Number 0001350, was calibrated on 10JUN2013. The instrument meets factory specifications per Procedure D0001.8310, ANSI S1.4-1983 (R 2006) Type 1; S1.4A-1985 ; S1.43-1997 Type 1; S1.11-2004 Octave Band Class 1; S1.25-1991; IEC 61672-2002 Class 1; 60651-2001 Type 1; 60804-2000 Type 1; 61260-2001 Class 1; 61252-2002.

Instrument found to be in calibration as received: YES
Date Calibrated: 10JUN2013
Calibration due: 10JUN2015

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Stanford Research Systems	DS360	61746	12 Months	06JUL2013	61746-070612

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 24 ° Centigrade

Relative Humidity: 32 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"AS RECEIVED" data same as shipped data.
Tested with PRM831-010875

Signed: Ron Harris
Technician: Ron Harris

Page 1 of 1

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

Scantek, Inc.
CALIBRATION LABORATORY

ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1
ACCREDITED by NVLAP (an ILAC MRA signatory)

NVLAP®

NVLAP Lab Code: 200625-0

Calibration Certificate No.30716

Instrument: **Sound Level Meter**
Model: **140**
Manufacturer: **Norsonic**
Serial number: **1402796**
Tested with: **Microphone 1225 s/n 112883**
Preamplifier 1209 s/n 13442
Type (class): **1**
Customer: **Scantek, Inc.**
Tel/Fax: **410-290-7726 / 410-290-9167**

Date Calibrated: **3/3/2014** *Cal Due:* **3/4/2015**

Status:	Received	Sent
In tolerance:	X	X
Out of tolerance:		
See comments:		

Contains non-accredited tests: __Yes _X_ No
Calibration service: __ Basic _X_ Standard
Address: **6430 Dobbin Road, Suite C, Columbia, MD 21045**

Tested in accordance with the following procedures and standards:
Calibration of Sound Level Meters, Scantek Inc., Rev. 6/22/2012
SLM & Dosimeters – Acoustical Tests, Scantek Inc., Rev. 7/6/2011

Instrumentation used for calibration: Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31052	Oct 7, 2013	Scantek, Inc./ NVLAP	Oct 7, 2014
DS-360-SRS	Function Generator	33584	Sep 30, 2013	ACR Env./ A2LA	Sep 30, 2015
34401A-Agilent Technologies	Digital Voltmeter	US36120731	Sep 30, 2013	ACR Env. / A2LA	Sep 30, 2014
HM30-Thommen	Meteo Station	1040170/39633	Sep 30,2013	ACR Env./ A2LA	Sep 30, 2014
PC Program 1019 Norsonic	Calibration software	v.5.2	Validated Mar 2011	Scantek, Inc.	-
1251-Norsonic	Calibrator	30878	Nov 8, 2013	Scantek, Inc./ NVLAP	Nov 8, 2014

Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK).

Environmental conditions:

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
24.4 °C	101.260 kPa	34.1 %RH

Calibrated by:	Lydon Dawkins	Authorized signatory:	Mariana Buzduga
Signature	Lydon Dawkins	Signature	[illegible]
Date	3/3/2014	Date	3/5/2014

Calibration Certificates or Test Reports shall not be reproduced, except in full, without written approval of the laboratory.
This Calibration Certificate or Test Reports shall not be used to claim product certification, approval or endorsement by NVLAP, NIST, or any agency of the federal government.
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Page 1 of 2

Results summary: Device complies with following clauses of mentioned specifications:

CLAUSES[1] FROM IEC/ANSI STANDARDS REFERENCED IN PROCEDURES:	RESULT[2,3]	EXPANDED UNCERTAINTY (coverage factor 2) [dB]
CALIBRATION OF SOUND LEVEL METER - ANSI S1.4 CLAUSE 3.2	Passed	0.2
LEVEL LINEARITY TEST - ANSI S1.4-1983, CLAUSE 6.9 & 6.10	Passed	0.25
WEIGHTING NETWORK TEST: A NETWORK - ANSI S1.4-1983 CLAUSE 8.2.1	Passed	0.25
WEIGHTING NETWORK TEST: C NETWORK - ANSI S1.4-1983 CLAUSE 8.2.1	Passed	0.25
WEIGHTING NETWORK TEST: LINEAR NETWORK - ANSI S1.4-1983 CLAUSE 8.2.1	Passed	0.25
OVERLOAD DETECTOR TEST: A-NETWORK - ANSI S1.4-1983 CLAUSE 8.3.1	Passed	0.25
F/S/I/PEAK TEST: STEADY STATE RESPONSE - ANSI S1.4 1983 CLAUSE 6.4	Passed	0.25
FAST-SLOW TEST: OVERSHOOT TEST - ANSI S1.4 1983 CLAUSE 8.4.1	Passed	0.25
FAST-SLOW TEST: SINGLE SINE WAVE BURST - ANSI S1.4 1983 CLAUSE 8.4.1 & 8.4.3	Passed	0.25
IMPULSE TEST: CONTINUOUS SINE WAVE BURST - ANSI S1.4 1983 CLAUSE 8.4.3	Passed	0.25
IMPULSE TEST: SINGLE SINE WAVE BURST - ANSI S1.4 1983 CLAUSE 8.4.1 & 8.4.3	Passed	0.25
PEAK DETECTOR TEST, SINGLE SQUARE WAVE BURST - ANSI S1.4 1983 CLAUSE 8.4.4	Passed	0.25
RMS DETECTOR TEST: CREST FACTOR TEST - ANSI S1.4-1983 CLAUSE 8.4.2	Passed	0.25
RMS DETECTOR TEST: CONTINUOUS SINE WAVE BURST - ANSI S1.4-1983 CLAUSE 8.4.2	Passed	0.25
TIME AVERAGING TEST: AVERAGING FUNCTIONS - ANSI S1.43 CLAUSE 9.3.2	Passed	0.25
LINEARITY TEST - ANSI S1.43 CLAUSE 9.3.3	Passed	0.15
FILTER TEST 1/1OCTAVE: RELATIVE ATTENUATION - IEC 61260, CLAUSE 4.4 & #5.3	Passed	0.25
FILTER TEST 1/3OCTAVE: RELATIVE ATTENUATION - IEC 61260, CLAUSE 4.4 & #5.3	Passed	0.25
SUMMATION OF ACOUSTIC TESTS - ANSI S1.4 CLAUSE 5 USING ACTUATOR	Passed	0.2-0.5

[1] The results of this calibration apply only to the instrument type with serial number identified in this report.

[2] Parameters are certified at actual environmental conditions.

[3] The tests marked with (*) are not covered by the current NVLAP accreditation.

Comments: The instrument was tested and met all specifications found in the referenced procedures.

Note: The instrument was tested for the parameters listed in the table above, using the test methods described in the listed standards. All tests were performed around the reference conditions. The test results were compared with the manufacturer's or with the standard's specifications, whichever are larger.
Compliance with any standard cannot be claimed based solely on the periodic tests.

Tests made with the following attachments to the instrument:

Microphone: Norsonic 1225 s/n 112883 for acoustical test
Preamplifier: Norsonic 1209 s/n 13442 for all tests
Other: line adaptor ADP005 (18pF) for electrical tests
Accompanying acoustical calibrator: none
Windscreen: none

Measured Data: in Test Report # 30713 of 12 + 1 pages.

Place of Calibration: Scantek, Inc.
6430 Dobbin Road, Suite C
Columbia, MD 21045 USA

Ph/Fax: 410-290-7726/ -9167
callab@scantekinc.com

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APPENDIX E
BIOLOGICAL SURVEY REPORT

BIOLOGICAL RESOURCES SURVEY

NA PUA MAKANI WIND ENERGY PROJECT

KAHUKU, KOOLAULOA, OAHU, HAWAII

by

Robert W. Hobdy
Environmental Consultant
Kokomo, Maui
July 2013

Prepared for:
Tetra Tech, Inc.

BIOLOGICAL RESOURCES SURVEY
NA PUA MAKANI WIND ENERGY PROJECT
KAHUKU, KOOLAULOA, OAHU

INTRODUCTION

The Na Pua Makani Wind Energy Project lies on 685 acres of land above Kahuku Town, Koolauloa, Oahu TMK's (1) 5-6-08:06 and (1) 5-6-06:16. It is surrounded by agricultural farm lands to the north and east and by undeveloped forested lands to the west and south. This biological study was initiated in fulfillment of environmental requirements of the planning process.

SITE DESCRIPTION

The project consists of steep, dissected ridges surrounding gently sloping valleys. Elevations rise steeply behind Kahuku Town to about 250 ft., while the inland ridges rise to nearly 350 ft. Soils include Kaena Stony Clay, 12-20% slopes (KaeD), Paumalu Badlands Complex (PZ), which is highly dissected and steep, and with coral outcrops (CR) at elevations below 100 ft. (Foote et al. 1972). Rainfall averages 45 in. to 50 in. per year with most falling during a few winter storms (Armstrong, 1983). Vegetation consists mostly of low, windblown shrubs and trees on the ridge tops and larger trees and brush on the slopes and in the gullies.

BIOLOGICAL HISTORY

In pre-contact times the lower, more gently sloping lands would have been extensively farmed by a large Hawaiian population that lived in the lower valleys and along the sea shore. The ridges would have been covered by a dense tangle of native shrubs such as ʻūlei (*Osteomeles anthyllidifolia*), ʻakia (*Wikstroemia oahuensis*), ʻiliahi aloʻe (*Santalum ellipticum*), and ʻuhaloa (*Waltheria indica*).

In the late 1800s much of the area was converted to sugar cane agriculature. The land was cleared, plowed, burned and harvested in continuous cycles for about 100 years. Much of the steeper land was used to pasture plantation horses and mules. This reduced the numbers and diversity of native plants considerably. Sugar was discontinued in the 1980's and the land was put into truck crop agriculture or left idle. Today the area is a largely non-native shrubland and forest consisting of a diverse array of aggressive weedy species and a few tough and persistent native plants that have been able to compete and survive.

SURVEY OBJECTIVES

This report summarizes the findings of a flora and fauna survey of the proposed Na Pua Makani Wind Energy Project which was conducted during June 2013. The objectives of the survey were to:

1. Document what plant, bird and mammal species occur on the property or may likely occur in the existing habitat.

2. Document the status and abundance of each species.

3. Determine the presence or likely occurrence of any native flora and fauna, particularly any that are Federally listed as Threatened or Endangered. If such occur, identify what features of the habitat may be essential for these species.

4. Determine if the project area contains any special habitats, which if lost or altered, might result in a significant negative impact on the flora and fauna in this part of the island.

BOTANICAL SURVEY REPORT

SURVEY METHODS

A walk-through botanical survey method was used following multiple routes to ensure complete coverage of the area. Areas most likely to harbor native plants such as open ridge tops, gullies or rock outcrops were more intensively examined. Notes were made on plant species, distribution and abundance as well as on terrain and substrate.

DESCRIPTION OF THE VEGETATION

The vegetation on this property is a mixture of aggressive weedy species that have taken over since the abandonment of sugar cane agriculture, but there is also a complement of native shrubby species remnant on windy ridge tops. Most abundant throughout the project area is the common ironwood (*Casuarina equisetifolia*). Other common species are koa haole (*Leucaena leucocephala*), octopus tree (*Schefflera actinophylla*), (*Bidens alba*) no common name, Guinea grass (*Megathyrsus maximus*), pitted beardgrass (*Bothriochloa pertusa*), parasol leaf tree (*Macaranga tanarius*), Formosa koa (*Acacia confusa*), kaimi clover (*Desmodium incanum*), ‘uhaloa, Koster’s curse (*Clidemia hirta*), Java plum (*Syzygium cumini*), strawberry guava (*Psidium cattleianum*), huehue haole (*Passiflora suberosa*), ‘ulei, ‘akia and Jamaica vervain (*Stachytarpheta jamaicensis*).

A total of 100 plant species were recorded during the course of the survey. Of this total, 19 were common native species: ni’ani’au (*Nephrolepis exaltata*), kilau (*Pteridium aquilinum* var. *decompositum*), ‘uki’uki (*Dianella sandwicensis*), (*Carex wahuensis*) no common name, ‘akia, pala’a (*Sphenomeris chinensis*), uluhe (*Dicranopteris linearis*), moa (*Psilotum nudum*), pi’ipi’i (*Chrysopogon aciculatus*), pili grass (*Heteropogon contortus*), pukiawe (*Leptecophylla tameiameiae*), kauna’oa pehu (*Cassytha filiformis*), ‘uhaloa, huehue (*Cocculus orbiculatus*), ‘ulei, alahe’e (*Psydrax odorata*), ‘ala’alawainui (*Peperomia latifolia*), naupaka kahakai (*Scaevola taccada*), and ‘iliahi alo’e (*Santalum ellipticum*). None of these are rare species, and all are known from multiple islands. The native species are mixed in with non-native species for the most part with the exception of a few spots on the ridge tops where ‘ulei forms large monotypic patches.

DISCUSSION AND RECOMMENDATIONS

The vegetation on this property is dominated by non-native agricultural weeds and tree species, although a fair number of common native species occupy some of the ridge tops. No officially listed Endangered or Threatened plant species (USFWS, 2013) were found on the property, nor were any found that are proposed for such status. No special habitats were found either.

Due to the lack of unique or sensitive species or habitats there is little of botanical concern with regard to this property, and the proposed project is not expected to have a significant negative impact on the botanical resources in this part of Oahu.

If, however, there is any re-vegetation planned along road cuts or on the margins of tower pads, it is suggested that some of the native species listed above be selected for propagation and outplanting.

PLANT SPECIES LIST

Following is a checklist of all those vascular plant species inventoried during the field studies. Plant families are arranged alphabetically within each of three groups: Ferns, Monocots and Dicots. Taxonomy and nomenclature of the flowering plants (Monocots and Dicots) are in accordance with Wagner et al. (1999) and Staples and Herbst, (2005). Ferns follow Palmer, (2003).

For each species, the following information is provided:

1. Scientific name with author citation

2. Common English or Hawaiian name.

3. Bio-geographical status. The following symbols are used:

endemic = plants native only to the Hawaiian Islands; not naturally occurring anywhere else in the world.

indigenous = plants native to the Hawaiian Islands and also to one or more other geographic area(s).

non-native = plants brought to the islands intentionally or accidentally after western contact.

Polynesian = plants brought to Hawaii by the Polynesians during their migrations

4. Abundance of each species within the project area:

abundant = forming a major part of the vegetation within the project area.

common = widely scattered throughout the area or locally abundant within a portion of it.

uncommon = scattered sparsely throughout the area or occurring in a few small patches.

rare = only a few isolated individuals within the project area.

SCIENTIFIC NAME	COMMON NAME	STATUS	ABUNDANCE
FERNS			
BLECHNACEAE (Chain Fern Family)			
Blechnum appendiculatum Willd.	----------	non-native	uncommon
DENNSTAEDTIACEAE (Bracken Fern Family)			
Pteridium aquilinum (L.) Kuhn *var. decompositum* (Gaud.) R.M. Tyron	*kilau*, bracken fern	endemic	rare
GLEICHENIACEAE (False Staghorn Fern Family)			
Dicranopteris linearis (Burm.f.) Underw.	*uluhe*	indigenous	rare
LINDSAEACEAE (Lindsaea Fern Family)			
Lindsaea ensifolia Sw.	----------	non-native	rare
Sphenomeris chinensis (L.) Maxon	*pala'a*	indigenous	rare
NEPHROLEPIDACEAE (Sword Fern Family)			
Nephrolepis brownii (Desv.) Hovencamp & Miyam.	Asian sword fern	non-native	rare
Nephrolepis exaltata (L.) Schott	*ni'ani'au*	indigenous	uncommon
POLYPODIACEAE (Polypody Fern Family)			
Phlebodium aureum (L.) J. Sm.	rabbit's foot fern	non-native	rare
Phymatosorus grossus (Langsdon&Fisch.) Brownlie	*laua'e*	non-native	uncommon
PSILOTACEAE (Whisk Fern Family)			
Psilotum nudum (L.) P. Beauv.	*moa*	indigenous	rare
PTERIDACEAE (Brake Fern Family)			
Cheilanthes viridis (Forssk.) Sw.	green cliff brake	non-native	uncommon
Pityrogramma austroamericana Domin	gold fern	non-native	rare
Pityrogramma x *mckenneyi* W.H. Wagner	hybrid gold fern	non-native	rare
THELYPTERIDACEAE (Marsh Fern Family)			
Christella parasitica (L.) H. Lev.	----------	non-native	rare
MONOCOTS			
ARECACEAE (Palm Family)			
Cocos nucifera L.	*niu*, coconut	Polynesian	rare
Phoenix x *dactylifera*	hybrid date palm	non-native	rare
ASPARAGACEAE (Asparagus Family)	----------	non-native	rare
Agave sisalana Perrine	sisal	non-native	rare
COMMELINACEAE (Spiderwort Family)			
Commelina diffusa N.L. Burm.	honohono	non-native	rare
CYPERACEAE (Sedge Family)			
Carex wahuensis C.A. Meyen	----------	endemic	rare
Cyperus rotundus L.	nut sedge	non-native	uncommon
HEMEROCALLIDACEAE (Hemerocallis Family)			
Dianella sandwicensis Hooker & Arnott	'uki'uki	indigenous	uncommon
ORCHIDACEAE (Orchid Family)			
Arundina graminifolia (D.Don) Hochr.	bamboo orchid	non-native	rare
POACEAE (Grass Family)			
Andropogon virginicus L.	broomsedge	non-native	uncommon
Axonopus fissifolius (Raddi) Kuhlm.	narrow-leaved carpetgrass	non-native	uncommon

SCIENTIFIC NAME	COMMON NAME	STATUS	ABUNDANCE
Bothriochloa pertusa (L.) A. Camus	pitted beardgrass	non-native	common
Chloris barbata (L.) Sw.	swollen fingergrass	non-native	uncommon
Chloris radiata (L.) Sw.	plushgrass	non-native	rare
Chrysopogon aciculatus (Retz) Trin.	*pi'ipi'i*	indigenous	uncommon
Cynodon dactylon (L.) Pers.	Bermuda grass	non-native	rare
Digitaria ciliaris (Roetz.) Koeler	Henry's crabgrass	non-native	rare
Digitaria insularis (L.) Mez ex Ekman	sourgrass	non-native	rare
Eleusine indica (L.) Gaertner	wiregrass	non-native	uncommon
Heteropogon contortus (L.) Beauv.	*pili* grass	indigenous	rare
Hyparrhenia rufa (Nees) Stapf	thatching grass	non-native	rare
Melinis minutiflora P. Beauv.	molasses grass	non-native	rare
Melinis repens (Willd.) Zizka	Natal redtop	non-native	rare
Oplismenus hirtellus (L.) P.Beauv.	basketgrass	non-native	uncommon
Panicum maximum Jacq.	Guinea grass	non-native	common
Paspalum conjugatum Bergius	*Hilo* grass	non-native	uncommon
Paspalum dilatatum Poir.	Dallis grass	non-native	uncommon
Paspalum fimbriatum Kunth	Panama grass	non-native	rare
Paspalum scrobiculatum L.	ricegrass	non-native	rare
Pennisetum polystachion (L.) Schult.	feathery pennisetum	non-native	uncommon
Pennisetum purpureum Schumach.	Napier grass	non-native	rare
Saccharum officinarum L.	sugar cane	non-native	rare
Setaria parviflora (Poir.) Kerguelen	yellow foxtail	non-native	rare
Sorghum halapense (L.) Pers.	Johnson grass	non-native	uncommon
Sporobolus africanus (Poir.) Robyns & Tournay	African dropseed	non-native	uncommon
Urochloa mutica (Forrsk.) T.Q.Nguyen	California grass	non-native	rare
ACANTHACEAE (Acanthus Family)			
Asystasia gangetica (L.) T.Anderson	Chinese violet	non-native	common
AMARANTHACEAE (Amaranth Family)			
Alternanthera pungens Kunth	khaki weed	non-native	rare
Amaranthus spinosus L.	spiny amaranth	non-native	uncommon
ANACARDIACEAE (Mango Family)			
Schinus terebinthifolius Raddi	Christmas berry	non-native	uncommon
ARALIACEAE (Ginseng Family)			
Polyscias guilfoylei (W.Bull) L.H.Bailey	panax	non-native	rare
Schefflera actinophylla (Endl.) Harms	octopus tree	non-native	common
ASTERACEAE (Sunflower Family)			
Bidens alba (L.) DC	----------	non-native	common
Calyptocarpus vialis Less.	straggler daisy	non-native	rare
Conyza bonariensis (L.) Cronq.	hairy horseweed	non-native	uncommon
Crassocephalum crepidioides (Benth.)S.Moore	redflower ragleaf	non-native	rare
Cyanthillium cinereum (L.) H. Rob.	little ironweed	non-native	uncommon
Emilia fosbergii Nicolson	red pualele	non-native	uncommon

SCIENTIFIC NAME	COMMON NAME	STATUS	ABUNDANCE
Emilia sonchifolia (L.) DC.	violet pualele	non-native	rare
Pluchea carolinensis (Jacq.) G.Don	sourbush	non-native	rare
Pluchea indica (L.) Less.	Indian fleabane	non-native	rare
Sonchus oleraceus L.	*pualele*	non-native	uncommon
BIGNONIACEAE (Bignonia Family)			
Spathodea campanulata P.Beauv.	African tulip tree	non-native	rare
CASUARINACEAE (She-oak Family)			
Casuarina cunninghamiana Miquel	river she-oak	non-native	rare
Casuarina equisetifolia Stickm.	common ironwood	non-native	abundant
CONVOLVULACEAE (Morning Glory Family)			
Ipomoea obscura (L.) Ker-Gawler	----------	non-native	uncommon
Ipomoea triloba L.	little bell	non-native	rare
Merremia tubersoa (L.) Rendle	wood rose	non-native	rare
CUCURBITACEAE (Melon Family)			
Coccinea grandis (L.) Voigt	ivy gourd	non-native	uncommon
Momordica charantia L.	balsam pear	non-native	rare
ERICACEAE (Heath Family)			
Leptecophylla tameiameiae (Cham.&Schlect.) C.M. Weiller	*pukiawe*	indigenous	rare
EUPHORBIACEAE (Spurge Family)			
Aleurites moluccana (L.) Willd.	*kukui*	Polynesian	rare
Euphorbia hirta L.	hairy spurge	non-native	rare
Euphorbia hypericifolia L.	graceful spurge	non-native	rare
Euphorbia prostrata L.	prostrate spurge	non-native	rare
Macaranga tanarius (L.) Mull. Arg.	parasol leaf tree	non-native	common
Phyllanthus debilis Klein ex Willd.	niruri	non-native	common
Ricinus communis L.	Castor bean	non-native	rare
FABACEAE (Pea Family)			
Acacia confusa Merr.	Formosa koa	non-native	common
Alysicarpus vaginalis (L.) DC.	alyce clover	non-native	rare
Canavalia cathartica Thouars	*maunaloa*	non-native	rare
Chamaecrista nictitans (L.) Moench	partridge pea	non-native	uncommon
Crotalaria pallida Aiton	smooth rattlepod	non-native	rare
Desmanthus pernambucanus (L.) Thellung	slender mimosa	non-native	rare
Desmodium incanum DC.	*ka'im*i clover	non-native	common
Desmodium triflorum (L.) DC.	three-flowered beggarweed	non-native	uncommon
Falcataria moluccana (Miq.) Barneby & Grimes	albizia	non-native	rare
Indigofera hendecaphylla Jacq.	creeping indigo	non-native	rare
Leucaena leucocephala (Lam.) de Wit	*koa haole*	non-native	uncommon
Mimosa pudica L.	sensitive plant	non-native	rare
Neonotonia wightii (Wight & Arnott) Lackey	glycine	non-native	rare
Senna occidentalis (L.) Link	coffee senna	non-native	rare

SCIENTIFIC NAME	COMMON NAME	STATUS	ABUNDANCE
GOODENIACEAE (Goodenia Family)			
Scaevola taccada (Gaertner) Roxburgh	*naupaka kahakai*	indigenous	rare
LAMIACEAE (Mint Family)			
Hyptis pectinata (L.) Poit.	comb hyptis	non-native	rare
Leonotis nepetifolia (L.) R. Brown	lion's ear	non-native	uncommon
LAURACEAE (Laurel Family)			
Cassytha filiformis L.	*kauna'oa pehu*	indigenous	rare
Cinnamomum burmanni (Nees) Blume	Padang cassia	non-native	rare
MALVACEAE (Mallow Family)			
Abutilon grandifolium (Willd.) Sweet	hairy abutilon	non-native	rare
Malvastrum coromandelianum (L.) Garcke	false mallow	non-native	rare
Sida rhombifolia L.	Cuban jute	non-native	rare
Sida spinosa L.	prickly sida	non-native	rare
Waltheria indica L.	*'uhaloa*	indigenous	common
MELASTOMATACEAE (Melastoma Family)			
Clidemia hirta (L.) D.Don	Koster's curse	non-native	common
MENISPERMACEAE (Moonseed Family)			
Cocculus orbiculatus (L.) DC.	*huehue*	indigenous	uncommon
MORACEAE (Mulberry Family)			
Ficus microcarpa L.	Chinese banyan	non-native	uncommon
MYRSINACEAE (Myrsine Family)			
Ardisia elliptica Thunb.	shoebutton ardisia	non-native	rare
MYRTACEAE (Myrtle Family)			
Pimenta dioica (L.) Merr.	allspice	non-native	uncommon
Psidium cattleianum Sabine	strawberry guava	non-native	common
Psidium guajava L.	common guava	non-native	uncommon
Syzygium cumini (L.) Skeels	Java plum	non-native	common
NYCTAGINACEAE (Four-o'clock Family)			
Bougainvillea spectabilis Willd.	bougainvillea	non-native	rare
PASSIFLORACEAE (Passion Flower Family)			
Passiflora edulis Sims	passion fruit	non-native	rare
Passiflora foetida L.	love-in-a-mist	non-native	rare
Passiflora suberosa L.	*huehue haole*	non-native	common
PHYTOLACCACEAE (Pokeberry Family)			
Rivinia humilis L.	Coral berry	non-native	rare
PIPERACEAE (Pepper Family)			
Peperomia latifolia Miquel	*'ala'alawainui*	endemic	rare
PLANTAGINACEAE (Plantain Family)			
Plantago lanceolata L.	narrow-leaved plantain	non-native	uncommon
POLYGALACEAE (Milkwort Family)			
Polygala paniculata L.	----------	non-native	rare
ROSACEAE (Rose Family)			
Osteomeles anthyllidifolia (Sm.) Lindl.	*'ulei*	indigneous	common

SCIENTIFIC NAME	COMMON NAME	STATUS	ABUNDANCE
RUBIACEAE (Coffee Family)			
Morinda citrifolia L.	*noni*	Polynesian	rare
Psydrax odorata (G.Forst.) A.C. Smith & S.P. Darwin	*alahe'e*	indigenous	rare
Spermacoce assurgens Ruiz & Pav.	buttonweed	non-native	rare
SANTALACEAE (Sandalwood Family)			
Santalum album L.	white sandalwood	non-native	rare
Santalum ellipticum Gaud.	*'iliahi alo'e*	endemic	uncommon
SAPOTACEAE (Sapodilla Family)			
Chrysophyllum mexicanum T. Brandegee	satin leaf	non-native	rare
SOLANACEAE (Nighshade Family)			
Solanum torvum Sw.	pea aubergine	non-native	rare
THYMELAEACEAE ('Akia Family)			
Wikstroemia oahuensis (A. Gray) Rock	*'akia*	endemic	common
VERBENACEAE (Verbena Family)			
Lantana camara L.	lantana	non-native	uncommon
Stachytarpheta australis Moldenke	*owi*	non-native	rare
Stachytarpheta cayennensis (Rich.) Vahl	nettle-leaved vervain	non-native	uncommon
Stachytarpheta jamaicensis (Jacq.) Vahl	Jamaican vervain	non-native	common

FAUNA SURVEY REPORT

SURVEY METHODS

A walk-through survey method was conducted in conjunction with the botanical survey. All parts of the project area were covered. Field observations were made with the aid of binoculars and by listening to vocalizations. Notes were made on species, abundance, activities and location as well as observations of trails, tracks, scat and signs of feeding. In addition, an evening visit was made to the area to record crepuscular activities and vocalizations and to see if there was any evidence of occurrence of the Hawaiian hoary bat (*Lasiurus cinereus semotus*) in the area.

RESULTS

MAMMALS

Four species of mammals were observed within the project area during six site visits. Taxonomy and nomenclature follow Tomich (1986). Two species were of uncommon occurrence, the small Indian mongoose (*Herpestes auropunctatus*) and the domestic cat (*Felis catus*). Two others, the domestic dog (*Canis familiaris*) and the endemic and Endangered *'ōpe'ape'a* or Hawaiian hoary bat (*Lasiurus cinereus semotus*) were rare.

The bat survey was conducted at three separate locations within the project area during the evening of June 24, 2013. A bat detecting device (Batbox IIID) was employed, set to the frequency of 27,000 Hertz that these bats are known to use to echolocate for flying insects. A single bat was detected in the northwestern portion of the area along the road to a meteorological tower site. Echolocation calls were produced in two second bursts of modulated sound, and were repeated every few seconds as the bat located and homed in on flying insects. These calls were followed for several minutes.

Dense vegetation prevented good visibility of other ground-dwelling mammals, but a significant population of rats (*Rattus* spp.) and mice (*Mus domesticus*) would be expected, as they are known to frequent this type of habitat.

BIRDS

There was moderate birdlife diversity observed within this project area during six site visits. A total of fourteen species of non-native birds were observed. Taxonomy and nomenclature follow American Ornithologists' Union (2011). One species was abundant throughout the project area, the red-vented bulbul (*Pycnonotus cafer*). Also common were the zebra dove (*Geopelia striatus*) and the common myna (*Acridotheres tristis*). The remaining species were uncommon or rare.

This study area is situtated about ¾ mile above the substantial wetlands of the James Campbell National Wildlife Refuge that provides habitat for three Endangered waterbirds, the *'alae 'ula* or common moorhen (*Gallinula chloropus sandvicensis*), the *'alae ke'oke'o* or Hawaiian coot (*Fulica alai*), and the *ae'o* or Black-necked stilt (*Himantopus mexicanus knudseni*) as well as other commoner waterbirds and shorebirds. These birds fly substantial distances and could overfly the project area enroute to other wetland habitats. This area, however, has no wetland habitat to attract such waterbirds and none were seen.

INSECTS

Diverse insect life was observed across this large property during six site visits. Taxonomy and nomenclature follow Nishida et al. (1992). Eighteen insect species were observed in seven Orders. Three non-native species were common throughout the area, the cabbage butterfly (*Pieris rapae*), the honey bee (*Apis mellifera*) and the Southern house mosquito (*Culex quinquefasciatus*). The remaining species were uncommon or rare. One native dragonfly, the globe skimmer (*Pantala flavescens*) was seen. This indigenous dragonfly is widespread and common throughout the tropics worldwide.

MOLLUSKS

Two non-native snails, the giant East African snail (*Achatina fulica*) and the roseate cannibal snail (*Euglandina rosea*), were seen at scattered locations across the property.

DISCUSSION AND RECOMMENDATIONS

Most of the wildlife observed on the property is non-native and generally unremarkable from an environmental protection standpoint. One native species, however, the Hawaiian hoary bat which was detected near the lower margins of the project is a federally Endangered species with all of the protections that are associated with this status.

The Hawaiian hoary bat is currently known from the six largest islands, but is considered rare on the island of Oahu where a few recent confirmed sightings have been made on the rural northern end of the island.

The Hawaiian hoary bat is a highly mobile creature that is known to move about in response to temperature changes and insect population spikes. They are solitary (rather than colonial) bats whose roosting sites appear to be opportunistic and ever-changing. They have been recorded from almost every conceivable habitat including high and low elevations, forests, pastures, lava flows, bogs and even rural communities. They can occupy an area when flying insects are abundant and be absent when feeding opportunities have moved elsewhere. Thus, no critical habitats have been established for them. The more we focus on these cryptic, nocturnal bats, the more of them we find and the more widespread we find them to be.

None-the-less, the presence of these Endangered flying mammals in the vicinity of proposed wind turbines is of concern and merits consideration as to how to minimize threats to their well-being.

In the same vein, there is also a small possibility that Endangered water birds from the not too distant James Campbell National Wildlife Refuge might overfly the project area and place themselves in harms way. The situations with both the water birds and the bats may need to be addressed in consultation with the U.S. Fish and Wildlife Service.

No other concerns regarding the wildlife in this project area are anticipated.

ANIMAL SPECIES LIST

Following is a checklist of the animal species inventoried during the field work. Animal species are arranged in descending abundance within four groups: mammals, birds, insects and mollusks. For each species the following information is provided:

1. Common name

2. Scientific name

3. Bio-geographical status. The following symbols are used:

   endemic = animals native only to Hawaii; not naturally occurring anywhere else in the world.

   indigenous = animals native to the Hawaiian Islands and also to one or more other geographic area(s).

   non-native = animals brought to Hawaii intentionally or accidentally after western contact.

   migratory = spending a portion of the year in Hawaii and a portion elsewhere. In Hawaii the migratory birds are usually in the overwintering/non-breeding phase of their life cycle.

4. Abundance of each species within the project area:

   abundant = many flocks or individuals seen throughout the area at all times of day.

   common = a few flocks or well scattered individuals throughout the area.

   uncommon = only one flock or several individuals seen within the project area.

   rare = only one or two seen within the project area.

SCIENTIFIC NAME	COMMON NAME	STATUS	ABUNDANCE
MAMMALS			
Herpestes auropunctatus Hodgson	small Indian mongoose	non-native	uncommon
Felis catus L.	domestic cat	non-native	uncommon
Canis familiaris L.	domestic dog	non-native	rare
Lasiurus cinereus semotus Allen	*'ōpe'ape'a,* Hawaii hoary bat	endemic	rare
BIRDS			
Pycnonotus cafer L.	red-vented bulbul	non-native	abundant
Geopelia striata L.	zebra dove	non-native	common
Acridotheres tristis L.	common myna	non-native	common
Zosterops japonicus Temminck & Schlegel	Japanese white-eye	non-native	uncommon
Estrilda astrild L.	common waxbill	non-native	uncommon
*Lonchura punctulat*a L.	nutmeg mannikin	non-native	uncommon
Copsychus malabaricus Scopoli	white-rumped shama	non-native	uncommon
Carpodacus mexicanus Muller	house finch	non-native	uncommon
Streptopelia chinensis Scopoli	spotted dove	non-native	uncommon
Pycnonotus jocosus L.	red-whiskered bulbul	non-native	rare
Bubulcus ibis L.	cattle egret	non-native	rare
Cettia diphone Kittlitz	Japanese bush-warbler	non-native	rare
Cardinalis cardinalis L.	northern cardinal	non-native	rare
Gallus gallus L.	chicken	non-native	rare
INSECTS			
Order ARANEAE - true spiders			
ARANEIDAE (Orb Weaver Family)			
Araneus diadematus Clerck	European garden spider	non-native	rare
Order DIPTERA - flies			
CULICIDAE (Mosquito Family)			
Culex albopictus Skuse	tiger mosquito	non-native	uncommon
Culex quinqefasciatus	southern house mosquito	non-native	common
DROSOPHILIDAE (Fruit Fly Family)			
Drosophila melanogaster Meigen	common fruit fly	non-native	uncommon
SYRPHIDAE (Hoverfly Family)			
Eristalinus aeneus Scopoli	drone fly	non-native	rare
Order HYMENOPTERA - bees, wasps & ants			
APIDAE (Honey Bee Family)			
Apis mellifera L.	honey bee	non-native	common
Xylocopa sonorina Smith	Sonoran carpenter bee	non-native	uncommon
FORMICIDAE (Ant Family)			
*Anopolepis longipe*s Jerdon	long-legged ant	non-native	rare

SCIENTIFIC NAME	COMMON NAME	STATUS	ABUNDANCE
Pheidole megacephala Fabricius	big-headed ant	non-native	rare
Order LEPIDOPTERA - butterflies & moths			
CRAMBIDAE (Grass Moth Family)			
Spoladea recurvalis Fabricus	beet webworm moth	non-native	rare
LYCAENIDAE (Gossamer-winged Butterfly Family)			
Lampides boeticus L.	long tail blue butterfly	non-native	uncommon
NOCTUIDAE (Owlet Moth Family)			
Ascalapha oderata L.	black witch moth	non-native	rare
NYMPHALIDAE (Brush-footed Butterfly Family)			
Agraulis vanillae L.	passion flower butterfly	non-native	uncommon
PIERIDAE (White and Sulphur Butterfly Family)			
Phoebis agarithe Boisduval	large orange sulfur butterfly	non-native	rare
Pieris rapae L.	cabbage butterfly	non-native	common
Order ODONATA - dragonflies & damselflies			
LIBELLULIDAE (Skimmer Dragonfly Family)			
Pantala flavescens Fabricius	globe skimmer	indigenous	uncommon
Order ORTHOPTERA - grasshoppers & crickets			
ACRIDIDAE (Grasshopper Family)			
Oxya japonica Thunberg	small rice grasshopper	non-native	uncommon
Order SPIROBOLIDA - round-backed millipedes			
TRIGONIULIDAE (Rusty Millipede Family)			
Trigoniulus corallinus Gervais	rusty millipede	non-native	rare
MOLLUSKS			
Achatina fulica Ferussac	giant East African snail	non-native	rare
Euglandina rosea Ferussac	roseate cannibal snail	non-native	rare

Figure 1 - Project Area outlined in black

Literature Cited

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APPENDIX F
ARCHAEOLOGICAL INVENTORY SURVEY (AIS)

DAVID Y. IGE
GOVERNOR OF HAWAII

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STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

STATE HISTORIC PRESERVATION DIVISION
601 KAMOKILA BOULEVARD, ROOM 555
KAPOLEI, HAWAII 96707

December 18, 2015

Michael D. Cutbirth, President
Champlin/GEI Wind Holdings, LLC
2020 Alameda Padre Serra, Suite 123
Santa Barbara, CA 93103

Log No. 2015.02702
Doc. No. 1512SL14
Archaeology

Dear Mr. Cutbirth:

SUBJECT: **Chapter 6E-42 and National Historic Preservation Act (NHPA) Section 106 Review – Archaeological Inventory Survey for the Proposed Nā Pua Makani Wind Project in the Ahupuaʻa of Kahuku, Keana, and Mālaekahana, District of Koʻolauloa, Island of Oʻahu TMK: (1) 5-6-005:018; (1) 5-6-006:018, 047, 051, 055; and (1) 5-6-008:006**

Thank you for the opportunity to review this revised draft report titled *Archaeological Inventory Survey for the Proposed Nā Pua Makani Wind Project in the Ahupuaʻa of Kahuku, Keana, and Mālaekahana, District of Koʻolau Loa, Island of Oʻahu; TMK: (1) 5-6-005:018; (1) 5-6-006:018, 047, 051, 055; and (1) 5-6-008:006* (McIntosh et al., December 18). We received this submittal on July 14, 2015, and final revisions on December 15, 2015. The archaeological inventory survey plan (Cleghorn, June 2014) was reviewed and accepted by SHPD on August 4, 2014 (Log. No. 2014.02981, Doc. No. 1408NN02).

The project was completed for Nā Pua Makani Power Partners, LLC, a subsidiary of Champlin Hawaiʻi Wind Holdings, LLC. The project area includes parcels that will be leased from the State of Hawaii, Division of Land and Natural Resources (landowner) and Mālaekahana Hui West, LLC (landowner). The project area also includes non-leased State of Hawaii roadways. The proposed project prompting the archaeological inventory survey is the development of a wind farm. Based on figures provided in the report, the wind farm will include 12 turbines on prepared pads and access roads, though specific construction activities are unstated.

This report presents the results of an archaeological inventory survey (AIS); the boundary of the Area of Potential Effect (APE) was revised following initiation of the survey. The revised APE totals 464 acres. As a result of the APE revision, 14 of the 28 sites initially identified during the pedestrian survey are inside the final APE and 14 are outside (Table 1). The project included a 100% pedestrian survey; completion of site descriptions; site mapping and photography; backhoe trenching and manual excavation of test units; and soil descriptions and preparation of stratigraphic profile drawings. The 28 sites include 41 components relating to the Kahuku Plantation (Site 7844), 22 traditional Hawaiian (pre- and/or early post-Contact sites related to habitation, agriculture, and/or possible burial (Sites 7841, 7842, 7846, 7847, 7849-7865, and 7867), three other historical sites (Sites 7845, 7848, and 7866), and two military sites (Sites 7840, 7843). No cultural deposits or artifacts were encountered during the backhoe trenching across the project area and manual excavation of a mound at Site 7841. However, a fairly substantial cultural deposit was recorded during the manual excavation at Site 7867. Additionally, midden and/or traditional artifacts were noted on the surface of multiple sites (Sites 7849, 7850, 7854, 7859, and 7862). Two conventional radiocarbon ages obtained from short-lived wood charcoal from the Site 7867 deposit provide corroborating calibrated (2-sigma) date ranges from the mid-/late-17th century to post-1950.

Of the 14 sites identified outside the revised APE, each was assessed per HAR §13-284-6 as significant under Criterion "d" and is recommended to be included in an AIS prior to any future proposed ground-disturbing project. Of the 14 sites identified within the revised APE, all 14 were assessed as significant under Criterion d and two sites were also assessed as significant under Criterion "a" for their association with the extensive former plantation

system established on O‘ahu (Site 7444) or with WWII defense of O‘ahu (Site 7843). The following mitigation recommendations were made for the 28 sites:

- No further work at five sites (Sites 7840, 7841, 7845, 7863, and 7864). These sites have been sufficiently documented;
- Data recovery is recommended for Site 7866 (historic artifact scatter) and a habitation cave (Site 7867). Data recovery at Site 7866 will involve surface collection and laboratory analysis, and at site 7866 it will involve excavation. This data recovery work will add to our knowledge of traditional and historic land use of the area;
- Data recovery is recommended for Site 7844 in the form of historical documentation and analysis of the ditch system associate with this extensive irrigation network; and
- Preservation is recommended for the entirety of five sites (Site 7842, 7843, 7846, 7847, and 7865) and for Site 7844 Component 39, Features A (aqueduct) and B (adjoining ditch). No further work is recommended for Features C-E). Feature A will be preserved in its entirety while only the adjoining portion of Feature B will be preserved.

The project effect determination is “effect, with agreed upon mitigation commitments.” SHPD concurs with the significance assessments (see Table 1). Of the identified sites, only Site 7843 was evaluated as eligible for listing in the National Register of Historic Places. Site 7844 (plantation ditch system) was evaluated as not eligible as it is not unique, not an exemplary example, and does not include the full range of plantation related water irrigation/transportation features or other infrastructure. SHPD concurs with the significance assessments and the mitigation recommendations.

The revisions adequately address the issues raised in our earlier correspondence (August 31, 2015; Log No. 2015.01603, Doc. No. 1508TR01) and our several consultation meetings. The report is generally well-written and contains an adequate discussion of the methods, environment, traditional and historical background, and previous investigations; as well as the AIS methods and findings. The report meets the requirements of Hawaii Administrative Rules (HAR) §13-276 and the *Secretary of the Interior’s Standards for Archaeological Documentation*. The report is accepted. Please send one hardcopy of the document, clearly marked **FINAL**, along with a copy of this review letter and a text-searchable PDF version on CD to the Kapolei SHPD office, attention SHPD Library.

As stipulated in HAR §13-284-7(e), when SHPD comments that the project will have an “effect, with agreed upon mitigation commitments,” then detailed mitigation plans shall be developed for SHPD review and acceptance. The agreed-upon mitigation measures for this project include data recovery in the form of controlled excavations and historical documentation, and preservation. Pursuant to HAR §13-284-8(a)(3)(e), we look forward to receiving a data recovery plan that includes excavation and historical documentation components that meets HAR §13-278-3, a preservation plan that meets HAR §13-277.

Please contact me at (808) 692-8019 or at Susan.A.Lebo@hawaii.gov for any concerns regarding this letter.

Aloha,

Susan A. Lebo

Susan A. Lebo, PhD
Archaeology Branch Chief

cc: Paul Cleghorn, PhD, Pacific Legacy (cleghorn@pacificlegacy.com)

Table 1. Results of AIS Survey

Site #	Site Function	Period	Location	Significance	Recommendation
7840	Bivouac	Historic / Military	Inside APE	Not significant	NFW
7841	Stone Mound	Pre- / Early Post-Contact	Inside APE	d	NFW
7842	Platform	Pre- / Early Post-Contact	Inside APE	d	Preservation
7843	Bunkers	Historic / Military	Inside APE	a, d	Preservation
7844	Water Control, Storage, Transportation	Historic / Sugar	Inside APE, except C26, C33, C35	a, d	Data Recovery
7845	Agriculture	Historic	Inside APE	d	NFW
7846	Agriculture	Pre- / Early Post-Contact	Inside APE	d	Preservation
7847	Agriculture	Pre- / Early Post-Contact	Inside APE	d	Preservation
7848	Agriculture	Historic	Inside APE	d	NFW
7849	Habitation	Pre- / Early Post-Contact	Outside APE	d	Future AIS
7850	Habitation	Pre- / Early Post-Contact	Outside APE	d	Future AIS
7851	Poss. Burial	Pre- / Early Post-Contact	Outside APE	d	Future AIS
7852	Agriculture	Pre- / Early Post-Contact	Outside APE	d	Future AIS
7853	Undetermined	Pre- / Early Post-Contact	Outside APE	d	Future AIS
7854	Agriculture	Pre- / Early Post-Contact	Outside APE	d	Future AIS
7855	Agriculture	Pre- / Early Post-Contact	Outside APE	d	Future AIS
7856	Undetermined	Pre- / Early Post-Contact	Outside APE	d	Future AIS
7857	Habitation	Pre- / Early Post-Contact	Outside APE	d	Future AIS
7858	Undetermined	Pre- / Early Post-Contact	Outside APE	d	Future AIS
7859	Habitation Shelter	Pre- / Early Post-Contact	Outside APE	d	Future AIS
7860	Undetermined	Pre- / Early Post-Contact	Outside APE	d	Future AIS
7861	Habitation	Pre- / Early Post-Contact	Outside APE	d	Future AIS
7862	Habitation	Pre- / Early Post-Contact	Outside APE	d	Future AIS
7863	Undetermined Modified Outcrop	Pre- / Early Post-Contact	Inside APE	d	NFW
7864	Undetermined	Pre- / Early Post-Contact	Inside APE	d	NFW
7865	Habitation, Agriculture	Pre- / Early Post-Contact	Inside APE	d	Preservation
7866	Dump	Historic	Inside	d	Data Recovery
7867	Habitation	Pre - / Early Post-Contact	Inside APE	d	Data Recovery

Pacific Legacy

Historic Preservation

FINAL

ARCHAEOLOGICAL INVENTORY SURVEY FOR THE PROPOSED NĀ PUA MAKANI WIND PROJECT IN THE AHUPUAʻA OF KAHUKU, KEANA, AND MĀLAEKAHANA, DISTRICT OF KOʻOLAU LOA, ISLAND OF OʻAHU

[TMK (1) 5-6-005:018; (1) 5-6-006:018, 047, 051, 055; and (1) 5-6-008:006]

Pacific Legacy: Exploring the past, informing the present, enriching the future.

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FINAL

ARCHAEOLOGICAL INVENTORY SURVEY FOR THE PROPOSED NĀ PUA MAKANI WIND PROJECT IN THE AHUPUAʻA OF KAHUKU, KEANA, AND MĀLAEKAHANA, DISTRICT OF KOʻOLAU LOA, ISLAND OF OʻAHU

[TMK (1) 5-6-005:018; (1) 5-6-006:018, 047, 051, 055; and (1) 5-6-008:006]

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ABSTRACT

Pacific Legacy, Inc., under contract to Nā Pua Makani Power Partners, LLC, a subsidiary of Champlin Hawaii Wind Holdings, LLC, conducted an archaeological inventory survey (AIS) of the proposed 464–acre site for the Na Pua Makani Wind Project [TMK (1) 5-6-005:018; (1) 5-6-006:018, 047, 051, 055; and (1) 5-6-008:006] in the *ahupuaʻa* of Kahuku, Keana and Mālaekahana, on the North Shore of the Island of Oʻahu. This project required a permit from the U.S. Fish and Wildlife Service is considered a federal "undertaking subject to the rules and regulations of the National Historic Preservation Act of 1966, as amended.

A total of 28 newly identified archaeological sites were documented; 14 of these sites are within the project's area of potential effect (APE) and 14 sites not associated with the historic sugar complex are located outside of the APE. These sites included 22 traditional Hawaiian pre-Contact or early post-Contact sites, a sugar plantation complex, three additional historic sites, and two military sites.

The project area was a part of the historic Kahuku Sugar Plantation that operated in Kahuku from 1890 to 1971 Large scale land alterations that took place as part of the sugar plantation severely altered the traditional cultural landscape and undoubtedly obliterated the majority of pre-Contact and early post-Contact cultural features. The 22 pre-Contact and early post-Contact sites that were documents are the remnants of the once vibrant traditional habitation areas. Archival research indicates that that fairly diverse traditional agriculture was probably conducted here including both irrigated and dryland techniques. There is also evidence of the importance of tree crops in the traditional economy of the area.

All of the sites recorded in the APE (n=14), with the exception of one modern military site and a low stone mound are assessed as significant for their informational potential (Criterion (d). Two of the sites (7843 and 7844) are also assessed as significant under Criterion (a) (associated with important historic events).

Data recovery investigations are recommended for two sites: a pre-Contact or early post-Contact habitation cave (Site 7867) and a historic artifact scatter (7866). Investigations at these two sites will provide important information on the chronology and use of this area from pre-Contact to early historic times. Data recovery in the form of further historic research is also recommended for Site 7844, a large historic sugar plantation complex (Kahuku Plantation) that operated in the area from 1890 to 1971.

Five sites and a portion of a sixth site (7842, 7843, 7846, 7847, 7865, and a portion of 7844.C39-Features A and B) are recommended for preservation based on their significance. All these sites are outside of the area of disturbance and are assessed as eligible for listing in the National Register of Historic Places because of its association with World War II.

Finally, archaeological monitoring is recommended during all ground disturbing activities within the project area because of the number of resources identified during the AIS and the potential to uncover additional subsurface sites during construction.

GLOSSARY OF HAWAIIAN TERMS USED IN TEXT

Hawaiian Word	Meaning
ʻae	Yes, to consent.
ahu	Mound, cairn, altar, or shrine; to gather or collect together.
ahupuaʻa	Traditional land division usually extending from the mountains to the ocean.
ʻāina	Land, earth.
alaloa	Highway, main road, belt road around an island, a long road.
aliʻi	Chief, chiefess, officer, ruler, monarch, peer, headman, etc.
aliʻi ʻai ahupuaʻa	"Chief who eats the ahupuaʻa"; the lower chief who represented the *ahupuaʻa.*
ʻamaʻu	All species of an endemic genus of ferns.
ʻaumakua	Family or personal god(s), deified ancestors who might assume the shape of various totemic items (e.g., animals, birds, plants, clouds, etc.).
ʻauwai	Ditch, canal.
ʻawa	The kava shrub; the root being the source of a narcotic drink of the same name used in ceremonies.
haku	Lord, master, employer.
hala	The pandanus or screw pine.
hānai	Provider, caretaker (said affectionately of chiefs by members of the court).
hula	The *hula*, a *hula* dancer; to dance the *hula*.
hula hālau	Long house, as for canoes or hula instruction; meeting house.
ʻili	Land section, next in importance to *ahupuaʻa* and usually a subdivision of an *ahupuaʻa.*
ipu	Bottle gourd.
kahawai	"The place (having) water"; the area beyond or intersecting the *kula* lands.
kahu	Honored attendant, guardian, nurse.
kahu iwikuamoʻo	Personal attendant of a person of rank; near and trusted relative of a chief who attended to his personal needs and possessions, and executed private orders.
kahuna	Priest, sorcerer, magician, minister, or expert in any profession (whether male or female).
kalana	Division of land smaller than a *moku* or district; county.
kalo	Taro (Colocasia esculenta), a kind of aroid cultivated since ancient times for food.
kanaka	Human being, man, person.
kapa	Bark cloth, *tapa* cloth, as made from *wauke* or *māmaki* bark.
kapu	Taboo, prohibition.
kauhale	Group of houses comprising a Hawaiian home, formerly consisting of men's eating house, women's eating house, sleeping house, cook-house, canoe house, etc.
keiki	Child.
kino lau	Many forms taken by a supernatural body (personification).
kō ʻele	Type of sugarcane.

Hawaiian Word	Meaning
ko kaha kai	Land by the sea, or coastal region providing marine resources.
konohiki	Headman of an *ahupuaʻa* land division under the chief.
kuahiwi	Mountain, high hill.
kuahu	Alter.
kukui	Candlenut.
kula	The plains or sloping lands (without trees) above the coastal region.
kula kai	Seaward plains.
kula uka	Inland or upland slopes (towards the mountains).
kupunawahine	Grandmother.
kupuna/kūpuna	Grandparent, ancestor (*kūpuna* is plural).
kūʻula	Any stone god used to attract fish, whether tiny or enormous, carved or natural, named for the god of fishermen; heiau near the sea for worship of fish gods; hut where fish gear was kept with *kūʻula* images so that gear might be impregnated with *kūʻula mana*, usually inland and very taboo.
lau hala	Pandanus leaves.
lei	Garland, wreath; necklace of flowers, leaves, shells, ivory, feathers, etc.
limu	A general name for all kinds of plants living under water, both fresh and salt.
loʻi	Irrigated terrace, especially for taro, but also for rice; paddy.
lua	Hole, pit, grave, den, cave.
māhele	Division, piece, portion, department, category, part, land division; to divide, apportion.
makaʻāinana	Commoner; "people that attend the land".
makai	Ocean.
māmaki	Small native trees; its bark yielded a fiber valued for a kind of tapa.
māla	Garden, plantation, patch, cultivated field. *Note: the use of diacriticals in the Foreign Testimony was limited and inconsistent. Table 1 text was taken directly from the testimony records. Contextually, <u>māla</u> rather than <u>mala</u> (lit. aching, as after unaccustomed exercise; or sour, as fermented sweet potatoes) is the correct word.*
makua hānai	Adopted parent.
mana	Life force or supernatural energy.
manu	Bird; any winged creature.
mauka	Inland.
mele	Song, anthem, or chant of any kind.
menehune	Legendary race of small people who worked at night, building fish ponds, roads, temples, etc.
moku	District, island, or section.
moʻo	1. Narrow strip of land, smaller than an *ʻili*; also *moʻo ʻāina*. 2. Lizard, reptile of any kind, dragon, serpent; water spirit.
moʻolelo	Story, history, tradition, literature, or legend.
nāhelehele	Weeds, undergrowth. *Note: the use of diacriticals in the Foreign Testimony was limited and inconsistent. Text was taken directly from the testimony records and as such, diacriticals were not inserted when not present in the original.*

Hawaiian Word	Meaning
noni	Medicinal plant.
ʻohana	Family, kin group, related.
ʻōhiʻa	A flowering tree.
ʻokana	District or sub-district, usually comprising several *ahupuaʻa.*
ʻolena	Turmeric.
pali	Cliff, precipice, steep hill or slope suitable for *olonā* or *wauke*.
puaʻa	Pig
pule	Prayer, magic spell, incantation, blessing.
tapa	Bark cloth (see *kapa*).
ʻuala	Sweet potato.
wao	Wilderness.
wao akua	"Region of deities"; a distant mountain region, believed inhabited only by spirits (*akua*).
wao kanaka	"Region of man"; lower forest, providing hard wood (*koa*) for spears, utensils, and logs for canoes.
wao maʻukele	Rain forest.
wauke	Paper mulberry.
weuweu	Herbage, grass, greenery.

Traditional land divisions, from largest to smallest:

- *Moku*
- *ʻOkana or kalana*
- *Ahupuaʻa*
- *ʻIli*
- *ʻIli paʻa*
- *ʻIli kūpono*
- *ʻIli lele*
- *Lele*
- *Moʻo*
- *Moʻo ʻāina*
- *Paukū*
- *Kīhāpai*
- *Kōʻele*
- *Kuleana*

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Frontispiece: Site 7844.C23, stacked stone ditch.

1.0 INTRODUCTION

Pacific Legacy, Inc., under contract to Nā Pua Makani Power Partners, LLC, a subsidiary of Champlin Hawaii Wind Holdings, LLC, conducted an archaeological inventory survey (AIS) of the proposed site for the Na Pua Makani Wind Project [TMK (1) 5-6-005:018; (1) 5-6-006:018, 047, 051, 055; and (1) 5-6-008:006] in the *ahupua'a* of Kahuku, Keana and Mālaekahana, on the North Shore of the Island of O'ahu (Figure 1). Because this wind power project requires an "Inadvertent Take" permit from the U.S. Fish and Wildlife Service, it is considered an "undertaking" under 36 CFR 800. As such it must comply with the different regulations associated with the National Historic Preservation Act of 1966 (as amended), especially 36 CFR 60.

The following is the project proponent:

Michael D. Cutbirth, President
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An Archaeological Inventory Survey Plan (AISP) was produced prior to the initiation of fieldwork (Cleghorn 2014) and was accepted by the State Historic Preservation Division (LOG NO. 2014.02981, DOC NO. 1408NN02; see Appendix A). This plan outlines the methods and procedures to be followed by the AIS.

The purpose of the AIS is to identify and document archaeological properties and cultural sites within a delineated area, gathering sufficient information to evaluate the significance of identified properties and sites (HAR §13-275). If significant cultural resources are identified during the survey, effect determinations are made and mitigation measures are recommended.

The current AIS presents the results of the pedestrian survey of the project area as defined as the Area of Potential Effect (APE). All construction related activities will be confined to the defined APE, as depicted in Figure 1. The current AIS also presents the results subsurface testing via backhoe trenching and hand excavated test units.

1.1 PROJECT AREA

The proposed Project is located in the Ko'olau Loa District, west of the town of Kahuku in the City and County of Honolulu and covers three *ahupua'a*: Kahuku, Keana, and Mālaekahana [TMK (1) 5-6-005:018; (1) 5-6-006:018, 047, 051, 055; and (1) 5-6-008:006]. It includes portions of two parcels which would be leased from the DLNR (approximately 234 acres [95 hectares]) and from the Mālaekahana Hui West, LLC (MHW) (approximately 452 acres [183 hectares]), as well

as the use of approximately 21 acres [8.5 hectares] of non-leased State land for roadways into the project area.

The leased area plus the State-owned access measures approximately 707 acres (286 hectares). Within this leased area is the defined 464-acre (188 hectares) APE. All proposed Project activities would occur within this smaller approximately 464-acre (188 hectares) project area. This area constitutes the maximum footprint of the Project within which all ground disturbing activities would occur and which would be occupied by permanent Project facilities (Figure 1). The AIS was conducted in this 464-acre (188 hectares) APE.

The Project is located adjacent to Kamehameha Highway at its closest point, southwest of the Town of Kahuku. It is accessible via local roads off of Kamehameha Highway, and is located east of the existing Kahuku Wind Farm. Most of the land leased from MHW is under active small-scale commercial truck farming while the State land is largely undeveloped and forested foothills with some small leased farm lots.

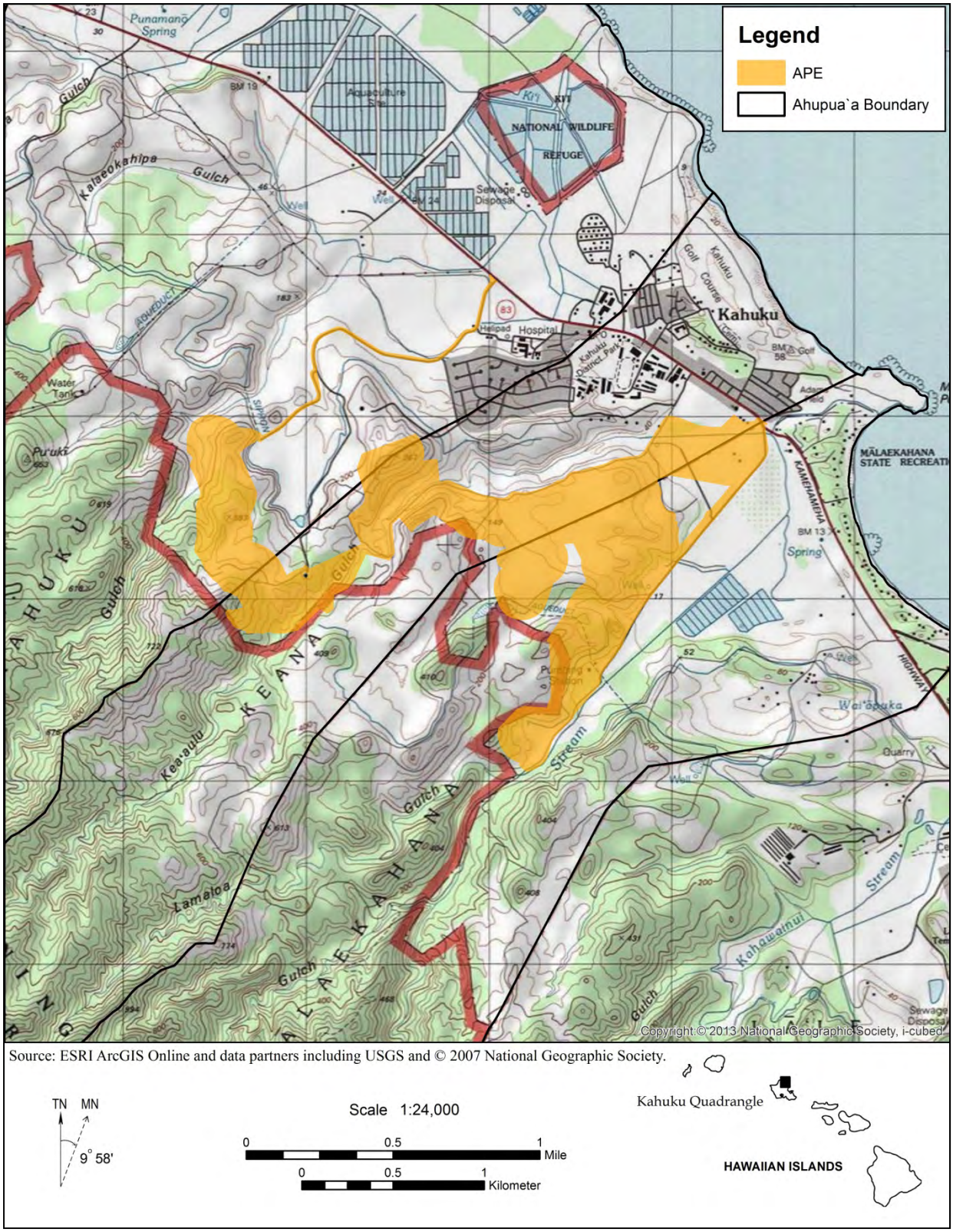

Figure 1. Project Area/APE on USGS map.

1.2 ENVIRONMENT

The dominant trade winds are out of the northeast and the average annual rainfall within this portion of Kahuku is less than 60 inches (1,524 mm) per year (Juvik and Juvik 1998: 56). Vegetation within the project area is quite diverse and varied and consists of *kī* (*Cordyline fruticosa*), *hau* (*Hibiscus tiliaceus*), *kukui* (*Aleurites moluccana*), *kalo* (*Colocasia esculenta*), *liliko'i* (*Passiflora edulis*), *noni* (*Morinda citrifolia*), *'ōlapa* (*Cheirodendron* spp.), *olonā* (*Touchardia latifolia*), *hala* (*pandanus tectorius*), *laua'e* (*Phymatosorus sclopendria*), mango (*Mangifera* spp.), coconut (*Cocos nucifera*), eucalyptus (*Eucalyptus* spp.), shower tree (*Cassia* spp.), banana (*Musa* sp.), *koa haole (Leucaena leucocephala*), guava (*Psidium guajava*), strawberry guava (*Psidium cattleianum*), *'ulu* (breadfruit; *Artocarpus altilus*), jackfruit (*Artocarpus heterophyllus*), tamarind (*Tamarindus indica*), java plum (*Syzygium cumini*), Christmasberry (*Schinus terebinthifolius)*, iron wood (*Casuarina equisetifolia*), century plant (*Agave Americana sp.*), sugarcane (*Saccharum officinarum*), banyan (*Ficus* spp.), bamboo (*Schizostachyum glaucifolium*), and various grasses and ferns. Also present are numerous other cultivated commercial crops and herbs on the active farm lots.

1.2.1 Geology and Hydrology

Geologically, the Kahuku area is formed by the inland Ko'olau Range and the coastal plain. The Ko'olau Range is the elongated eroded remnant of a shield volcano that plunges beneath the coastal plain and extends north for many miles beneath the sea. The northernmost terminus of the Ko'olau Range forms the Kahuku uplands. Surficial lavas of Ko'olau Basalt (Stearns and Vaksvik, 1935; Stearns, 1939) have been deeply weathered, leaving a mantle of readily erodible red soil tens of feet thick over most of the uplands (Hunt and De Carlo 2000: 10).

> The low-lying coastal plain separates the Kahuku uplands from the sea by as much as 1.5 mi. The land surface is less than 10 ft above sea level throughout much of the coastal plain, except along seaward dune ridges. The coastal plain is underlain by marine sediments and basaltic alluvium washed down from the uplands, and by Koolau Basalt at depth. Streams have deposited alluvial fans where they empty out onto the coastal plain at the mouths of their valleys. Two prominent alluvial fans are aligned with Punamano and Kii marshes. The fans are readily noticeable when driving along Kamehameha Highway as broad rises at altitudes of 20 to 30 ft above sea level.
>
> The Koolau Range is deeply dissected by streams that have followed the consequent drainage pattern established on the original domed surface of the Koolau shield volcano. In the Kahuku area, this has resulted in a divergent, radial drainage pattern of the main stream courses, with tributaries branching off in a dendritic pattern. The divergent drainage pattern has generated triangular interfluves of relatively undissected terrain known as flow-slope facets (Wentworth, 1951) (cited in Hunt and De Carlo 2000: 10).

The streams in the Kahuku area are short, with steep gradients and small drainages. In upper *mauka* areas, the steep terrain causes rapid run-off of the streams and permeable upland soils permit rapid infiltration of rainfall to the underlying Ko'olau aquifer (Hunt and De Carlo 2000: 10). As a result, streamflow near the coastal areas are characteristically flashy, with high flood peaks and little base flow. At the higher elevations, streamflow is perennial where rainfall is persistent and streams "intercept dike-impounded ground water, and at altitudes of 10 ft or less, where streambeds cut into the basal water table in the Koolau aquifer or in sediments" (Hunt and De Carlo 2000:10).

At the coastal areas, "reef limestone near Kahuku extends to a height of 50 feet above sea level and is overlain by fossiliferous beach sand and conglomerate 10 feet thick, suggesting a stand of the sea about 55 feet above the present one – the Kahuku stand (MacDonald and Abbott 1977:355).

1.2.2 Soils

Soils within the project area are comprised of the Coral Outcrop, Haleiwa Series, Kaena Series, Kawaihapai Series, Lahaina Series, Mokuleia Series, Paumalu Series, and Waialua Series.

Coral Outcrop

> Coral outcrop (CR) consists of coral or cemented calcareous sand on the island of Oahu. The coral reefs formed in shallow ocean water during the time the ocean stand was at a higher level. Small areas of coral outcrop are exposed on the ocean shore, on the coastal plains, and at the foot of the uplands. Elevations range from sea level to approximately 100 feet. The annual rainfall amounts to 18 to 40 inches. Coral outcrop is geophysically associated with Jaucas, Keaau, and Mokuleia soils…This land type is used for military installations, quarries, and urban development. Vegetation is sparse and consists of kiawe, koa haole, and fingergrass (Foote et al. 1972:29).

Haleiwa Series

> This series consists of well-drained soils on fans and drainageways along the coastal plains. Theses soils are on the islands of Oahu and Molokai. They developed in alluvium derived from basic igneous material. They are nearly level to strongly sloping. Elevations range from sea level to 250 feet. The annual rainfall amounts to 30 to 60 inches, most of which occurs between November and April…Haleiwa soils are geographically associated with Waialua and Kawaihapai soils on Oahu and Kalaupapa soils on Molokai…These soils are used for sugarcane, truck crops, and pasture. The natural vegetation consists of koa haole, lantana, guava, Christmasberry, Bermuda grass, and fingergrass (Foote et al. 1972:33).
>
> **Haleiwa silty clay, 2 to 6 percent slopes** (HeB). - On this soil, the runoff is slow and the erosion hazard is slight. This soil is used for sugarcane, pineapple, and truck crops (Foote et al. 1972:34).

Kaena Series

> This series consists of very deep, poorly drained soils on alluvial fans and talus slopes on the islands of Oahu and Kauai. These soils developed in alluvium and colluviums from basic igneous material. They are gently sloping to steep and are commonly stony. Elevations range from 50 to 150 feet. The annual rainfall amounts to 30 to 45 inches, most of which occurs between November and April…Kaena soils are geographically associated the Honouliuli, Lualualei, and Waialua soils…These soils are used for sugarcane, truck crops, pasture, and homesites. The natural vegetation consists of kiawe, klu, lantana, koa haole, and fingergrass (Foote et al. 1972:49).
>
> **Kaena clay, 2 to 6 percent slopes** (KaB). - This soil has a profile like that of Kaena stony clay, 6 to 12 percent slopes, except that there are few or no stones in the surface layer. Runoff is slow, and the erosion hazard is slight. This soil is used for sugarcane, truck crops, pasture, and urban development (Foote et al. 1972:50).

Kaena clay, 6 to 12 percent slopes (KaC). - This soil has a profile like that of Kaena stony clay, 6 to 12 percent slopes, except that there are few or no stones in the surface layer…This soil is used for sugarcane and pasture (Foote et al 1972:50).

Kawaihapai Series

This series consists of well-drained soils in drainageways and on alluvial fans on the coastal plains on the islands of Oahu and Molokai. These soils formed in alluvium derived from basic igneous rock in humid uplands. They are nearly level to moderately sloping. Elevations range from nearly sea level to 300 feet. The annual rainfall amounts to 30 to 50 inches…Kawaihapai soils are geographically associated with Haleiwa, Waialua, and Jaucas soils. These soils are used for sugarcane, truck crops, and pasture. The natural vegetation consists of kiawe, koa haole, lantana, and Bermudagrass (Foote et al. 1972:63-64).

Kawaihapai clay loam, 0 to 2 percent slopes (KIA). - This soil occupies smooth slopes…The natural vegetation consists of guava, honohono, kukui, and hala…Permeability is moderate. Runoff is slow, and the erosion hazard is no more slight…This soil is used for sugarcane, truck crops, pasture, and orchards (Foote et al. 1972:64).

Lahaina Series

This series consists of well-drained soils on uplands on the islands of Lanai, Maui, Molokai, and Oahu. These soils developed in material weathered from basic igneous rock. They are nearly level to steep. Elevations range from 10 to 1,500 feet. The annual rainfall amounts to 20 to 35 inches, most of which occurs in fall and winter…Lahaina soils are geographically associated with Helemano, Hoolehua, Kahana, Molokai, Pamoa, and Wahiawa soils. These soils are used for sugarcane and pineapple (Foote et al. 1972:78).

Lahaina silty clay, 3 to 7 percent slopes (LaB). - This soil is on smooth uplands…Cobblestones are common on the surface in a few places. In some places near the coastal plains, the profile contains fragments of coral, stone gravel, or sand…Permeability is moderate. Runoff is slow, and the erosion hazard is slight (Foote et al. 1972:78).

Lahaina silty clay, 7 to 15 percent slopes (LaC). - On this soil runoff is medium and the erosion hazard is moderate…This soil is used for sugarcane and pineapple. Small acreages are used for truck crops, pasture, and wildlife habitat (Foote et al. 1972:79).

Mokuleia Series

This series consists of well-drained soils along the coastal plains on the islands of Oahu and Kauai. These soils formed in recent alluvium deposited over coral sand. They are shallow to nearly sea level. Elevations range from nearly sea level to 100 feet. The annual rainfall amounts to 15 to 40 inches on Oahu…Mokuleia soils are geographically associated with Hanalei, Jaucas, and Keaau soils (Foote et al. 1972:95).

Mokuleia clay loam (Mt). - This soil occurs as small areas on the coastal plains…Permeability is moderate in the surface layer and rapid in the subsoil. Runoff is very slow, and the erosion hazard is more than slight…This soil is used for sugarcane, truck crops, and pasture (Foote et al. 1972:95).

Paumalu Series

This series consists of well-drained silty clay soils on uplands in the northern part of Oahu. These soils developed in old alluvium and colluviums derived from basic igneous rock. They are gently sloping to very steep. Elevations range from 700 to 1,000 feet. The annual rainfall amount to 50 to 70 inches and is well distributed throughout the year. Paumalu soils are geographically associated with Kemoo soils, near Kahuku. These soils are used for pasture and sugarcane. The natural vegetation consists of guava, waiwe, Christmasberry, ricegrass, and carpetgrass (Foote et al. 1972:110).

Paumalu silty clay, 3 to 8 percent slopes (PeB). - On this soil, runoff is slow and the erosion hazard is slight. Workability is easy. This soil is used for sugarcane and pasture (Foote et al. 1972:111).

Paumalu silty clay, 8 to 15 percent slopes (PeC). - On this soil, runoff is slow to medium and the erosion hazard is slight to moderate. Workability is slightly difficult. This soil is used for sugarcane and pasture (Foote et al. 1972:111).

Paumalu-Badland complex (PZ). - In this complex Paumalu soils make up 40 to 80 percent of the acreage. The slope is 10 to 70 percent…Runoff is medium to rapid, and the erosion hazard is moderate to severe…Badland consists of nearly barren land that has remained after the Paumalu soils were removed by wind and water erosion. Runoff is rapid, and the erosion hazard is very severs. This complex is used for pasture and military purposes (Foote et al. 1972:111).

Waialua Series

This series consists of moderately well drained soils on alluvial fans on the island of Oahu. These soils developed in alluvium weathered from basic igneous rock. They are nearly level to steep. Elevations range from 10 to 100 feet. Annual rainfall amounts to 25 to 50 inches; most of it occurs between November and April. Waialua soils are geographically associated with Honouliuli, Kaena, and Kawaihapai soils. These soils are used for sugarcane, truck crops, orchards, and pasture. The natural vegetation is swollen fingergrass, koa haole, and uhaloa (Foote et al. 1972:128).

Waialua silty clay, 0 to 3 percent slopes (WkA). - This soil is on smooth coastal plains…Permeability is moderate. Runoff is slow, and the erosion hazard is no more than slight…This soil is used for sugarcane, truck crops, and pasture (Foote et al. 1972:128).

Waialua silty clay, 3 to 8 percent slopes (WkB). - On this soil, runoff is slow and the erosion hazard is slight. This soil is used for sugarcane, truck crops and pasture (Foote et al. 1972:128).

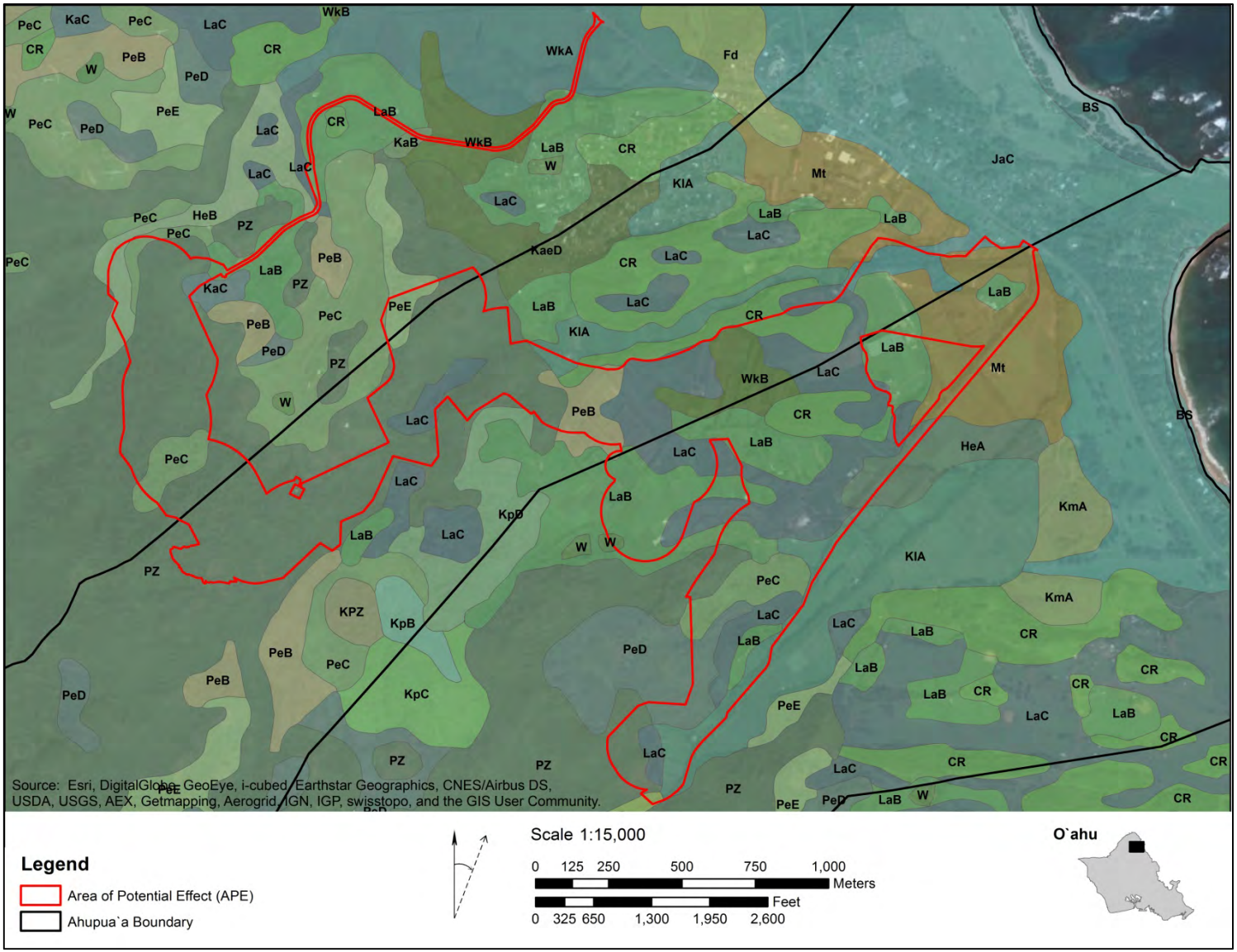

Figure 2. Soils in the project area.

2.0 HISTORIC OVERVIEW

2.1 TRADITIONAL PERIOD

At the time of European contact, the Kahuku area was a rich cultivated landscape. Lieutenant James King remarked:

> Nothing can exceed the verdure of the hills, the variety of wood and lawn, and the rich cultivated valleys which the whole face of the country displayed (Cook 1784:115, as cited in Handy and Handy 1991:462).

This comment indicates the wealth of the Kahuku region. However, a short time later, the explorer George Vancouver paints a picture of an area in great decline:

> Our examination confirmed the remark of Capt. King excepting that in point of cultivation or fertility, the country did not appear in so flourishing a state, nor to be so numerously inhabited, as he represented at that time, occasioned most probably by the constant hostilities that existed since that period (Vancouver 1798 vol. 3:71, as cited in Handy and Handy 1991:462).

Handy and Handy write of the abandoned terraces which once dotted the Kahuku landscape and the population decline:

> In 1833 Hall (1839) observed at Kahuku that "much taro land now lies waste because the diminished population of the district does not require its cultivation" (Handy and Handy 1991:462).

McAllister in 1930 remarked that this it seemed improbable that this "rather desolate and windswept" plain could have supported agricultural pursuits, before the era of mechanized farming.

Based upon these descriptions, it is evident that the Kahuku area was once fairly densely inhabited and that agricultural activities flourished. However, after European contact it appears that there was a marked population decline with an associated decrease in agricultural activity.

2.2 HISTORIC PERIOD

Ranching in the Kahuku area began in the 1850s when the Kahuku Ranch was established on land purchased from Kamehameha III (Korn 1958: 211-212). The cattle and sheep ranch grew and soon the once rich vegetation of Kahuku began to disappear, as the result of free-range overgrazing (Stride et al. 2003:16). This took a toll on the natural resources, the small unprotected family gardens, and the native population. "At the same time the *hala* forests began to disappear, the Hawaiian population also began to disappear" (Stride et al. 2003:16). Presumably the population continued to decline between the 1830s and the 1850s.

A brief history of the Kahuku Plantation is provided by Carol Wilcox (1996) which forms the basis of the following summary. The Kahuku Plantation was formed in 1890 by James Castle and Alexander Young. In 1892 Alexander and Young became the agent for Kahuku Plantation, which was comparatively small with about 2,500 scares of sugar cane. The Kahuku Plantation was hindered by its small size and the lack of surface water. Water was supplied for the fields from ground water sources that required mechanical pumping. In 1906, the Kahuku Plantation leased lands in Punaluʻu from Bishop Estate, which provided access to the Punaluʻu Stream and allowed this portion of the plantation to utilize surface water that was channeled to fields by a system of ditches. In 1931, Kahuku Plantation expanded further by leasing lands in Lāʻie. In 1968, Kahuku Plantation became a solely owned subsidiary of A&B. The plantation closed in 1971.

As succinctly summarized by Stride et al. (2003):

> Much of the uplands above Kahuku Village were once planted in sugar cane and pineapple. These fields were established wherever possible except on steep hillsides and on the crests of ridges and knolls (Stride et al. 2003:5).

The Kahuku Plantation was seen as a very progressive economic and social force in Hawaiʻi by introducing

> concrete stoves for laborer's cottages and sanitation drains that were used as models for other plantations…Kahuku…introduced the first plantation day nursery and high school…baseball diamond, [and] the first golf course…" (Stride et al. 2003:22).

The 81 year history of Kahuku Plantation evidenced major land altering activities in the region. The activities included large-scale mechanized clearing of land and the creation of fields. Water was channeled throughout the area with a complex of ditches, channels, pumps and aqueducts.

3.0 ARCHIVAL RESEARCH SUMMARY

This section is a synthesis of records documenting traditional and mythological accounts associated with the Nā Pua Makani Wind Project lands and surrounding areas as well as Historical documentation and archaeological record. The names and locations of *ahupuaʻa* used in this section of the report are largely derived from information in the *Oʻahu Pre-Māhele Moku and Ahupuaʻa* map created by Kamehameha School's Hawaiian Studies Institute in 1987 and *Place Names of Hawaiʻi* (Pukui et al. 1974). According to this map, the project area spans an area that incorporates inland portions of three *ahupuaʻa*: Kahuku, Keana, and Mālaekahana.

The subject *ahupuaʻa* are located within the district, or *moku*, of Koʻolau Loa and extends from the *ahupuaʻa* of Kaʻaʻawa on the central east side of Oʻahu, rounding the northern tip of the island to Pūpūkea. In *Sites of Oʻahu* (Sterling and Summers 1978:142), writer for *Ka Nūpepa Kuokoa*, S. M. Kaui, holds that Koʻolau Loa District stretches from Keahu-o-Hapuʻu to the Point of Kaʻōʻio, which is between Kualoa and Kaʻaʻawa (Figure 3). The name of this district, spelt as "Koʻolau Loa" by Pukui et al. (1974:117), literally translates to "long Koʻolau" (ibid.), Koʻolau being the windward mountain range that runs along the entire eastern side of Oʻahu.

3.1 PRE-EUROPEAN CONTACT CULTURAL LANDSCAPE

In general, traditional and mythological accounts from pre-European contact Hawaiʻi represent a belief system explaining all aspects of the physical universe and spirit realm, the origin and nature of mankind, and the history of the community, as well as collectively remembering the heroic adventures, exceptional feats, and cautionary tales of their ancestors. These traditional accounts are contained in the hearts and minds of cultural practitioners and customarily passed on through oration. Throughout the passage of time, figures transcend earthly legends into the cosmic, divine, and fearsome realm of the gods that is only separated from the mundane world by a thin veil and has the power to interact with and cast influence on the mundane. To this day, a sense of respect, reverence, and fear is still held on to by cultural practitioners and those indoctrinated in these traditions, as it is believed that the very landscape is imbued with the *mana* (life force or supernatural energy) of the divine.

3.1.1 The Natural World

Conversely, the mundane, or lifeways and land use, of pre-European contact Hawaiians are also part of the cultural landscape and are interpreted through archaeological research in conjunction with oral histories and recorded traditional accounts. Handy and Handy (1991) provide some commentary on general land use patterns of ancient Hawaiians that are applicable to the general Kahuku area. As marine resources represent the main source of protein in the traditional Hawaiian diet, Handy and Handy (1991) suggest that upland agriculture was typically preceded by or correlated with the productiveness of an area's coastal fishing grounds. *Mauka* lands were intensively developed in areas where coastal fishing grounds were easily accessed. On Oʻahu, sweet potatoes were cultivated to supplement taro, the main starch of the Hawaiian diet, when soils were too sandy or dry to grow taro. Further,

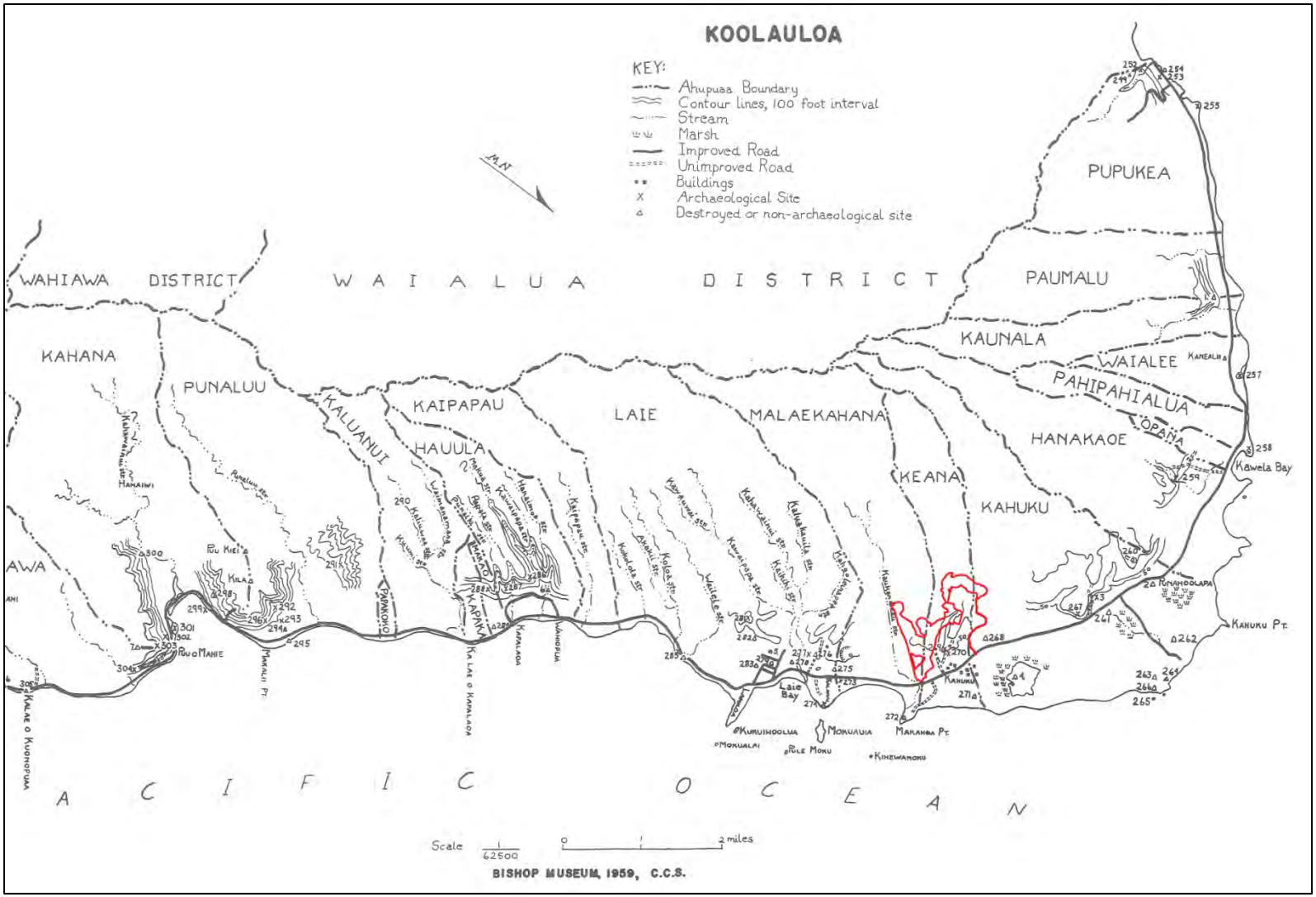

Figure 3. Sterling and Summers (1978) map of Koʻolau Loa showing approximate location of project area.

sweet potato cultivation, typically grown inland, appeared to correlate with high population densities in general.

Traditionally in Hawaiʻi, environmental zones were perceived and determined by various natural features and resource criteria (Handy and Handy 1991:54-56). The following is a summary of Handy and Handy (1991:54-56) description of the terrestrial environmental zones:

1. *Ko Kaha Kai*: Land by the sea, or coastal region providing marine resources (fish and other marine animals, seaweed and salt). "Kaha was a special term applied to areas facing the shore but not favorable for planting.
2. *Kula*: The plains or sloping lands (without trees) above the coastal region.
   a) *Kula kai:* Seaward plains.
   b) *Kula uka*: Inland or upland slopes (towards the mountains).
3. *Kahawai:* The place (having) water. The area beyond or intersecting the *kula* lands. This upland zone provided suitable agricultural sites and abundant naturally occurring resources which were used for religious, domestic, and economic purposes.
4. *Wao:* Wilderness
   a) *Wao kanaka:* Region of man. Lower forest, providing hard wood (*koa*) for spears, utensils, and logs for canoes; *lau hala* (pandanus leaves) for thatch and mats; *māmaki* for bark cloth (*tapa*); *kukui* (candlenut) for oil; wild yams, roots, and sandalwood.
   b) *Wao akua*: Region of deities. …remote, awesome, seldom penetrated, source of supernatural influences, both evil and beneficent.
   c) *Wao maʻukele*: Rain forest. Here grew giant trees and tree ferns (*ʻamaʻu*) under almost perpetual cloud and rain.

The Nā Pua Makani Wind Project lands are predominantly located in the following environmental zones: *Kula uka* and *Wao kanaka.* Numerous traditional accounts, *moʻolelo*, and Land Claim Native Testimonies allude to the cultivation of lands, varying in intensity, from *kula* to *wao* (Hall 1839; Fornander 1917; Thrum 1919; Handy 1940; Handy and Handy 1991; Sterling and Summers 1978; Silva 1984; Maly and Maly 2003; Hammatt 2008; Vogeler et al. 2011).

3.1.2 Traditional Hawaiian Land Divisions

The pre-Contact economy of the Hawaiian Islands was based upon agricultural production that worked within a tiered system of land divisions (Lyons 1875; Malo 1951; Handy and Handy 1991; Kirch 1985; AKAC 2010). In 1875, Curtis J. Lyons, the distinguished surveyor published an article in *The Islander* on land issues, which identified the *ahupuaʻa* as the principal subdivision in a *moku* (district). In this article, he states:

> ...Its name is derived from the *Ahu* or altar; (literally, pile, *kuahu* being the specific term for altar) which was erected at the point where the boundary of the land was intersected by the main road, *alaloa,* which circumferenced each of the islands. Upon this altar at the annual progress of the *akua makahiki* (year god) was deposited the tax paid by the land whose boundary it marked, and also an image of a hog, *puaa,* carved out of kukui wood and stained with red ochre. How long this was left on the altar, I do not know, but from this came the name,

> *ahupua'a,* of the pile of stones, which title was also given to the division of land marked thereby…(Lyons 1875:103-104).

The islands are divided into several sections called *moku* (districts), in which are particular subdivisions referred to as *'okana* (a portion) or *kalana* (a division) (Lyons 1868:67-68; Malo 1951:16-17). According to Curtis J. Lyons (1868) in *Nūpepa Kuakoa*, these units are further divided into *ahupua'a*, which are the main units of traditional Hawaiian land division. Within *ahupua'a* are *'ili*, followed by *'ili pa'a, 'ili kūpono, 'ili lele, lele, mo'o, mo'o 'āina, paukū, kīhāpai, kō'ele,* and *kuleana* (Pukui and Elbert 1986). However, in some cases, the *'ili kūpono* or *kū* were a type of sovereign *'ili* within an *ahupua'a* that were not made to pay tribute to the chief (Thrum 1890:106). Within the *paukū* are dry land patches, referred to as *kō'ele*, *hakuone*, and *kuakua* (cultivated specifically for the chief; listed from smallest to largest). In general, high elevations or mountains are called *mauna,* but mountains or mountain summits located centrally on the island are termed *kuahiwi*, while the peaks or ridges on top of the *kuahiwi* are called *kualono.* In 1868, Lyons continues to describe the geography of the typical *ahupua'a* as well as the Hawaiian names for these geological features, stating:

> The place where trees are small below the fern belt is termed kuahea (hillock section); below it is the wao (wild place), also called waonahele (wilderness) and wao eiwa (ninth wilderness). The place where trees grew taller below the wao eiwa is the wao maukele, and a little below it again is the waoakua (spirit region) ; next below that is where voices increase and, hence, called wao kanaka (people's sphere), because there the people cultivate food. Below that is apaa, and next is ilima (where this plant of the Sida genus is found), and below it is pahu (stake or land mark). Below pahu is kula (open country) adjoining habitations, and seaward of the village is the shore, where it joins the sea. Such was the island divisions by the ancient people of Hawaii.
>
> …Places that stand high up in this and that locality are called puu (mounds or peaks) ; if they stand in a row they are a lalani puu, or pae puu (a line or range of peaks or hills)…High places of the earth lying narrow is a lapa (ridge), or kua lapa (shoulder ridge). If the ridges are many they are called olapalapa (rough protuberances). Deep places lying lengthwise are called kahawai, awawa, or owawa (streams, valleys or ditches). Lengthy, solitary places are called alanui (roads), and kuamoo (paths), and if it continues circuiting the island it is a highway. In places where the path is steep it is called piina or hoopiina (ascending path), kooku (hill slope), and auku (up hill road). Descending paths are termed ihona, alu, kalua, and hooihona, and the place where men would rest is oioina (a resting place). Places where water flows continually are streams (kahawai). Inland places are kumu (source) and seaward places are called nuku (point or outlet). Where water is led to places of cultivation, that is called an auwai (watercourse); where the water joins the sea is a muliwai (river) ; waters borne within the land are lokos (lakes or ponds) (C.J. Lyons 1868 as cited in Thrum 1921:67-68).

Perhaps the ancient Hawaiians created names for an array of topographical features and slight variations within the *ahupua'a* as a way to help keep the dynamic *mauka-makai* economic structure organized.

The names of the three *ahupuaʻa,* Kahuku, Keana, and Mālaekahana, in which the project area are located each have traditional meanings. According to Pukui et al. (1974:67) Kahuku literally translates as "the projection" and is the name of a village, land division, northernmost point, golf course, ranch, schools, forest reserve, as well as surfing beach on Oʻahu. Keana literally translates into English as "the cave," according to Clark (2002:177), perhaps due to the fact that one of its most prominent sites is an ancient rock shelter (Site No. -270) known as Keana Cave (McAllister 1933:233; Sterling and Summers 1978:154). Mālaekahana Ahupuaʻa, which is named after the mother of legendary figure, Lāʻie-i-ka-wai, is also the name of the large bay and stream found within the land division (Pukui et al. 1974:143).

3.1.3 Life in the Ahupuaʻa

With great variations of geological features, each *ahupuaʻa* had its own dynamic resource management system that was based on traditional customs upheld by the *kapu* system, or ancient religious law. The *ahupuaʻa* typically extended form the coast to the nearest mountain top or ridge and resources from the land and sea were equally distributed within the *ahupuaʻa*. Lyons (1875) describes the geographic nature of the *ahupuaʻa* as well as the movement of resources from mountain to sea and vice versa, stating:

> The Ahupuaa ran from the sea to the mountain, theoretically. That is to say the central idea of the Hawaiian division of land was emphatically central, or rather radial. Hawaiian life vibrated from *uka,* mountain, whence came wood, kapa, for clothing, olona, for fish line, ti-leaf for wrapping paper, *ie* for rattan lashing, wild birds for food, to the *kai,* sea, whence came *ia*, fish, and all connected therewith. Mauka and makai therefore fundamental ideas to the native of an island (Lyons 1875: 104).

The *ahupuaʻa* was also an important socio-political unit in the pre-Contact era, each unit with its own hierarchy. Kirch (1985) holds that *moku* were independent chiefdoms, divided into a number of radial land divisions, referred to as *ahupuaʻa,* with subdivisions of *ʻili* and *moʻo* within. According to Kirch:

> Each ahupuaʻa was controlled by a lesser chief, who in turn appointed one or more stewards to oversee production, organize work parties, collect tribute, and in other ways represent the chief. Ahupuaʻa were economically self-sufficient to some degree, although differences in the local resource base (agricultural land, water resources, stone for tools, and so on) resulted in differences in the production patterns of individual land sections. Within the ahupuaʻa, there were yet smaller sections and divisions, especially the ʻili and moʻo, which were held and worked by extended households or groups of commoners (Kirch 1985:2).

According to Handy and Handy (1991:48), for the purpose of taxation, the chief political subdivision of the pre-Contact era was the *ahupuaʻa,* which was generally under the management of the *konohiki* (steward or caretaker). The term *ahupuaʻa* itself is derived from the fact that each coastal *ahupuaʻa* boundary was marked with an altar (*ahu*) which held a carved wooden effigy of a pig (*puaʻa*) head during the Makahiki festival, when harvest tributes (taxes) were offered to the god of rain. Handy and Handy refer to the lower chief who represented the *ahupuaʻa* as *aliʻi ʻai ahupuaʻa*, which translates to English as "chief who eats the ahupuaʻa" (1991:48). Yet, according to Malo (1951:142) the *konohiki* was tasked with collecting levies from

the *maka'āinana* (commoners; literally "people that attend the land") of the *ahupua'a* for the king and of the *ali'i 'ai ahupua'a.* The word *konohiki* is defined by Pukui and Elbert (1986) as the, "Headman of an ahupua'a land division under the chief; land or fishing rights under control of the konohiki; such rights are sometimes called konohiki rights" (1986:166). Thrum (1924) wrote that the *konohiki* was a local representative or steward of the landlord owner whose privileges and duties were, "…practically those which go with that position in any land and in common with his brethren today in Russia or Ireland he had his failings and was not always popular among his fellows…" (1924:60).

Handy and Handy liken the *ahupua'a* tenure system to western share cropping, where "sharing between the chief and tenant was comprehensive and reciprocal in benefits" (1991:48). Kirch and Sahlins (1992) delve further into the social dynamics of the *ahupua'a* in their historical ethnography, *Anahulu: The Anthropology of History in the Kingdom of Hawai'i, Volume One*. Kirch and Sahlins (1992:17) state the following about variations in land use in the ancient *ahupua'a*:

> Economically more highly valued, the coastal areas were also generally preferred for chiefly residence. Here were the most extensive wet taro lands, offshore and onshore fish ponds, as well as access to the sea and the fishing and surfing that in Hawaii were sports of kings. Still, the uplands were also necessary for the Hawaiian existence. In addition, to things mentioned by Lyons, people were specifically dependent on the uplands for the timber and thatching of their houses; the materials for their canoes, bowls, weapons, images, agricultural tools, and other objects using hardwoods; rope, line, fishnetting; lighting (from candlenuts); pasture for domestic animals (in the nineteenth century); various fruit trees; and more (Kirch and Sahlins 1992:19).

Thus, resources needed for daily life were best grown in or collected from the habitats that they were best suited for and likely distributed, through trade, gifting, or taxes, from *mauka* to *makai* or vice versa within the *ahupua'a*. Further evidence of this is found in the archaeological record, where most upland habitation features in the area contain significant amounts of marine shell and fish bone in midden deposits, which suggests that people inhabiting the *mauka* areas of the *ahupua'a* had a steady diet of marine resources (Jensen 1989; Williams and Patolo 1998).

3.1.4 Traditional Names of Topographical Features

The Nā Pua Makani Wind Project lands are within Kahuku, Keana, and Mālaekahana Ahupua'a. The great majority of the project area is within the *kula* (plains/fields) and *wao* (upland) areas of Keana and Mālaekahana Ahupua'a. Several culturally significant landmarks and noted topographical are located in and around the Nā Pua Makani Wind Project lands. These landmarks possessed Hawaiian names in the pre-Contact era, which were based on distinguishing characteristics, *mo'olelo*, or traditional use of the area. These traditional names are seldom used to refer to these landmarks in the modern era.

Kahuku Ahupua'a covers the largest area and has a relatively large amount of noteworthy topographical features as well as an extensive mythological background. Due to the fact that only the northwest extreme of the project area is located in the eastern portion of the Kahuku Ahupua'a, only noteworthy Kahuku traditional landmarks within the eastern portion of the *ahupua'a* will be mentioned in this study. Only three landmarks within the southern half of

Kahuku Ahupuaʻa were found to have traditional names. Punamanō, which translates as "shark spring," is a spring-fed wetland located a little more than one kilometer north of the project area (Clark 2002:310; Site 261 shown on Figure 3). Also within the southern portion of Kahuku Ahupuaʻa is Kaauhelemoa Fishpond (Site No. 268 shown on Figure 3), which was an ancient fishpond named after its *moʻo* (guardian), named Kaauhelemoa. This fishpond was once located only several hundred meters west of Kahuku Village. According to legend, "Kaauhelemoa was half man and half chicken, a being of supernatural power who could change himself at will into a man or a chicken" (McAllister 1933 as cited in Sterling and Summers 1978:152). Before being destroyed for sugarcane cultivation, the pond was said to have been fed by a spring (ibid). McAllister (1933) holds that Kiʻi Wetlands, also referred to by some as Kahuku Fishponds, was always simply a swamp and never used as a fishpond (ibid.). Kiʻi Wetlands, now a National Wildlife Refuge, is located just under two kilometers north of the project area (See Figure 3, Site 4 for location).

In Keana Ahupuaʻa, northwest of Makahoa Point is a noted fishing ground, referred to as Kaluahole, which translates as the "pit, or cavern of the ahole fish" (Clark 2002:155; Pukui et al. 1974:78). The *āhole* (Hawaiian Flagtail; *Kuhlia sandwicensis*), is described by Titcomb as "a common shore fish" that inhabits the coral and lava caverns of the reef when mature (1972:59). North of Kaluahole is Kaʻohana, or "the family," which is a calcareous sand beach near the Japanese Cemetery (Clark 2002:161). The coastline fronting the Kahuku Golf Course was traditionally referred to as Keoneʻōʻio, or "the ʻoʻio sands," where *ʻōʻio* is the Hawaiian word for *Albula vulpes,* commonly known as bonefish (Clark 2002:137). This is also the traditional name for the channel that is most suitable for swimming in the area. Pōlou is the name of a pool of water that once existed *makai* of the Kahuku Mill, recorded by McAllister (1933) as Site No. -271 (as cited by Sterling and Summers 1978:154). This pool was said to have been the anchoring spot where the fabled "floating island" of Kahuku attaches to the rest of the island of Oʻahu (ibid.).

Mālaekahana has also been referred to in local mythology. Less than 800 meters *makai* (seaward) of the project area is Makahoa Point, which is located on the north coast of Mālaekahana Ahupuaʻa. The beach ends at the south end at Makahoa Point in Mālaekahana Ahupuaʻa. Makahoa translates to English as "friendly" or "a companion" according to Pukui et al. (1974:140) and Clark (2002:228). Where the mouth of Keaʻaulu Stream pours into Mālaekahana Bay marks the boundary Keana and Mālaekahana Ahupuaʻa. The name Keaʻaulu means "the growing root," (Pukui et al. 1974:100), which may indicate that traditional Hawaiian agricultural practices likely occurred along Keaʻaulu stream and gulch. Also in Mālaekahana Ahupuaʻa is Site No -275, referred to as Waiʻāpuka, which is a pool mentioned in the legendary story of Lāʻie-i-ka-wai and was said to be the opening of a subterranean cavern with fresh spring that a person could swim underwater for a great distance prior to it being filled in with sediment in the historic era (Sterling and Summers 1978:155). This site is located approximately 1.5 kilometers to the south of the project area.

3.1.5 Traditional Names of the Winds of Koʻolau Loa

Traditional Hawaiian stories and legends (*moʻolelo*) have been told and retold; shortened and changed; published in turn-of-the-century Hawaiian language newspapers; and collected for books. In 1902, Moses Kuaea Nakuina published *Moolelo Hawaii o Pakaa a me Ku-a-Pakaa, na*

Kahu Iwikuamoo o Keawenuiauni, ke Alii o Hawaii, a o na Moopuna hoi a Laamaomao wherein he retold a "traditional legend collected from various sources, edited, and expanded" (Nakuina 1992:vii) upon in order to preserve its knowledge. In 1992, an English version of Nakuina's *mo'olelo* was published as *The Wind Gourd of La'amaomao: The Hawaiian Story of Pāka'a and Kūapāka'a, Personal Attendants of Keawenuia'umi, Ruling Chief of Hawai'i and Descendants of La'amaomao*, with the translation done by Esther T. Mookini and Sarah Nākoa.

This *mo'olelo* retells the story of Pāka'a and Kūapāka'a, who were personal attendants to the ruling chief of Hawai'i, Keawenuia'umi. Pāka'a was the son of a Hawai'i Island *ali'i*, Kūanu'uanu, and La'amaomao, a "cherished keiki, brought up with care and refinement" in a family of status on Kaua'i (Nakuina 1992:2). Before the birth of his son, Kūanu'uanu returned to Hawai'i Island and La'amaomao was shunned by most of her 'ohana and left to care for Pāka'a alone in a cave by the beach. When Pāka'a was a boy, he pestered his mother, always asking 'who is my father?' When La'amaomao finally answered she told him, "as for your real father, you must look for him. I'll tell you this: to find him, you must look to the east, where the sun rises and a certain local wind blows. Your father lives there." Pāka'a determined that he would search for his father when he was "old enough to travel the seas between the islands" (Nakuina 1992:2).

As he grew up, Pāka'a worked hard to help his mother and learned the ways of a fisherman. Pāka'a was clever and determined and when he learned that an *ali'i* of Kaua'i would be touring the islands, he asked his mother's permission to join the traveling company. "'Ae, go,' said his mother. 'But go with humility and modesty;…and when you arrive in the presence of Keawenuia'umi, you'll know you've arrived at the place where your father lives'" (Nakuina 1992:14). Then:

> La'amaomao lifted the lid of a large calabash and took out a small, long, highly polished gourd in a woven bag. The gourd was covered securely. She turned to her keiki and said, "I'm giving you this gourd which belonged to your extraordinary kupunawahine for whom I was named. Her bones are inside the gourd. While she was alive, she controlled all the winds of the islands-she had them under a supernatural power. She gathered all the winds and put them into this gourd, where they're still kept. She memorized one by one the names of all the winds from Hawai'i to Ka'ula. On windless days, she could remove the cover and call out the name of a wind, and the wind in this gourd would blow. This gourd, called 'the wind gourd of La'amaomao,' was famous.
>
> Before she died, she entrusted me to put her bones inside this gourd and care for them until I had a child. Then I was to give the gourd to the child to watch over. You're my only child, so now I'm giving the gourd to you. You must look after it according to the wishes of your extraordinary kupunawahine.
>
> You must care for this gourd because it has been handed down from the kupuna. This gourd has great value-you may not think so now, but when you sail with the ali'i and arrive at an area where no wind blows and the canoes are becalmed, say that the winds are at your command; all you have to do is call, and the winds will blow.

> When you're laughed at, remove the lid of the gourd and call for a wind. The wind will blow and bring the canoes to shore. The aliʻi will be grateful to you, and you'll be loved and valued by him.
>
> Before Pākaʻa sailed off, Laʻamaomao taught him the names of all the winds, along with the prayers, songs and chants concerning them, and when she was done, Pākaʻa had memorized everything. Then he took the wind gourd and tied it with a cord he had made, prepared his other things for the voyage, and left home (Nakuina 1992: 14-15).

The "grand traveling company" landed first at Waikīkī and from Oʻahu, then continued on to Molokaʻi, Maui, and eventually, Hawaiʻi Island, where he found his father in the chief's court (Nakuina 1992:15). He trained under his father, Kūanuʻuanu, to become a *kahu iwikuamoʻo* (personal attendant). When his father died, Pākaʻa took on the role of *kahu* for the old *aliʻi*. There were those jealous of Pākaʻa's position and skill and eventually, he fell out of favor with the old *aliʻi* and his court. Pākaʻa left Hawaiʻi Island, taking the wind gourd his mother had given him, and sailed to Molokaʻi where he met and married Hikauhi. They had a son named Kūapākaʻa, who was dutiful and learned all his father had to teach (Nakuina 1992).

Many years after Pākaʻa left Hawaiʻi Island, the old *aliʻi* became tired of the poor service and greedy manners of his *kahu* and went in search of Pākaʻa. Word traveled that Keawenuiaʻumi was searching for him, so Pākaʻa and Kūapākaʻa "gathered their supplies for catching uhu…took along with them the wind gourd of Laʻamaomao" (Nakuina 1992:30) and paddled out in their fishing canoe to await the entourage of his *haku* (master, lord). A fleet of canoes ladened with the people of Keawenuiaʻumi's court was approaching and each time they encountered a canoe, Kūapākaʻa would ask his father, 'Is this perhaps my haku?' and Pākaʻa would reply, 'It is not your haku' (Nakuina 1992:33). Kūapākaʻa asked that same question throughout the night and finally Pākaʻa said, 'When you see the first rays of the sun, you'll see your haku' (Nakuina 1992:33). At first light, Pākaʻa ordered Kūapākaʻa to call out to his *haku*, and the *keiki* began to chant:

> The canoe is yours,
> Great Hawaiʻi of Kāne,
> Great Hawaiʻi, land of the sun,
> The sun emerges, emerges,
> The sun emerges at Haʻehaʻe,
> With a strong affectionate love for my haku,
> Not my real haku,
> But a companion of the giddy sun,
> The Kona sun without food,
> Its loved one has arrived,
> Arrived along with Hilo of Kāne,
> Hilo of Kāneakapu,
> Hilo, land of Kanilehua,
> Beloved companion of Keawenuiaʻumi mā,
> There sits Keawenuiaʻumi,
> The canoe is yours
> (Nakuina 1992:37-38).

Once greetings were exchanged, the *keiki*, Kūapākaʻa, asked Kahikuokamoku, the Kuhina Nui, to bring the canoe fleet ashore, because, "'Tomorrow is a calm day for sailing; today will be stormy: there are thick cumulus clouds resting above Kawainui and the ridge of Wailau; when these clouds are blown with full force, a terrible storm will rage; when the clouds are at rest again, then good weather will follow'….There were no clouds yet-only the clouds in the wind gourd" (Nakuina 1992:38). The Kuhina Nui asked, "how is it a calm day like today can be a bad day for sailing? The sky is clear, the mountain tops are exposed, and the banks of clouds are asleep at the horizon" (Nakuina 1992:39). Kūapākaʻa responded, "This will be a stormy day, a windy day. You came here from Hawaiʻi with the winds from there; Hawaiʻi is a windy land and they blow here from behind you." The Kuhina Nui challenged Kūapākaʻa, a *keiki* of Molokaʻi, on his knowledge of the winds of Hawaiʻi Island. Kūapākaʻa chanted the names of the winds for the west side of the island; he chanted the names of the winds for the east side of the island. Kahikuokamoku asked his advisers if it would storm and they contradicted Kūapākaʻa. Encouraged by a look from his *haku*, Kūapākaʻa chanted the rest of the names of the winds of Hawaiʻi (Nakuina 1992). Kahikuokamoku answered:

> "The aliʻi's canoes won't go ashore with you, ē ke keiki. These winds you've called out belong to Hawaiʻi. They blow over the sea of ʻAlenuihāhā and die out there. The winds of Hawaiʻi won't reach here."
> Kūapākaʻa said, "Since you deny the winds of Hawaiʻi, here in front of you is Oʻahu, another windy land."
> Kahikuokamoku said, "Let's hear the names of the Oʻahu winds."
> Kūapākaʻa chanted the winds of Oʻahu:
>
> There are our clouds, my father's and mine,
> Covering the mountains;
> The clouds rise with a sudden shower,
> The whirling winds blow,
> The source of the storm of the keiki,
> Ku a ē-ho is at sea
> From the sea, the storm comes sweeping toward shore,
> The windward Kui-lua wind churns up the sea,
> While you're fishing and sailing,…
>
> …The sea wind blows hard,
> Mālualua comes from the northeast,
> Peapueo is of Kaunala,
> Ahamanu is of Kahuku,
> Lanakilia is of Hauʻula,
> Moaʻe is of Punaluʻu,
> ʻĀhiu is of Kahana,
> Holopali is of Kaʻaʻawa and Kualoa,…
>
> …The Kona winds turn, the Koʻolau winds turn,
> The winds will turn before you and find you,
> You will be overwhelmed, O deaf aliʻi,
> The winds will gather,
> The naʻenaʻe leaves will bend,
> You'll be swept ashore at ʻAwawamalu,
> Caught in the fishing net of the head fisherman,
> Your thigh bone and upper arm bone

Will be made into fishhooks,
To catch pāoʻo and ʻōpakapaka,
Your flesh will be without bones,
The black crab, the shearwater will eat your remains,
The life from the parents will be broken off,
Here I am, the ʻaumakua kanaka,
Listen to my life-giving words,
Keawenuiaʻumi, come ashore, a storm is coming,
When you sailed yesterday, it was calm.[1]
After the winds of Oʻahu had been named, the kānaka were uncertain: they didn't believe fully in the keiki's words, yet they were afraid that the words might be right and that some of them might die at sea... (Nakuina 1992:42-44).

The tale continues, Pākaʻa urging Kūapākaʻa to call out the names of the winds of Kauaʻi; chant of the destruction to be caused by the wind; call out the names of the winds of Maui and Molokaʻi; and chant of terrible storms and rough seas. Pākaʻa had a plan of revenge that required the *aliʻi*, who had blackened his name to Keawenuiaʻumi, go ashore. At that time, Pākaʻa would then be reunited with his *hānai* (provider). In the end, "Pākaʻa was victorious over his enemies who had come between him and his hānai. With the help of Kūapākaʻa, his keiki, Pākaʻa returned to enjoy the comforts and honors and carry out the responsibilities of an aliʻi of Hawaiʻi" (Nakuina 1992:106).

According to Handy and Handy (1991), the gourd is a personification (*kino lau*) of Lono, the Hawaiian god of agriculture and fertility. "Lono is the gourd; the cosmic gourd is the heavens whence some winds, clouds, and rain" (Handy and Handy 1991:220). In a rite called the "Gourd Prayer" (*Pule Ipu*), a male child was blessed in order that he grow with the vigor of the gourd vine. Lines in the *Pule Ipu* refer to the gourd Lono-kui-kui, Lono-the-punisher, and his wife, Ka-papa-ia-kea, who bore him 12 children. They "dwelt in an underground cavern (*lua*), in which grew famous gourds (his children)….One of these gourd-children…was undoubtedly the great wind-gourd named Laʻa-maʻo-maʻo. Laʻa-maʻo-maʻo (Distant-Laʻa), or Ka-ipu-makani-a-Laʻa-maʻo-maʻo (the-wind-gourd-of-the-far-away-heavens-of-Laʻa) was a name for the sky and its horizons whence come the winds and rains" (Handy and Handy 1991:219-220).

In consonance with the *moʻolelo* of the Wind Gourd of Laʻamaomao, there is one named wind within the project area. It is the Ahumanu wind of Kahuku. "Ahu" (lit. to gather or collect) and "manu" (the general name for fowls or the feathered tribe) together literally mean bird gathering or gathering of birds (Andrews 1865; Kaleinohea Cleghorn, personal communication 2015) suggesting that birds, and possibly bird hunting/gathering activities, were common in the area.

A second named wind of Kahuku, Mikioi, is referenced by Elbert (1965) in the section 3.1.6 below (Kahuku Ahupuaʻa).

[1] One of the greatest fears of the *aliʻi* was the desecration of their bones by fishermen who used human bones to make fishhooks. The *mana* (spiritual power) of a person resided in the bones, and this *mana* could be passed on to descendants only if the bones were taken care of. (Thus Pākaʻa carries the bones of his grandmother Laʻamaomao with him in his gourd.) Fishermen preferred the thigh bone and upper-arm bone for making hooks.

3.1.6 Moʻolelo of Kahuku, Keana, and Mālaekahana Ahupuaʻa

Each *ahupuaʻa* in which the Nā Pua Makani Wind Project lands are located has a traditional background from the pre-Contact era. Ancient *moʻolelo* for each *ahupuaʻa* helps to explain their traditional names, what kinds of natural resources were found within, what stories and mythological figures are associated with them, as well as the chronicles and conflicts may have occurred there. These facets of the cultural landscape help to provide a connection for modern day cultural practitioners to the land and their ancestors who dwelt in these *ahupuaʻa*. In addition, traditional *moʻolelo* about each *ahupuaʻa* is integral to understanding the cultural, historic, and spiritual significance of these lands.

Kahuku Ahupuaʻa

The name Kahuku appears to be used not only as the name of an *ahupuaʻa* and village, but as a district or place name for the area roughly between ʻŌʻio and Keana Ahupuaʻa. Of the three *ahupuaʻa* represented in the project area, Kahuku has the most extensive traditional and mythological background.

Traditional accounts of natural resources and environmental conditions are relatively abundant for the *ahupuaʻa* of Kahuku. Traditional land use in Kahuku is also made apparent through legend. The landscape of Kahuku appears to have had several configurations, from the pre-European contact era to the present. During Hawaiian settlement prior to the arrival of Europeans, many parts of the landscape were used for traditional agriculture, habitation, and ceremony, varying from intense to moderate. In the early European Contact period, a good portion of the land lay fallow due to severe population decline and was overgrown in some areas with exotic plant species. Thus, there are several conflicting accounts of what the landscape was like and how it was used prior to European contact. Several themes are tied to Kahuku's landscape, including its abundance of *hala,* or pandanus, and its importance to ancient Kahuku's cultural identity.

Fresh water springs were mentioned in several traditional accounts of the Kahuku area. For instance, in the tale of Makanikeoe, the celebrated adventurer, Makanikeoe stopped at Punahoʻolapa, "a deep spring on the plain of Kahuku," where he found the spring that the legendary *kapa* anvil fell into and ended up in Waipahu, at ʻEwa (Maly and Maly 2003:91). Subsequently, Makanikeoe "crawled along another path" arriving at another Kahuku spring known as Punamanō (ibid.). A lone rock here, Kū's Rock Spring, was said to give forth pure spring water (Sterling and Summers 1978:153). Further, Handy (1940:88), disclosed that a spring, referred to as Kaainapele Spring, was located *mauka* of the Kahuku Ranch house.

Agricultural terraces were also said to exist in northern Kahuku in the pre-European contact era, which was made possible with the presence of natural springs (Handy 1940:88). There is some debate, however, on the origin of these terraces, where some informants claim that the terraces pre-date European contact and were used in the late 19th Century by the Chinese for rice paddies and some claim that the terraces were built by the Chinese for this purpose (ibid.). On the district of Koʻolau Loa in general, Hall (1839) states that, "…much taro land now lies waste, because the diminished population of the district does not require its cultivation," which upholds the abandonment of taro patches in various locations in Koʻolau Loa due to population decline (as cited in Sterling and Summers 1978:148).

The presence of fish and fishing practices of pre-Contact Kahuku are recalled in legends. In the legend of Kaneaukai, as told by Thrum (1976:254) from April through July, schools of mullet, or *ʻanae-holo*, and surgeonfish, or *āa,* move from Maui to Waimea, passing by Kahuku. Further, in the tale, *Two Fish from Tahiti*, Westervelt (1915:138-140) alludes to *kapu* being placed on the catching and eating of certain species of reef fish associated with the Tahitians that fell victim to cannibalism in this story. The story of Punamanō Spring in Kahuku alludes to locals net fishing at the beach at night, which is telling of traditional fishing methods used in Kahuku (Sterling and Summers 1978:150). The story of Kūkiʻo Pond holds that the pond was once much larger and had contained a variety of fish. This story suggests that these natural ponds were utilized as brackish water fish ponds in ancient times.

Numerous proverbs, prayers, and *mele* about Kahuku in general elude to its abundance of *hala*, or pandanus trees. Pukui (1983:248) recites the proverb, *Nani i ka hala ka ʻōiwi o Kahuku*, which translates to, "the body of Kahuku is beautified by hala trees." In Fornander's translation of the prayer of Kualiʻi, Kahuku is described as a *hala* tree (Fornander 1917:28). Thrum (1919) also associates pandanus with Kahuku in his translation of Comparison of Kualiʻi, in the following lines:

> …Not like the paua [clam or abalone] which cuts the pandanus,
> To weave its blossoms at the social gatherings,
> That was the knife to cut Kahuku's pandanus.
> [He is] Not like these.
> (Thrum 1919:459)

This *mele* compares Kualiʻi with a host of euphemisms that often call upon various localities and objects often associated with them. In a section titled: "Various Heathen Prayers," Fornander (1920:46-51) translates an untitled prayer with a line that states: "He hala o Kahuku…" which Fornander interprets as, "Full of pandanus is Kahuku…" (1920: 50). Intending to win back the affections of his wife, Halemano, composed a chant that referring to the *hala* trees of Kahuku, stating:

Ku au nana i laila,	I stood and gazed, then
Haloiloi Kuu waimaka e uwe,	Tears filled my eyes causing me to weep.
Nani na hala ka oiwi o Kahuku,	How beautiful are the hala, native trees of Kahuku.
I ka lawe a ka makani he mikioi	As they are being fanned by the Mikioi wind.
	(Elbert 1965:281)

Another tearful sentiment about the *hala* of Kahuku comes from the tragic tale of Kaopulupulu, who's failed prophecy sealed his death warrant in the time of Kahahana. According to Thrum (1912:210):

> …In the morning, ascending a hill, they turned and looked back over the sea-spray of Wailua to the swimming halas of Kahuku beyond. Love for the place of his birth so overcame Kaopulupulu for a time that his tears flowed for that he should see it no more (as cited in Silva 1984:C-4).

Further, Apuakehau wrote in the Hawaiian newspaper, *Kuokoa*, in 1922 that "the first Kahuku" was covered by a *hala* grove (as cited in Sterling and Summers 1978:149). The association of *hala* with Kahuku is even repeated in the traditional Hawaiian myth of Pele and Hiʻiaka (Silva 1984).

In this portion of the myth, while Hiʻiaka is in Kahuku (Kahipa), she rebukes two bad-mannered individuals, Puna-heʻe-lapa and Pahi-pahi-alua, who did not pay her the proper respects by stating:

> We enter the fragrant groves,
> Hala groves whose heads make a calm,
> Wild growths by the sea of Kahuku,
> But what, indeed are your halas?
> Shall their murmur forbid you speech?
> Make you dumb to my salutation?
> I make this kindly entreaty
> To you who sit in the grove
> (Emerson 1915:97-8 cited in Silva 1984:C-5).

Silva (1984) adds that Emerson (1915) gathered that there was some word play in the chant, where the word "*hala*" stood for the pandanus tree as well as a fault or a sin. As late as the late 1820s, Chamberlain holds that the Kahuku area was "beautified with lauhala and some other trees" in his manuscript, "Trip Around Oahu in 1826" (as cited in Sterling and Summers 1978:149).

The wearing of *hala*, in the form of plaited *lau* (leaves) *hala* or *lei* made of the *hala* fruit/seed was a way in which the people of Kahuku represented their homeland. In the tale of Kalelealuaka, the strong and brave young warrior who fought for King Kakuhihewa went to Kahuku and fashioned wreaths of pandanus fruit and sugarcane to disguise himself. He then was able to convince the King's marshal, who was disabled, that he was from Kahuku and that he would carry the marshal to his destination. As a reward, the marshal granted Kalelealuaka the district of Koʻolau Loa for his services (Thrum 1976:100). Cummins (1913) also calls the Kahuku area as "land of the hala tree" and stated that people should not leave Kahuku for Waimea or Waialua without a wreath of Hala-fruit (as cited in Sterling and Summers 1978:149).

Kahuku was infamous for several other landmarks that stand out in Kahuku's cultural and physical landscape. Some legends explain the occurrence of these distinctive natural features, such as the tale relayed by Pukui et al. (1974:67) where, Lono-ka-ʻeho (Lono the stone), who is described as a chief with eight stone foreheads, severed Kahuku Point from the island. Emerson (1909) translates the verses of a *hula* that describes a few of these landmarks of Kahuku in a rather colorful way. He preludes the translation with the quip, "Whether there is any connection between the name of the hula—breast-beating—and the expression in the first verse of the following mele is more than the author can say." The verses for this *hula* are translated by Emerson into English as:

> 'Tis Kahipa, with pendulous breasts;
> How they swing to and fro, see-saw!
> The teeth of Lani-wahine gape—
> A truce to upper and lower jaw!
> From Lihue we look upon Ewa;
> There swam the monster, Miko-lo-lou,
> His bowels torn out by Pa-piʻ-o.
> The shark was caught in grip of the hand.
> Let each one stay himself with wild herbs,

> And for comfort, turn his hungry eyes
> To the rustling trees of Lei-walo.
> Hark! The whistling-plover—her old-time seat,
> As one climbs the hill from Echo-glen,
> And cools his brow in the breeze.
> (Emerson 1909:206)

Emerson goes on to say that, "The thread of interest that holds together the separate pictures composing this mele is slight. It will, perhaps, give to the whole a more definite meaning if we recognize that it is made up of snapshots at various objects and localities that presented themselves to one passing along the old road from Kahuku, on Oʻahu, to the high land which gave the tired traveler his first distant view of Honolulu before he entered the winding canyon of Moana-lua" (ibid.). He adds that Kahipa is the name of a fabled female character, which was then applied to a locality in Kahuku where the mountains resemble two female breasts. Further, he describes Lani-wahine as, "A benignant *moʻo*, or water-nymph, sometimes taking the form of a woman, that is said to have haunted the lagoon of ʻUkoʻa, Waialua, Oʻahu" (ibid.).

Another tale of the distinguished promontory, referred to as Kalaeokahipa is as follows:

> Nawai-o-lewa is on the northwest side of the rocky brow of Kalaeokahipa and now only one breast is left to move in the gusty winds of Kuhuku-lewa. The other was broken off by that supernatural son of Ku and Hina…Between Kalaeokahipa and Nawaiolewa, just above is a small round opening to a secret cave…The small secret cave belonged to Kaalae-huapi (Red head mud hen) and others in the first Kahuku that was covered by a hala grove (J.K. Apuakehau, Kuokoa, June 29, 1922 in Sterling and Summers 1978:152).

Sterling and Summers (1978:151-2) list numerous historic references to Kalaeokahipa, most enlisting the use of the word "breast(s)"to describe the peak(s).

Also of note are the harsh currents and surf of Kahuku's coasts, which are mentioned in *The Birth Chant of Princess Bernice Pauahi Bishop,* as translated by Ahuena Taylor, which follows:

> …Who builds the heat, the oven, until the long fires
> Become like a wild sea.
> From "Kama" to "Waialua."
> And comes close the head lands of "Kahuku,"
> And the hawk-like scratching sea of "Kahuku,"
> The night was spent at "Waialua,"
> For a voice was at the sea of "Ewa."
> Listening for the response.
> Respond! Oh Heavenly one…
> (Kanahele 2002: 223-226)

This chant lends a rather rough image to the coast of Kahuku.

Kamakau (1964) tells of a famous hiding cave, referred to as Pohukaina. This cave, which had an entrance in Kahuku, is described by Kamakau:

> The mountain peak of Konahuanui was the highest point of the ridgepole of this burial cave "house," which sloped toward Kahuku. Within the cave are pools of water, streams, creeks, and decorations by the hand of man (*hana kinohinohʻia*), and in some places level land (Kamakau 1964:38).

The great cave of Pohukaina is also said have been the refuge and storage place of "much wealth" for Oʻahu's chiefs (Kamakau 1964).

Although Kahuku lacked physical evidence of taro terraces along Kahuku Stream, informants interviewed by Handy and Handy claimed that there was taro cultivation in ancient times (Handy and Handy 1991).

Hawaiian legend holds that Kahuku was once a floating island blown here and there by the trade winds and is recounted by many sources in several different ways. Pukui (1983) writes of the traditional proverb, *Kahuku ʻāina lewa,* which translates as "Kahuku, an unstable land…" and later writes that, "Oʻahu, according to legend, was once two islands that grew together. Kahuku is the part that bridges the gap" (Pukui 1983:144). Yet, there are many variations to this legend. In one version, the people of Kahuku grew tired of the moving island bumping against Oʻahu, so they fastened Kahuku to Oʻahu with fishhooks. McAllister (1933:155) retells this story in great detail:

> A story is told that Kahuku was once a land afloat, wafted about by the winds, drifting over the ocean. Just how it came to Oahu is not told, but old Hawaiians point out to Polou, the place where Kahuku is fastened to Oahu. Formerly it was possible to dice into the pool and when a depth of 40 fathoms was reached, a shelf of rock was found upon which to rest. Forty fathoms deeper Punakea (white line from coral) was reached and on looking toward Malaekahana, the hook by which Kahuku was made fast could be seen. This hook was intricately fashioned of Kawila (Alphitonia excelsior). Seaward of the Waialee Industrial School, in another pool of water, known as Kalou, is the spot where Kahuku is attached to Waialee… (McAllister 1933:155).

In addition, when McAllister (1933) relays the story about Kāne and Kanaloa, one line repeats the common tale that Kahuku was not attached to Oʻahu in ancient times, stating that "Kane and Kanaloa lived in the vicinity of the ridge (Kalaiokahipa ridge); but that was at the time when the Kahuku plain was still under water, and the waves lapped about Kalaiokahipa" (as cited by Wong-Smith 1989:A-2).

Silva (1984) lists several stories of how Kahuku was reattached to Oʻahu. One colorful account holds that the floating island of Kahuku belonged to the *menehune*, stating as follows:

> Ka-hu-ku section of Oʻahu was once a separate island…It was an islet whose people were the Mene-hune, or Dwarfs as they are called today. Many stories are told about the miraculous feats performed by the Little People of ancient Hawaiʻi. It is known, that they always worked from just after sunset until just before dawn.
>
> Legend tells us that Kahuku was a floating island situated several miles out to sea. For a long time, the people of Oʻahu had planned to make the island part of

> their land, for they saw it come close to Oʻahu's shores. The floating island of the Menehune did not have any fresh water springs because there were no high mountains covered with verdure and trees to capture the rains. So, the Little Folk used to paddle their islet into the bays of Oʻahu at night to haul water from the springs of the large island.
>
> One day, a resident of Kahuku suggested that all the people gather together to make strong hooks of whalebone and attach them to a stout rope made of sacred olonā fibers. This was done.
>
> The Menehune came to take water as usual, then the residents of Oʻahu attached the large hooks to the floating isle while the Menehune started to paddle off again, but they could not move their islet or free it from the ivory hooks and olonā ropes.
>
> Today, many people who travel Kahuku section of Oʻahu and see the many islets seeming to float off shore, and hear the sea singing its songs, they say, 'Listen to the Menehune grumbling while they try to move their island that used to float!'
>
> The rumbling and grumbling is heard only at night, for that is the time for the Menehune to be working at Kahuku. (Paki 1972:53 as cited in Silva 1984:2-3)

Another account of Kahuku being an island was provided by Silva (1984), which also links the locality with a legendary princess, named Lāʻieikawai, and reads as follows:

> Kahuku District, according to legend, was once a floating island blown about by the winds. As it banged against Oʻahu, it made noises which disturbed the old women guarding the princess Laieikawai. The old women grappled the island with fishhooks and attached it securely to Oʻahu. Polou pool on the sea side of the Kahuku mill is one spot where the hook was fastened. The other end was fastened at Kūkiʻo pond 300 feet inland at Kahuku Point (Boswell 1958:68 as cited in Silva 1984:2).

Other versions provide a political motive for uniting the two islands. A portion of the tale of "The Hole of Kahipa and Nawaiuolewa" was told to Mary Pukui by a one-hundred and five year old woman named, Kanui, who described how two ruling chiefs united Kahuku with Oʻahu. In this tale, "the two were brother and sister. In order to make it one, the two sat down and hooked their fingers together and drew them together. The hole marks the place where they sat (Kamakau Part II, Moolelo o Hawaii, Note 4, Chap 12, as cited by Sterling and Summers 1978:151). Kamakau (1991:38-9) holds that Oʻahu was a floating island, rather than Kahuku. However, there are some consistencies with the previously mentioned versions. He writes:

> According to traditions of some people, Oʻahu was said to have once been a floating land, *he ʻāina lewa o Oʻahu*. The Kahuku side was a wide open gap (*puka hāmama*) and this was called *Ka Puka o Kahipa a me Nawaiuolewa*, "The opening of Kahipa and Nawaiuolewa." The piece of land that closed it up was called Kahuku, and the hooks that made fast the piece of land and joined it to the island were called Kilou and Polou (Kamakau 1991:38-39).

Another variation of the story told holds that there was an underground canal or tunnel where the two islands joined. In 1828, Levi Chamberlain, a missionary accountant, tells of a 5-7 mile

long by 1-2 mile wide underground canal leading from the sea inland at the convergence of the two islands (Chamberlain 1957:35-36). He reiterated the following in regards to this legend:

> The natives tell a marvelous story respecting the origin of this destrict [sic], which they say floated in from the sea, and attached itself to the ancient shore of the island, that there was a subterranean communication between the sea and the ancient shore, by which a shark used to pass, and make depredations up on the land. The basis of the tract, which is from five to seven miles in length, and from one to two miles in breadth, appears to be of coral; and it was evidently redeemed from the sea, as a good deal of land, in many places along the shore around the whole circuit of the island, evidently has been (Chamberlain 1957:35-6).

McAllister (1933) relays a story about a secret underwater passage way marked by two stones off of Kahuku Point that led to another land referred to as Ulukaa or Kahuna Moku. The story is as follows:

> Two stones known as Kahoa in water about 250 ft. from the beach just opposite from Kalaehila heiau, Kahuku Point. Many years ago a woman who lived on this beach was frequently seen to swim to these stones and disappear. At times she would be gone for as much as a week. Sometimes she was seen to put her clothes in a watertight calabash and swim away. When she returned she usually wore a kou lei. It was finally discovered that this was the entrance to another land, known as Ulukaa or Kahuna Moku (as cited by Silva 1984:A-5).

The theme of an underground canal is echoed in Thrum's (1911) "Legend of the Tapa Log," which largely takes place in Punahoolapa Marsh, located in the Hanakaʻoe Ahupuaʻa to the west. Thrum's story is as follows:

> A kapa-beating log of peculiar sound, unlike any other known on the island, which was placed in its waters at the close of the kapa-making season to keep it smooth and free from cracks that would impart an impression to the cloth in its manufacture, was missed, and, believing it to have been stolen, search was made all through the Koolau, Waialua and other districts ʻtil at last it was found in use at Waipahu. Recognizing it by its resonant tone, it was claimed by the searching owner, and right thereto by those in possession was vigorously maintained. To test the truth of ownership as claimed, the ʻEwa people accompanied the claimant back to Kahuku to visit the scene and witness a test of the underground stream theory. A bundle of ti leaves were gathered, which was wrapped together and consigned to the waters of Punahoolapa. In the course of a few days they were lost to sight, whereupon the party set out for ʻEwa, and after careful watching, as predicted, the bundle of ti leaves came forth on the bosom of the waters of the Waipahu stream. The kapa log was thereupon recognized as the rightful property of the Kahuku claimant (Thrum 1911:130 as cited in Sterling and Summers 1978:149).

Associated with Kahuku's underground canal are several legends of man-eating sharks, where a shark once traversed to consume people (Chamberlain 1957:35-36). In Handy (1922:111), Manō-niho-kahi (shark with one tooth) is a man who had the power to shape-shift into a shark. This version of the tale presents him as normal looking, except for the shark mouth on his back

that he always covered with a cloak of *tapa*. When Manō-niho-kahi found out that people, specifically women, were going to the sea to fish or collect *limu*, he would rush out to where they were and bite them with his single shark tooth, killing them. When the killings became too regular, the chief of the region and his *kahuna* gathered all of his people and ordered them all to disrobe. When Manō-niho-kahi refused to take off his *tapa* cloak, he was stripped, revealing the shark mouth on his back. At once, he was put to death, ending the streak of deaths of women in those waters. Another, albeit less gruesome, tale about man-eating sharks associated with Kahuku is told by McAllister (1933), where a shark was caught and kept as a pet in Punamanō marsh. The story, as reiterated from an informant's testimony is as follows:

> One time when the people of Kahuku were fishing they caught a small shark. Putting him in a calabash of water they carried him to their houses near the beach. Here he was cared for and put in larger and larger calabashes as he grew bigger. Finally haven outgrown even the largest calabash that could be found, it was decided to place him in one of the pools of brackish water which came to be known as Punamanō. A man and woman living near the pool became guardians. They had lived in their grass huts with a breadfruit tree near the pool and taro and potato patches near the mountains for several years when the brother of the woman came to live with them. Sometime after, the man and his wife went to the mountains to gather taro and potatoes. The brother, who was staying at home, thought that he would like to have some food prepared when the sister and her husband returned. He climbed the breadfruit tree and gathered several, throwing the fruit into the water instead of on the ground, where it would have been bruised in the fall. After picking enough for a few days he descended the tree and gathered most of the fruits from the bank. Two had floated to the middle of the pond and he could not reach them. Now this man knew of the shark that lived in the pool, but he had frequently bathed in the pool and no thought of fear crossed his mind as he swam to the breadfruit. He did not know, however, that his sister and her husband had warned the shark not to allow anyone to steal breadfruit when they were gone. When the sister and her husband returned they could not find brother. Neither was the shark to be found, but they saw the breadfruit floating in the pool and the reddish color to the water. They guessed what had occurred. For nearly a mile they followed the bloody trail until they came to a spring known as Punahoolapa. Not only was the brother never seen, but the shark has never been seen to this day (as cited in Wong-Smith 1989:A-7).

In this case, it appears that the shark was simply looking out for its keeper's interests. Kuapuu (1861) wrote a very similar account of the Punamanō man-eating shark in the *Ka Hae Hawaii* newspaper (as cited in Sterling and Summers 1978:151).

Other supernatural beings and demigods associated with Kahuku are mentioned in Beckwith (1940). On a quest to find his brother, Lono-ka-ehu brought his "great dog" or the dog-man, Kū-ʻīlio-loa (Kū long dog), to Oʻahu from Kahiki. In the search, Kū-ʻīlio-loa "pierced the hill Kāne-hoa-lani at Kualoa, cleft Kahuku and Kahipa apart, and broke Ka-pali-hoʻokuʻi at Kailua" according to Beckwith (1940:321). She later describes Kū-ʻīlio-loa as "a dog with a human body and supernatural power, 'a great soldier and famous warrior,' who terrorizes Kahiki" (Beckwith 1940:321).

Kahuku is also a place where the manifestation of ancient *kapu* law had become a permanent part of the landscape in the form of two stone outcrops. According to Beckwith (1970:48), Kamakau mentioned the story of two stones in the cave of Ke-ana at Kahuku that are said to be the bodies of two boys who disobeyed their mother's injunction to keep silence during a thunderstorm. Kāne-hekili, the god of thunder, is associated with several gods whose names are also suggestive of the phenomenon experienced during thunderstorms, such as Kāne-wawahi-lani (Kāne breaking through heaven) and Ka-uila-nui-maka-kehaʻi-i-ka-lani (Lightning flashing in the heavens). The gods in their humpbacked forms can be seen flying through the air during storms with Na-kolo-i-lani, who are the humpbacked brothers of Pele. According to the ancient *kapu* laws, all containers should be turned bottom side up and people should lie face down without any outcry, for silence is the law of Kāne-hekili (Beckwith 1970:48).

Another well known *moʻolelo* is the Legend of Kamapuaʻa, a supernatural being and a deity attributed to agriculture, rain, and fertility (Elbert 1965:200-1; Maly and Maly 2003:9). While he had the ability to shape-shift into multiple bodily forms (*kino lau*), Kamapuaʻa was most noted for his pig-like appearance. In one of his many exploits, Kamapuaʻa was caught stealing chickens from Olopana, the head chief of Oʻahu at the time. To catch Kamapuaʻa, Olopana enlisted the residents of Kahuku, who capture him, bind him to a pole, and carry him towards Punaluʻu. Upon seeing this, his grandmother, Kamaunuaniho, recited a chant that gave him the power to kill the captors from Kahuku.

In *The Hawaiian Romance of Laieikawai,* the people of Waianae on Oʻahu offered their version of the story, which mentions the high chief who ruled Kahuku named, Kahoʻaliʻi. In this account, Kahoʻaliʻi instructs his son to, "Fly about Oʻahu while I chew the *ʻawa;* before I have emptied it into the cup return to me and rehearse to me all that you have seen" (Beckwith 1918:30). The tale goes on to list the places his son passed on his journey. Further, Kahuku is mentioned in the chant of Kualiʻi as one of the major landmarks of Oʻahu for those travelling to the island from Kauaʻi (Beckwith 1918:30).

In the tale, *Two Fish from Tahiti*, Westervelt (1915:142-144) recounts two great canoes filled with men from Tahiti, referred to as two "fish," journeyed to Oʻahu. The purpose of the journey was to "find the wonderful fire-land of Hawaii about which they had been taught in the stories of returned travelers…" and "…find an appropriate location for a settlement. Possibly they planned to make a permanent home or hoped to meet some good community into which they might be absorbed" (Westervelt 1915:140). Upon their arrival on the shores of Makapuʻu, the travelers found an "unfriendly coast" and decided to separate and circle the island, with one canoe going north and one going south. Westervelt continues:

> The boat which sailed toward the north found no good resting-place until it came to the fishing-village of Hauula…Evidently there, was dissension and at last a battle. The whole story is summed up by the Hawaiian legend in the saying: "The fish from Tahiti was caught by the fishermen of Hauula. They killed it and cut it up into pieces for food." Thus the visitors found death instead of friendship, and cannibalism was thereby veiled by calling the victims "fish" and the victory a "catch…"
>
> …The second fish from Tahiti had gone on southward in its journey around the island of Oahu. It passed the rough and desolate craters of Koko Head on the

eastern end of the island. It swam by Diamond Head and the beautiful Waikiki Beach. Either the number of the inhabitants was so large that they were afraid to make any stay or else they preferred to make the complete circuit of the island before locating, for they evidently made only a very short stay wherever they landed, and then hurried on their journey. By the time they reached Kaena, the northwestern cape of Oahu, they were evidently anxious concerning their missing companions. Not a boat on the miles of water between Kaena and Kahuku, the most northerly point on the island. The legend says that the fish changed itself into a man and went inland to search the coast for its friend, but the search was unsuccessful. It was now a weary journey from point to point, watching the sea and exploring all the spots on the beach where it seemed as if there was any prospect of finding a trace of their expected friends. Where a break in the coral reef permitted their boat to approach the land they forced their way to shore. Then when the thorough search failed again, the boat was pushed out over the line of white in rolling breakers to the great sea until at last the Tahitians came to Kahuku.

Now they appeared no longer as "fish," but went to the village at Kahuku as men. They made themselves at home among the people and were invited to a great feast. They heard the story of a battle with a great fish at Hauula and the capture of the monster. They heard how it had been cut up and its fragments widely distributed among the villages on the northwest coast. Evidently provision had been made for several great feasts. The people of Kahuku, although several miles distant from Hauula, had received their portion. The friendly strangers must share this great gift with them. But the men from Tahiti with heavy hearts recognized the fragments as a part of their companion. They could not partake of the feast, but by kindliness and strategy they managed not only to decline the invitation, but also to secure some portions of the flesh to carry down to the sea. These were thrown into the water, and immediately came to life. They had the color of blood as a reminder of the death from which they had been reclaimed. Ever after they bore the name "Hilu-ula," or "the red Hilu."

Then the "fish" from Tahiti went on around to Hauula. They went up to the tabu land back of Hauula. They pulled up the tabu flags. Then they dammed up the waters of the valley above the village until there was sufficient for a mighty flood. The storms from the heavy clouds drove the people into their homes. Then the Tahitians opened the flood-gates of their mountain reservoir and let the irresistible waters down upon the village. The houses and their inhabitants were swept into the sea and destroyed. Thus vengeance came upon the cannibals.

The Tahitians were "fish," therefore they went back into the ocean to swim around the islands. Sometimes they came near enough to the haunts of fishermen to be taken for food. They bear the name "hilu." But there are two varieties. The red hilu is cooked and eaten, but never eaten without having felt the power of fire. The trace of the cannibal feast is always over its flesh. Therefore it has to be removed by purification of the flames over which it is prepared for food. The blue hilu, the natives say, is salted and eaten uncooked. Thus the legend says the two fish came from Tahiti, and thus they became the origin of some of the beautiful fish whose colors flash like the rainbow through the clear waters of Hawaii (ibid.:142-144).

This account calls attention to the political control of resources, *kapu* systems, variations in conduct with outsiders as well as warfare and cannibalism in pre-European contact Kahuku and Hauʻula.

Keana Ahupuaʻa

Few traditional legends mention Keana Ahupuaʻa specifically. One of which is the section of the Pele and Hiʻiaka legend, where Hiʻiaka passes through Lāʻie, Mālaekahana, and Keana to make her way to Kahuku (Emerson 1915:233). However, there are a number of traditional sites associated with legendary stories in the *ahupuaʻa.*

For example, two large stones in the Keana Cave or Rock Shelter (Site No. -270) are said to be the remains of two boys who failed to follow their mother's orders to stay silence during a thunderstorm, which was the *kapu* (law) of the god of thunder, Kane-hekili (Beckwith 1940:48). According to Beckwith (1940:48), "During such a storm all containers should be turned bottom side up; all persons should lie face down-ward and make no outcry." Emerson's (1915) rendition of this tale is as follows:

> In Kahuku, island of Oahu, at a place not far from the sugar-mill, is a cave, known as Keana. In former times this cave was the home where lived a mother and her two sons. One day, having occasion to journey to a distance, she left them with this injunction, "If during my absence you hear the sound of thunder, keep still, make no disturbance, don't utter a word. If you do it will be your death." During her absence, there sprang up a violent storm of thunder and lightning, and the young lads made an outcry of alarm. Thereupon a thunderbolt struck them dead, turning their bodies into stone. Two pillar-shaped stones standing at the mouth of the cave are to this day pointed out in confirmation of the truth of the legend (Emerson 1915:233).

Additionally, Pōlou (Site No. -271), which was described by McAllister (1933) as once being, "a pool of water, sea side of the Kahuku mill," was located in Keana Ahupuaʻa. This was said by some *kūpuna* to be the place where the "floating island" of Kahuku attached to the Island of Oʻahu. It was also said to be the location of a "stone" known as Kanaloa (ibid).

Mālaekahana Ahupuaʻa

Several legendary stories reference Mālaekahana as a locality, and the name itself is shared with a great heroine of ancient myth and the mother of Lāʻie-i-ka-wai and her twin sister, Lāʻielohelohe. In the story of Lāʻie-i-ka-wai, Beckwith (1940:526-527) describes the nature of the twin's birth, betrothals, and trials in finding the right suitor:

> Laie-i-ka-wai and her twin sister Laie-lohelohe are born at Laie on Oahu of Kahauokapaka the father, chief of the northern lands of the island, and Malaekahana the mother. Since the father has vowed to let no daughter born to his wife live until she bears him a son, the mother conceals the birth of the twins and gives them to her own relatives to rear, Laie-lohelohe to Ka-puka-i-haoa to bring up at the heiau at Ku-kani-loko, and Laie-i-ka-wai to Waka, who first hides her in a cave near Laie which can be reached only by diving into the pool which conceals the entrance, and then takes her to the uplands of Puna. Here she builds a tapu house for her ward thatched with bird feathers, and gives her birds to

wait upon her and mists to hide her from the sight of men until such time as a suitable lover shall appear to make her his wife.

The first whose suit seems acceptable is Kauakahi-aliʻi, ruling chief of Kauai and husband of Ka-ili-o-ka-lau-o-ke-koa (Skin like the leaf of the koa). The reappearance of his wife whom he had mourned for dead prevents the appointed meeting, but on his return to Kauai he relates the adventure and the young chiefs of that island are stirred by the story. Aiwohikupua meets her nightly in dream and goes to woo her, but even the presence of his four sweet-scented kupua sisters, named after the four varieties of maile vine whose scent they inherit, cannot shake her refusal. Enraged by the insult, he abandons the sisters in the forest. His fifth and favorite sister, Ka-hala-o-mapuana (The fragrant hala blossom) refuses to abandon them. Through her clever management she attracts the attention of Laie-i-ka-wai and the five are adopted as sisters and made the guardians of Paliuli. They drive off their brother upon his second attempt to win the chiefess, and a guardian moʻo named Kiha-nui-lulu-moku (Great moʻo shaking the island) completes his discomfiture. Another and more favored young chief from Kauai named Hauailike is also expelled by the watchful youngest sister.

Waka now arranges a match with Ke-kalukalu-o-ke-wa, younger brother of Ka-ili-o-ka-lau-o-ke-koa and successor with her to Kauakahi as ruling chief of Kauai. Just as the formal marriage (hoao) is about to be consummated, a young rascal from Puna named Hala-aniani, aided by his sorceress sister, carries her off on his surfboard in place of the legitimate lover. Waka finds them sleeping together and abandons the girl in a rage, stripping her of mist and bird guardians and of the house thatched with feathers whose protection her loose conduct has forfeited. The five sisters and the great moʻo, however, refuse to abandon their mistress. Since the Kauai chief has made her twin sister Laie-lohelohe his wife in place of their disgraced mistress, they determine to retrieve her fortunes by providing a more splendid match, and the clever youngest sister is despatched, with the great moʻo as carrier, to fetch their oldest brother who lives as a god in a tapu house in the very center of the sun in the highest heavens. While she is away on this errand the group leave Paliuli and travel about the island and, meeting an old family guardian and seer named Hulu-maniani, make their home with him as adopted daughters at Honopuwai-akua on Kauai. Throughout the course of the story this old seer (kaula) has been following around the islands after the rainbow sign which hovers over the place where Laie-i-ka-wai is hidden, determined to make this new divinity his chief and thus provide for his own old age.

Ka-onohi-o-ka-la (Eyeball of the sun) looks favorably upon his sister's proposal and, putting off his nature as a god, he descends to earth, strips the enemies of Laie-i-ka-wai of their lands and power and, leaving Ke-kalukalu-o-ke-wa and the twin sister rulers over Kauai, gives to each of the sisters rule over one of the other islands of the group and takes Laie-i-ka-wai up on a rainbow to live with him in Ka-hakaekaea. All goes well until, on one of his visits to earth to see that all goes well there, he notices the budding beauty of his sister-in-law. He presses his attentions and succeeds in securing her. His wife in the heavens wonders what important affairs keep him so long on earth. In the temple at Kahakaekaea stands the gourd Lau-ka-palili which reveals to one who looks within what is going on below. Laie-ika-wai discovers her husband's infidelity and reports him to his

> parents, who live with her in the heavens. They banish him to become a wandering spirit, the first lapu (ghost) in Hawaii. Laie-i-ka-wai returns to earth and lives like a god with her sister. Today she is worshiped as Ka-wahine-o-ka-liula (Lady of the twilight, mist, or mirage) (Beckwith 1940: 526-527).

Another fable that takes place in primarily in Mālaekahana Ahupuaʻa area is that of "Manuwahi: A Legend of Oahu" in *Hawaiian Legends* (Rice 1923), which is told as follows:

> At Laie lived Manuwahi, Free Gift, with his son, Ka haku loa, The-Lord-of-a-Long-Land; his grandson, Kaiawa, Bitter Sea, and his great-grandson Kauhale-kua The-Village-on-the-Ridge. These men were the keepers of the akua at Laie.
>
> Manuwahi and his children were hairless and were possessed of supernatural powers.
>
> Manuwahi planted black and white area far up in the mountains for the use of the akua. Every awa root planted was given one of these names, Kaluaka, The-Hole-That-Gives-a-Shadow; Kumumu, Blunt-Edged; Kahiwa, Best-Awa, or Kumilipo, The-Root-of-Unconsciousness. This was done so [that] Manuwahi, when sending one of his sons for a piece of awa could designate the exact one he wished.
>
> When the awa a was given to him, Manuwahi would prepare it, and then summon the akua from the North, South, East, and West, as well as from above and below, to drink of it. They prayed in this wise, before they drank:
>
> > Gods of the Morning,
> > Gods of the Night,
> > Look at your progeny:
> > Grant them health,
> > Grant them long life;
> > Amama ua noa - it is free!
>
> It happened that during this time Kamehameha I had come to conquer Oahu. He had succeeded in subduing all the island except Malae-kahana, between Laie and Kahuku. Determined to add this place to his conquests, the king sent one of his body guard, Ka-hala-iu, In-the-Shadow-of-the-Hala-Tree, with many of his bravest soldiers to subdue Malae-kahana.
>
> Ka-hala-iu marched as far as Hanapepe the first day, where he spent the night. Early the next morning he set out and meeting Manuwahi, whom he did not recognize, asked him where the powerful kahuna of Malae kahana lived.
>
> Manuwahi answered, "Pass over the river and you will see a spring and nearby a hut with trees about it. This is his home."
>
> Ka-hala-iu did as he was told and had soon surrounded the hut with his soldiers. When Manuwahi's son came out Ka-hala-iu asked him, "Where is your father?"
>
> "Did you meet a bald headed man?" asked the boy in turn.
>
> "Yes," replied Ka-hala-iu.
>
> "Well, that was my father. Why did you come here?"

"I came to kill your father by the orders of King Kamehameha," answered the King's man. Deciding it would profit them nothing to kill the son, the soldiers departed for Hanapepe by the makai side of the hill, and failed to meet Manuwahi, who had returned to his home by the mauka side.

The next morning the King's body-guard again surrounded with his soldiers the home of the kahuna. Manuwahi came out and asked, "What are you here for? Did you come for battle?"

"Yes," answered the fearless soldier, "We came to kill you."

Whereupon Manuwahi called to his assistance all the akua from the North, South, East and West as well as those from above and below. They came at once and gave battle to the soldiers of the king. The akua fought by biting and scratching their assailants and before long they had killed all but Ka-hala-iu.

Ka-hala-iu cried out, "Spare my life, kahuna of the gods, and I will stay with you."

"What can you do if you stay with me?" asked Manuwahi.

"I will plant awa for you. I came from Hawaii, where I lived by planting awa," answered Ka-hala-iu.

But Manuwahi said, "I do not need you. Go back and tell your king that even his bravest soldiers were not able to conquer Malae-kahana. Tell him that all but you were killed by the akua there."

When Kamehameha had heard these words he sent Ka-hala-iu back with another body of soldiers with orders that he must conquer Malae-kahana.

In the meantime, Manuwahi had moved with his sons up to the cave of Kaukana-leau, where the natives made their stone adzes. There the King's soldiers met them. As before, Manuwahi called all the akua to his aid. Again the soldiers were quickly put to death and only Ka-hala-iu was left. So Malae-kahana was not conquered.

Ka-hala-iu respected and admired Manuwahi so much that he was very anxious to remain with him, and so he asked again to be allowed to remain as an awa grower. Manuwahi consented this time and gave him one side of the valley to cultivate in awa.

One day as Ka-hala-iu was preparing the side hill for its cultivation. He noticed that on the opposite side of the valley, trees and bushes were falling in every direction, as if a whirlwind were uprooting them. This frightened him very much, as he could not understand the phenomenon, so he ran in great haste to Manuwahi, and asked what it meant. Manuwahi told him that his akua were helping in the clearing of the side hill, and that if he wished them to help him they would gladly do so. Ka-hala-iu was only too happy to have help so he called upon the akua, and in a short time both sides of the valley were cleared, and were growing luxuriantly with the most beautiful awa.

After the battle, between Ka-hala-iu and the akua for the possession of Malae-kahana, Manu-ka, Frightener-of-Birds, one of Manuwahi's sons, moved to Kaneohe, where he died some time later. He was buried makai of the present

> road. The natives dug a very large grave but before they could cover the body the akua brought red dirt from Ewa, in a cloud, which filled the grave, and made a red hill above it, which can be seen to this day. There is no other red dirt in that district (Rice 1923:113-115).

In Fornander's (1920) "Legend of Halemano," the hero, Halemano, passed through the area, mentioning Kahuku and Mālaekahana. In this story, Halemano's companion, Kumukahi, arrived at Hauula after they fled Hawai'i and so admired an upright image, named Mālaekahana, that he decided to stay in the area while the rest of his party continued on (Fornander 1920:236). It is possible that the statue was created in the likeness of its heroine namesake. The site of this statue may have been McAllister's Site No. -273, which is described as the *kauhale*, or house, foundation that once belonged to the *kahuna* (priest/sorcerer), Manuwahi, who was the keeper of the god of Mālaekahana (Sterling and Summers 1978:154). This site was located just within southern boundary of Mālaekahana Ahupua'a, near the present day entrance to the Mālaekahana State Recreation Area, which is approximately 1.5 kilometers southeast of the project area.

Mālaekahana is also associated with one of the many legends of shark gods. In this tale, Manō-niho-kahi (Shark with one tooth), resides near a spring in Mālaekahana located somewhere between Lā'ie and Kahuku, perhaps Wai'āpuka (Site No. -275). When Manō-niho-kahi spies a woman going to gather fish or *limu* (seaweed) from the ocean, he tells her to be wary of sharks, before attacking and killing her himself (Beckwith 1940:142). Subsequently, the chief detected Manō-niho-kahi out of a line-up of villagers when his tapa cloak is removed, revealing the mark of the shark's mouth on his back.

Wai'āpuka (Site No. -275), located in the *kula* of Mālaekahana, is noted in 1888 by King David Kalākaua in his book, *The Legends and Myths of Hawaii,* as a significant feature of Mālaekahana's landscape as well as an important locale in "The Story of Laieikawai." He iterates the acts of Waka, Laieikawai's grandmother, who provided the infant Laieikawai sanctuary from her father's wrath for not being born male, as follows:

> In his absence she was delivered of twin girls, who were named Laieikawai and Laielohelohe. They were surpassingly beautiful children, and, desirous of saving their lives, the mother consigned the first-named to the care of Waka, the child's grandmother, and the other to Kapukaihaoa, a priest of discretion and sanctity.
>
> On the return of the husband he was told that the expected child came into the world without life. He knew that a birth in his house had occurred during his absence, for he had heard two distinct claps of thunder.
>
> Waka took her foster-child to the cavern which opens into the pond of Waiapuka, and which can be entered only by diving. Laielohelohe was taken by her priestly protector to the sacred enclosure of Kukaniloko, on the western side of the island, and there tenderly cared for.
>
> The moment Waka entered the cavern of Waiapuka with Laieikawai a rainbow appeared over the place, and was constantly visible so long as the child remained there. Even when the sun was obscured by clouds the rainbow could be seen.

> At length the rainbow was observed by the great prophet Hulumaniani on the distant island of Kauai. For twenty days in succession he saw it, and knew its significance. He secured a canoe and fifteen men from Poloula, the chief of Wailua, provided himself with a black pig, white fowl and red fish for sacrifice, and, when the star Sirius rose, set sail for Oahu.
>
> Reaching that island he landed at Waianae, and, guided by the rainbow, in due time arrived at the pool of Waiapuka.
>
> Waka had just dived into the cave, and he noticed ripples on the water. During the day Waka started to leave the cavern, but caught a glimpse of the prophet sitting on the bank, and quickly returned, again ruffling the water.
>
> The prophet remained by the pool all night, and in the morning saw a rainbow over Kukaniloko. Traveling in that direction, he ascended Mount Kaala, when he saw the rainbow over the island of Molokai. Finding a canoe bound thither, he took passage and landed at Haleolono, near the western shore.
>
> In a dream Waka had been directed by Kapukaihaoa to remove Laieikawai to some securer place, and had accordingly taken her to Malelewaa, a secluded spot on the north side of Molokai (Kalākaua 1990:457-458).

Another mythical tale attributed to Mālaekahana Ahupuaʻa concerns Laniloa, which the name given to a point of land that extends *makai* from Lāʻie. According to Rice (1923) this legend, referred to as *Laniloa, The Moʻo*, this point was said to have been a *moʻo*, or a standing lizard in this case. Rice (1923) holds that this *moʻo* was ready at any time to kill passersby. In Rice's version of the legend, he states:

> After Kana and his brother had rescued their mother from Molokai and had taken her back to Hawaii, Kana set out on a journey around the islands to kill all the mo-o. In due time he reached Laie, where the mo-o was killing many people. Kana had no difficulty in destroying this monster. Taking its head, he cut it into five pieces and threw them into the sea, where they can be seen today as the five small islands lying off Malae-kahana: Malualai, Keauakaluapaaa, Pulemoku, Mokuaaniwa and Kihewamoku.
>
> At the spot where Kana severed the head of the mo-o is a deep hole which even to this day has never been fathomed (Rice 1923:112).

One might speculate that this "deep hole" is the legendary site, Waiʻāpuka (Site No. -275).

3.2 EUROPEAN CONTACT

At European Contact and shortly thereafter, the general Kahuku area was commented on by several maritime officials, with observations that point to a drastic change in land use from initial contact in the mid-1780s to the mid-1830s.

Approximately two weeks after the death of British Captain James Cook, Charles Clerke took over the helm of the H.M.S. Resolution. As the ship rounded the northern point of Oʻahu,

Captain Clerke provided the first post-Contact account of the Kahuku area. Clerke wrote on February 28, 1779:

> SUNDAY 28th. . . Winds Eterly [Easterly]. fresh breezes with open Cloudy Weather. Run round the Noern [Northern] Extreme of the Isle which terminates in a low Point rather projecting; off it lay a ledge of rocks extending a full Mile into the Sea, many of them above the surface of the Water; the Country in this neighborhood is exceedingly fine and fertile; here is a large Village, in the midst of it is run up a high Pyramid doubtlessly part of a Morai. I stood into a Bay just to the Westward of this point the Eastern Shore of which was far the most beautifull [sic] Country we have yet seen among these Isles, here was a fine expanse of Low Land bounteously cloath'd with Verdure, on which were situated many large Villages and extensive plantations; at the Water side it terminated in a fine sloping, sandy Beach. . . (Beaglehole 1967:I:572 in Silva 1984:C-10).

This description paints a pleasant picture of the Kahuku area, with a thriving community and large ceremonial structures. At about the same period, H.M.S. Resolution Lieutenant, James King, described this northern tip of Oʻahu, writing:

> WOAʻHOO. . . We saw this Island the beginning of last year, but only just as a high lump, We this Time sailed along its NE & NW sides but say nothing of its Soern [Southern] part. What we did see of this Island was by far the most beautiful country of any in the Groupe; particularly the Neck that Stretches to the No ward [Northward] and its NW side. Nothing could exceed the verdure of the hills, nor the Variety which the face of the Country displayʻd. It /s north-eastern/ parts were cliffy, & rugg'd to the Sea side, but the Valley look'd exceedingly pleasant, near the
>
> N point we were charmed with the narrow border full of Villages, & and Moderate hills that rose behind them (Beaglehole 1967:I:610 in Silva 1984:C-10-11).

This is yet another testimony to the beauty and lushness North Shore during the early Contact period. In contrast, Captain George Vancouver visited the northern tip of Oʻahu later in 1794, discovering that the Kahuku coast had significantly changed in terms of cultivation and population, writing:

> …In every other respect our examination confirmed the remark of Capt. King excepting that in point of cultivation or fertility, the country did not appear in so flourishing a state, nor to be so numerously inhabited, as he represented it to have been at that time, occasioned most probably by the constant hostilities that had existed since that period (Vancouver 1798, Vol.3:71).

Wong-Smith (1989) suggests that regular hostilities and the scourge of Western diseases caused the severe decline of the Hawaiian population in Kahuku. It was likely Captain Cook's 1778 expedition that brought venereal disease to Hawaiʻi and spread rapidly between the initial and secondary contact events (Kuykendall 1938; Beaglehole 1967; Lind 1968; Schmitt 1968, 1971). By the time the first missionaries conducted a census of the islands in the early 1820s, they estimated that the entire population had been reduced by nearly a third (Schmitt 1968:10 in

Wong-Smith 1989:A-10). This population crash created a wasteland out of the once verdant fields and lively villages of Kahuku.

3.3 HISTORIC ERA

The focus of this section will remain on events that greatly shaped the modern character of Kahuku, Keana, and Mālaekahana Ahupuaʻa as well as any occurrences that help paint a picture of what Hawaiian cultural practices were like during this period.

3.3.1 Western Observations

Many accounts of the Kahuku, Keana, and Mālaekahana area's early historic era were provided by missionaries. According to missionary censuses from the 1830s the area suffered severe population decline during this time (Schmitt 1968). Koʻolau Loa's population in 1831 was 2,891 with 452 living in Lāʻie. Wong-Smith (1989:A-10) notes that "a population loss of 210 for the entire district occurred between 1831 and 1835." This population decline affected the extent of traditional agriculture in the area. In the early 1830s, E.O. Hall, of the American Board of Missions, stated in regards to Koʻolau Loa, "Much taro land now lies waste, because the diminished population of the district does not require its cultivation" (as cited in McAllister 1933: 153). The greatest factor in the tragic population decline during this period was the introduction of Western diseases, followed by warfare (Kuykendal 1938; Nakamura 1981; Wong-Smith 1989).

The Superintendent of Secular Affaires for the Mission in Hawaiʻi, Levi Chamberlain, gave an 1828 account of Mālaekahana during his second circuit of Oʻahu, where he evaluated the effectiveness of the island's education system, provides insight on the fecundity of lands in this area. Chamberlain states:

> Tuesday Feb. 5th. After breakfast I examined two schools, belonging to Laie & Malaekahana, and was pleased with the appearance of the scholars. At a quarter before 11 A.M. we set out for Kahuku, and after travelling about two hours over a level sandy country, arrived at the school house, where we found 83 scholars assembled, waiting to be examined … A good hog had been cooked for us & when the examination closed, dinner was waiting … my attendants made a heartly meal; and the remainder of the food was placed in the calabashes of our natives, and carried along to furnish food for us when we should be again in need (Chaimberlain 1957:35-6).

Another account of Koʻolau Loa and the project area vicinity from the late 1800s was provided by John Effinger, in an article titled, "A Tramp Around Oahu," for *Paradise of the Pacific* magazine, where he states:

> The sun had scarcely got its eyes open when I had pushed on several miles further along the grassy plain and shore through Kualoa ranch, past the ruins of the old Wilder mill, looking like an antiquated English castle, and past the Punaluu rice patches. The chimney of Kahuku mill was my guiding star this morning, and the miles seem to fly along so green is the verdure around us and so fresh the strong salt air. Sentinel cliffs, sheltering pleasant valleys where are

> many of the summer residences of Honolulu's "400" shoot into the sky on the left. Chief Justice Judd Hon. P.C. Jones, and Cecil Brown, Esq. have country places along here, and when the Oahu Railway is completed, there will be an exodus from Honolulu every Saturday afternoon for a Sunday's vacation to this favored spot. The air is cool and bracing. Mosquitoes are hardly a nuisance. From Kualoa to Laie is the prettiest, healthiest part of the island of Oahu. About noon I reached Laie, a Mormon settlement, with a small cane plantation and mill. The plantation railway runs down into Laie from Kahuku plantation and all the cane is ground at the big Kahuku mill. Laie Point shoots out into the blue ocean here and the surf banging up against it throws spray high in the air. It was a few hours after noon when Kahuku mill was reached, and I took a few moments rest before pushing out for Waialua. The Kahuku stock ranch takes up all the land of this district not occupied by cane (Effinger 1895:88).

One account, which was recorded by King Kalākaua in the late 1800s, provides a very detailed description of a significant landmark of Mālaekahana, Waiʻāpuka (Site No. -275). He reiterated the experiences of a group of travelers touring the area in 1885, as follows:

> Entering the district of Koolouloa, and approaching the coast over a broad stretch of grassy meadow but slightly above the level of the ocean, our party was suddenly brought to a halt beside a pool of clear water, nearly round, and perhaps a hundred feet in diameter. The surface of the pool was ten or twelve feet below the level of the surrounding plain, and its even banks of solid rock dropped almost perpendicularly into water of unknown depth. The volume of the pool is affected neither by rain nor drought, and the native belief is that it is fed by springs at the bottom, and has a subterranean drainage to the ocean, some two or three miles distant.
>
> This, we learned, was the celebrated pond of Waiapuka, around which so many strange legends have been woven. All of them speak of a cavern somewhere beyond the walls of the pool, and to be reached only by diving into the water and finding the narrow passage leading up into it.
>
> While listening to fragments of the story of Laieikawai and of other legends connected with the mysterious cavern, and seriously doubting the existence of the secret chamber so prominently referred to in early folk-lore of Oahu, an old native, who had joined the party at Kaneohe, quietly and without a word, dismounted, divested himself of his upper garments and plunged into the pool. Swimming to the northern wall, he clung for a moment to a slight projection, and then disappeared. It was suggested for the first time that he was in search of the cavern of Laieikawai, and all eyes were turned toward the point where he was last seen above the water.
>
> Three or four minutes elapsed, and fears for his safety began to be exchanged, when the salutation of "*aloha*!" greeted us from the opposite wall, and the next moment a pair of black eyes were seen glistening through a small opening into the cavern, not before observed, about four feet above the surface of the water.
>
> The swimmer then returned to the pool by the passage through which he had left it, and we were compelled to admit that the cavern of Laieikawai was a reality, however wild and visionary may have been the stories connected with it. Not a single person present, including the governor, had ever before seen the passage

> to the cavern attempted, and the natives were overjoyed at what they had witnessed.
>
> To the many questions with which he was asked the old man returned but brief answers on his return, and when importuned to explain the method of his entrance to the cavern, that the secret might not be lost, he pointed significantly to the sea, and declared that there would be found thee bodies of those who sought to solve the mystery of the passage and failed (Kalākaua 1990:455-456).

This description suggests that Waiʻāpuka was not only massive, being approximately 100-feet in diameter, but also a classic sinkhole in an area known to be *karstic*, which is a geological term for limestone terrain that has been subjected to complex acidic weathering. Typically, *karstic* topography is prone to exhibiting a variety of subterranean and surficial features, including caves, tunnels, caverns, underground rivers and bodies of water, as well as sinkholes and cenotes. Unfortunately, by the time of McAllister's (1933) island-wide survey, the site of this culturally and topographically significant feature was destroyed by being filled with sediment. Whether man or natural forces are responsible for this act has not been ascertained.

Just after the turn-of-the-Century, Andrew Adams of the Territory's Forestry Division, reported on the agricultural and horticultural developments of Koʻolau Loa, stating:

> Mr. Andrew Adams, District Forester for the Koolauloa District, desired that no formal report for him be published but in correspondence he stated that "The Plantation is constantly planting Ironwood trees, which are thriving, but no systematic effort has been made toward forest planting, in fact the little planting that has been done could scarcely be dignified by the term 'forestation.' There are no forest nurseries, except several boxes on the premises of the head luna and my own where Iron wood trees are started from seeds.
>
> The native forest in the mountains is in good condition, and the Koa, of which there is a good belt between Malaekahana and Kaipapau valleys, is vigorous and thriving. The insect usually preying upon the Koa is not so much in evidence in this forest, it appears to me, as formerly, and there are many young Koas springing up; some of this is sizeable timber, but I doubt if it could ever be lumbered without great destruction to the surrounding forest, and especially the undergrowth, because of the almost inaccessible ridges on which the Koa stands (Adams 1905:90-91).

3.3.2 Cultural Practices

Although the spread of Western ideals and lifestyles was rampant at this time, there are several instances of Hawaiian traditional practices taking place in Kahuku. *Hula* and *mele* performances held in Kahuku in 1844 and 1849 were described by Emerson (1998). The first performance, a *hula*, called the Hula O-Niu, which took place in 1844 was described by Emerson (1998) as such:

> The so-called hula *o-niu* is not to be classed with the regular dances of the halau. It was rather a popular sport, in which men and women capered about in an informal dance while the players engaged in a competitive game of top-spinning. The instrument of sport was made from the lower pointed half of an oval coconut shell, or from the corresponding part of a small gourd. The sport was

> conducted in the presence of a mixed gathering of people amid the enthusiasm and boisterous effervescence which betting always greatly stimulated in Hawaii.
>
> The players were divided into two sides of equal number, and each player had before him a plank, slightly hollowed in the center—like the board on which the Hawaiians pounded their poi—to be used as the bed for spinning his top. The naked hand, unaided by whip or string, was used to impart to the rude top a spinning motion and at the same time the necessary projectile force—a balancing of forces that called for nice adjustment, lest the whirling thing reel too far to one side or run wild and fly its smooth bed. Victory was declared and the wager given to the player whose top spun the longest.
>
> The feature that most interests us is the singing, or cantillation, of the oli. In a dance and game of this sort, which the author's informant witnessed at Kahuku, Oahu, in 1844, one contestant on each side, in turn, cantillated an oli during the performance of the game and the dance (Emerson 1998:248).

The later performance, a *mele* about Kāne, recorded by Emerson (1998) took place in 1849 and was viewed by King Kamehameha III's during his circuit around the island of Oʻahu. Emerson (1998) wrote:

> The author has already hinted at the form and character of the entertainments with which hula-folk sometimes beguiled their professional interludes. Fortunately the author is able to illustrate by means of song the very form of entertainment they provided for themselves on such an occasion. The following mele, cantillated with an accompaniment of expressive gesture, is one that was actually given at an awa-drinking bout indulged in by hula-folk. The author has an account of its recital at Kahuku, island of Oahu, so late as the year 1849, during a circuit of that island made by King Kamehameha III. This mele is reckoned as belonging to the ordinary repertory of the hula; but to which particular form of the dance it was devoted has not been learned…(Emerson 1998:129-130).

The fact that this performance was part of King Kamehameha III's circuit and recorded with such detail and contemplation by Emerson (1998), suggests that this unnamed *hula hālau* was no ordinary one. It is possible that this Kahuku *hālau* has a long, but unrecorded history.

In terms of traditional agricultural practices, Handy (1940; as cited by Barrera 1981) maintains that Kahuku had a few areas that traditional Hawaiian farming methods may have taken place. He states the following about agriculture in Kahuku Ahupuaʻa:

> Inland from the Kahuku ranch house is Kaainapele Spring. Terrace symbols are shown south of the ranch house (U.S.G.S. topographic map, 1917), but Judge Rathburn says that these flats were built by Chinese before 1890 for rice paddies. They were irrigated with artesian water, but the water turned brackish and the paddies were abandoned. They were never used for taro. The 1917 map shows extensive terrace areas in the swampland seaward of the Oahu Railway, stretching 15 miles south of Kukio Pond. These were originally terraces, were later planted to rice, and are now under sugar cane. According to John Kaleo, there is a small group of terraces, south of this swampland, named Kaukana. North of Kukio Pond was also a small area. It is reported that there were no

> terraces up Kahuku Stream or Kaohiaae, its upland branch. Kaleo names 11 localities where terraces were formerly cultivated (as cited in Barrera 1981:13-14).

However, Handy and Handy (1991 [1972]) stated that there were no terraces in Keana's stream or on the lowland plains. They also hold that, Kaleo, their informant for the area, knew of agricultural terraces in Kaukanalaau Stream.

3.3.3 Land Court Awards

Private land ownership was established in Hawai'i with the Māhele 'Āina, also known as the Great Māhele of 1848. Crown and *ali'i* lands were awarded in 1848 and *kuleana* titles were awarded to the general populace in 1850 (Chinen 1958). Awarded lands in this process are referred to as Land Commission Awards (LCAs). Over time, government lands were sold off to pay government expenses. The purchasers of these lands were awarded Grants or Royal Patent Grants (Chinen 1958). LCAs offer the native and foreign testimonies recorded during the claiming process, which shed light on what the land use of the area was in the early historic period. This information can be used to predict the types of resources may still be present in the project area.

There are no LCAs within the Nā Pua Makani Project APE. For the purposes of gaining as much early historic information on land use in the area, the LCA information presented in this section are a sample of LCAs located outside of the project area, some as far away as 2 kilometer from the boundaries of the APE.

Numerous LCAs were identified within an approximate 2 kilometer radius around the Nā Pua Makani Project APE. A partial list of these properties by *ahupua'a* is provided in Table 1. Figure 4 and Figure 5 show the project area on TMK maps. The LCAs are described in Native Register (NR) comments and Foreign Testimonies (FT) submitted during the Māhele 'Āina and provide a narrative on traditional use of land within each *ahupua'a*. A few of these testimonies are presented below.

<u>LCA Awards in Kahuku Ahupua'a</u>

While King Kamehameha III, under the name of Victoria Kamāmalu, retained the entire *ahupua'a* of Kahuku as part of Crown Lands, the land rights of its tenants amounted to 4,752 acres (Indices 1929:27-8 as cited by Wong-Smith 1989:A-11). According to Rechtman (2009:15), "…eighty-five claims for Land Commission Award (LCAw.) parcels were made within the *ahupua'a* of Kahuku, but only 72 *kuleana* lots were awarded to native tenants. Nearly all of awards were located makai of the present day highway…." The following are claims for lands either within or partially within Kahuku Ahupua'a. These claims provide a narrative on traditional use of *kula* and *wao* lands.

> <u>No. 2887: Keawe (claimant), Kahuku, Oahu</u>
> <u>January 5, 1848</u>
>
> > To the Land Commissioners, Respectful Greetings: I, Keawe, hereby state my claim for land at Kahuku. The name of the *mo'o* is Luahime. There are three *lo'i*, bounded on the north by Kawaa's [land] on the east by Kaluau's [land], on the

Table 1. Land Court Awards (LCA) in the Vicinity of the Nā Pua Makani Wind Project Area

LCA	Ahupuaʻa	Claimant	Testimony	Book	TMK Map
2691:1 & 2	Kahuku	Laumea	8 *loʻi*, 2 watercourses (*ʻauwai*?), *kula* lands and shore area, *wauke* gardens, banana plantation (a mountain land), 3 *koa* trees, 2 *hala* trees, 1 *kukui* tree, houselot	NR v. 3, 592 FT v. 10, 169	5-6-004
2702:1	Kahuku	Waiaulaa	*Kula* lands planted with melons, spring, houselot with wooden fence	NR v.3, 598 FT v.10, 188	5-6-002
2723:3	Kahuku	Puu	6 *loʻi*, *kula* land, houselot	NR v. 3, 607 FT v. 10, 166	5-6-002
2872:1 & 2	Kahuku	Kaihikapu	18 *loʻi kalo*, *kula* lands, salt land, shore land, mountain land, *mala* of *wauke*, *mala* of sweet potato, houselot	NR v. 3, 672 FT v. 10, 154	5-6-004
2887:1 & 2	Kahuku	Keawe	3 *loʻi*, *kula* land, a *mala* of *ʻawa*, houselot	NR v. 3, 678 FT v. 10, 171	5-6-002 5-6-004
2916:1 & 2	Kahuku	Kaluau	5 *loʻi kalo*, watercourse (*ʻauwai*?), *mala* of *wauke*, *mala* of *ʻolena*, a *kuahiwi*, *kula* lands, houselot	NR v. 3, 692 FT v. 10, 168	5-6-004
2918:1 & 2	Kahuku	Kawaa	1 *loʻi*, houselot	NR v. 3, 692 FT v.10, 182	5-6-002 5-6-004
3723:1	Kahuku	Male	9 *loʻi*, *kula* lands, houselot	NR v. 4, 156 FT v. 10, 171 NT v. 4, 368	5-6-002
4391:1 & 2	Kahuku and Keana	Kalawaiamanu	3 *ʻili weuweu,* 1 *ʻili* of sweet potato, 1 *ʻili* of *wauke*, 1 *kula*, sugarcane and *wauke*, breadfruit, *noni*, *ʻawa* and banana, tobacco, houselot	NR v. 4, 292 FT v. 10, 184	5-6-006
4422:2	Kahuku	Kaumualii	10 *loʻi*, *kula* land with *wauke*, sweet potato, *hala*, salt land, a *mala* of *noni*, banana, watermelon, houselot	NR v. 4, 296 FT v. 10, 164	5-6-005
4458:1	Kahuku	Kaihupailani	5 *loʻi kalo*, *kula* lands, *kula* of *wauke*, wooded upland, *koa* tree, *kukui* tree, houselot	NR v. 4, 303 FT v. 10, 203	5-6-004
238-E:1	Lāʻiewai	Pakolu	-	No testimony.	5-5-008
3696:1 & 2	Lāʻiewai	Mahunalii	1 *loʻi*, *ʻili* of *wauke*, 8 *ʻili* of gourd, a *mala* of *wauke*, 2 *ʻili* of *weuweu*, houselot	NR v. 4, 145 FT v.11, 281	5-5-005 5-5-008
3697:1, 2 & 3	Lāʻiewai	Mahoe	3 *loʻi* and 1 *kula* land, houselot	NR v. 4, 146 FT v. 11, 281	5-5-008
3699:1, 2 & 3	Lāʻiewai	Kahakea	3 *loʻi*, 1 steep patch sweet potato (*pali ʻuala*),1 *kula*, 1 *ʻili* of sweet potato, 2 *mala* of gourd, *ʻili* of *wauke*, 2 *loʻi* and a houselot	NR v. 4, 146 FT v.11, 253	5-5-008
3699-B:1	Lāʻiewai	Kainoahou	2 *loʻi kalo*, *kula* land and a houselot	FT v. 3, 531	5-5-008
3708:1	Lāʻiewai	Moanauli	3 *loʻi* and 1 *kula* land	NR v. 14, 150 FT v. 11, 251	5-5-008

LCA	Ahupuaʻa	Claimant	Testimony	Book	TMK Map
3714:2	Lāʻiewai	Maii	7 *loʻi*, 3 *kula*, houselot, 2 *koa* trees	NR v. 4, 154 FT v. 11, 251	5-5-008
3731:1 & 3	Lāʻiewai	Ihupuu	6 *loʻi*, houselot	FT v. 11, 247	5-5-008
3743:1 & 2	Lāʻiewai	Wi	5.5 *loʻi*, 9 *kula*, 3 mountain *kula*, 2 *hala* clumps, 1 gourd *kula*, 4 fallen *koʻa* trees, 1 *kula* houselot	- FT v. 11, 305	5-5-005 5-5-008
3773:1, 2 & 3	Lāʻiewai	Amaka	8 *loʻi* and 16 *kula*	NR v. 4, 165 FT v. 11, 213	5-5-008
3789:2 & 3	Lāʻiewai	Opala & Kaiimakuhi	1 *moʻo*, 3 *loʻi kalo*, 1 *loʻi*, *ʻili* of *wauke*, 2 *ʻili* of *weuweu*, houselot	- FT v. 11, 287	5-5-005
3807:1	Lāʻiewai	Laielohelohe	6 *loʻi*, 13 *kula* (1 planted in tobacco) and a houselot	NR v. 4, 173 FT v. 11, 249	5-5-008
3859:1	Lāʻiewai	Pahumoa	8 *loʻi*, 1 *kula*, 2 *ʻili* of sweet potato, 1 *mala* of *ʻawa*, houselot	NR v. 4, 179 FT v. 11, 261	5-5-008
3861:1, 2 & 3	Lāʻiewai	Pulehu	1 *moʻo*, 7 *loʻi*, 1 *ʻili* of *weuweu*, 1 *ʻili* of sweet potato, houselot	NR v. 4, 179 FT v. 11, 263	5-5-005 5-5-008
3864:1	Lāʻiewai	Paiakea	4 *loʻi*, 2 houselots, 3 *kula*	NR v. 4, 180 FT v. 11, 261	5-5-008
3873:1, 2 & 3	Lāʻiewai	Paakahi	9 *loʻi*, 7 *kula*, 1 fishery, 1 *koa* tree, houselot	NR v.4, 183 FT v. 11, 275	5-5-008
3936:1, 2, 3 & 4	Lāʻiewai	Nakahili	5 *loʻi*, 3 *kula*, houselot	FT v. 11, 299	5-5-008
3945: 1 & 2	Lāʻiewai	Napahu	3 *loʻi*, 5 *kula*, houselot	NR v. 4, 196 FT v. 11, 285	5-5-008
4003:1, 2 & 3	Lāʻiewai	Hano	3 *loʻi*, 1 *kula*, 1 *kai* [fishery], 1 mtn. area; scattered claims: 6 *loʻi*, 10 *kula*, 1 houselot; in Kapuna: 1 *loʻi*, 2 *kula*	NR v. 4, 208 FT v. 44, 277	5-5-005 5-5-008
4039:1 & 2	Lāʻiewai	Kalawaiaholona	1 *loʻi*, 1 *kula* (planted in *wauke*)	NR v.4, 214 FT v.11, 306	5-5-008
4269:1	Lāʻiewai	Kala (testimony says "Kula")	1 *moʻo*, 3 *loʻi kalo*, 1 *ʻili* (Kakaiahui), 1 steep sweet potato planting, 2 sweet potato *loʻi* (dried out *loʻi*?), 2 *koa* canoe trees, houselot	NR v. 4, 235 FT v. 11, 311	5-5-008
4270:2	Lāʻiewai	Keao	5 *loʻi kalo*, 45 *moku weuweu*, 1 *moku moʻo*, 5 *koa* trees, houselot	NR v. 4, 235 FT v. 11, 308	5-5-008
4271:1, 2 & 3	Lāʻiewai	Kaleo	44 *loʻi*, 1 *kula*, 2 *ʻili* of *wauke*, houselot	NR v. 4, 235 FT v. 11, 265	5-5-008
4272:1	Lāʻiewai	Koi	7 *loʻi*, 3 *kula*, 1 *mala* of *ʻawa*, 2 *koa* trees, houselot	NR v. 4, 236 FT v.11, 269	5-5-008

LCA	Ahupuaʻa	Claimant	Testimony	Book	TMK Map
4280:1	Lāʻiewai	Kauhane	1 *loʻi*, 1 *kula*	NR v. 4, 237 FT v. 11, 307	5-5-008
4283:1	Lāʻiewai	Koula	6 *loʻi*, 2 *kula*, 1 *moku* of *weuweu*, 1 *ʻili* planted in gourd, houselot	NR v. 4, 238 FT v. 11, 298	5-5-008
4288:1	Lāʻiewai	Kaonohi	7 *loʻi*, 2 dry *loʻi*, 1 clump of *hau*, 11 *moku* of *weuweu*, 1 *koa* tree	NR v. 4, 239 FT v. 11, 294	5-5-008
4290:1	Lāʻiewai	Kaiolohia	6 *loʻi*, 1 *ʻili* of *wauke*, 1 grass *kula*, 2 mala of *ʻawa*, 1 *mala* of *noni*, 3 *mala* of sweet potato, houselot	NR v. 4, 239 FT v. 11, 293	5-5-008
4291:1	Lāʻiewai	Kapule	4 *loʻi*, 1 *kula*, 1 *mala* of *ʻawa*, houselot, *kula wauke*, partly in Mālaekahana	NR v. 4, 240 FT v. 11, 296	5-5-008
4293:1	Lāʻiewai	Keawe	14 *loʻi*, 1 *kula*, 1 *ʻili* of sweet potato, 1 *ʻili* of *noni*, 1 *mala* of *wauke*, houselot	NR v. 4, 290 FT v. 11, 298	5-5-008
4297:1	Lāʻiewai	Kapuaokahala	4 *loʻi*, 3 *kula*, houselot	NR v. 4, 240 FT v. 11, 269	5-5-008
4298:1 & 2	Lāʻiewai	Kaualewa	2 *loʻi*, 1 *kula*, 3 *ʻili* of sweet potato, 2 *ʻili* of *wauke*, 1 *ʻili* of *noni*, 1 *mala* of sweet potato, 1 *mala* of *ʻawa*	NR v. 4, 241 FT v. 11, 297	5-5-005
4300:1	Lāʻiewai	Kapule for Waikupulani	7 *ʻili* of sweet potato, 3 *loʻi kalo*, houselot	NR v. 4, 241 FT v. 11, 297	5-5-008
4301:1	Lāʻiewai	Kanakanui	7 *loʻi*, 1 *kula*, 1 *kula* of *wauke*, 4 *mala* of *noni*, 2 steep sweet potato plantings, 2 houselots	NR v. 4, 242 FT v. 11, 373	5-5-008
4325:1	Lāʻiewai	Kahoale	2 *loʻi*, 2 *kula*, houselot	NR v. 4, 259	5-5-008
4326:1, 2, 3 & 4	Lāʻiewai	Koalaukanu	8 *loʻi*, 5 *kula*, houselot	NR v. 4, 259 FT v. 11, 309	5-5-005 5-5-007 5-5-008
4329:1 & 2 (4329B)	Lāʻiewai	Kalua	5 *loʻi*, 7 *kula*, houselot	NR v. 4, 260 FT v. 11, 306	5-5-008
4331:1 & 2	Lāʻiewai	Kamano	7 *kalo loʻi*, 6 *kula*, 1 *kula* houselot, 1 fish pond	NR v. 4, 261 FT v.11, 310	5-5-007 5-5-0088
4333:1	Lāʻiewai	Kahoukua	6 *loʻi*, 17 *kula*, houselot	NR v. 4, 262 FT v. 11, 292	5-5-008
4334:1	Lāʻiewai	Kalou	2 *loʻi*, 17 *kula* (some planted in tobacco), houselot enclosed with a wooden fence	NR v. 4, 263 FT v. 11, 292	5-5-008
4338:1 & 2	Lāʻiewai	Kahalelaau	1 *loʻi*, 1 *kula*, 3 *mala*, 1 *mala* of *wauke*, 1 shore area and a mountain land, houselot	NR v. 4, 265 FT v. 11, 293	5-5-008

LCA	Ahupuaʻa	Claimant	Testimony	Book	TMK Map
4343:1 & 2	Lāʻiewai	Not found	10 *loʻi*, 7 *kula* (scattered claims)	NR v. 4, 267 FT v. 11, 298	5-5-005 5-5-008
4345:1	Lāʻiewai	Kaumiumi	1 *loʻi*, 3 *kula*, 3 fallen (shattered) *koa* trees, houselot	NR v. 4, 286 FT v. 11, 297	5-5-008
4361:1, 2 & 3	Lāʻiewai	-	no specifics on land use	NR v. 4, 271 FT v. 11, 300	5-5-005 5-5-008
4451:1, 2 & 3	Lāʻiewai	Kuapuu	16 *loʻi*, 5 *kula*, 3 *koa* trees, 4 *lua hānai* (holes where fish feed), houselot	NR v. 4, 301 FT v. 11, 301	5-5-008
4514:1, 4 & 5	Lāʻiewai	Pupuka	5 *kalo loʻi*, 5 *kula*, 1 houselot	NR v.4, 313 FT v. 11, 302	5-5-008
6989:2	Lāʻiewai	Kahuailua	5 *loʻi*, 11 *kula*, houselot	NR v. 5, 411 FT v. 11, 291	5-5-008
8355:3	Lāʻiewai	Kakau	2 *loʻi*, 1 *kula*, houselot	NR v. 5, 545 FT v. 10, 150	5-5-008
8440:1	Lāʻiewai	Kamamae	1 *loʻi*, 2 *wauke* patches, 2 sweet potato patches, one *mala* of *noni*, 2 *hala* trees, houselot	NR v. 5, 565 FT v. 11, 307	5-5-008
8443:1, 2 & 3	Lāʻiewai	Kauhalekua	5 *loʻi*, 2 *wauke* patches, 2 *kula*, 4 *weuweu* patchs, houselot	NR v. 5, 565 FT v. 11, 307	5-5-005
8580:1, 2, 3 & 6	Lāʻiewai	Kealiiwaiwaiole	5 *loʻi*, 3 *ʻili* of *kula*, 1 *mala* of *maiapia*, houselot	NR v. 4, 355 FT v. 11, 321	5-5-005 5-5-008
8580-B:1, 2 & 3	Lāʻiewai	Palii	5 *loʻi*, 1 *mala*	FT v. 11, 322	5-5-008
10748:2 & 3	Lāʻiewai	Puhibaka	3 *loʻi*, 1 watercourse (*ʻauwai*?), 1 *kula,* 1 *mala* of *noni*, 2 *koa* trees, 1 *mala* of sweet potato, 2 pools for fish	NR v. 4, 584 FT v. 11, 302	5-5-008
10763:1	Lāʻiewai	Puni	5 *loʻi*, 4 *kula*, houselot	NR v. 4, 584 FT v. 11, 304	5-5-008
10822:1, 2, 3 & 4	Lāʻiewai	Peka	4 *loʻi*, 1 kula patch, coconut tree and sweet potato patches, 10 *moʻo*, 1 *mala* of *ʻawa*, the *pali* of Kaukauulua, the beach of Laiemaloo, 1 *kula* of mountain area	NR v. 4, 602 FT v. 11, 324	5-5-008
10928:1	Lāʻiewai	Ulukou	4 *kalo loʻi*, 1 sweet potato patch, houselot	NR v. 4, 614 FT v. 11, 304	5-5-008

> south by *lo'i kō 'ele*, on the west by Paukoa's [land]. A *mala* of sweet potato is at Ahamau, and at Keana I have a *mala* of *'awa*. My houselot is Kahuku, and is surrounded by *kula*. My right of occupancy is from the time of Kamehameha I. KEAWE x his mark

LCA Awards in Keana Ahupua'a

The *ahupua'a konohiki* (overseer), Kinimaka was closely affiliated with Kamehameha III, which may have helped secure his claim to the entire *ahupua'a*. According to O'Hare et al. 2008, "He was a *makua hanai* (adopted parent) to David Kalākaua, sixth king of Hawai'i. Kinimaka retained one-half of the *ahupua'a*, giving back the other half to pay his commutation fees for the properties that he retained. This second half became part of the government lands" (O'Hare et al. 2008:19).

Environmental conditions would partly explain for the dearth of claims for this *ahupua'a*, as these lands were not suited for most traditional methods of farming. While the coastal areas of Keana appeared to be largely brackish water swamp and/or sand with outcrops of limestone, the uplands were relatively dry and rocky - not suitable for terrace farming. This was expressed by the sentiments of Kaleo, E. C. Handy's trusted informant, as they recorded traditional land use on O'ahu in the 1940s. He maintained that he knew of no agricultural terraces up the stream, nor of any on the plains of Keana (Handy 1940). This was later upheld in Handy and Handy (1991:462), who stated the following about Mālaekahana and Keana:

> These two small ahupua'a intervening between La'ie and Kahuku (the northernmost tip of Oahu) show much the same pattern, in miniature, of dune coasts, elevated coral, and broken level land seaward from the hills. Each has a small stream. There were formerly some irrigated terraces in Malaekahana (Wayclear-for-work), but not in Keana (The-cave) (as cited by O'Hare et al. 2008:19).

The following is a claim for lands partially within Keana Ahupua'a. This claim provides a narrative on traditional use of Keana's *kula* and *wao* lands.

> No. 4391: Kalawaiamanu (claimant), Keana, Oahu
> January 3, 1848
>
> > To the Land Commissioners, Greetings: I, Kalawaiamanu, am a claimant in the *'ili* in Louana. There are three *'ili weuweu*, one *'ili* of sweet potato, one *'ili* of *wauke*, bounded on the north by the *kula*, on the east and west by sugarcane, on the south by the *pali*. Here are the jump lands: At Halulu is sugarcane, *wauke*. At Kahalau is breadfruit and *noni*. At Keaaulu is a breadfruit, and *noni*. At Kapuou is *noni*. At Kealahaka is *'awa*, sugar cane, and banana. At Paos is *'awa*. At Uumhalu is a *kula* planted in sweet potato and watermelon. My house is at Nonoula. My right of occupancy is from the time of Kameharneha II. KALAWAIMANU

LCA Awards in Mālaekahana Ahupua'a (in the Vicinity of Nā Pua Makani Project Area)

The Mālaekahana *ahupua'a* LCA claims suggest that traditional agricultural practices occurred in Mālaekahana, but was limited to dryland cultivation as well as gathering of plant resources,

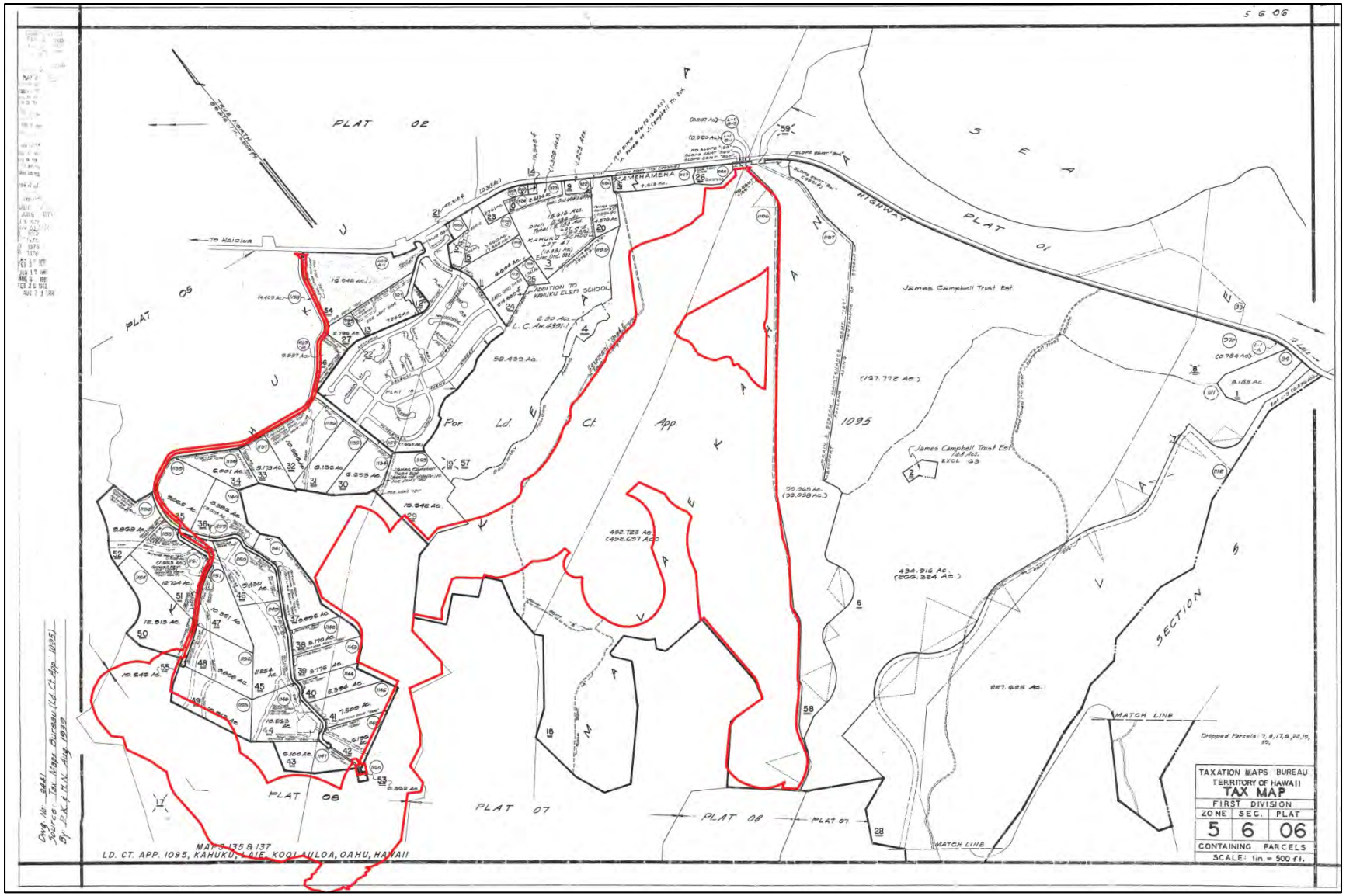

Figure 4. Project area depicted on TMK Map.

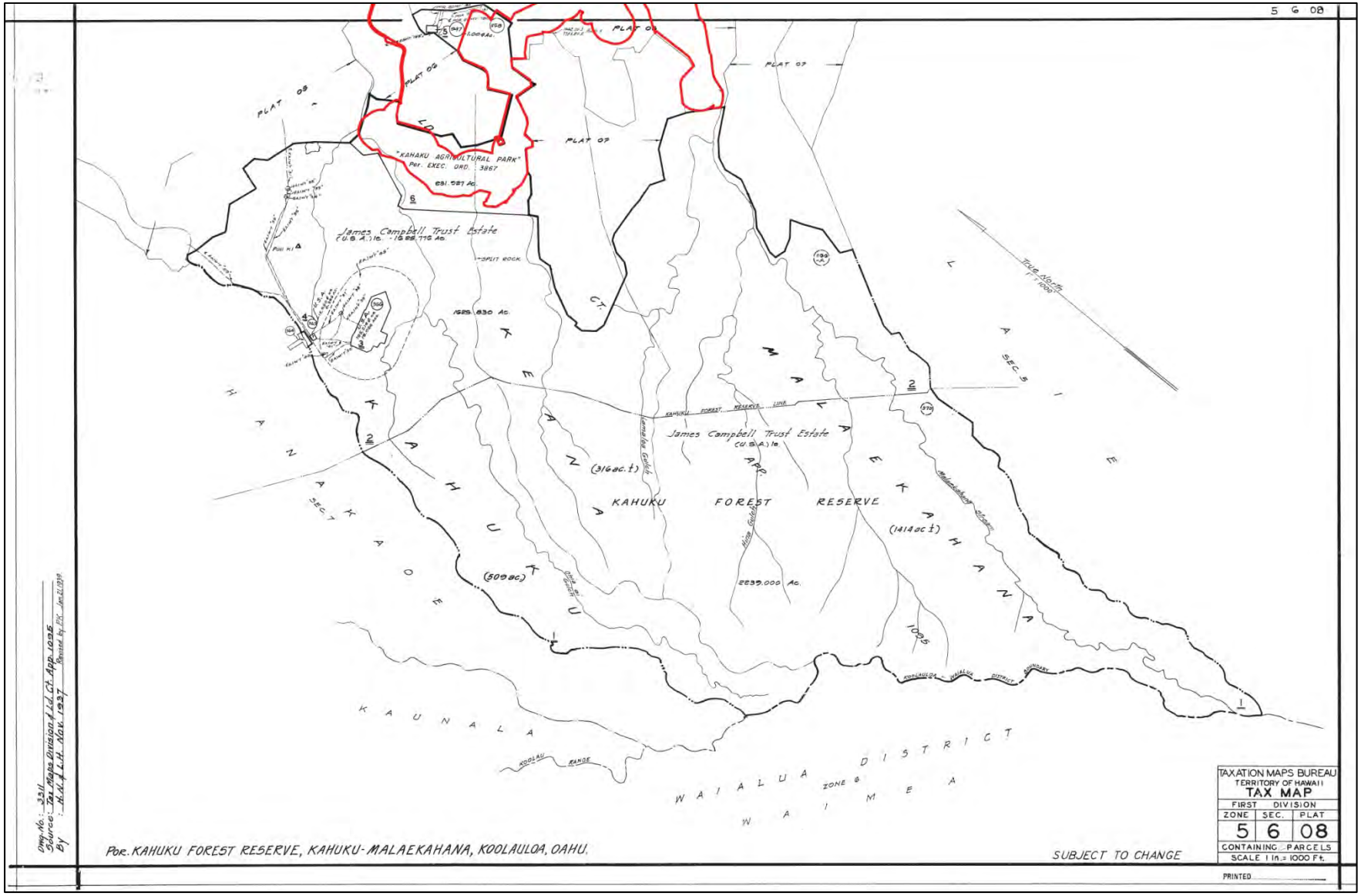

Figure 5. Project area depicted on TMK Map.

while wetland agricultures was practicing in adjacent Lāʻie (Hammatt 1996). Land use as indicated in Mālaekahana LCA claims is described by Hammatt (1996) as follows:

> In 1850 the *ahupuaʻa* of Mālaekahana (3280 Acres) is claimed by A. Keohokalole, mother of King Kalākaua, Queen Liliuʻokalani, Miriam Likelike Cleghorn and Wm. Pitt Leleiohoku (II) and is awarded to her in 1854. Of 21 claims for land parcels (*apana*) in Mālaekahana only four *kuleana* claims are awarded. There are no claims for *loʻi* in Mālaekahana. The claims often state that the area jumps around and goes from sea to mountain and therefore boundaries can't be given. The claims for Mālaekahana mention 15 *kula*, 6 *mala* ,and 1 *moʻo* with no crop given, 12 *wauke* patches, 7 house sites, 6 banana patches, 3 potato patches, 5 koa trees for canoe making, and 1 *mala* each for *hala*, *noni*, *ti*, *hau,* breadfruit and tobacco. Two mountain areas are also claimed. Two house sites, 1 banana and potato land, and 1 *wauke* land are awarded. However, no present maps show where these awards were located. The old Mālaekahana maps at the State Survey office are missing (as reported by the survey office to Dr. V. Creed on 2/2/96). Tax maps do not show the location of these few awards (Hammatt 1996:4-5).

After exhausting all available historic maps for Mālaekahana during this documentary research, no maps were found depicting the Mālaekahana LCA locations. The entire *ahupuaʻa* was awarded to Ane Keohokālole.

<u>LCA Awards in Lāʻiewai Ahupuaʻa (in the Vicinity of Nā Pua Makani Project Area)</u>

The succeeding sample of Lāʻiewai LCA claims provide insights on the area's traditional land use.

> <u>No. 3861: 2&3: Pulehu (claimant), Lāʻie, Oahu</u>
> <u>January 5, 1848</u>
>
> > To the Land Commissioners, Greetings: I hereby state the claim for my land. Kahikiea is the *moʻo*. There are five taro *loʻi* at Kahikiea. One *loʻi* is at Kaholo, one *loʻi* is at Paakea. One *ʻili weawea* [grass or herbage], one *moʻo* is at Malaekahana. One *ʻili* of sweet potatoes is at Omao. The right of my *makuas* was from Liholiho.
>
> Foreign Testimony V. 11:263
> No. 386l Pulehu
>
> > Kauaikaua, sworn says, he knows the land claimed by Pulehu in Laie. It consists of 6 *kalo* patches, a piece of *kula* land and a House site. The 6 patches are bounded on Hauula side by Kahalelaau's land, Mauka and Waialua side by the Konohiki, Makai by Kii's land. The *kula* land is planted with *wauke* - contains about half an acre - surrounded by the Konohiki. The house site is not enclosed, there is one house on it. Claimant has held the land for 30 years. The Konohiki''s agent consented to this claim.

No. 4003:3: Hano (claimant), Lāʻie, Oahu
January 5, 1848

Native Register V. 4:208
January 5, 1848

> To the Land Commissioners, Greetings: I, Hano am a claimant of land at Laie. In the ʻ*ili* of Paoo are three *loʻi*, one *kula*, one *kai* /fishery/ one mountain area. The boundaries are: on the north, *muliwai* land of Poouahi, on the east, land of Kaaipuaa, on the south, land of Kauwaiawa, on the west, land of Palii. Here are the scattered claims: In the ʻ*ili* or the *ahupuaʻa*, six *loʻi*, ten *kula*. Seaward of the mountain, one house lot. In the ʻ*ili* of Kapuna, one *loʻi*, two *kula*. Because these claims are so very scattered, therefore it is noc practical to describe their boundaries lo you, the Land Commissioners. My right of occupancy at these places is from the time of Kamehameha 1 until the reign of Kamehameha III at this time.

Foreign Testimony V. 11:277
No. 4003 Hano

> Kauaiamanu, sworn says, he knows the land-claimed by Hano in Laie. It consists of 3 *kalo* patches, a piece of *kula* land, and a House lot. The 3 patches are bounded on Hauula side by Maii's land, Mauka by Hoanauli's land,- Waialua side by Kaluaiaawa's land. - Makai by Kauaiamanu's land. The *kula* land is planted with tobacco & bananas. It is bounded on Hauula side by Kauaiamanu's land, - Mauka by Napahu's land, -Waialua and Makai by the Konohiki. The houselot is in another place. It is not enclosed. Claimant has held the land for 9 years. The konohiki's agent had no other objection to the claim ....

No. 4343:2: Kauaiomono (claimant), Lāʻie, Oahu
January 3, 1848

Native Register V. 4:267
January 3, 1848

> To the Land Commissioners, Greetings: I, Kauaiomano, am a claimant at Laie for four *loʻi* and one *kula*. The boundaries are: north, the land of Pupukea, east, Kalakee's /land/, south, the land of Napaeko, west, the land of Hano. The scattered *loʻis* and *kulas* are as follows: Kalawa, one *loʻi*, no *kula*. Kapaakea, four *loʻi*, three *kula*. Kaholi, no *loʻi*, no *kula*. Kahikiea no *loʻi*, two *kula*. Kumupali, no *loʻi*, one *kula*. My right of occupancy is from my *kupunas* until the present.

Foreign Testimony V. 11:298
No. 4343 Kauaiomano

> Kauaikaua, sworn says, he knows-the land of claimant in Laie. It consists of 12 *kalo* patches, 7 of which are planted, a piece of *kula* land and a house site. 5 of the patches have not been planted for two years. The 7 *kalo* patches which are planted are bounded on Hauula side by Kaleoʻs land, -Mauka by Elemakule's land, ·Waialua side by the Konohiki, -Makai by Kamamai's land. The *kula* land is bounded on Hauula side by Pulehu's land, - Mauka by Kaleo's land, Waialua side by the land of Malaekahana, - Makai by Kamamai's land. It is planted with *wauke*. The house site is separate- not enclosed. Claimant derived the land from his ancestors. The Konohiki's agent had no other objection to this claim ...

No. 4361:3: Kii (claimant), Lāʻie, Oahu
January 3, 1848

Native Register V. 4:271 Laie wai, Oahu
January 3, 1848

> To the Land Commissioners, Greetings: I, Kii.am 1 claimant of land in the ʻ*ili* of Kahikea. There are two taro *loʻi*, a *kula* and a wooded upland named Omao. The boundaries are: north, Napilipili, east, Kaiwikkole, west, a stream, south, Kapaakea. Here are the scattered claims: At Puhahaka is one ʻ*ili* of *wauke*. At Namahana, is one ʻ*ili* of *wauke* and a *pali uala*; [steep planting of sweet potatoes]. At Keanahale is one ʻ*ili* of *wauke* and an *apuapuʻuala*. At Noholua are two *loʻi* and a watercourse. At Paakea is one ʻ*ili* of *wauke*, two ʻ*ili* of sweet potato, and, ʻ*ili* of watermelon. At Malaekahana is one ʻ*ili* of sweet potato. Malaekahana is a separate *ahupuaʻa*. Also, my house is at Paakea. My occupancy has been from the reign of Kamehameha 3 [sic]

Foreign Testimony V. 11:300
No. 4361 Kii

> Kupehia, sworn says, he knows the land claimed by Kii in Laie. It consists of 2 *kalo* patches, a piece of *kula* land and a house site. The 3 patches are bounded on Hauula side by Kahalelaau's land, - Maauka by Pulehua's, - Waialua side by the Konohiki, - Makai by Mahoe's land. The *kula* land is bounded on Hauula side by Kauaiomano's, - Mauka and Makai by the *konohiki*, - Waialua side by Kauikaua's land. The house site is distinct from the land – not enclosed. Claimant has held his land for over ten years. The land claimed in Malaekahana is *nahelehele*. The agent of the Konohiki of Laie had no objections to this claim.

Summary of Traditional Economic Activities

Based on the information presented above, the following is a summary of the traditional economic activities that may have taken place in the area of the project.

- Houselots for habitation.
- Irrigated taro cultivation.
- Dryland farming on *kula* lands:
  - Sweet potato
  - Wauke
  - ʻŌlena
  - ʻAwa
  - Banana
  - Melons
  - Tobacco
  - Sugar cane
- Economically useful trees:
  - Hala
  - Kukui
  - Koa
  - Breadfruit
  - Noni
  - Coconut

The summary indicates that agricultural pursuits were widespread and diverse. Both irrigated and non-irrigated farming took place, and a wide range of trees appeared to have been important to the residents of the area. Most of the cultigens were Polynesian introductions, but a couple of historically introduced plants (melons, tobacco) were added after European contact. It appears that the main agricultural cultigens were taro, sweet potato, and breadfruit. Added dietary items included banana, sugar cane, and coconut. *Wauke,* used in making tapa was apparently widespread. Medicinal plants including *ʻōlena* and *noni* were also present.

3.3.4 Historic Agriculture, Religion, Developments, and Military Land Use

The Kahuku Ranch

According to Rechtman (2009), prior to Campbell's ownership, Charles Gordon Hopkins obtained the *ahupuaʻa* of Kahuku in 1851 the as part of Grant No. 550 and founded a ranch at Kahuku.

The result of these developments were not all positive, as suggested by Emerson (1928), where he writes that the tyranny of the new land owners had caused the Native population of Kahuku to suffer, on which he elaborates:

> Kahuku had passed from control of its chief to that of an Englishman. The pastures of his big ranch extended along the shore for 12 miles, reaching inland to the mountain chain, and he was so autocratic that the natives could not own a dog, or pasture a cow or horse, without his consent. The depredations of herds and flocks on their small homesteads became unbearable, but they appealed in vain for their beloved *hala* trees and patches of vegetables. . . There was no redress, however, and with the fading of the forests the people also disappeared and the once populous district of Kahuku became a lonely sheep and cattle ranch (Emerson 1928:135-136 as cited in Rechtman 2009).

The 25,000 acre property in Kahuku that would become Kahuku Ranch had passed through a series of hands before it was purchased by James Campbell for $63,500 cash in the mid-1870s. Campbell then stocked this ranch with 3,000 head of cattle as well as a number of sheep and horses he hoped would reach 30,000 (Silva 1984:C-16).

The Kahuku Plantation

By the late 1800s, Campbell had leased a large portion of his ranch lands to James B. Castle, which would become the Kahuku Plantation, the sugar mill at Kahuku was built in 1890. The plantation proved to be innovative both socially and economically. In the early 1900s, the Hawaiian Sugar Planters' Association became a recognized organization that aimed to improve general working and living conditions of plantation workers. Kahuku Plantation became a pioneer in the movement, providing a day-care center for the working mothers beginning in 1905 (Thrum 1921:116). The plantation had also developed a new fuel-saving device that burnt waste molasses, creating an ash that was then used as a high grade fertilizer (ibid.). By the mid-1930s, the plantation was cultivating nearly 4,500 acres and had 1,137 people under its employ (O'Hare and Hammatt 2006:21). With its heyday long over, the Kahuku Plantation shut its doors in 1971, causing the greater Kahuku area to experience economic instability for years.

During the plantation's operation, water was an extremely valued resource in the Kahuku and Keana area. Prior to the plantation, traditional agricultural methods relied on seasonal rains, the area's few springs, and intermittent streams. Thus, the plantation began pumping spring water, stream water, and rain to irrigate the sugarcane, but "…these sources were found to be insufficient. Thereafter, the company resorted to artesian wells, which came to be the main source of water" (Kuykendall 1967:69).

Religion and Religious Developments in Kahuku, Keana, and Mālaekahana Ahupuaʻa

Western religions in Kahuku during the late 1800s were jostling to gain the loyalty of the community. In the 1878 *Annual Report of the Hawaiian Evangelical Association*, Kahuku Church, which eventually merged with Hauʻula Church, was one of the last Hawaiian speaking Evangelical churches on the island (Hawaiian Evangelical Association 1878:2). This church is later described in this report as "one of the feeble churches," to the point that, "its pastor has been called to Waianae, and installed over that church…It would be well for this church to unite with some stronger one…" (Hawaiian Evangelical Association 1878:10).

The Church of Jesus Christ of Latter Day Saints gained the majority of Lāʻie and Mālaekahana's faith in as early as 1850, when Mormon missionaries initially settled in the area. According to Ahlo and Hommon (1981), the Mormon Church purchased approximately 6,000 acres in the area for farming. Of these lands, approximately 1,500 acres of which were ideal for agriculture. Crops that were initially cultivated on these lands, but by the end of the 19th century pineapple and sugar cane dominated. This is upheld in Vogeler et al. (2011), who largely cite Britsch (1989), holding that Brigham Young sent the first eight Mormon missionaries to the Hawaiian Islands in 1850. This initial mission yielded a significant religious, economic, and infrastructural foothold for the Mormon Church, as is evident in Vogeler et al. (2011):

> They arrived on December 12 in Honolulu, and then split up, traveling in groups of two or three to the other islands. Their original mission to convert the mainly foreign-born (*haole*) population proved to be difficult. The missionaries were discouraged and discussed returning home, but they instead decided to stay, to learn the Hawaiian language, and to preach to the native Hawaiians...The number of Hawaiian converts quickly grew, and in 1853, they decided to buy land on Lānaʻi to start a colony, where all the brethren could live and work.
>
> The Lānaʻi colony was not a success, for a wide variety of reasons, and in 1864, the mission decided to found a new gathering place. In 1864, two Latter-day Saints Mission presidents, Francis A. Hammond and George Nebecker, traveled to Hawaiʻi to purchase land for a new Mormon settlement. Land was fairly cheap at this time in Hawaiʻi as the end of the Civil War in the U.S. had led to a depression in the sugar market, leading to an eagerness to sell land by sugar planters… In 1865, Hammond purchased a six-thousand acre plantation called "Lāʻie" from Thomas T. Dougherty. By 1865, the Church had 6,000 acres, probably all the land in Lāʻiemaloʻo and a portion of the land in Lāʻiewai (minus the 298.5 acres owned by the Kahuku Ranch and Kahuku Sugar Company).
>
> On this land was 600 head of cattle, 500 sheep, 250 goats, 20 horses, a large frame house, five native houses, and five acres of cotton…The first order of business for the new owners was to establish a cash crop that would sustain the settlement. Although corn and cotton were grown for the first two years, it soon became

> evident that sugar would be the salvation of the growing community. A mill was purchased and set up in Lāʻie in 1868...The problem of insufficient water in some years was solved in the early 1880s, when a flume was built to bring water down from the Koʻolau Mountains. A new, more efficient mill was built in 1879…
>
> By 1866, about two hundred Hawaiians, mostly members of the Church, were living at the Lāʻie mission settlement…Growth of the community was slow through the 1870s, due to most Hawaiians wishing to stay near their own homes. In 1874, only about 377 members lived near the mission... However, church membership as a whole did increase during this time; in 1865, the island-wide membership of the Hawaiian mission was recorded as 500; by 1906, it was 7,212 strong… (Vogeler et al. 2011:41-42).

In 1920, the Mormon Temple was erected in Lāʻie, with a price tag of $250,000, which was intended to resemble the Tabernacle in Salt Lake (Elder 1922:194).

Transportation in Kahuku, Keana, and Mālaekahana Ahupuaʻa

The entire northern portion of Oʻahu was greatly isolated from the Western urban sprawl of Honolulu until paved roadways and rail were implemented. While this area remained "country," the new transportation infrastructure forever changed the landscape Kahuku, Keana, and Mālaekahana Ahupuaʻa. According to Kuykendall (1953),

> On Oahu, what came to be called the "round-the-island road" --ancestor of Kamehameha Highway--extended from Honolulu to Ewa, thence across the central plateau to Waialua; from that place it ran along the coast past Kahuku and Kualoa to Kaneohe, where it joined the road which came over the Nuuanu pali from Honolulu. In 1856, for the first time, a four-wheeled carriage drawn by a pair of horses was driven over the portion of this road between Honolulu and Kahuku. Three years later, a Captain Coffin is reported to have driven with a carriage and span of horses from Honolulu to Kahuku one day in ten hours and to have returned the following day in eight hours (Kuykendall 1953:25).

In the late 1800s, the Oʻahu Railway and Land Co. ran a line up to Kahuku from Honolulu via the Pali – with the terminus of the line running from Waiʻanae (Honolulu Star-Bulletin 1941:155). This line was lauded for opening up new economic opportunities to windward districts of Oʻahu (ibid.:158). Wong-Smith (1989) summarizes this as follows:

> For its first nine years Kahuku Plantation Co. relied on little coastal vessels which anchored offshore from Kahuku Landing to bring supplies and return raw sugar to Honolulu. Five miles of 36-inch gauge railway, some of it portable, had been laid in 1890 to haul the cane through the plantation fields to the Kahuku mill and thence to the landing. The plantation track extended south opposite Laie and the Mormon settlement, which sent its cane to be ground at Kahuku… In 1899, the Oahu Railway finally laid track to a terminal at Kahuku. It hauled sugar and the agricultural freight products back and forth across the windward part of Oahu. The Koolau Railway Co. laid tracks from Kahana to Kahuku and served as a common carrier until 1931. From then until the 1950s, its sole function was to carry cane from the northeastern field of the island (Wong-Smith 1989:A-15-16).

Military Presence in Kahuku, Keana, and Mālaekahana Ahupuaʻa

Prior to the construction of any U.S. military bases in Hawaiʻi, the American Marconi Company set up a wireless operation in Hawaiʻi in 1902, building their transpacific receiving station at Kahuku in 1915. This site is located less than 3 kilometers north of the Nā Pua Makani Wind Project area.

According to O'Hare et al. (2008), Kahuku Golf Course, which is less than one kilometer east of the project area, also played a part in World War II, stating:

> It was during the attack on Pearl Harbor on December 7, 1941 that the Kahuku Golf Course was first used as an emergency landing field. On December 6, twelve B-17s had left California on route to the Philippines, with a stopover for refueling at Oʻahu. They flew into Oʻahu completely unaware of the Japanese attack and had to quickly dodge strafing by the Japanese Zeros. Amazingly, they all managed to make emergency landings, seven at Hickam Air Field, one at Wheeler Airfield, one at Bellows Airfield, one at the tiny Haleʻiwa Airport, and one on the grass and sand surface of the Kahuku Golf Course…The Army Air Force on Oʻahu had planned to build an emergency strip at the golf course, but it had not been completed by the time of Pearl Harbor attack (O'Hare 2008:28).

In 1942, the Kahuku Airfield was constructed as an auxiliary airfield, with several runways, ancillary bunkers, and emplacements (O'Hare and Hammatt 2006:21). Pilots from Wheeler Air Force Base were trained to fly a variety of aircraft on this airfield. By the late 1940s, Kahuku Field was abandoned and the lands once leased by the military were returned to the landowner. This former airfield was located near the present day Turtle Bay Resort.

According to Nakamura (1981), the *wao/mauka* areas of Kahuku and Keana Ahupuaʻa were also leased to the U. S. Military for training purposes in the mid-1950s. These lands, referred to as the Kahuku Training Area (KTA), have continuously been utilized by various branches of the United States Department of Defense and have not been easily accessible to the general public since. KTA makes up most of the western boundary of the Nā Pua Makani project area.

4.0 PREVIOUS ARCHAEOLOGICAL INVESTIGATIONS

A total of 39 archaeological studies have been conducted in various locations within a 2.5 kilometer radius around the proposed Nā Pua Makani Wind Project lands. Presented in the following section is a summary of the findings for these reports. A list of the reports and their locations in chronological order is provided in Table 4 and map of the project area with all of the study areas and known archaeological sites is provided in Figure 6.

The earliest archaeological study performed in the vicinity of the Nā Pua Makani Wind Project is the 1930 island-wide survey conducted by J. Gilbert McAllister (1933). In *Archaeology of Oahu*, McAllister identifies several historic sites near the project area, including Site 269 (traditional platform) and Site 270 (Keana Cave), located less than 300 meters north of the project area. In addition, Kaaulelemoa Fishpond (Site 268) is located less than a kilometer north of the project area, a traditional fishing shrine on Makahoa Point (Site 272) is less than a kilometer to the east, and Pōlou Pool (Site 271) is located just over a kilometer to the north.

Nearly 50 years later, a state-wide survey of petroglyph sites was performed by J. Halley Cox and Edward Stasack (1970). In this study, Cox and Stasack (1970:97) recorded a human figure petroglyph on a boulder at Kalaeuila Point, which is ca. 4 kilometers south of the Kahuku/Keana boundary.

In 1977, Paul Rosendahl performed an archaeological survey on 1,044 acres (non-contiguous) of the 9,646-acre Kahuku Training Area (KTA), the eastern sections of which abut and overlap portions of the west-southwest boundaries of the current Nā Pua Makani Wind Project lands. During this survey, Rosendahl (1977) identified nine archaeological sites, including five previously recorded (-259, -260, -1043,-2501, and -9517), and four newly discovered sites (-9506 through -9509). All sites found by Rosendahl (1977) are located in the *ahupuaʻa* of Hanakaoe and nearly two kilometers to the northwest of the project area. Only site -9506, Keaʻaulu Ditch, which is described as a historic stone-faced irrigation ditch, is located in close proximity to the project area (ca. 500 meters southwest).

In 1978, the Kualoa Archaeological Research Project (City and County of Honolulu) was tasked with a reconnaissance survey of the 49.9-acre Koʻolauloa Housing Project area and the 7.4-acre Kahuku District Park Expansion area (Clark 1979). These areas are located less than 500 meters north of the project area. During the survey, local informants led the archaeologists to a locale in the housing area that they referred to as a "sacred way," which was a cleared area with no visible man-made features, but held some spiritual significance to the community. Site -269 was relocated in the school expansion area and described as a stone platform containing a large coral slab that was interpreted as a possible *kūʻula* or god stone. Also revisited was Keana Cave (Site -270) where human skeletal remains were observed on the slope of the cave entrance. In addition, Clark (1979) found a second rock shelter located along a coral outcrop that contained skeletal remains, possibly human, and wood. Clark (1979) noted several other small crevices in outcrops and rock shelters with crude walls in the project area, but did not investigate further.

Table 2. Previous Archaeological Investigations in the Nā Pua Makani Wind Project Vicinity

Authors	Year	Report Title	Project Location	Findings
McAllister	1933	*Archaeology of Oahu.*	Island-wide survey.	Sites 50-80-02-0268 through -0272 near Nā Pua Makani Wind Project area. Site numbers shown on Figure 6
Cox and Stasack	1970	*Hawaiian Petroglyphs*.	Island-wide survey.	Located a petroglyph on a beach boulder in either Keana or Kahuku Ahupuaʻa. Not shown on Figure 6.
Rosendahl	1977	Archaeological Inventory and Evaluation Report for U.S. Army Support Command, Hawaiʻi (USASCH). Parts I Report Text and II Tables.	Kahuku Training Area, selected portions totaling 1,044 acres.	Relocation of three sites and discovery of six new sites (No. 50-80-02-9506 through -9509); Site -9506 (Historic stone faced irrigation ditch) is less than 0.5 km southwest of project area.
Barerra	1979	Kahuku Archaeological Survey.	Described in Barrera (1981) as located "…inland of the post office at Kahuku."	Discovery of five sites (No. 50-80-02-1425 through -1429), largely traditional.
Clark	1979	Preliminary Archaeological Reconnaissance Report for Koʻolau Loa Housing Project and Park Expansion, Kahuku, Island of Oʻahu. Kualoa Archaeological Research Project.	57.3-acres in the proposed Koʻolau Loa Housing Project area and Park Expansion Area, Kahuku.	Relocation of Site -0269, A "sacred way," (described as a Hawaiian sacred area having no structural features).
Schilt	1979	Archaeological Reconnaissance Survey of Proposed Extension, Kahuku Elementary School, Kahuku, Oʻahu.	4-acres in the Proposed Extension of Kahuku Elementary School.	Relocated a rock shelter and platform previously recorded by McAllister (1933). Two new sites (a mound and overhang shelter) were also found.
Yent and Estioko-Griffin	1980	Archaeological Investigations at Mālaekahana (50-80-02-2801), Windward Oʻahu.	Mālaekahana State Park, Phase I (south portion).	Site No. -2801; 3-year project; performed mapping, testing, excavation, and analysis; 3 major occupational layers found (ca. AD 1600-1780).
Barrera	1981	Cultural Resources Reconnaissance of the Kahuku Agricultural Park Project Area.	Four separate parcels totaling 3,000 acres in *mauka* Kahuku, Keana, and Mālaekahana Ahupuaʻa.	Three new sites: (1) a surface scatter of historic and traditional artifacts, (2) a single cowrie shell, and (3) a surface scatter of Historic artifacts. Sites 2 and 3 are located near a prominent limestone outcrop.
Davis	1981	Archaeological Reconnaissance Survey of Hawaiian Wind Farm Project area at Kahuku Oʻahu, Hawaiʻi.	Kahuku Training Area, selected portions (proposed windmill sites).	Discovery of four additional sites, including a Historic stone wall remnant, a habitation complex, agricultural terraces, and stone platform.
Sinoto	1981	Archaeological Reconnaissance Survey of Kiʻi and Punamanō Wetland Refuge Units, Kahuku, Oʻahu, TMK 5-6-02 & 3.	Kiʻi and Punamanō Wetland Refuge Units in Kahuku.	Relocation of two sites found by McAllister (1933): Punamanō Spring and Kiʻi Fishpond.
Yent & Ota	1982	Mālaekahana Phase II Initial Testing Results.	Mālaekahana State Park, Phase II (central portion).	22 cores; cultural materials encountered only in coastal cores; no new sites found.
Rogers-Jourdane	1982	Archaeological Reconnaissance Survey of Marine Culture Enterprises Lands in Kahuku, Oʻahu Island.	45 acres in Kahuku Golf Course area.	No sites found.

Authors	Year	Report Title	Project Location	Findings
Yent & Ota	1983	Eroding Archaeological Site at Mālaekahana Phase III, Mālaekahana Bay, Windward Oʻahu.	Mālaekahana State Park; Dune area of Phase III.	In eroding dune face, a human burial, imu, and two hearths were recorded (Site No. -1038).
Yent & Estioko-Griffin	1986	Results of Auger Coring Conducted at Mālaekahana State Recreation Area, Phase II, Koʻolau Loa, Oʻahu.	Mālaekahana State Park, Phase II (northern portion).	11 cores excavated; no sites found.
Sinoto	1986	Perimeter Flagging for Proposed Fencing Around Two Archaeological Site Areas, Kahuku Elementary School, Kahuku, Oʻahu. Letter Report.	Kahuku Elementary School, Keana Ahupuaʻa.	No new sites found; flagging of McAllister (1933) Sites -0269 and -0270.
Jensen	1989	Archaeological Inventory Survey Punamanō and Mālaekahana Golf Courses Lands of Ulupehupehu. Punaluʻu. Kahuku, Mālaekahana, and Lāʻie, Koʻolau Loa District, Island of Oʻahu.	Non-contiguous project area, totaling 866-acres of inland Kahuku. Punamanō Golf Courses is within Ulupehupehu, Punalau and Kahuku Ahupuaʻa. Mālaekahana Golf Course is in Lāʻie and Mālaekahana Ahupua`a.	Twenty-six sites containing 45 component features were identified. Traditional site types: caves, overhangs, walls, terraces, platforms, enclosures, isolated midden deposits. Historic site types: WWII II emplacements, dumps, roads, and agricultural ditches.
Kennedy	1989a	Archaeological Inventory Survey for the Proposed Mālaekahana Golf Course, A Portion of the Country Courses at Kahuku.	200 acres inland of Mālaekahana Bay and Kalanai Point, ca. 100 meters southeast of project area. Was location of Site -0275, Waiʻāpuka, a legendary sinkhole with spring.	Thirteen new sites found (11 Traditional habitation and agricultural sites and 2 Historic Plantation and Military sites). Also, 6 sand dunes recommended for testing. Letter report lists only temporary site numbers. Site -0275 not relocated.
Kennedy	1989b	Archaeological Assessment and Reevaluation Report Concerning the Recently surveyed, Proposed Punamanō Golf Course; A Portion of the Country Courses at Kahuku.	Inland Ulupehupehu, Punalau and Kahuku Ahupuaʻa.	Two new Historic sites to the Jensen's (1989 a&b) findings with a total of 14 additional features. Also recommends preservation of Site -4076 (possible burial).
Kennedy	1989c	Archaeological Reconnaissance Survey at TMK: 5-6-02:25, Located at Kahuku, Oʻahu.	Across Kamehameha Hwy. to the north of Hospital (Kahuku Medical Center).	No sites found.
Kennedy	1990	Kahuku Sand Mining Project: Archaeological Subsurface Testing Results.	Immediately southwest of Kahuku Golf Course.	No burials or cultural layers were found during testing.
Pfeffer & Hammatt	1992	Waialua to Kahuku Power Line.	Uplands of Ahupuaʻa spanning from Waialua to Kahuku.	Archaeological assessment indicating that there may be sites in the vicinity of the project area. Not shown on Figure 6.
Hammatt & Pfeffer	1992	Archaeological Reconnaissance of Kahuku Agricultural Park.	Upland Keana Ahupuaʻa.	One day reconnaissance survey yielded no new sites. Not shown on Figure 6.
Dagher	1993	Inadvertent Discovery of a Human Burial At Makahoa Point, Mālaekahana, Koʻolau Loa, Oʻahu.	Makahoa Point.	A single pre-Contact era human burial of Hawaiian ancestry was inadvertently discovered.
Jourdane	1994	Inadvertent Discovery of Human Remains near Kahuku Golf Course, Kahuku, Oʻahu.	Near Kahuku Golf Course.	A single pre-Contact era juvenile human burial was inadvertently discovered.
Hammatt	1996	Archaeological Reconnaissance for Proposed Mālaekahana Exploratory Wells, Mālaekahana, Oʻahu.	Just mauka of the southern mauka end of the NPM APE.	Archival research and archaeological background performed. No sites recorded.

Authors	Year	Report Title	Project Location	Findings
Hibbard	1997	Inadvertent Discovery of Human Remains, Japanese Cemetery, Kahuku Golf Course, TMK 5-6-002:010. Memo in Burial Files.	Japanese Cemetery near Kahuku Golf Course.	A single pre-Contact era human bone was inadvertently discovered.
Collins	1999	Recovery of Human Remains From Kahuku Golf Course.	Kahuku Golf Course (makai).	Pre-Contact era human remains were inadvertently discovered (site -5773).
Perzinski & Hammatt	2001	Archaeological Inventory Survey Report for Hospital Ditch and Kiʻi Bridge in the Ahupuaʻa of Kahuku, District of Koʻolau Loa, Island of Oʻahu (TMK: 5-6-02, 05 & 06).	Kamehameha Hwy., Kahuku near detour roads.	No sites recorded.
Calis & Tome	2002	An Archaeological Monitoring Report for the Force Main Sewer Replacement Project, Kahuku Ahupuaʻa, Koʻolauloa District, Oʻahu Island, Hawaiʻi.	Force Main Sewer, makai of Kamehameha Hwy., Kahuku.	No sites recorded.
Stride et al.	2003	Archaeological Inventory Survey of the Proposed 785-Acre Kahuku Agricultural Park.	The original 1992 project area was 1666 acres, later in 2003 reduced to 785 acres in upland Kahuku and Keana Ahupuaʻa (single report submitted in 2003).	In all, 21 sites were located in original project area. However, 7 sites were recorded (50-80-02-4510 through -4516) in the revised area. Site types: wall sections, overhang shelters, terraces, and enclosures. Most appear to function as habitation sites from pre-contact into Historic times.
O'Hare et al.	2004	Documentation of the Kahuku Sugar Mill, Kahuku Ahupuaʻa, Koʻolau Loa District, Island of Oʻahu.	Kahuku Mill Complex.	Documentation report of remaining Plantation structures.
O'Hare et al.	2008	Archaeological Inventory Survey Plan for the Kahuku Subdivision Project, Kahuku, Keana, and Mālaekahana Ahupuaʻa, Koʻolau Loa District, Oʻahu Island TMK: (1) 5-6-002; 003, 010, 012, 016, and 027.	200 acres of makai Kahuku, Keana, & Mālaekahana Ahupuaʻa. Bound by the coast, Makahoa Point, Kaluahole, & Kamehameha Hwy.	No sites recorded. Extensive background research performed on area.
Morrison	2009	Archaeological Background Report for the Proposed Nā Pua Makani Wind Farm Project, Kahuku, Oʻahu (TMK 5-6-008:006).	231.9 acres of Kahuku and Keana Ahupuaʻa, mauka of Kahuku Hospital.	No sites recorded. Background research performed on area.
Rechtman	2009	A Comprehensive Archaeological Survey of the First Wind Kahuku Wind Power Project Area (TMKs: 1-5-6-05:007 & 014).	230 acres west of Kahuku Village and 2.5 kilometers inland of coast.	SIHP Site 4707, which was described as sugarcane field infrastructure.
Dagher & Spear	2010	Literature Search and Field Inspection of the Kahuku Storm Damage Reduction Project Kahuku Ahupuaʻa, Koʻolau Loa District, Oʻahu Island.	Kahuku Intermediate and High School grounds & park adjacent to the west.	No sites recorded. Background research performed on area.
Dagher & Spear	2014a	Archaeological Inventory Survey Report for the Kahuku Village Subdivision Project, Keana and Mālaekahana Ahupuaʻa, Koʻolau Loa District, Island of Oʻahu, Hawaiʻi [TMK (1) 5-6-002:027].	Portion of 50 acres between Kahuku Golf Course and Kamehameha Hwy.	A single site was found (site No. -7508), consisting of ten features (9 plantation era & 1 pre-Contact to early Contact era).

Authors	Year	Report Title	Project Location	Findings
Dagher & Spear	2014b	An Archaeological Monitoring Report for the Kahuku Village Subdivision Project, Keana and Mālaekahana Ahupuaʻa, Koʻolau Loa District, Island of Oʻahu, Hawaiʻi [TMK (1) 5-6-002:013, 014].	Portion of 50 acres between Kahuku Golf Course and Kamehameha Hwy.	Five archaeological sites found: site Nos. -7398 (historic cesspools); -7399 (Burial); -7400 (-7401 and -7511); -7398.
Lyman & Spear	2014	Archaeological Inventory Survey for the Kahuku Village Subdivision Project Keana Ahupuaʻa, Koʻolau Loa District, Island of Oʻahu, Hawaiʻi [TMK: (1) 5-6-002:047 por].	Kahuku Village immediately makai of Kamehameha Hwy. and mauka of Kahuku Golf Course.	Site No. -7508, feature 8 (Historic existing Plantation era homes) relocated.

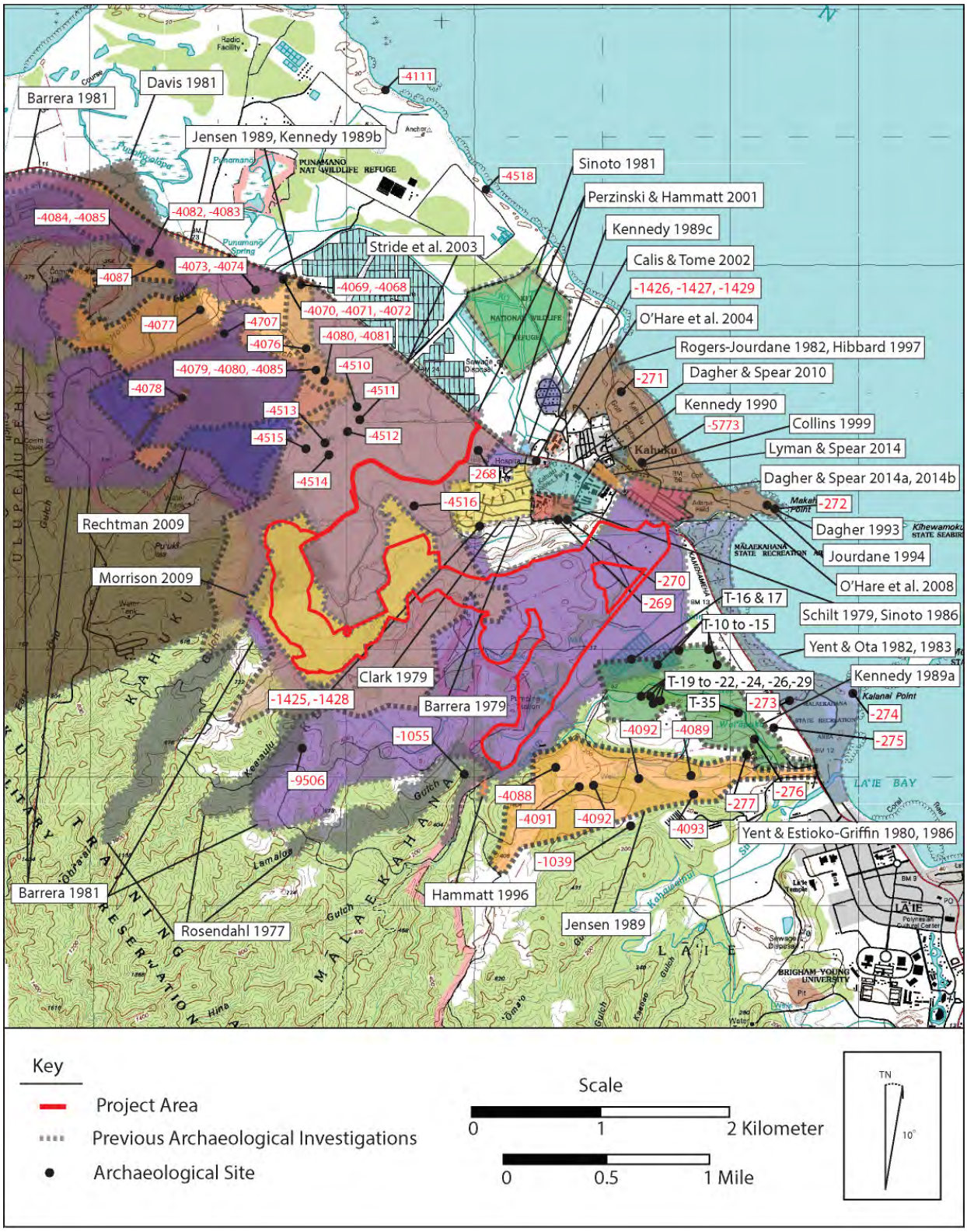

Figure 6. Previous archaeological studies and sites in vicinity of NPM project area (adapted from USGS Kahuku Quadrangle Map).

A single historic grave with a marker exhibiting a date of 1945 was also found during this investigation.

William Barrera (1979) revisited the Koʻolau Loa Housing project the following year, conducting a more thorough archaeological inventory survey and subsurface testing. Barrera (1979) suggested that two limestone knolls and the base of a limestone ledge had the potential to contain archaeological sites, and that the rest of the area had been impacted by sugarcane activities. These three areas were surveyed, yielding five archaeological sites. Site No. -1425 was comprised of two walls aligned at the base of the limestone cliff. Site No. -1426 was described as a rock-lined depression and a metal pipe located at the eastern knoll. Site No. -1427 consisted of a complex of three walls, three rock mounds, and one cave located on the eastern knoll. Site No. -1428 was described as a wall situated on top of a cliff. Site No. -1429 consisted of an earthen mound within an L-shaped wall. Although several of the features were tested, no cultural remains were observed. The conclusion was that most of these features, if not all, were historic and associated with sugar cane cultivation (Barrera 1979).

In 1979, a crew from the Bishop Museum recorded Sites No. -269 and -270 (Schilt 1979), during an archaeological reconnaissance survey for the 4-acre Kahuku School Expansion project. Although some collapse and disturbance was observed on the platform (Site No. -269), Schilt (1979) noted that one component of the platform was a large coral "block," which may indicate that the feature had a ceremonial component. Sketches were made of the platform as well as photographs to record the condition of the platform. Schilt (1979) also noted that the two stones at the entrance of Keana Cave (Site No. -270) were natural formations and that the cave floor was covered by scattered limestone fragments that were likely roof fall, but that midden could possibly lie below it. A roughly rectangular stone mound (Site No. -2478) and a small overhang located within a large outcrop (Site No. -2479) were also recorded (Schilt 1979).

A reconnaissance survey was performed in 1981 by Barrera for the 2,500-acre Kahuku Agricultural Park, which was separated into four parcels. This study area nearly encompasses the current Nā Pua Makani Wind Project area. Barrera (1981) brief survey was performed in three of these parcels and a more thorough survey was performed in one 500-acre parcel. The current project area lies largely in the 500-acre parcel intensively surveyed and the eastern most parcel Barrera (1981) surveyed. In his background research, Barrera (1981:19) listed sites on file at the SHPD office at that time, stating that Site -1055, described as a "Shelter Cave," was outside of his project area and mapped it approximately 200 meters west of the southernmost projection of the project area. However, no source was cited in Barrera's 1981 report. Three archaeological "locations" were identified in the westernmost parcels, which did not include any structural features, but consisted of solely of possibly pre-Contact and historic surficial remains. These three locations were all within Kahuku Ahupuaʻa, just under a kilometer north of the project area. Location 1 consisted of a marine shell, coral fragments, and basalt flakes. Location 2 was comprised of one cowry shell. Location 3 was a concentration of glass bottle fragments.

Subsequently, Bertel Davis (1981) performed a reconnaissance-level survey in selected areas of KTA for a proposed wind farm, which yielded four newly identified sites (Site No -2357 through -2360). Site No. -2357 consisted of a discontinuous segment of a stacked stone wall that

supported a barbed-wire fence with milled wood posts. Sites No. -2358 through -2360, consisting of a house site, habitation terraces, and a terrace with ceremonial features (respectively), are suggested to be functionally and spatially related, being situated within a swale in upland ʻŌpana Ahupuaʻa (Davis 1981). These findings are located over 3 kilometers to the northeast of the project area.

The same year, Aki Sinoto of the Bishop Museum performed a brief reconnaissance survey of the Kiʻi and Punamanō Wetland Refuge areas (Sinoto 1981), finding that the land had been extensively modified. He noted a single historic site, which was an old OR&L railroad track. The entire wetland site was designated 50-0a-F4-10/1l. While Sinoto (1981) referred to this area as Kahuku Fishpond, one of McAllister's (1933:154) informants maintains that this area was always a swamp - not a fishpond.

Between the years 1980 and 1986, several archaeological investigations were performed in Mālaekahana State park, which had been divided into three phases. In 1980, Yent and Estioko-Griffin performed mapping, testing, excavation, and analysis at Site No. 50-80-02-2801, which was in Phase I located in the southern portion of the park. The three-year project yielded three major occupational layers dating from ca. AD 1600 to 1780. (Yent and Estioko-Griffin 1980:xxi-xxiv). Yent and Ota (1982) performed auger testing at Phase II of the park, which is the northern portion of the park. Of the 22 cores, cultural materials were encountered only in coastal areas. No new sites were found. The next year, Yent and Ota (1983) recorded a human burial, *imu*, and two hearths in an eroding dune face in Phase III, which is in the center of the bay's coast (Site No. 50-80-02-1038). In 1986, Yent and Estioko-Griffin excavated 11 cores in the southern extent of Phase I, which yielded no new sites (Yent and Estioko-Griffin 1986).

Also in 1982, Rogers-Jourdane performed a reconnaissance survey of approximately 45 acres of the Kahuku Golf Course as well as a 2,000-foot long by 100-foot wide corridor for an associated pipeline. This survey yielded no archaeological sites (Rogers-Jourdane 1982). This project area was located over 200 meters to the northeast of the current project area.

Four years later, Sinoto revisited Sites No. -269 and -270 to flag the perimeter for protective fencing to be installed prevent damage during the proposed Kahuku Elementary School extension construction activities (Sinoto 1986).

In 1989, Jensen performed an archaeological inventory survey of two separate areas for the proposed development of Punamanō and Mālaekahana Golf Courses project, totaling 866 acres. Twenty-six sites containing 45 component features were identified between the two separate project areas. These reports were initially released as a single report by Jensen (1989). The two golf course areas were then considered two separate project areas and Kennedy 1989a and 1989b continued the investigations in these two separate project areas.

Kennedy 1989b reevaluated Jensen's (1989) Punamanō Golf Course survey. The proposed 638-acre Punamanō Golf Course was located less than one kilometer north of the current project area. Twenty-six archaeological sites were recorded by Jensen (1989) in this portion of the project area (Sites No. -4076 through -4081, and -4085). Site No. -4076 is comprised of an overhang shelter complex of eight features (Features A-H) with visible midden and basalt

flakes. Site No. -4077, also a complex (Features A-C), was described as a terrace with a wall and *ʻauwai* (ditch). Site No. -4078 is a three feature complex (A-C) comprised of an overhang shelter with two stacked walls. Site No. -4079 consists of short wall segments. Site No. -4080 is described as a historic trash dump and bottle scatter. Site No. -4085 is a complex of two features (A and B), Feature A being an enclosure and Feature B being a low wall.

Kennedy (1989b) reviewed and reevaluated Jensen's (1989) findings at the Punamanō Golf Course and added two new historic sites, including an enclosure complex and an irrigation ditch, as well as fourteen new features associated with sites previously identified by Jensen (1989). SIHP numbers for newly identified sites were not provided. Further, Kennedy (1989b) suggested that Jensen's (1989) Site No. -4076 be preserved, as Kennedy maintained that it could possibly be a burial.

Kennedy's (1989a) survey of 200 acres at the site of the proposed Mālaekahana Golf course, which was not the same survey area as Jensen's (1989) Mālaekahana Golf Course project area, yielded 19 surface features. These sites included overhang shelters with evidence of previous human occupation, suspected agricultural terraces, low mounds, midden scatter areas, large, sandy dune formations with suspected cultural components, prehistoric surface artifacts, a historic gun emplacement, and a historic railroad bed. Kennedy (1989a) found thirteen new sites, consisting of 11 traditional habitation and agricultural sites and two historic plantation and military sites. Also, six sand dunes recommended for testing. Sites in this report did not receive SIHP numbers, but were designated temporary site numbers. This portion of the project area is located less than 100 meters south of the current Nā Pua Makani Wind Project's southern boundary.

Later that year, Kennedy (1989c) performed a reconnaissance survey on a 14-acre parcel across Kamehameha Highway of Kahuku Hospital, which is roughly 1 kilometer north of the project area. While no archaeological sites were identified, Kennedy noted that Kiʻi Ditch ran through the parcel. There is no evidence that this plantation-era ditch followed an earlier *ʻauwai*, or traditional irrigation ditch.

In 1990, Kennedy performed archaeological subsurface testing in a parcel just northeast of the Kahuku Sugar Mill and approximately 500-meters north of the current project area. Although no archaeological materials were found in the 47 trenches, a single early modern trash pit and a few shallow irrigation channels associated with nearby small garden areas were observed. The stratigraphy of the trenches suggested that a sand deposit, which has been formed by gradual Aeolian processes over a lengthy time period, exists throughout the area. As such, human remains may potentially exist in the upper, penetrable sand deposit (Kennedy 1990).

Pfeffer and Hammatt (1992) of Cultural Surveys Hawaiʻi, performed an archaeological assessment of an area spanning from Waialua to Kahuku for a power line project. They noted that a multitude of archaeological sites may be present in the vicinity of the project area, with greater probability in coastal areas.

A one-day survey was performed by Hammatt and Pfeffer in 1992 on four parcels (lA, lB, 2, and 3) in *mauka* Keana Ahupuaʻa for the Kahuku Agricultural Park, limiting the survey to areas not under cultivation. No sites were recorded during the brief survey.

In 1992, Cultural Survey Hawaiʻi (CSH) surveyed ca. 785 acres that included the western portion [TMK (1) 5-6-008:006] of the current project area (Figure 7; Stride et al. 2003). The original survey area was 1,600 acres, but then reduced to ca. 785 acres with no reason given. Figure 7 shows that most of the western portion of the current project area was surveyed by CSH. Approximately 53 acres of this western portion of the current project area was not previously surveyed. In addition, CSH was originally supposed to survey an additional ca. 900 acres to the east [TMK (1) 5-6-006:018] which would have included nearly all of the current Nā Pua Makani project area. However, CHS never completed the survey to the east or explained why the project area was reduced.

Stride et al. (2003) state that 21 sites were identified in the overall 1,600 acre survey area, but only seven sites were located in the reduced ca. 785-acre western portion. This indicates 14 sites were found in the eastern portion of the original CSH survey area, which includes the current Nā Pua Makani project area. These sites were not described, so it not known what types of sites were found or where they were located.

Stride et al. (2003) describe the seven sites which they recorded near the western side of the current project area. These seven sites are located to the north and outside of the current project area. These seven sites are composed of 16 features: overhang shelters (n=8) (one of which contained human remains), walls (n=3), terraces (n=3) an enclosure (n=1), and a U-shaped temporary shelter (n=1) and terraces.

The results of the CSH survey indicate that although the current project area and vicinity was severely impacted by large-scale commercial agriculture, the area still has the potential to contain significant cultural resources. These resources would be in areas not impacted by mechanized agricultural activities. There is also the possibility that subsurface deposits may be present, but this is somewhat unlikely.

In 1993, a single pre-Contact era human burial of Hawaiian ancestry was inadvertently discovered at Makahoa Point (Dagher 1993), which is approximately 800 meters east of the current project area. The following year, Jourdane (1994) wrote a letter report for a single pre-Contact era juvenile human burial that was inadvertently discovered near the Kahuku Golf Course, ca. 800 meters east of the project area. In 1997, a single human bone, assumed to be pre-Contact era, was inadvertently discovered near the Kahuku Golf Course, approximately one kilometer north of the current project area (Hibbard 1997). Several years later, another set of pre-Contact era human remains were inadvertently discovered at the golf course (Site -5773), less than 500 meters north of the project area (Collins 1999).

An archaeological inventory survey was performed in 2001 for the Hospital Ditch and Kiʻi Bridge/Drainage (Perzinski and Hammatt 2001), which is located just over 1 kilometer north of the project area. No archaeological sites were noted.

Archaeological monitoring was performed in 2002 during excavations related to the 670-meter long force main sewer replacement *makai* of Kamehameha Hwy, which is a little over one kilometer north of the current project area (Calis and Tome 2002). Although no archaeological sites were encountered during ground disturbing activities, Calis and Tome (2002) recorded the stratigraphy of this area that appeared to be largely imported construction fills related to sugar cane cultivation and irrigation.

In 2004, O'Hare et al. conducted documentary research for the Kahuku Sugar Mill complex, following Historic American Engineering Records (HAER) recording format (O'Hare et al. 2004). The mill is roughly 900 meters north of the current project area.

O'Hare et al. (2008) performed extensive background research for the Kahuku Subdivision Project area, which is comprised of 200 acres that are located less than 300 meters northeast of the current project area. No sites recorded.

In 2009, International Archaeological Research Institute, Inc. (IARII) conducted archival research on the western portion of the Nā Pua Makani project area [TMK (1) 5-6-008:006] for West Wind Works, LLC (Morrison 2009). IARII reviewed early historic documents, historic maps, and previous archaeological investigations in the area.

IARII's research indicated that at the time of first European contact (1779) the general Kahuku area was densely settled and intensively cultivated. However, drastic population decline and reduction in agricultural practices were evident within 20 years (1794). In the mid 1800s, cattle and sheep ranching were being practiced in Kahuku, which led to dramatic vegetation change in the area. Sugar and pineapple cultivation began in the late 1800s resulting in extensive land modifications of the area. Figure 8, which shows that extent of historic commercial sugar cane and pineapple cultivation, is the result of IARII's research and the finding of a 1913 USGS map that shows the extent of these historic agricultural practices. Clearly, the majority of the Nā Pua Makani project area was extensively modified by these commercial agricultural activities.

IARII also reviewed the work done by CSH (Stride et al. 2003) and concluded that most of the Nā Pua Makani project area, as then defined (the western portion of the current project area [TMK (1) 5-6-008:006]), was surveyed by CSH. IRII noted that most of the area had been modified by historic agricultural activities and no archaeological sites were found.

IARII concluded that it is unlikely that any cultural remains would be found within the project area and that no further archaeological work was needed.

Rechtman (2009) conducted an archaeological inventory survey of the 230-acre First Wind Kahuku Wind Power project area located less than 300 meters northwest of the Nā Pua Makani Wind Project. A single archaeological site was recorded within the project area (Site -4707), which is an existing site recorded by Kennedy (1989) with related plantation infrastructure features that is located just outside of the project area.

Another background research report was prepared in 2010 by Dagher and Spear for the Kahuku Storm Damage Reduction Project, which is located approximately 500 meters north of the project area (Dagher and Spear 2010). No archaeological sites were recorded.

In 2014, Dagher and Spear performed an inventory survey on 50 acres between the Kahuku Golf Course and Kamehameha Highway for the Kahuku Village Subdivision Project, which is directly across Kamehameha Highway of the current project area (Dagher and Spear 2014a). During this survey, a single site was found (Site -7508), consisting of ten features (nine plantation era and one pre-Contact to early-Contact era). Subsequently, Dagher and Spear conducted archaeological monitoring for the same project, where five additional archaeological sites were found, including Site -7398 through -7401, and -7511. Site types include human burials and historic cesspools (Dagher and Spear 2014b). Later the same year, Lyman and Spear (2014) conducted an inventory survey for the same project, but the area immediately northwest of Dagher and Spear's (2014a and 2014b) project area. No new archaeological sites were found.

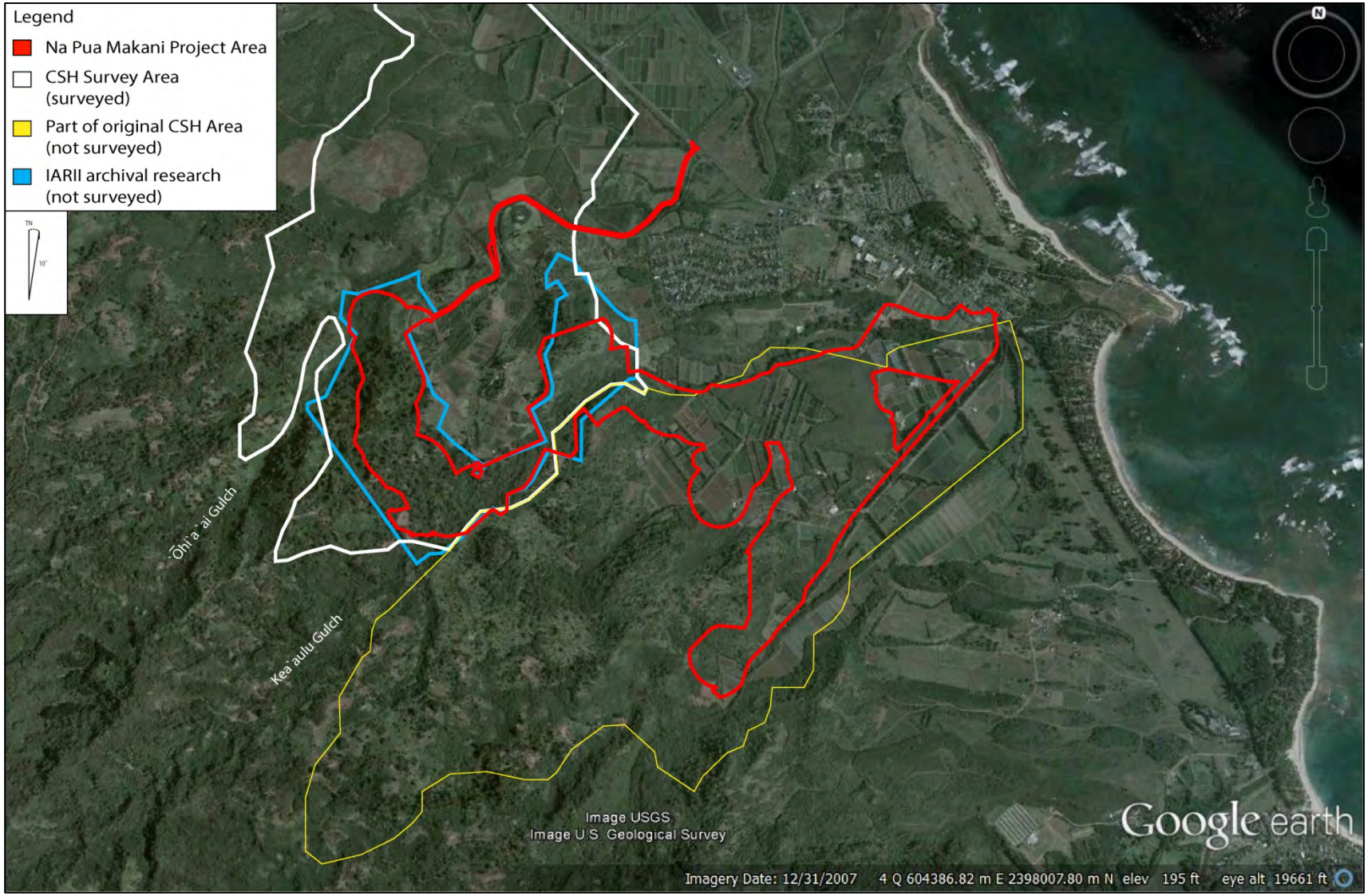

Figure 7. Map showing areas archaeologically surveyed and not surveyed in the CSH study in relation to current APE.

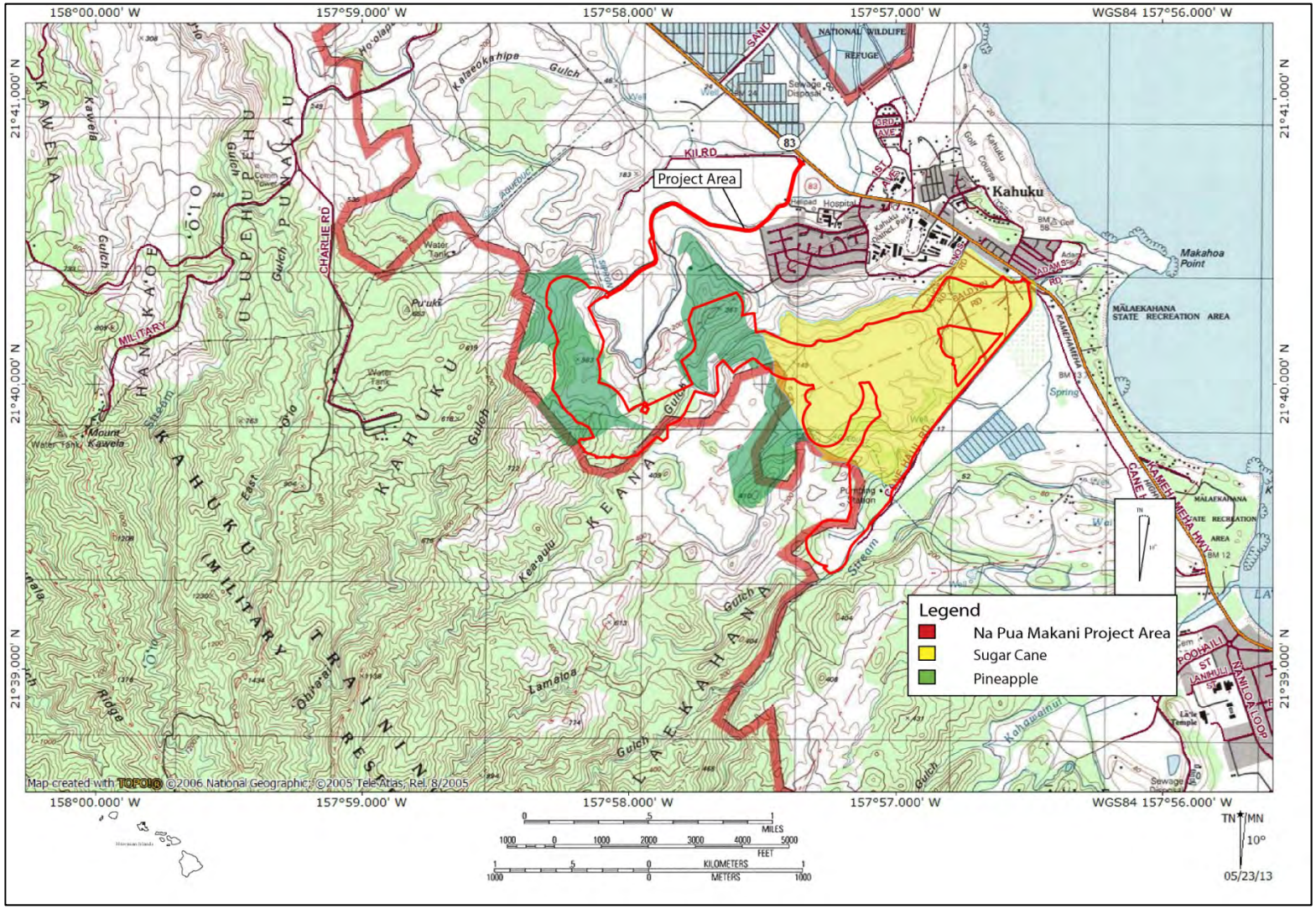

Figure 8. Location of former commercial agricultural lands (map source: National Geographic TOPO; data from Morrison 2009:Figures 4, 7, and 8).

5.0 METHODS

Under the overall direction of Paul L. Cleghorn, Ph.D., Pacific Legacy archaeologists, James McIntosh, B.A., Caleb Fechner, B.A., Jeff Putzi, B.A., Kimberly Mooney, B.A., Amara Kunishi, B.A., and Gina Farley, M.A. conducted multiple sessions of field investigations over an eight month period between April and December 2014.

The original APE began as approximately 450 acres but was subsequently altered to the current 464 acres due to changes in development plans. As a result, 14 sites originally recorded during the survey are now outside of the APE and thus will not be affected by the project. However, Pacific Legacy is reporting the results of these sites here because they were formally documented prior to the change of APE.

5.1 PEDESTRIAN SURVEY

The team began the survey in April on the far western side of the project area on the lands owned by the State of Hawaiʻi. Team members were spaced between 10 to 20 meters apart depending on vegetation density and ground visibility. As close as possible to a 100% coverage survey was achieved. The team surveyed ridge tops, slopes and valleys throughout the APE. Slopes greater than 35 to 40 percent were not surveyed due to the low likelihood of containing cultural resources and safety issues. All drainages within the APE were surveyed. Special attention was paid to the sides and bases of the drainages where traditional Hawaiian features were predicted to be present.

When an archaeological feature was encountered, it was examined to determine whether it constituted an isolated element deserving its own site number or whether it formed part of a larger site complex. Each recognized archaeological site was then assigned a temporary field number to facilitate identification. This consisted of a T (for temporary) followed by a consecutively number (i.e., T-001). Individual structural features within a specific site were assigned consecutive letter designations to aid in recording and mapping.

Once identified, each site and its component features were fully documented. Vegetation clearance was undertaken as needed. The relative location of each site was mapped using a hand held Trimble GeoExplorer XT global positioning system (GPS) unit. Its coordinates were recorded in Universal Transverse Mercator, North American Datum of 1983, Zone 4 (UTM NAD 83 Z4) projection. GPS points were recorded using a Real-Time SBAS Corrected system and had an horizontal accuracy of less than 1 meter; no post processing was undertaken. An individual point was taken for each site (site datum) and most individual features (feature datum); aluminum site tags were placed at the site datum. In a few cases, dense vegetation and topography resulted in a lack of satellite signal and GPS coordinates were not recorded. For mapping linear or shaped features, GPS line recordings were made.

Detailed site and feature descriptions were recorded for all identified archaeological remains (Appendix B provides full descriptions for all recorded sites and features). Documentation also included digital photographs of each site. Plan view maps were prepared of the more complex sites using either a plane table or tape and compass. A metal site tag was filled out and left at each site for relocation purposes. Since, at the time of the survey, SIHP numbers had not been assigned, the metal site tags left at each site were marked with the temporary field number and date.

5.2 TEST EXCAVATION

Subsurface backhoe testing was conducted at various locations throughout the project area. The focus of the testing was the areas where heavy ground disturbance would take place during the proposed construction of the wind farm. No subsurface testing was conducted within the active farm lots on the MHW lands to the east, however, one test trench was placed within one active farm lot along the roadway within the DOA controlled lands on the west side of the APE. An archaeologist stood-by and directed all backhoe excavations. Excavations were closely monitored, to ensure that no potentially significant finds were overlooked. Backhoe trenches ranged from 3 to 6 meters long and proceeded to 0.6 to 1.5 meter below surface (2 – 4.9 feet). Once excavation of the trench was completed, a representative wall facing was cleaned and the stratigraphic profile was drawn and described; standard USDA descriptive terminology and Munsell Color references were used.

Two controlled, hand-excavated test units were excavated at two sites. They were excavated with trowel and dustpan and all soil was screened through nested 1/4 and 1/8 inch screens. Excavation proceeded in arbitrary 10 centimeter levels within natural stratigraphic layers. Any cultural material identified was collected, bagged by provenience and transported back to the Pacific Legacy laboratory. The excavations were documented with notes on standard excavation forms. Profiles were drawn and the excavation recorded with digital images. Radiocarbon samples were submitted for wood identification and radiocarbon dating.

5.3 LABORATORY ANALYSES

All materials collected during the course of test excavations were transported to Pacific Legacy's Oʻahu laboratory for processing, identification, and detailed analysis. All laboratory work was conducted by Kimberly Mooney, B.A., a trained faunal and human osteological technician, using Pacific Legacy reference collections and books. Analysis of recovered materials included sorting, identification, labeling, and curation. One hundred percent of faunal material (shell fish, marine bone, avian bone, mammal bone) was sorted as to recognizable taxa, weighed and analyzed. All shell and bone midden material was identified and sorted by family, genus, or species when possible and was weighed separately before being entered onto a site midden table. The few artifacts recovered during test excavation were cleaned, identified, measured, weighed, described, photographed, cataloged and analyzed for function and chronological patterns.

During the course of excavation, samples for radiocarbon dating were recovered from secure proveniences. Two charcoal samples were selected for radiocarbon analyses from Site 7867. Prior to submission for radiometric analyses, the charcoal samples were submitted to the Wood Identification Laboratory at the International Archaeological Research Institute, Inc. for species identification. Each sample was examined and identified by academically trained wood analyst Gail Murakami. The purpose of this analysis was to det ermine the presence or absence of historically introduced wood and to differentiate between short lived and long lived species (short lived species are better indicators of the true date at which a piece of wood was burned). The results of wood analyses are presented in Appendix D. The two charcoal samples were then sent to Beta Analytic Radiocarbon Dating Laboratory for dating. Both samples were relatively small so that accelerator mass spectrometry (AMS) radiocarbon dating was necessary.

5.4 CURATION

All field records (descriptions, notes, and photographs) resulting from the inventory survey, as well as all cultural materials (artifacts, midden, etc.) and samples (soil, charcoal, etc.) collected during test excavations, have been temporarily housed in the Pacific Legacy Kailua, Oʻahu office. The ultimate disposition of all materials generated by this project will be determined through consultation with the State Historic Preservation Division.

6.0 ARCHAEOLOGICAL SURVEY RESULTS

A total of 28 newly identified archaeological sites were documented during the AIS survey (Figure 9 through Figure 13; Table 3) of a quite varied landscape (Figure 14 through Figure 18). Of the 28 sites documented, 22 sites are traditional Hawaiian pre-Contact or early post-Contact sites, one site is related to the sugar industry, three sites are historic sites not associated with sugar plantation activities, and two are military sites.

The original APE for the project began as approximately 450 acres, but was subsequently altered to the current 464 acres. This change in the size of the APE stems from design changes for the wind farm and the desire to avoid several pre-Contact archaeological sites identified on lands not strictly needed for the development of the wind farm. Besides this reduction in acreage, modifications were made to accommodate minor project design changes that increased the size of the APE; all of the maps in this report (e.g., Figures 9 – 13) show the boundaries of the final APE. The interested reader is referred to the Archaeological Inventory Survey Plan (Cleghorn 2014) for the boundaries and layout of the original APE. As a result of this APE alteration, 14 of the identified sites (7849 through 7862 and three components [C26, C33, and C35] of Site 7844) are located outside of the revised APE and will not be impacted by the proposed Nā Pua Makani Wind Project. Of these, all except three of the Site 7844 components are pre-Contact or early post-Contact sites and relate to traditional habitation, agricultural, and burial practices. Pacific Legacy is reporting on these 14 sites in this AIS report because these sites were formally documented and recorded prior to the reduction of the APE. However, no test excavations were conducted in any of these sites. Specific descriptive information, including photographs and maps of each site is presented in Appendix B. A total of 14 archaeological sites are located within the current APE.

The vast majority of recorded components and features within the APE were associated with the agricultural development and intensive use for the cultivation of sugar cane by the former Kahuku Plantation (Table 3). The overwhelming majority of sugar plantation related features functioned mainly to control and transport water. A total of 68 features are related to water control and transport (Figure 12). These features include a variety of ditches, metal pipelines, wells, reservoirs, pump houses, and concrete foundations. The ditches are present in several forms, from simple earthen ditches, to stone-lined ditches and concreted ditches.

The next most common archaeological sites within the APE are pre-Contact or early post-Contact Native Hawaiian sites (n=8). These consist of terraces, a stone mound, a stone platform, a modified outcrop, and a cave that functioned as habitation sites and areas for the cultivation of traditional crops.

Three non-sugar plantation historic era sites were also recorded, as were two historic military sites consisting of two World War II defensive military bunkers and one military bivouac area.

The density of sites identified within the 464 acre APE is fairly low; 28 sites in the 464 acre APE computes to one site per 16.6 acres. The density of traditional pre-Contact sites (n=8) in the APE is even lower, with one site per 58.0 acres. The reason for this low density of archaeological

sites is undoubtedly due to the massive earth moving operations associated with mechanical cultivation of sugar cane for the Kahuku Plantation. A large number of surface pre-Contact or early post-Contact archaeological sites were undoubtedly destroyed during mechanical clearance of the landscape for sugar cane cultivation.

Assessments of the significance of each recorded archaeological site and recommendations for listing in either the Hawai‘i Register of Historic Places are presented in Section 9.0 and summarized in Table 12 in that section. Recommendations for the treatment of the archaeological resources found in the APE are provided in Section 10.0. These recommendations are also summarized in Table 12.

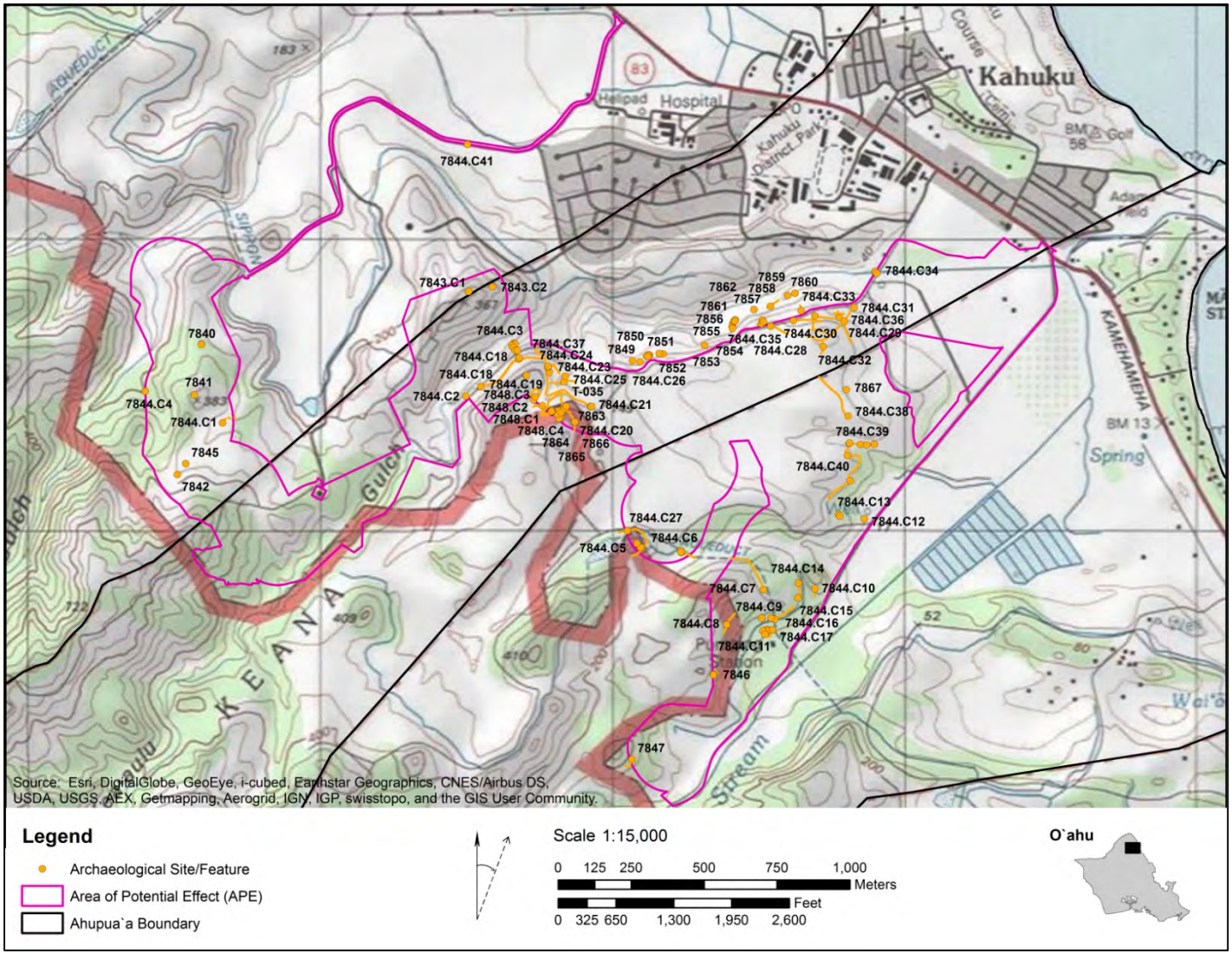

Figure 9. USGS map showing the locations of archaeological sites identified during the current project.

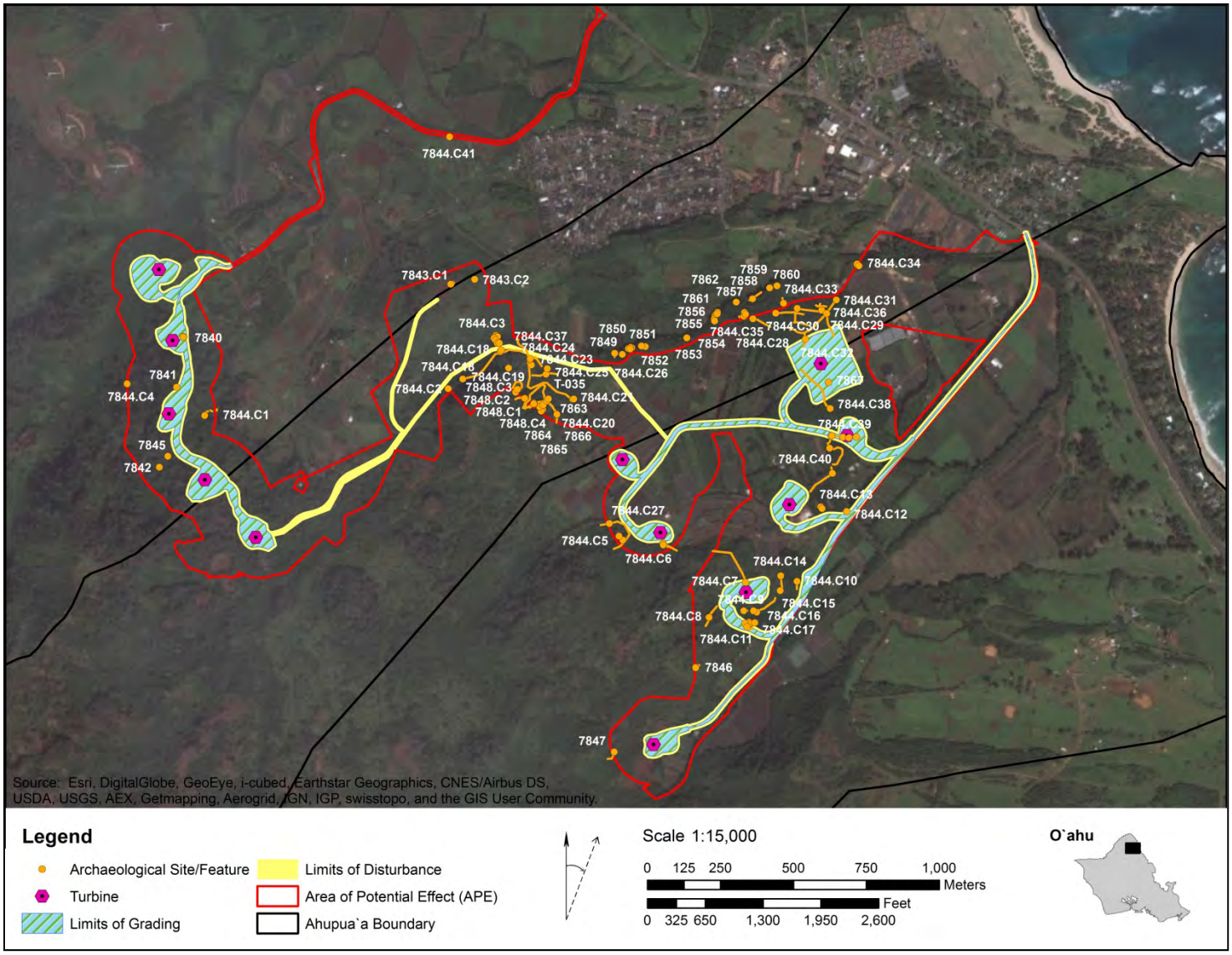

Figure 10. Aerial photograph showing the locations of archaeological sites identified during the current project.

Table 3. Archaeological Sites Recorded During the Current Project

SIHP No. (50-80-02-XXXX)	Component	Temp. No.	Feature	Type	Function	Period	Outside of APE
7840	-	T-001	A	Alignment	Bivouac	Historic/Military	
			B	Hearth			
7841	-	T-002	-	Stone Mound	Marker	Pre-Contact or early post-Contact	
7842	-	T-003	-	Platform	Habitation	Pre-Contact or early post-Contact	
7843	-	T-004	A	Bunker	Observation	Historic/Military	
		T-005	B	Bunker	Firing Position		
7844	C1	T-006	-	Ditch	Water Transport	Historic/Sugar	
	C2	T-008	-	Concrete Culvert	Water Control	Historic/Sugar	
	C3	T-009	A	Concrete Foundation	Water Control	Historic/Sugar	
			B	Concrete Foundation			
			C	Concrete Foundation			
			D	Concrete Foundation			
			E	Retaining Wall			
	C4	T-010	A	Ditch	Water Transport	Historic/Sugar	
			B	Ditch			
			C	Ditch			
			D	Ditch			
	C5	T-011	A	Valve	Water Control	Historic/Sugar	
			B	Well			
	C6	T-014	A	Concrete Foundation	Water Control	Historic/Sugar	
			B	Concrete Ditch	Water Transport		
			C	Iron Pipeline			
	C7	T-015	-	Pipeline	Water Transport	Historic/Sugar	
	C8	T-016	-	Soil Ditch	Water Transport	Historic/Sugar	
	C9	T-018	-	Stone/Concrete Ditch	Water Transport	Historic/Sugar	
	C10	T-019	-	Concrete Ditch	Water Transport	Historic/Sugar	
	C11	T-021	A	Storage Area	Water Control	Historic/Sugar	
			B	Concrete Well			
			C	Brick Well			
			D	Brick Well			
			E	Stone/Concrete Wall			
			F	Brick Well			
	C12	T-022	-	Pump House	Water Control	Historic/Sugar	
	C13	T-023	A	Shed	Storage	Historic/Sugar	
			B	Concrete Slab			
	C14	T-024	-	Concrete Ditch	Water Transport	Historic/Sugar	
	C15	T-025	-	Stone Ditch	Water Transport	Historic/Sugar	
	C16	T-026	-	Stone Retaining Wall	Roadway	Historic/Sugar	
	C17	T-027	-	Stone/Concrete Ditch	Water Transport	Historic/Sugar	
	C18	T-028	A	Soil Ditch	Water Transport	Historic/Sugar	
			B	Concrete Foundations			
	C19	T-029	A	Stone Lined Ditch	Water Transport	Historic/Sugar	
			B	Stone Lined Ditch			
			C	Stone Lined Ditch			
	C20	T-030	A	Soil Ditch	Water Transport	Historic/Sugar	
			B	Retaining Wall			
			C	Retaining Wall			
			D	Concrete Ditch			

SIHP No. (50-80-02-XXXX)	Component	Temp. No.	Feature	Type	Function	Period	Outside of APE
7844	C21	T-034	A	Soil Ditch	Water Transport	Historic/Sugar	
			B	Concrete Footing	Water Control		
	C22	T-035	-	Concrete Ditch	Water Transport	Historic/Sugar	
	C23	T-036	-	Stacked Stone Ditch	Water Transport	Historic/Sugar	
	C24	T-037	-	Concrete Ditch	Water Transport	Historic/Sugar	
	C25	T-038	-	Stone Alignment	Water Transport	Historic/Sugar	
	C26	T-043	-	Stone Lined Drainage	Water Control	Historic/Sugar	X
	C27	T-053	-	Reservoir	Water Control	Historic/Sugar	
	C28	T-054	-	Concrete Ditch	Water Transport	Historic/Sugar	
	C29	T-055	-	Concrete Ditch	Water Transport	Historic/Sugar	
	C30	T-056	-	Limestone Ditch	Water Transport	Historic/Sugar	
	C31	T-057	-	Iron Pipeline	Water Transport	Historic/Sugar	
	C32	T-059	-	Concrete Ditch	Water Transport	Historic/Sugar	
	C33	T-060	-	Concrete Ditch	Water Transport	Historic/Sugar	X
	C34	T-061	A	Pump House	Water Control	Historic/Sugar	
			B	Tank			
			C	Concrete Ditch	Water Transport		
			D	Concrete Ditch			
	C35	T-064	-	Concrete Ditch	Water Transport	Historic/Sugar	X
	C36	T-065	-	Limestone Ditch	Water Transport	Historic/Sugar	
	C37	T-066	-	Stacked Stone Ditch	Water Transport	Historic/Sugar	
	C38	T-073	-	Concrete Ditch	Water Transport	Historic/Sugar	
	C39	T-074	A	Aqueduct	Water Transport	Historic/Sugar	
			B	Concrete Ditch			
			C	Soil Ditch			
			D	Limestone Retaining Wall			
			E	Concrete Ditch			
	C40	T-077	-	Soil Ditch	Water Transport	Historic/Sugar	
	C41	T-078	-	Concrete Ditch	Water Transport	Historic/Sugar	
7845	-	T-007	-	Terrace	Agriculture	Historic	
7846	-	T-017	A	Stone Terrace	Agriculture	Pre-Contact or early post-Contact	
			B	Soil Terrace			
7847	-	T-020	-	Terrace	Agriculture	Pre-Contact or early post-Contact	
7848	-	T-031	A	Terraced Soil Furrows	Agriculture	Historic	
		T-032	B	Terrace			
		T-033	C	Terraced Soil Furrows			
		T-071	D	Terraced Soil Furrows			
7849	-	T-039	A	Overhang Shelter	Habitation	Pre-Contact or early post-Contact	X
			B	Terrace			X
7850	-	T-040	A	Terrace	Habitation	Pre-Contact or early post-Contact	X
			B	Terrace	Habitation		X
			C	Terrace	Habitation		X
			D	Terrace	Agriculture		X
			E	Terrace	Agriculture		X
7851	-	T-041	-	Filled Crevice	Poss. Burial	Pre-Contact or early post-Contact	X
7852	-	T-042	-	Terrace	Agriculture	Pre-Contact or early post-Contact	X
7853	-	T-044	-	Terrace	Uncertain	Pre-Contact or early post-Contact	X

SIHP No. (50-80-02-XXXX)	Component	Temp. No.	Feature	Type	Function	Period	Outside of APE
7854	-	T-046	-	Terrace	Agriculture	Pre-Contact or early post-Contact	X
7855	-	T-047	-	Terrace	Agriculture	Pre-Contact or early post-Contact	X
7856	-	T-048	-	Wall	Uncertain	Pre-Contact or early post-Contact	X
7857	-	T-049	-	Wall	Habitation	Pre-Contact or early post-Contact	X
7858	-	T-050	-	Wall	Uncertain	Pre-Contact or early post-Contact	X
7859	-	T-051	-	Overhang Shelter	Habitation	Pre-Contact or early post-Contact	X
7860	-	T-052	-	Wall	Uncertain	Pre-Contact or early post-Contact	X
7861	-	T-062	A	Overhang Shelter	Habitation	Pre-Contact or early post-Contact	X
			B	Terrace (Internal)			X
			C	Terrace (External)			X
7862	-	T-063	A	Cave	Habitation	Pre-Contact or early post-Contact	X
			B	Terrace			X
7863	-	T-067	-	Modified Outcrop	Uncertain	Pre-Contact or early post-Contact	
7864	-	T-068	-	Stone Terrace	Uncertain	Pre-Contact or early post-Contact	
7865	-	T-069	A	Terrace	Habitation	Pre-Contact or early post-Contact	
			B	Terrace	Agriculture		
7866	-	T-070	-	Artifact Scatter	Dump	Historic	
7867		T-072	-	Cave	Habitation	Pre-Contact or early post-Contact	

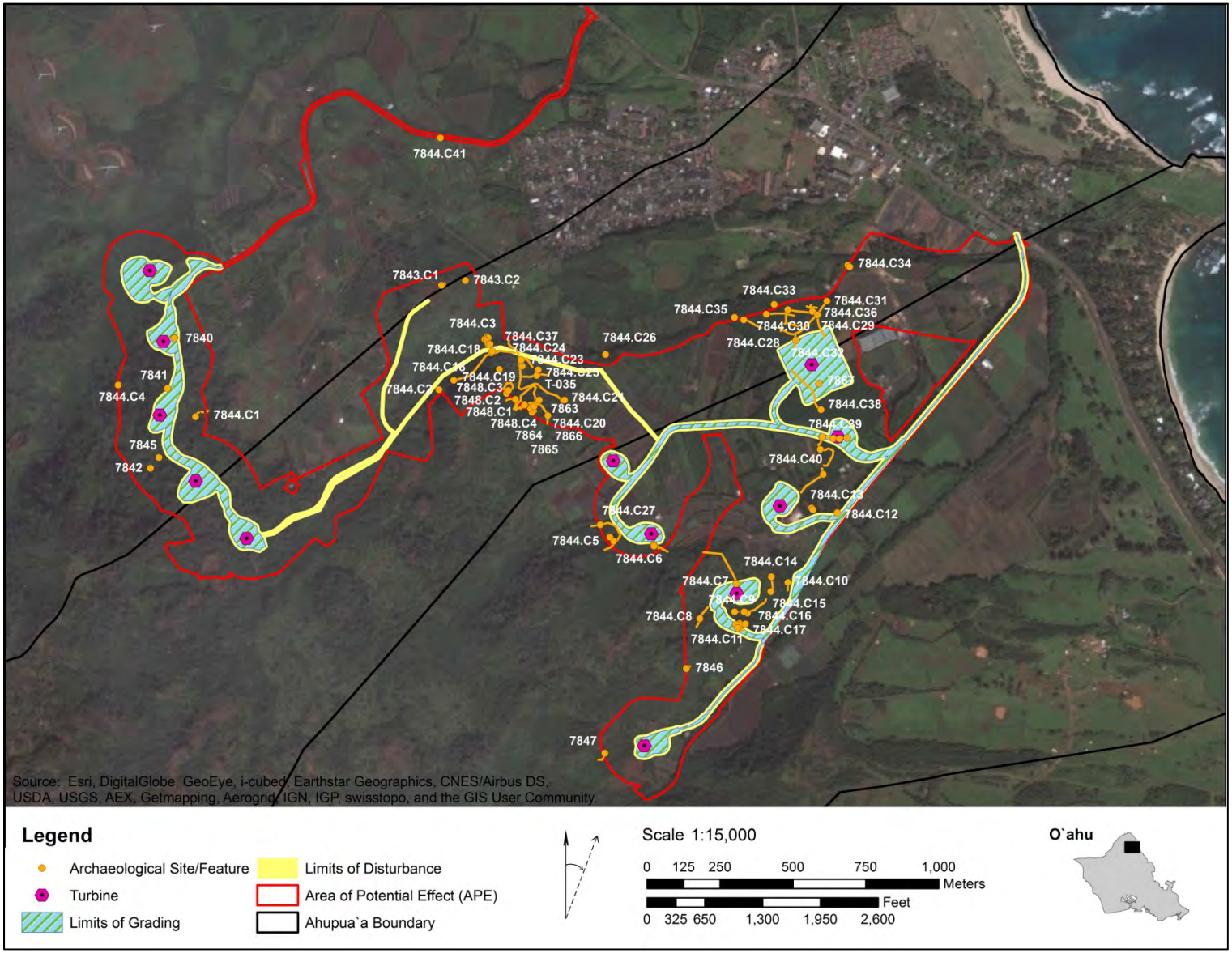

Figure 11. Aerial photograph showing the locations of all archaeological sites within APE (with the exception of Site 7844.C26, C33, and C35).

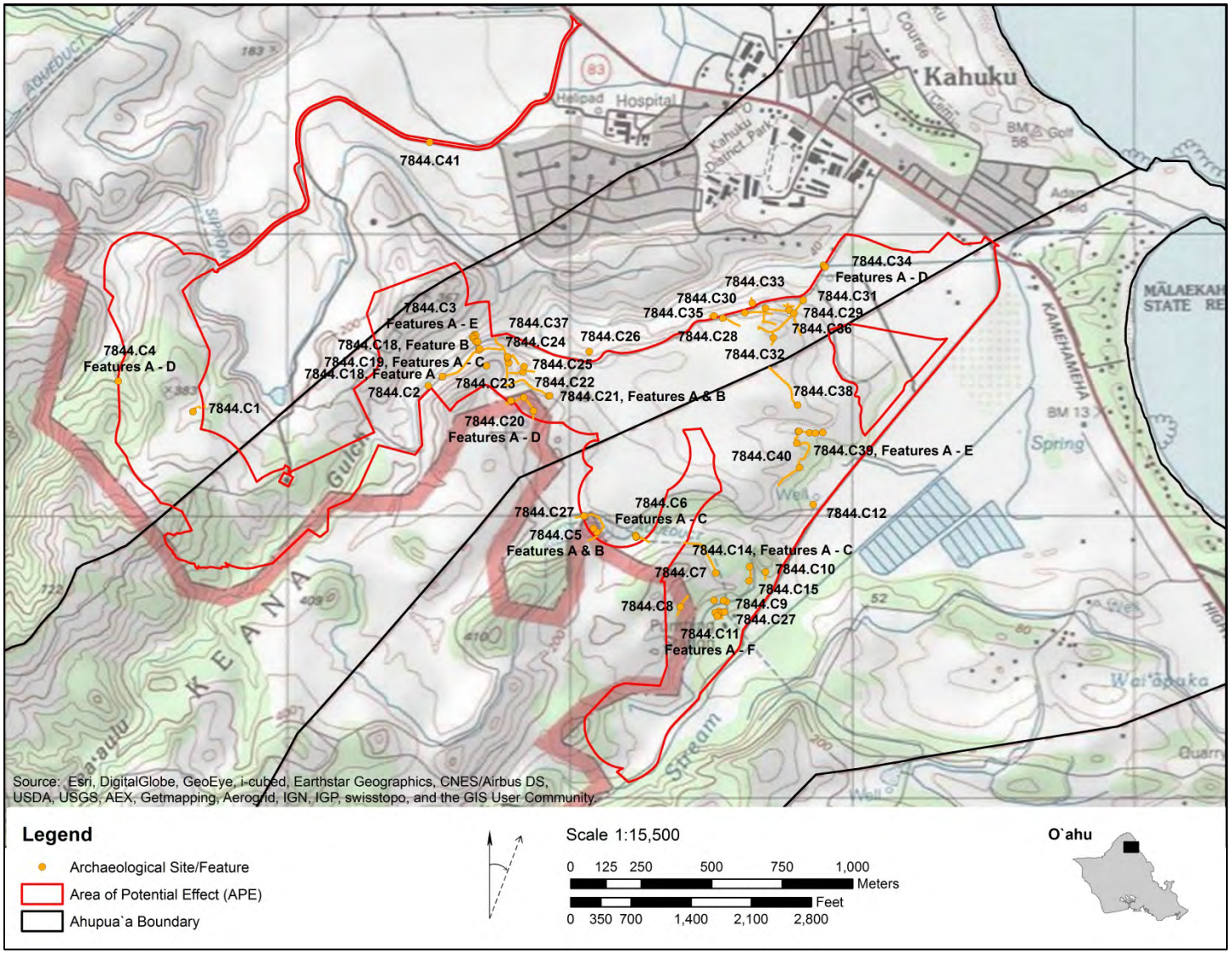

Figure 12. USGS map showing distribution of sugar plantation water transportation and control features.

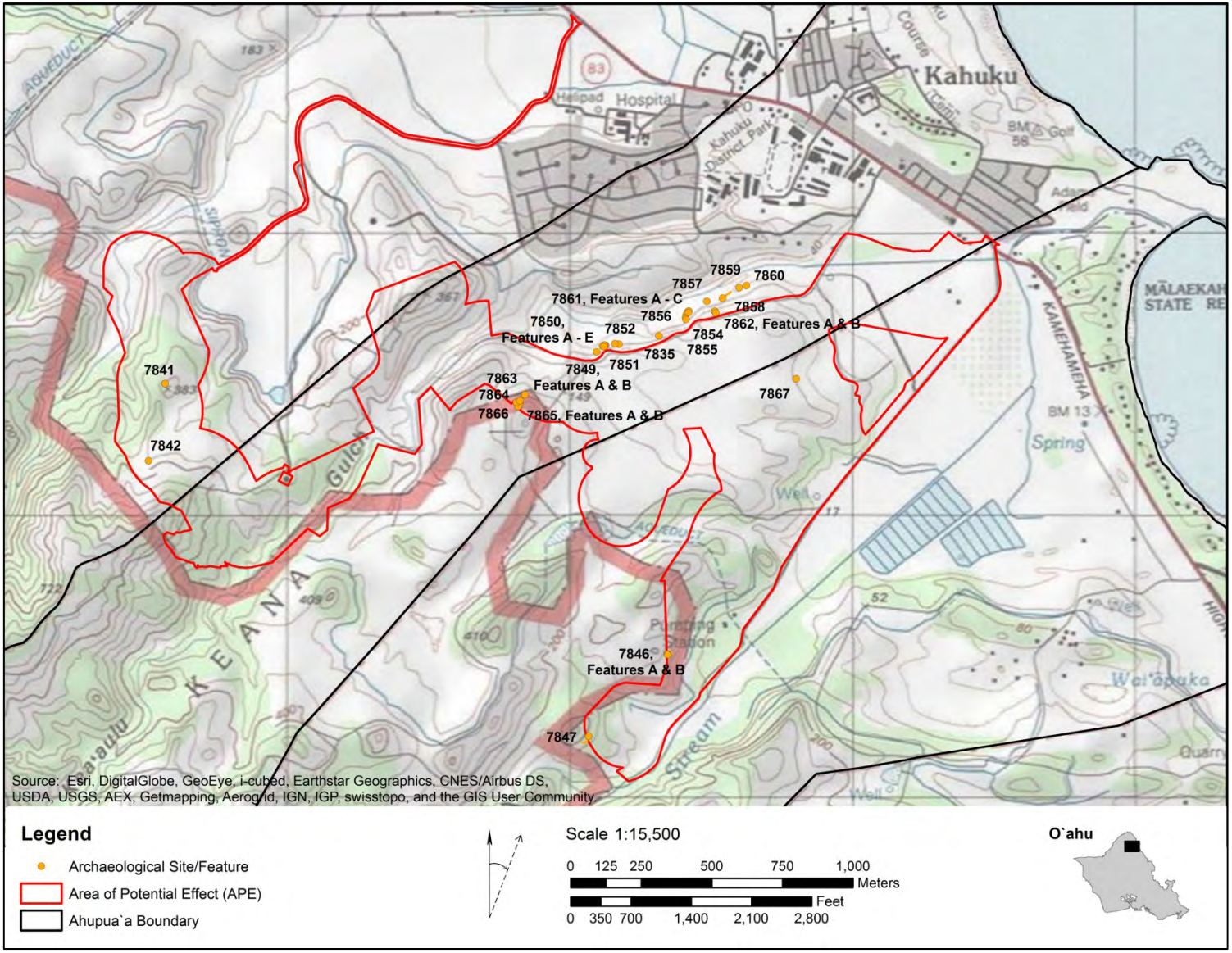

Figure 13. USGS map showing distribution of pre-Contact and early post-Contact sites.

Figure 14. Overview of central portion of project area.

Figure 15. Overview of project area and active agricultural lands.

Figure 16. Overview of eastern-most portion of the project area.

Figure 17. View of ʻŌhiʻaʻai Gulch.

Figure 18. Area of exposed sand in the northeastern portion of the project area.

7.0 SUBSURFACE TESTING RESULTS

Subsurface mechanical backhoe testing and hand excavated test units were placed at various locations throughout the project area (Figure 19). A total of 16 mechanically excavated trenches were placed throughout the project area with the focus of the testing being in those areas where heavy ground disturbance would take place during the proposed construction of the wind farm (Figure 20). No subsurface testing was conducted within the active farm lots on the MHW lands to the east (so as to not disturb or excavate active farming), however, one test trench was placed within an active farm lot along the roadway within the DOA controlled lands on the west side of the APE. This trench (Trench 14) was placed in an area where the proposed road realignment may occur.

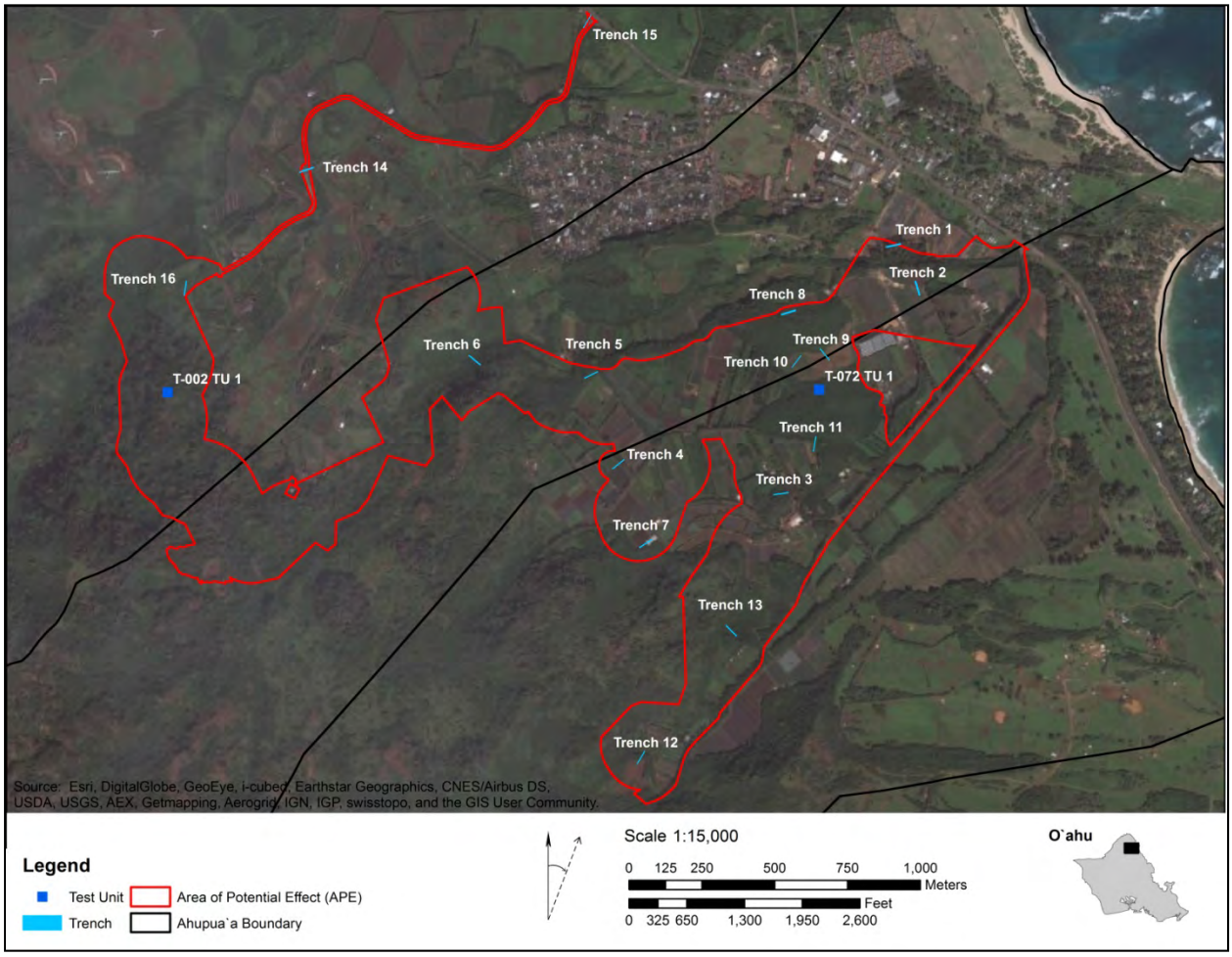

Figure 19. Locations of test trenches and test units within the APE.

Figure 20. Trench excavations were conducted throughout the project area.

A single controlled hand-excavated test unit was excavated in each of two sites (7841, mound and 7867, cave). The two units were excavated with trowel, brush, and dustpan and all soil was screened through nested 1/4 and 1/8 inch mesh screens. Any cultural material identified was collected, bagged by provenience, and transported back to the Pacific Legacy laboratory in Kailua for processing and further analysis. The excavations were documented with notes on standard excavation forms. Profiles were drawn and the excavation was recorded with digital images. Two collected charcoal samples were submitted for identification and radiocarbon dating.

7.1 BACKHOE TESTING

None of the 16 backhoe trenches uncovered any cultural deposits or remains. Detailed information regarding each trench excavation is presented in Appendix D. Below is a summary of the findings resulting from the backhoe testing.

Three of the trenches (T-8, T-9, and T-10) exposed bedrock composed of limestone. Additionally, Trench 11 contained a small limestone boulder. Limestone is also exposed along a low, east-to-west or *mauka-makai,* escarpment located just to the north of Trench 5 and Trench 8 (see Figure 19). This limestone was undoubtedly formed during a higher stand of the sea

during an interglacial period of the Pleistocene, probably the Waimanalo stand of the sea, when sea levels were some 25 feet higher than present (see Sterns and MacDonald 1970:355). Basalt bedrock, usually evidenced by decomposing basalt rocks was observed in Trenches T-6, T-14, T-15, and T-16. So bedrock within the project is a mixture of limestone and basalt.

Fine Aeolian calcareous sand was exposed in Trenches 1 and 2 (see Figure 19). This same calcareous sand was observed on the surface *makai* of these trenches as well as a little *mauka* of Keana Farms Zipline headquarters. This sand was probably blown inland from beach areas to the east.

The majority of the soil profiles exhibited massive deposits of silty clays, with some color variation from brown to dark brown, along with some reddish brown soils. Charcoal flecking was observed at fairly deep locations in three trenches: T-2 (Lens, c. 112-115 cmbs); T-5, (Layer V, c. 100 cmbs), and T-13; Layer II, c. 60 cmbs). Close examinations of the trench faces in the vicinity of these areas of charcoal flecking failed to reveal any firm evidence of cultural activity.

The soils exposed in the backhoe trenches appear to be consistent with historic sugar cane cultivation. One would have expected more charcoal to be present as a result of the burning of cane at harvest, but this was not the case.

7.2 SITE 50-80-02-7841

The excavations conducted at Site 7841 (stone mound) were conducted because it was thought that the stone mound could potentially contain a human burial. The mound is located on top a ridgeline on the west side of the APE. The 1x1 meter test unit was placed on the west side of the mound in order to bisect the stone feature (Figure 21 and Figure 22). The excavation proceeded with the removal of surface rocks within the test unit. Excavation proceeded to a depth of 63 centimeter below surface. Three natural stratigraphic layers were revealed (Table 6; Figure 23). These natural layers consisted of two layers of silty clay overlaying a clay layer.

No cultural remains, artifacts, or human remains were encountered during the excavation at Site 7841.

Figure 21. Site 7841, Test Unit 1. Prior to excavation, view to east.

Figure 22. Site 7841, Test Unit 1, post excavation, view to east.

Table 4. Soils Descriptions for Site 7841, Test Unit 1

Layer	Depth (cm below surface)	Description
Layer I	0-6	Dark yellowish brown (5YR 2/2) silt loam; very fine grain, structureless; non-sticky, non-plastic; abrupt boundary. Contains leaf litter.
Layer II	3-26	Dark brown (7.5YR 3/3) silt loam; very fine grain, structureless; non-sticky, non-plastic; clear boundary.
Layer III	14-63	Yellowish red (5YR 4/6) clay; blocky, fine; non-sticky, non-plastic. Contains decaying rocks.

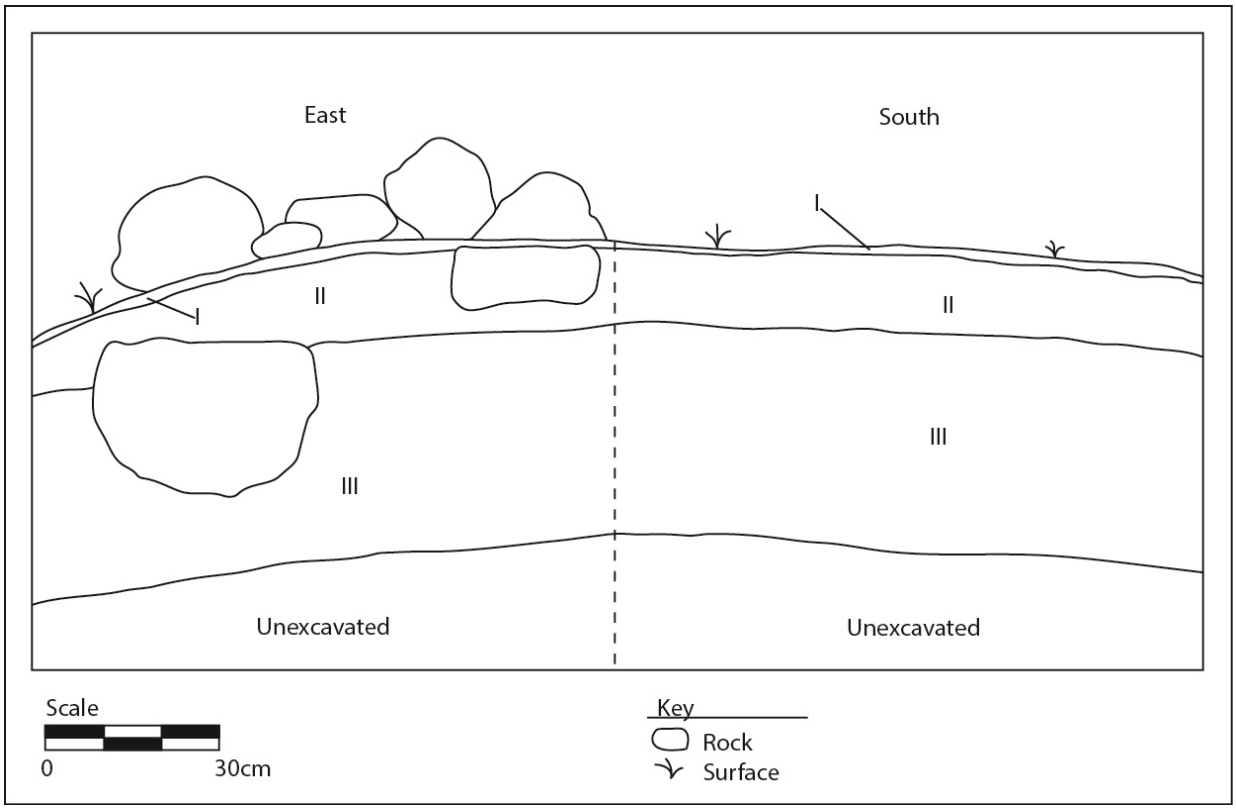

Figure 23. Soil profile of Test Unit 1 at Site 7841.

7.3 SITE 50-80-02-7867

A single 50 x 50 centimeter test unit was excavated at the rear of the cave at Site 7867 (Figure 24 and Figure 25). The test unit was placed at this site because marine shell midden and non-human animal bone were observed on the surface of the cave. Given the tight space and low ceiling within the cave along with the smaller entrance, it was thought that a smaller 50 x 50 centimeter unit would be best excavated at the site.

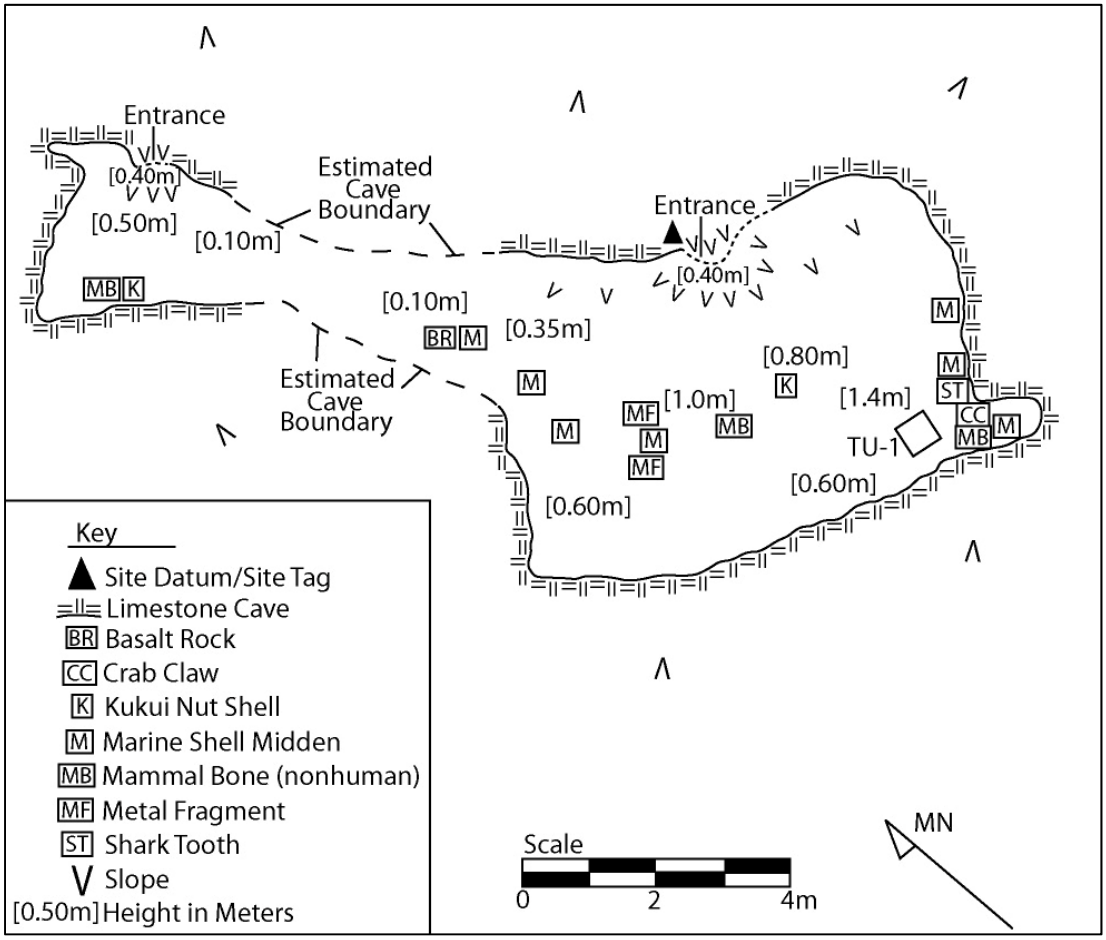

Figure 24. Plan view of Site 7867.

Excavations revealed a significant cultural deposit within the cave. Two silt layers were identified above limestone bedrock during the excavations (Table 7 and Figure 26). Two metal artifacts were recovered from Layer I, level 1 of the unit – a miniature metal picture frame and a metal button post.

Abundant marine shell midden was collected throughout the excavation. The majority of shell midden was recovered between Layer I, level 2 and Layer II, level 1. The midden was also associated with four basalt flakes recovered from Layer I, level 2. Two charcoal samples were collected in situ and submitted for dating. Both samples were recovered from Layer I, level 2 (ca. 22 cmbd and 37 cmbd). The radiocarbon dates spanned AD 1650 to Post 1950. However,

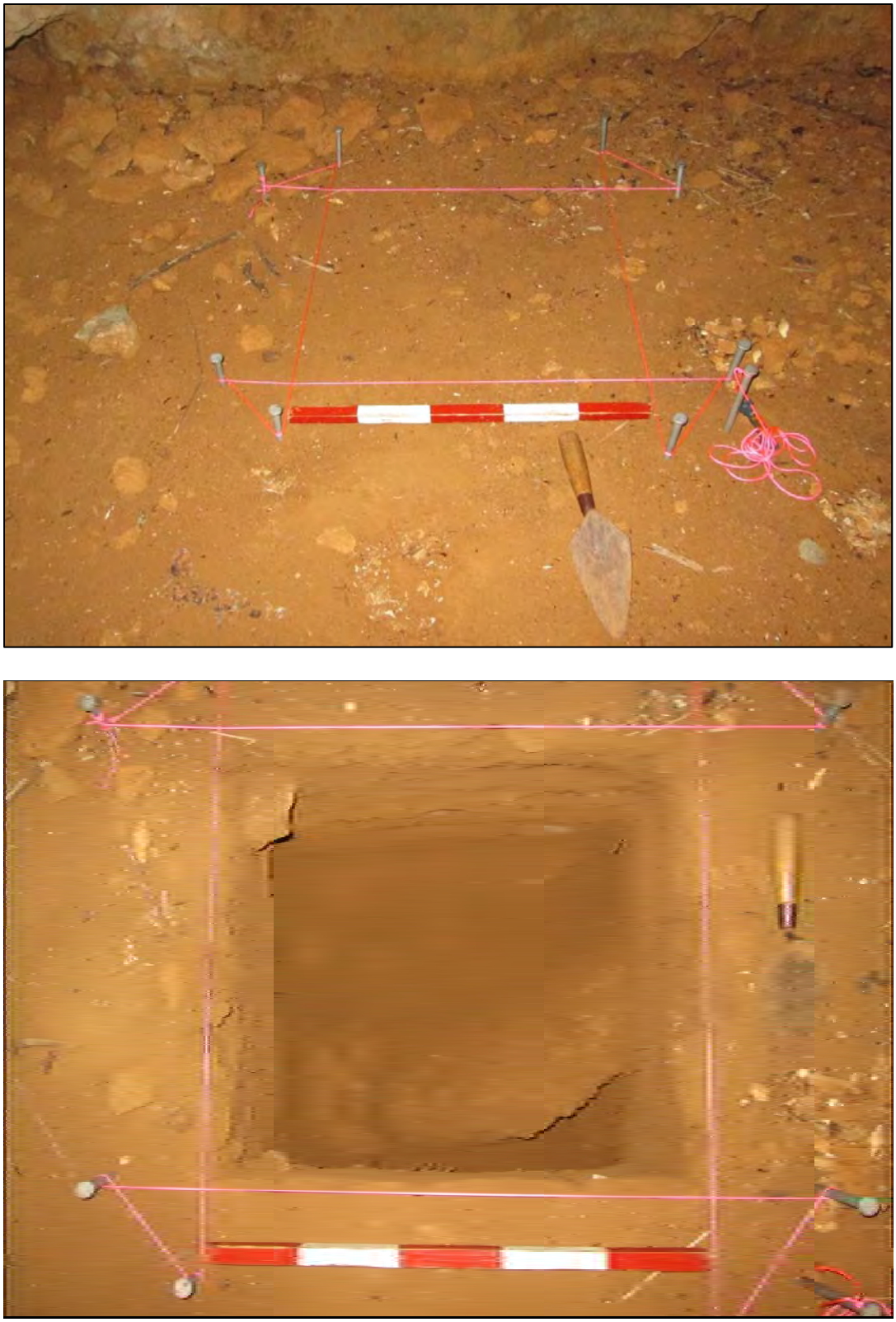

Figure 25. Site 7867, Test Unit 1, pre- and post-excavation photographs.

given the lack of historic material in the lower level, we can conclude a date of AD 1650 to 1815 for this site (see Section 8.4 for radiocarbon dating results).

Table 5. Soil Descriptions for Site 7867, Test Unit 1

Layer	Depth (cm below datum)	Description
Layer I	10-40	Dark yellowish brown (10YR 3/6) silt. Moderate, fine grain; slightly sticky, plastic, weakly cemented; abrupt boundary. Contains cultural material: midden, non-human bone, basalt flakes, and metal artifacts.
Layer II	30-70	Strong brown (7.5YR 4/6) silt loam. Moderate, fine blocky; slightly sticky, non-plastic, weakly cemented. Contains cultural material near the top of the layer.
Lens	45-46	Brown (10YR 4/3) silt. Structureless, very fine grain; non-sticky, non-plastic.

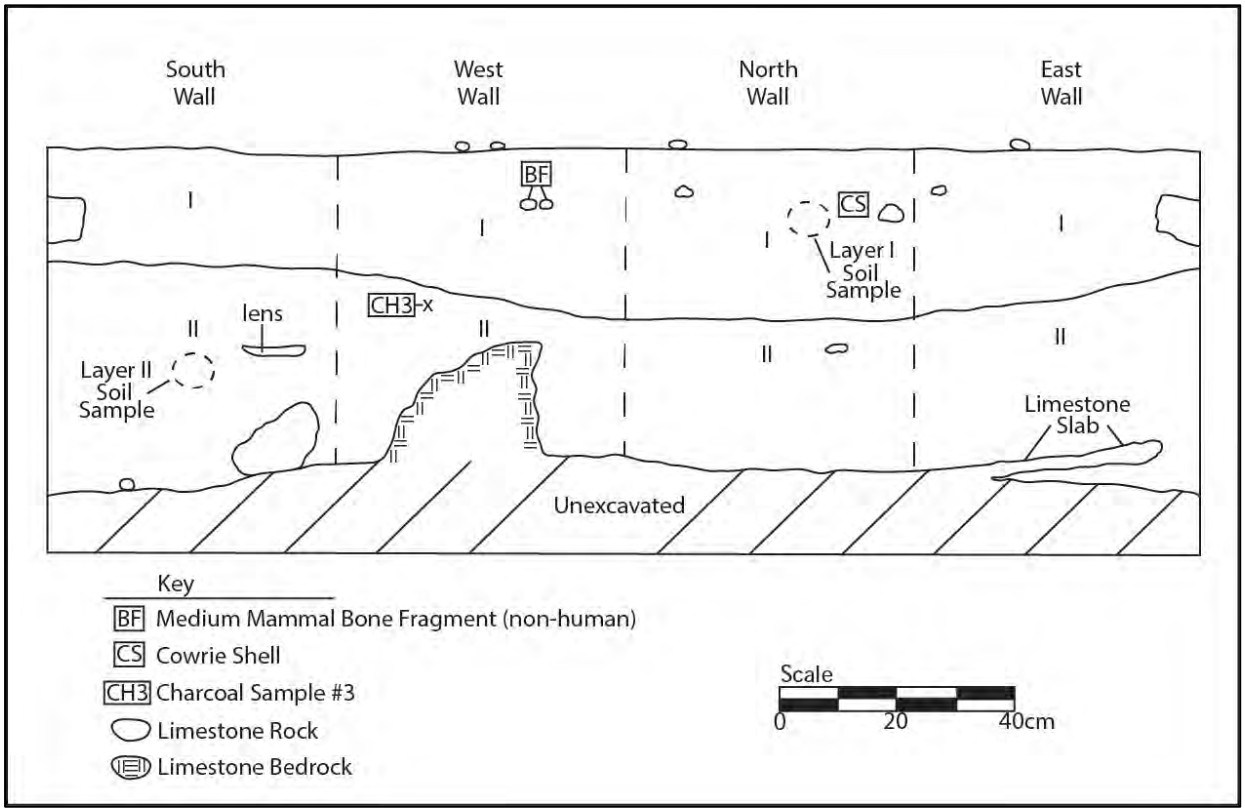

Figure 26. Profiles from Site 7867, Test Unit 1.

8.0 LABORATORY RESULTS

8.1 ARTIFACT ANALYSIS

Site 7862

Three traditional Hawaiian artifacts were recovered from Site 7862 (cave). Although no excavation was conducted at the site since it was located outside of the revised APE boundary, three artifacts were collected by the field crew for security reasons. The artifacts were very recognizable and visible in the cave and the archaeological crew worried that they might be looted, so were collected. The three traditional artifacts retrieved from the surface of the cave consisted of two basalt adzes and a limestone hammerstone and are described below, summarized in Table 8, and illustrated in Figure 27 through Figure 29).

Artifact 1. Basalt Adze (Figure 27). Consists of a large tanged quadrangular adze manufactured out of fine grain, dense, dark gray basalt. The front, sides, and back of the blade are ground and polished. The tang is partially ground and polished on the sides and back. The back of the poll is not ground or polished. The blade length relative to the length of the tang appears shorter than the typical adze of this size, which suggests that it may have originally been longer and possibly reworked after its original manufacture. It measures 197.5 mm in length, 45.2 mm in width, 40.5 mm in thickness, and weighs 329.5 grams. The cutting edge is 45.0 mm wide.

Artifact 2. Limestone Hammerstone (Figure 28). Consists of a discoidal hammerstone manufactured out of limestone. The edges are rounded and battered from hammering. The sides are slightly concave. It measures 75.9 mm in length, 75.6 mm in width, 39.0 mm in thickness, and weighs 270.6 grams.

Artifact 3. Basalt Adze (Figure 29). Consists of a small tanged quadrangular adze manufactured out of fine grain, dense, dark gray basalt. The front, sides, and back of the blade are ground and polished. The tang is partially ground and polished on the sides and back. The back of the poll is not ground or polished. It measures 88.3 mm in length, 26.7 mm in width, 18.1 mm in thickness, and weighs 82.6 grams. The cutting edge is 30.2 mm wide.

Figure 27. Large basalt quadrangular adze collected from Site 7862.

Figure 28. Limestone hammerstone recovered from Site 7862.

Figure 29. Small basalt quadrangular adze recovered from Site 7862.

Table 6. Artifacts Recovered from the Surface of Site 7862

Artifact No.	Site No.	Bag No.	Material	Description	Qty (MNI)	L (mm)	W/Diam (mm)	Th (mm)	Wt (g)	Age	Cond.	Comments
1	7862	001	Lithic	Basalt Adze	1	197.5	45.2	40.5	329.5	Pre-Contact	good	Large tanged quadrangular adze manufactured out of fine grain, dense, dark gray basalt; front, sides, and back are ground and polished; tang is partially ground and polished on the sides and back; back face of poll is not ground or polished; the blade length relative to the length of the tang appears shorter than the typical adze of this size, which suggests that it may have originally been longer and possibly reworked after its original manufacture. The cutting edge is 45.0 mm wide.
2	7862	002	Lithic	Limestone Hammerstone	1	75.9	75.6	39.0	270.6	Pre-Contact	good	Discoidal hammerstone manufactured out of limestone; the edges are rounded and battered from hammering; the sides are slightly concave
3	7862	003	Lithic	Basalt Adze	1	88.3	26.7	18.1	82.6	Pre-Contact	good	Small tanged quadrangular adze manufactured out of fine grain, dense, dark gray basalt; front, sides, and back are ground and polished; tang is partially ground and polished on the sides and back; back face of poll is not ground or polished. The cutting edge is 30.2 mm wide.

Site 7867

A total of six artifacts were collected from Test Unit 1 (Table 9), consisting of a miniature metal picture frame, a copper button post, and four basalt flakes. The two historic metal artifacts were collected from Layer I, level 1, while the four traditional basalt flakes were collected from Layer I, level 2. General artifact descriptions for each of the artifacts are presented below.

Artifact 1. Miniature metal picture frame (Figure 30a and b). This two-piece oval miniature picture frame (possibly a locket) **m**easures overall 27.9 mm long by 22.2 mm wide by 3.3 mm thick, and weighs 2.9 grams. The opening for the picture measures 14.4 mm by 8.9 mm. The front and back of the frame are held together by four pinch clasps.

Artifact 2. Metal button post (Figure 31). This copper button post measures 9.5 mm in length and weighs 2.0 grams. The post has a diameter of 4.0 mm; the back disk has a diameter of 9.4 mm and the front disk has a diameter of 11.2 mm. The front disk is slightly concave and exhibits a metal protrusion that probably anchored a ceramic (or other decorative material) face.

Also collected during the excavation at Site 7867, Test Unit 1 were four basalt flakes all recovered from Layer I, level 2 (20-30 cmbd). Artifact 3 was recovered *in situ* from 21 cmbd. The remaining flakes were collected from the screen.

Artifact 3. Basalt Flake (Figure 32). Medium grain, medium gray basalt flake with some cortex present on dorsal surface**.** Measures 53.6 mm in length, 63.0 mm in width, 12.0 mm in thickness, and weighs 54.5 grams.

Artifact 4. Basalt Flake (Figure 32). Fine grain, dark red basalt flake with no cortex present. Measures 12.7 mm in length, 17.5 mm in width, 3.8 mm in thickness, and weighs 0.5 grams.

Artifact 5. Basalt Flake (Figure 32). Fine grain, dark red basalt flake with no cortex present. Measures 14.1 mm in length, 19.4 mm in width, 3.2 mm in thickness, and weighs 0.8 grams.

Artifact 6. Basalt Flake (Figure 32). Medium grain, medium gray basalt flake with no cortex present. Measures 16.7 mm in length, 19.5 mm in width, 3.2 mm in thickness, and weighs 1.3 grams.

Figure 30a and b. Artifact 1, miniature metal picture frame recovered from Site 7867, Test Unit 1.

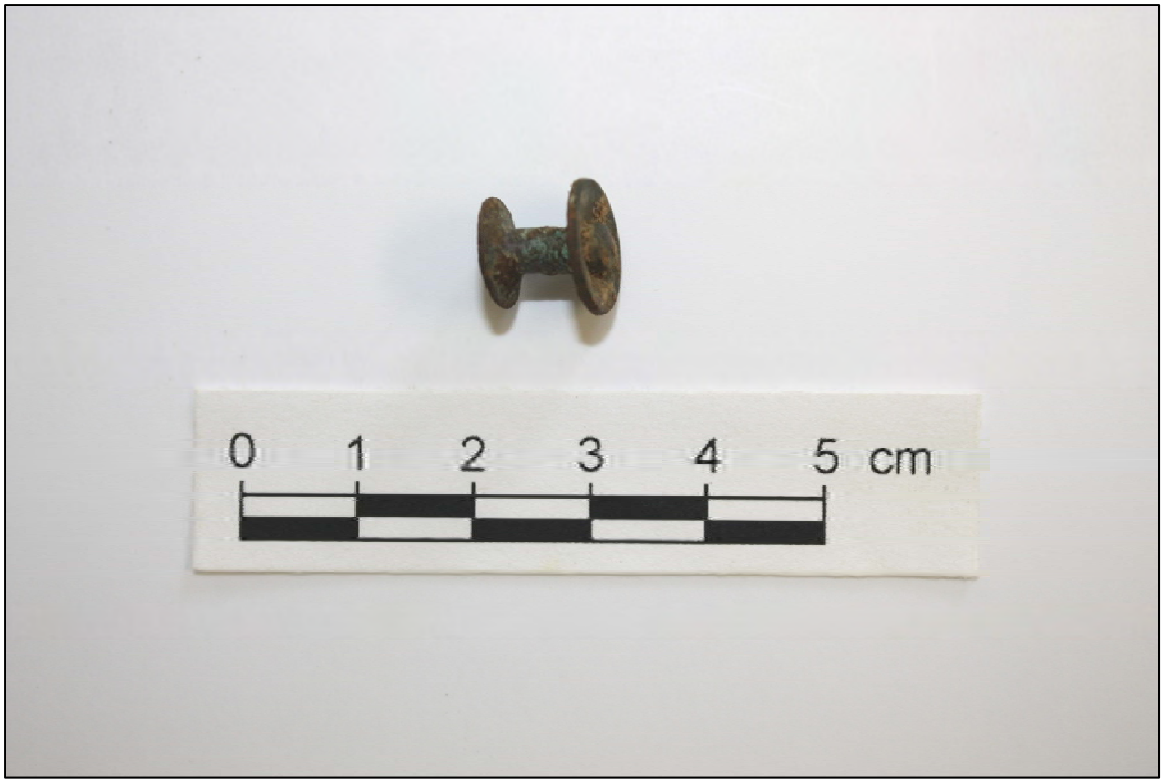

Figure 31. Artifact 2, metal button post recovered from Site 7867, Test Unit 1.

Figure 32. Basalt flakes recovered from Site 7867, Test Unit 1 (Artifacts Nos. 3-6 [left to right]).

Table 7. Artifacts Recovered from Site 7867, Test Unit 1

Artifact No.	Bag No.	Site No.	Unit	Layer/ level	CMBD	Material	Description	Qty (MNI)	L (mm)	W/ Diam. (mm)	Th. mm)	Wt (g)	Age	Cond.	Comments
1	5	7867	TU-1	I / 1	16	Metal	Picture Frame	1	27.9	22.2	3.3	2.9	Historic	fair	Miniature metal picture frame
2	8	7867	TU-1	I /1	10-21	Metal	Button Post	1	9.5			2.0	Historic	fair	Metal button post
3	10	7867	TU-1	I /2	21	Lithic	Basalt Flake	1	53.6	63.0	12.0	54.5	Pre-Contact	good	Medium grain, medium gray basalt; some cortex on dorsal surface
4	15	7867	TU-1	I /2	20-30	Lithic	Basalt Flake	1	12.7	17.5	3.8	0.5	Pre-Contact	good	Fine grain, dark red basalt; no cortex
5	15	7867	TU-1	I /2	20-30	Lithic	Basalt Flake	1	14.1	19.4	3.2	0.8	Pre-Contact	good	Fine grain, dark red basalt; no cortex
6	15	7867	TU-1	I	20-30	Lithic	Basalt Flake	1	16.7	19.5	3.2	1.3	Pre-Contact	good	Medium grain, medium gray basalt; no cortex

8.2 MIDDEN ANALYSIS

Midden is human food refuse, which for traditional Hawaiian deposits is typically comprised of marine shell, non-human bone generally consisting of remains from dog, pig, chicken, wild birds, and fish, as well as macrobotanical remains. Midden remains were a major component of cultural materials collected from the excavation of Test Unit 1 Site 7867. Overall, a total of 193.3 grams of midden was recovered from the test excavation unit. The most frequent midden type is marine shell, comprising 162.7 g (84.2%) of the total midden assemblage, followed by non-human bone (28.9 g; 15.0%), and flora (1.7 g; 0.9%) (Table 10).

Out of the total 193.3 grams that constitutes the midden assemblage, the marine shell is predominantly comprised of gastropods (71.8 g; 37.1%), followed by crustacean (45.4 g; 23.5%), bivalves (23.9 g; 12.4%), and sea urchin (21.6 g; 11.2%) (Table 11). The non-human bone is dominated by mammals (25.3 g; 13.1%), followed by fish (3.2 g; 1.7%), and bird (0.4 g; 0.2%). The flora consists of Euphorbiaceae, or spurge (1.7 g; 0.9%).

Midden was collected from every level during the excavation of Site 7867, Test Unit 1 (Figure 33). The majority of midden was collected from Layer I, level 2 (70.4 g; 36.4%), followed by Layer I, level 3 (39.5 g; 20.4 %), Layer I, level 1 (25.6 g; 13.2 %), Layer II, level 3 (22.4 g; 11.6%), Layer II, level 2 (21.1 g; 10.9%), Layer II, level 1 (8.9 g; 4.6%), Layer II, level 4 (4.3 g; 2.2%), and the surface (1.1 g; 0.6%).

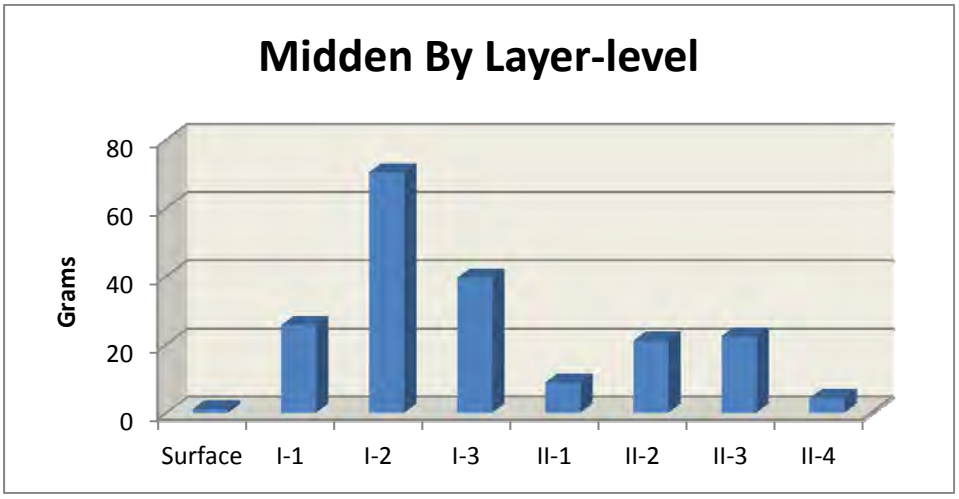

Figure 33. Distribution of total midden by layer and level.

Midden constituents from Layer I total 136.6 g, which are 70.7% of the total midden recovered. Marine and crab shell make up the majority of the midden recovered from Layer I (109.4 g; 80.1%). This is followed by non-human bone (25.5 g; 18.7%) and k*ukui* (*Aleurites*) endocarp (1.7 g; 1.2%. Gastropods make up the overall majority of marine shell midden recovered from Layer I. The crab shell only makes up 2.1 g of the 109.4 grams of crab and marine shell (1.9%).

Table 8. Midden Recovered from 7867, Test Unit 1

	Surface		Layer – level														Totals	
			I-1		I-2		I-3		II-1		II-2		II-3		II-4			
BONE	**Wt. (g)**	**Unit %**	**Wt. (g)**	**Unit %**	**Wt. (g)**	**Unit %**	**Wt. (g)**	**Unit %**	**Wt. (g)**	**Unit %**	**Wt. (g)**	**Unit %**	**Wt. (g)**	**Unit %**	**Wt. (g)**	**Unit %**	**Wt. (g)**	**Unit %**
Aves	**0.0**	**0.0%**	**0.0**	**0.0%**	**0.0**	**0.0%**	**0.4**	**0.2%**	**0.0**	**0.0%**	**0.0**	**0.0%**	**0.0**	**0.0%**	**0.0**	**0.0%**	**0.4**	**0.2%**
Unid. Aves spp.	-	-	-	-	-	-	0.4	0.2%	-	-	-	-	-	-	-	-	0.4	0.2%
Mammalia	**1.1**	**0.6%**	**8.8**	**4.6%**	**12.4**	**6.4%**	**0.0**	**0.0%**	**0.0**	**0.0%**	**1.8**	**0.9%**	**1.2**	**0.6%**	**0.0**	**0.0%**	**25.3**	**13.1%**
Rattus exulans	-	-	0.1	0.1%	0.1	0.1%	-	-	-	-	-	-	-	-	-	-	0.2	0.1%
Unid. Med. Mammal spp.	1.1	0.6%	8.5	4.4%	11.1	5.7%	-	-	-	-	1.8	0.9%	1.2	0.6%	-	-	23.7	12.3%
Unid. Med. Mammal spp., burnt	-	-	-	-	0.9	0.5%	-	-	-	-	-	-	-	-	-	-	0.9	0.5%
Unid. Small Mammal spp.	-	-	0.2	0.1%	0.3	0.2%	-	-	-	-	-	-	-	-	-	-	0.5	0.3%
Osteichthyes	**0.0**	**0.0%**	**0.7**	**0.4%**	**0.8**	**0.4%**	**1.3**	**0.7%**	**0.4**	**0.2%**	**0.0**	**0.0%**	**0.0**	**0.0%**	**0.0**	**0.0%**	**3.2**	**1.7%**
Unid. Osteichthyes spp.	-	-	0.7	0.4%	0.8	0.4%	1.3	0.7%	0.4	0.2%	-	-	-	-	-	-	3.2	1.7%
Bone Totals	**1.1**	**0.6%**	**9.5**	**4.9%**	**13.2**	**6.8%**	**1.7**	**0.9%**	**0.4**	**0.2%**	**1.8**	**0.9%**	**1.2**	**0.6%**	**0.0**	**0.0%**	**28.9**	**15.0%**
MARINE SHELL	**Wt. (g)**	**Unit %**	**Wt. (g)**	**Unit %**	**Wt. (g)**	**Unit %**	**Wt. (g)**	**Unit %**	**Wt. (g)**	**Unit %**	**Wt. (g)**	**Unit %**	**Wt. (g)**	**Unit %**	**Wt. (g)**	**Unit %**	**Wt. (g)**	**Unit %**
Bivalvia	**0.0**	**0.0%**	**9.1**	**4.7%**	**3.5**	**1.8%**	**8.1**	**4.2%**	**3.1**	**1.6%**	**0.1**	**0.1%**	**0.0**	**0.0%**	**0.0**	**0.0%**	**23.9**	**12.4%**
Isognomon spp.	-	-	-	-	1.9	1.0%	5.0	2.6%	3.0	1.6%	-	-	-	-	-	-	9.9	5.1%
Mytilidae	-	-	-	-	1.6	0.8%	3.1	1.6%	0.1	0.1%	0.1	0.1%	-	-	-	-	4.9	2.5%
Unid. Bivalvia spp.	-	-	9.1	4.7%	-	-	-	-	-	-	-	-	-	-	-	-	9.1	4.7%
Echinoidea	**0.0**	**0.0%**	**0.9**	**0.5%**	**11.4**	**5.9%**	**9.3**	**4.8%**	**0.0**	**0.0%**	**0.0**	**0.0%**	**0.0**	**0.0%**	**0.0**	**0.0%**	**21.6**	**11.2%**
Unid. Echinoidea spp.	-	-	0.1	0.1%	7.6	3.9%	7.3	3.8%	-	-	-	-	-	-	-	-	15.0	7.8%
Echinoidea Radula	-	-	0.8	0.4%	3.8	2.0%	2.0	1.0%	-	-	-	-	-	-	-	=	6.6	3.4%
Gastropoda	**0.0**	**0.0%**	**5.2**	**2.7%**	**41.8**	**21.6%**	**18.0**	**9.3%**	**0.7**	**0.4%**	**0.5**	**0.3%**	**5.4**	**2.8%**	**0.2**	**0.1%**	**71.8**	**37.1%**
Cellana spp.	-	-	-	-	-	-	0.2	0.1%	-	-	-	-	-	-	-	-	0.2	0.1%
Conus spp.	-	-	1.1	0.6%	3.1	1.6%	3.2	1.7%	-	-	-	-	-	-	-	-	7.4	3.8%
Cypraea spp.	-	-	0.2	0.1%	7.3	3.8%	3.3	1.7%	-	-	-	-	-	-	-	-	10.8	5.6%
Nerita picea	-	-	1.1	0.6%	9.2	4.8%	2.8	1.4%	0.1	0.1%	-	-	-	-	-	-	13.2	6.8%
Strombus spp.	-	-	-	-	11.6	6.0%	5.1	2.6%	0.1	0.1%	-	-	-	-	-	-	16.8	8.7%
Thaididae	-	-	-	-	0.3	0.2%	0.5	0.3%	-	-	-	-	-	-	-	-	0.8	0.4%
Trochuse spp.	-	-	-	-	0.1	0.1%	0.3	0.2%	-	-	0.5	0.3%	5.4	2.8%	-	-	6.3	3.3%
Turbinidae	-	-	-	-	8.9	4.6%	2.2	1.1%	0.5	0.3%	-	-	-	-	-	-	11.6	6.0%
Unid. Gastropoda spp.	-	-	0.3	0.2%	1.0	0.5%	-	-	-	-	-	-	-	-	0.2	0.1%	1.5	0.8%
Unid. Gastropoda, operculum	-	-	0.7	0.4%	0.3	0.2%	-	-	-	-	-	-	-	-	-	-	1.0	0.5%
Unid. Land Snail	-	-	1.8	0.9%	-	-	0.4	0.2%	-	-	-	-	-	-	-	-	2.2	1.1%
Malacostraca	**0.0**	**0.0%**	**0.0**	**0.0%**	**0.0**	**0.0%**	**2.1**	**1.1%**	**4.7**	**2.4%**	**18.7**	**9.7%**	**15.8**	**8.2%**	**4.1**	**2.1%**	**45.4**	**23.5%**
Carpiliidae spp.	-	-	-	-	-	-	2.1	1.1%	4.7	2.4%	18.7	9.7%	15.8	8.2%	4.1	2.1%	45.4	23.5%
Shell Totals	**0.0**	**0.0%**	**15.2**	**7.9%**	**56.7**	**29.3%**	**37.5**	**19.4%**	**8.5**	**4.4%**	**19.3**	**10.0%**	**21.2**	**11.0%**	**4.3**	**2.2%**	**162.7**	**84.2%**
FLORA	**Wt. (g)**	**Unit %**	**Wt. (g)**	**Unit %**	**Wt. (g)**	**Unit %**	**Wt. (g)**	**Unit %**	**Wt. (g)**	**Unit %**	**Wt. (g)**	**Unit %**	**Wt. (g)**	**Unit %**	**Wt. (g)**	**Unit %**	**Wt. (g)**	**Unit %**
Euphorbiaceae	**0.0**	**0.0%**	**0.9**	**0.5%**	**0.5**	**0.3%**	**0.3**	**0.2%**	**0.0**	**0.0%**	**0.0**	**0.0%**	**0.0**	**0.0%**	**0.0**	**0.0%**	**1.7**	**0.9%**
Aleurites moluccana	-	-	0.9	0.5%	-	-	-	-	-	-	-	-	-	-	-	-	0.9	0.5%
Aleurites moluccana, burnt	-	-	-	-	0.5	0.3%	0.3	0.2%	-	-	-	-	-	-	-	-	0.8	0.4%
Flora Totals	**0.0**	**0.0%**	**0.9**	**0.5%**	**0.5**	**0.3%**	**0.3**	**0.2%**	**0.0**	**0.0%**	**0.0**	**0.0%**	**0.0**	**0.0%**	**0.0**	**0.0%**	**1.7**	**0.9%**
Totals	**1.1**	**0.6%**	**25.6**	**13.2%**	**70.4**	**36.4%**	**39.5**	**20.4%**	**8.9**	**4.6%**	**21.1**	**10.9%**	**22.4**	**11.6%**	**4.3**	**2.2%**	**193.3**	**100.0%**

The midden constituents from Layer II are much different. Total midden from Layer II is 56.7 g, or 29.3% of the total midden recovered from the test unit. The overwhelming majority of this midden is made up of crab claws and carapace. Crab remains from Layer II total 43.3 g or 76.4% of the total midden from Layer II. The remaining midden from Layer II is composed of a few gastropod and bivalve shells.

The remarkable aspect of the Layer II midden is the size and robust nature of the crab claws recovered. Figure 34 shows two of the better preserved and more complete claws recovered. These two claws are from Layer II, level 2. The significance of these claws is uncertain at this time, but their uniqueness needs recognition, because such findings are rare.

The marine shell recovered provides clues to exploitation patterns of the Native Hawaiian inhabiting this site. Most of the marine invertebrates inhabit shallow waters near the shore on reefs and benches, as well as in tide pools (*Cellana, Conus, Cypraea, Strombus,* Thaididae, *Trocus,* and Turbinidae. Others (*Cellana* and *Nerita*) inhabit the splash zone along rocky shorelines. Thus the marine habitats being exploited by the Native Hawaiian inhabitants appear to have been the shoreline areas.

Table 9. Weight (g) of Midden Recovered from Test Unit 1, Site 7867, Sorted by Level

	Surface	I-1	I-2	I-3	II-1	II-2	II-3	II-4	Totals
Aves	0	0	0	0.4	0	0	0	0	0.4
Mammalia	1.1	8.8	12.4	0	0	1.8	1.2	0	25.3
Osteichthyes	0	0.7	0.8	1.3	0.4	0	0	0	3.2
Bivalvia	0	9.1	3.5	8.1	3.1	0.1	0	0	23.9
Echinoidea	0	0.9	11.4	9.3	0	0	0	0	21.6
Gastropoda	0	5.2	41.8	18	0.7	0.5	5.4	0.2	71.8
Malacostraca	0	0	0	2.1	4.7	18.7	15.8	4.1	45.4
Euphorbiaceae	0	0.9	0.5	0.3	0	0	0	0	1.7
	1.1	**25.6**	**70.4**	**39.5**	**8.9**	**21.1**	**22.4**	**4.3**	**193.3**

Figure 34. Photograph of crab claws recovered from Layer II, level 1.

8.3 WOOD IDENTIFICATION

Prior to submitting a charcoal sample for radiometric analyses, two wood charcoal samples were submitted to the Wood Identification Laboratory at the International Archaeological Research Institute, Inc. for species identification. Each sample was examined and identified by academically trained wood analyst Gail Murakami. The purpose of this analysis was to determine the presence or absence of historically introduced wood and to differentiate between short lived and long lived species. The intent was to be able to factor out possible long lived species, thus controlling for the "old wood effect" (Tuggle and Spriggs 2001:169; Reith and Athens 2013).

Radiocarbon analysis measures the radioactive decay of carbon 14 following the death of an organism; the primary basis of these analyses is that the organism's time of death is also the time at which it ceased absorbing carbon 14 through exchange with the atmosphere. Trees grow by the addition of plant tissue and long lived species have the potential of vastly different ages of heartwood verses sap wood or seeds. If the tree is a long lived species, the radiocarbon age of its heartwood may differ significantly from the age of the sapwood or seeds. In some long lived tree species this in-built age adjustment can be on the order of 100 years (Dye 2000). For this reason, short lived species are better age indicators. Wood analysis can assist in the identification and red flagging of longer lived plant species, therefore helping to adjust for possible old wood effect (cf. Allen and Huebert 2014).

The results of wood identification on charcoal samples submitted for radiocarbon analysis are presented in Table 10. The full report from International Archaeological Research Inc. is presented in Appendix D.

One taxon was identified in each of the samples totaling two taxa for the assemblage. Neither of the charcoal samples submitted for wood analyses were found to consist of historically introduced species. Both samples were native, short lived species.

Table 10. Wood Identification Results

	WIDL No.	Taxa	Common / Hawaiian Name	Origin/Habit	Part	Count	Weight (g)
Bag 11, T-72, TU 1 Layer I/level 2, Sample #1	1426-1	*Chamaesyce* sp.	*ʻAkoko*	Native/Shrub	Wood	1	0.07
Bag 28, T-72, TU 1 37 cm bd, west wall post-ex, Sample #3	1426-2	*Hibiscus tiliaceus*	*Hau*	Native/Shrub-Tree	Wood	3	0.09

8.4 Radiocarbon Analysis

Once wood identification had been completed, two charcoal samples were submitted to Beta Analytic Radiocarbon Dating Laboratory for dating. Accelerator mass spectrometry (AMS) radiocarbon dating was used. AMS dating at Beta Analytic includes $^{13}C/^{12}C$ analysis, so the samples were adjusted based on the ^{13}C /^{12}C ratio. The pretreatment for the AMS dating charred material samples consisted of acid/alkali/acid washes where the sample was first gently crushed and dispersed in deionized water. It was then given hot acid washes to eliminate carbonates, then alkali washes to remove secondary organic acids, then a final acid rinse to neutralize the solution prior to drying. During these serial rinses, mechanical contaminants such as associated sediments and rootlets were removed. The results of these analyses are summarized in Table 11 and discussed below. The full report from Beta Analytic is presented in Appendix E.

Beta Sample 402614 from 37 cmbd produced three age ranges at 2 sigma (95% probability): AD 1680 – 1765; AD 1800 – 1940; and post 1950. Although two metal artifacts were recovered from Layer I, level 1, no historic artifacts were recovered from the level of the collected sample; it seems reasonable that this sample dates from AD 1680 – 1765.

Beta Sample 402615 also taken from Layer I, level 2 produced five ranges at 2 sigma (95% probability): AD 1665 – 1695, AD 1725 – 1815, AD 1835 – 1840, AD 1855 – 1865, and AD 1920 – post 1950. Again, given that no historic artifacts were recovered from this level of the excavation it seems reasonable that this sample dates from the 100 year period between AD 1655- 1815.

These two radiocarbon dates provide sound information that this site was used during late pre-Contact period between AD 1655 – 1815.

Table 11. Radiocarbon Dating Results

Sample No.	SIHP No. (50-60-04-) & Provenience	Material	Measured Radiocarbon Age	$^{13}C/^{12}C$ Ratio	^{13}C Conventional Age B.P.	Calibrated Age[1] (one sigma)	Calibrated Age[2] (two sigma)
Beta 402614	7867, Charcoal Sample #3, 37 cmbd	Charred Material (cf. *Hibiscus tiliaceus* ; *Hau)*	100+/-30 BP	-24.2 o/oo	110 +/-30 BP	Cal AD 1685 to 1730 (Cal BP 265 to 220) Cal AD 1810 to 1895 (Cal BP 140 to 55) Cal AD 1905 to 1925 (Cal BP 45 to 25) Post AD 1950 (Post BP 0)	Cal AD 1680 to 1765 (Cal BP 270 to 185) Cal AD 1800 to 1940 (Cal BP 150 to 10) Post AD 1950 (Post BP 0)
Beta 402615	7867, Charcoal Sample #1, Layer I, level 2	Charred Material *Chamaesyce sp.; ʻAkoko)*	100.7+/-0.4 pMC	-10.3 o/oo	180 +/- 30 BP	Cal AD 1665 to 1685 (Cal BP 285 to 265) Cal AD 1735 to 1785 (Cal BP 215 to 165) Cal AD 1795 to 1805 (Cal BP 155 to 145) Cal AD 1930 to Post 1950 (Cal BP 20 to Post 0)	Cal AD 1655 to 1695 (Cal BP 295 to 255) Cal AD 1725 to 1815 (Cal BP 225 to 135) Cal AD 1835 to 1840 (Cal BP 115 to 110) Cal AD 1855 to 1865 (Cal BP 95 to 85) Cal AD 1920 to Post 1950 (Cal BP 30 to Post 0)

9.0 SIGNIFICANCE AND LISTING ELIGIBILITY ASSESSMENTS

This development project is subject to the regulations associated with the National Register of Historic Places of 1966 (as amended) because it requires a permit issued by the U.S. Fish and Wildlife Service. As such it is considered an "undertaking" as per 36 CTR 800. This project is also subject to Hawai'i Revised Statutes 6E.

9.1 SIGNIFICANCE ASSESSMENTS

Hawai'i Administrative Rules §13-284-6 stipulate that all identified historic properties must be assessed for their significance and states:

> To be significant, a historic property shall possess integrity of location, design, settling, materials, workmanship, feeling, and association and shall meet one or more of the following criteria:
>
> (a) That are associated with events that have made a significant contribution to the broad patterns of our history; or
>
> (b) That are associated with the lives of persons significant in our past; or
>
> (c) That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
>
> (d) That have yielded, or may be likely to yield, information important in prehistory or history.
>
> (e) That have an important value to the Native Hawaiian people or to another ethnic group of the State due to associations with cultural practices once carried out or still carried out, at the property or due to associations with traditional beliefs, events or oral accounts – these associations being important to the group's history and cultural identity.

The significance of each of the sites identified during the current AIS is assessed in Table 12 below. Twenty-six of the 28 archaeological sites recorded in the APE are assessed as significant under Criterion (d), the one modern site (7840) is assessed as not significant, and the low stone mound that was tested and found to contain no cultural materials is also assessed as not significant. These 26 sites have either yielded or have the potential to yield information important to Hawai'i's history. The 14 sites recorded outside of the APE are also assessed as significant under Criterion (d). These sites are also important for their information potential. Two of the sites are also assessed as being significant under Criterion (a) because of their association with World War II (Site 7843 or with the Kahuku Sugar Plantation (Site 7844). Two additional sites – 7866 (a scatter of historic artifacts), and 7867 (a shelter cave) still have the

potential to yield important information of the history of the area. Data recovery has been recommended for these sites prior to Project construction. Excavations in these sites will provide important information on traditional activities that took place in this area and the chronology of settlement. Once this information has been collected, no additional work will be necessary and these sites will not be eligible for listing.

Six sites (7842, 7843, a portion of 7844, 7846, 7847, and 7865) are recommended for preservation based on their significance (Table 12). All these sites are outside of the area of disturbance are assessed as eligible for listing in the HRHP. One of the sites (7843) is assessed as eligible for listing in the NRHP (Table 12).

9.2 LISTING ELIGIBILITY ASSESSMENT

The National Historic Preservation Act of 1966 (as amended) authorizes the Secretary of Interior to expand and maintain a National Register of Historic Places (NRHP) that contains a listing of districts, sites, buildings, structures and objects significant in American history, architecture, archaeology, engineering and culture. A property may be listed in the NRHP if it meets criteria for evaluation defined at 36 CFR §60.4. As part of assessing the significance of all cultural resources located within the APE, assessments were made regarding the eligibility of each cultural resource to be listed in either the HRHP or in the NRHP. These assessments, based on HAR §13-198-8 are presented below and summarized in Table 12.

The two concrete bunkers (Site 7843) appear to be eligible for listing on both the HRHP and the NRHP, because of their association with World War II. These bunkers were a part of coastal defense system that was established around the circumference of the e island of Oʻahu. This sire appears to be eligible because of its association with an important event – World War II (Criterion (a) that made a significant contribution to our history as will as for its information potential (Criterion (d).

The historic sugar complex (Site 7844) appears to be eligible for listing in the HRHP because of its association with the Kahuku Plantation (1890-1971), one of the early sugar plantations in Hawaiʻi and a dominant economic and social force on the North Shore of Oʻahu. Most of the components of this site complex that were recorded were associated with water control and water transport. Most of the features are ditches and a wide variety of ditch types were documented. While this site is assessed as eligible for listing in the HRHP, it does not appear to be eligible for listing in the NRHP. It is not unique among Hawaiʻi plantation sites, nor is it an excellent example the full range of plantation related structures or activities.

Eight pre-Contact or early post-Contact sites (7841, 7842, 7846, 7847, 7863, 7864, 7865, and 7867) also appear to be eligible to be listed on the HRHP because they represent vestiges of the dynamic traditional Hawaiian landscape that existed here before the massive land alterations associated with the development and operation of the historic sugar plantation.

Table 12. Significance Assessments of Cultural Resources Within the APE

SIHP No. 50-80-02-XXXX	Component	Field No.	Feature	Type	Site Significance	Significance Justification	Determination of Effect	Recom-mendation	HRHP Listing Eligibility	NRHP Listing Eligibility
7840	-	T-001	A	Alignment	Not significant	Modern site	Site to be destroyed	No Further Work	Not eligible	Not eligible
			B	Hearth						
7841	-	T-002	-	Stone Mound	d	Site had information potential that was realized during AIS	Site to be destroyed	No Further Work	Not eligible	Not eligible
7842	-	T-003	-	Platform	d	Site has information potential	Site is outside grading limits	Preservation	Eligible D	Not eligible
7843	-	T-004	A	Complex, Bunker	a, d	Site is associated with WWII and has information potential	Site is outside grading limits	Preservation	Eligible A, D	Eligible A, D
		T-005	B	Complex, Bunker	a, d					
7844	C1	T-006	-	Complex, Ditch	a, d	Site is associated with the historic Kahuku Plantation	Component is outside grading limits	Data Recovery	Eligible A, D	Not eligible
	C2	T-008	-	Complex, Concrete Culvert	a, d	Site is associated with the historic Kahuku Plantation	Component is outside grading limits			
	C3	T-009	A	Complex, Concrete Foundation	a, d	Site is associated with the historic Kahuku Plantation	Component is outside grading limits			
			B	Complex, Concrete Foundation						
			C	Complex, Concrete Foundation						
			D	Complex, Concrete Foundation						
			E	Complex, Retaining Wall						

SIHP No. 50-80-02-XXXX	Component	Field No.	Feature	Type	Site Significance	Significance Justification	Determination of Effect	Recom-mendation	HRHP Listing Eligibility	NRHP Listing Eligibility
7844	C4	T-010	A	Complex, Ditch	a, d	Site is associated with the historic Kahuku Plantation	Component is outside grading limits	Data Recovery	Eligible A, D	Not eligible
			B	Complex, Ditch						
			C	Complex, Ditch						
			D	Complex, Ditch						
	C5	T-011	A	Complex, Valve	a, d	Site is associated with the historic Kahuku Plantation	Component is outside grading limits			
			B	Complex, Well						
	C6	T-014	A	Complex, Concrete Foundation	a, d	Site is associated with the historic Kahuku Plantation	Component to be destroyed			
			B	Complex, Concrete Ditch						
			C	Complex, Iron Pipeline						
	C7	T-015	-	Complex, Pipeline	a, d	Site is associated with the historic Kahuku Plantation	Component to be destroyed			
	C8	T-016	-	Complex, Soil Ditch	a, d	Site is associated with the historic Kahuku Plantation	Component is outside grading limits			
	C9	T-018	-	Complex, Stone/Concrete Ditch	a, d	Site is associated with the historic Kahuku Plantation	Component is outside grading limits			
	C10	T-019	-	Complex, Concrete Ditch	a, d	Site is associated with the historic Kahuku Plantation	Component is outside grading limits			

SIHP No. 50-80-02-XXXX	Component	Field No.	Feature	Type	Site Significance	Significance Justification	Determination of Effect	Recom-mendation	HRHP Listing Eligibility	NRHP Listing Eligibility
7844	C11	T-021	A	Complex, Storage Area	a, d	Site is associated with the historic Kahuku Plantation	Component to be destroyed	Data Recovery	Eligible A, D	Not eligible
			B	Complex, Concrete Well						
			C	Complex, Brick Well						
			D	Complex, Brick Well						
			E	Complex, Rock/Concrete Wall						
			F	Complex, Brick Well						
	C12	T-022	-	Complex, Pump House	a, d	Site is associated with the historic Kahuku Plantation	Component to be destroyed			
	C13	T-023	A	Complex, Shed	a, d	Site is associated with the historic Kahuku Plantation	Component is outside grading limits			
			B	Concrete Slab						
	C14	T-024	-	Complex, Concrete Ditch	a, d	Site is associated with the historic Kahuku Plantation	Component is outside grading limits			
	C15	T-025	-	Complex, Stone Ditch	a, d	Site is associated with the historic Kahuku Plantation	Component is outside grading limits			
	C16	T-026	-	Complex, Stone Retaining Wall	a, d	Site is associated with the historic Kahuku Plantation	Component is outside grading limits			
	C17	T-027	-	Complex, Soil/Concrete Ditch	a, d	Site is associated with the historic Kahuku Plantation	Component is outside grading limits			
	C18	T-028	A	Complex, Soil Ditch	a, d	Site is associated with the historic Kahuku Plantation	Component to be destroyed			
			B	Concrete Foundation						

SIHP No. 50-80-02-XXXX	Component	Field No.	Feature	Type	Site Significance	Significance Justification	Determination of Effect	Recom-mendation	HRHP Listing Eligibility	NRHP Listing Eligibility
7844	C19	T-029	A	Complex, Stone Lined Ditch	a, d	Site is associated with the historic Kahuku Plantation	Component is outside grading limits	Data Recovery	Eligible A, D	Not eligible
			B	Complex, Stone Lined Ditch						
			C	Complex, Stone Lined Ditch						
	C20	T-030	A	Complex, Soil Ditch	a, d	Site is associated with the historic Kahuku Plantation	Component is outside grading limits			
			B	Complex, Retaining Wall						
			C	Complex, Retaining Wall						
			D	Complex, Concrete Ditch						
	C21	T-034	A	Complex, Soil Ditch	a, d	Site is associated with the historic Kahuku Plantation	Component to be destroyed			
			B	Complex, Concrete Footing						
	C22	T-035	-	Complex, Concrete Ditch	a, d	Site is associated with the historic Kahuku Plantation	Component is outside grading limits			
	C23	T-036	-	Complex, Stacked Stone Ditch	a, d	Site is associated with the historic Kahuku Plantation	Component is outside grading limits			
	C24	T-037	-	Complex, Concrete Ditch	a, d	Site is associated with the historic Kahuku Plantation	Component is outside grading limits			
	C25	T-038	-	Complex, Stone Alignment	a, d	Site is associated with the historic Kahuku Plantation	Component is outside grading limits			
	C26	T-043		Complex, Stone Lined Drainage	a, d	Site is associated with the historic Kahuku Plantation	Component is outside APE			
	C-27	T-053	-	Complex, Reservoir	a, d	Site is associated with the historic Kahuku Plantation	Component to be destroyed			

SIHP No. 50-80-02-XXXX	Component	Field No.	Feature	Type	Site Significance	Significance Justification	Determination of Effect	Recom-mendation	HRHP Listing Eligibility	NRHP Listing Eligibility
7844	C28	T-054	-	Complex, Concrete Ditch	a, d	Site is associated with the historic Kahuku Plantation	Component is outside grading limits	Data Recovery	Eligible A, D	Not eligible
	C29	T-055	-	Complex, Concrete Ditch	a, d	Site is associated with the historic Kahuku Plantation	Component to be destroyed			
	C30	T-056	-	Complex, Limestone Ditch	a, d	Site is associated with the historic Kahuku Plantation	Component is outside grading limits			
	C31	T-057	-	Complex, Iron Pipeline	a, d	Site is associated with the historic Kahuku Plantation	Component is outside grading limits			
	C32	T-059	-	Complex, Concrete Ditch	a, d	Site is associated with the historic Kahuku Plantation	Component to be destroyed			
	C33	T-060	-	Complex, Concrete Ditch	a, d	Site is associated with the historic Kahuku Plantation	Component outside APE			
	C34	T-061	A	Complex, Pump House	a, d	Site is associated with the historic Kahuku Plantation	Component is outside grading limits			
			B	Complex, Tank						
			C	Complex, Concrete Ditch						
			D	Complex, Concrete Ditch						
	C35	T-064	-	Complex, Concrete Ditch	a, d	Site is associated with the historic Kahuku Plantation	Component outside APE			
	C36	T-065	-	Complex, Limestone Ditch	a, d	Site is associated with the historic Kahuku Plantation	Component is outside grading limits			
	C37	T-066	-	Complex, Stacked Stone Ditch	a, d	Site is associated with the historic Kahuku Plantation	Component to be destroyed			

SIHP No. 50-80-02-XXXX	Component	Field No.	Feature	Type	Site Significance	Significance Justification	Determination of Effect	Recom-mendation	HRHP Listing Eligibility	NRHP Listing Eligibility
7844	C38	T-073	-	Complex, Concrete Ditch	a, d	Site is associated with the historic Kahuku Plantation	Component to be destroyed	Data Recovery	Eligible A, D	Not eligible
	C39	T-074	A	Complex, Aqueduct	a, d	Site is associated with the historic Kahuku Plantation	Portion of Component is outside grading limits Portion of Component to be destroyed			
			B	Complex, Concrete Ditch						
			C	Complex, Soil Ditch						
			D	Complex, Limestone Retaining Wall						
			E	Complex, Concrete Ditch						
	C40	T-077	-	Complex, Soil Ditch	a, d	Site is associated with the historic Kahuku Plantation	Component is outside grading limits			
	C41	T-078	-	Complex, Concrete Ditch	a, d	Site is associated with the historic Kahuku Plantation	Component is outside grading limits			
7845	-	T-007	-	Terrace	d	Site had information potential that was realized during AIS	Site is outside grading limits	No Further Work	Eligible D	Not eligible
7846	-	T-017		Stone Terrace	d	Site has information potential	Site is outside grading limits	Preservation	Eligible D	Not eligible
7847	-	T-020		Terrace	d	Site has information potential	Site is outside grading limits	Preservation	Eligible D	Not eligible
7848	-	T-031	A	Complex, Terraced Soil Furrows	d	Site had information potential that was realized during AIS	Site is outside grading limits	No Further Work	Eligible D	Not eligible
		T-032	B	Complex, Terrace						
		T-033	C	Complex, Terraced Soil Furrows						
		T-071	-D	Complex, Terraced Soil Furrows						

SIHP No. 50-80-02-XXXX	Component	Field No.	Feature	Type	Site Significance	Significance Justification	Determination of Effect	Recom-mendation	HRHP Listing Eligibility	NRHP Listing Eligibility
7849	-	T-039	A	Complex, Overhang Shelter	d	Site has information potential	Site outside APE	Future AIS	Not evaluated	Not evaluated
			B	Complex, Terrace						
7850	-	T-040	A	Complex, Terrace	d	Site has information potential	Site outside APE	Future AIS	Not evaluated	Not evaluated
			B	Complex, Terrace						
			C	Complex, Terrace						
			D	Complex, Terrace						
			E	Complex, Terrace						
7851	-	T-041		Filled Crevice	d	Site has information potential	Site outside APE	Future AIS	Not evaluated	Not evaluated
7852	-	T-042		Terrace	d	Site has information potential	Site outside APE	Future AIS	Not evaluated	Not evaluated
7853	-	T-044		Terrace	d	Site has information potential	Site outside APE	Future AIS	Not evaluated	Not evaluated
7854	-	T-046		Terrace	d	Site has information potential	Site outside APE	Future AIS	Not evaluated	Not evaluated
7855	-	T-047		Terrace	d	Site has information potential	Site outside APE	Future AIS	Not evaluated	Not evaluated
7856	-	T-048		Wall	d	Site has information potential	Site outside APE	Future AIS	Not evaluated	Not evaluated
7857	-	T-049		Wall	d	Site has information potential	Site outside APE	Future AIS	Not evaluated	Not evaluated
7858	-	T-050		Wall	d	Site has information potential	Site outside APE	Future AIS	Not evaluated	Not evaluated
7859	-	T-051		Overhang Shelter	d	Site has information potential	Site outside APE	Future AIS	Not evaluated	Not evaluated
7860	-	T-052		Wall	d	Site has information potential	Site outside APE	Future AIS	Not evaluated	Not evaluated

SIHP No. 50-80-02-XXXX	Component	Field No.	Feature	Type	Site Significance	Significance Justification	Determination of Effect	Recom-mendation	HRHP Listing Eligibility	NRHP Listing Eligibility
7861	-	T-062	A	Complex, Overhang Shelter	d	Site has information potential	Site outside APE	Future AIS	Not evaluated	Not evaluated
			B	Complex, Terrace						
			C	Complex, Terrace						
7862	-	T-063	A	Complex, Cave	d	Site has information potential	Site outside APE	Future AIS	Not evaluated	Not evaluated
			B	Complex, Terrace						
7863	-	T-067	-	Modified Outcrop	d	Site had information potential that was realized during AIS	Site is outside grading limits	No Further Work	Not eligible	Not eligible
7864	-	T-068	-	Stone Terrace	d	Site had information potential that was realized during AIS	Site is outside grading limits	No Further Work	Not eligible	Not eligible
7865	-	T-069	A	Complex, Terrace	d	Site had information potential that was realized during AIS	Site is outside grading limits	Preservation	Eligible D	Not eligible
			B	Complex, Terrace						
7866	-	T-070	-	Artifact Scatter	d	Site had information potential that was realized during AIS	Site is outside grading limits	Data Recovery	Eligible D	Not eligible
7867	-	T-072	-	Cave	d	Site has information potential	Site to be destroyed	Data Recovery	Eligible D	Not eligible

10.0 DISCUSSION AND RECOMMENDATIONS

Pacific Legacy, Inc., under contract to Nā Pua Makani Wind Partners LLC, conducted an AIS of approximately 464 acres of State and private lands in the *ahupuaʻa* of Kahuku, Keana, and Mālaekahana on the North Shore of the Island of Oʻahu for a proposed wind farm project. The purpose of the AIS is to identify and document archaeological properties and cultural sites within a delineated area, gathering sufficient information to evaluate the significance of identified properties and sites. If significant cultural resources are identified, effect determinations are made and mitigation measures are recommended.

Over the course of field investigations, 28 newly identified archaeological sites were documented. Of the 28 sites documented, 22 sites are traditional Hawaiian pre-Contact or early post-Contact sites, one site is related to the sugar industry, three sites are historic sites not associated with sugar plantation activities, and two are military sites.

During the course of field investigations, the APE of the project was altered from ca. 450 acres to 464 acres. This change in the size of the APE stems from design changes for the wind farm and the desire to avoid several pre-Contact archaeological sites identified on lands not strictly needed for the development of the wind farm. As a result of this APE alteration, 14 of the identified sites (7849 through 7862 and three components [C26, C33, and C35] of Site 7844) are located outside of the revised APE and will not be impacted by the proposed Nā Pua Makani Wind Project. Of these, all except the three components of Site 7844 are pre-Contact or early post-Contact sites and relate to traditional habitation, agricultural, and burial practices. Pacific Legacy is reporting on these 14 sites in this AIS report because these sites were formally documented and recorded prior to the reduction of the APE. However, no test excavations were conducted in any of these sites. As a result, no recommendations regarding the eligibility of these sites to be listed on either the Hawaiʻi Register of Historic Places, or the National Register of Historic Places. However, if in the future, the current project area expands, or a new project is proposed in the area of these sites, additional archaeological work will need to be conducted on these sites including testing and providing significance and eligibility recommendations.

Of the 14 sites located within the APE, eight traditional, likely pre-Contact or early post-Contact archaeological sites (7841, 7842, 7846, 7847, 7863, 7864, 7865, and 7867) were identified. These traditional sites included habitation and agricultural terraces, a mound, a platform, a shelter cave, and a modified outcrop. These sites should be viewed as vestiges of a traditional Hawaiian landscape that once existed here. It seems rather obvious that the paucity of pre-Contact sites in this area is due to the intensive land altering activities that were conducted by the Kahuku Plantation. These traditional sites provide a glimpse of the very intensive use of the area by Native Hawaiians during the pre-Contact period. The intensive traditional use of the area probably had both permanent habitation sites and temporary shelters, with activities centered on intensive agricultural practices and exploitation of the adjacent marine resources. Agricultural practices probably revolved around dryland cultivation of traditional crops such as sweet potato, taro, sugar cane, gourd, etc. Marine exploitation included shell fish and seaweed

gathering, as well as near-shore and off-shore fishing. The intensive use of the area is supported by early historic explorer accounts describing this portion of Oʻahu.

The current investigations have made a significant contribution to our knowledge of the historic activities taking place in the Kahuku area revolving around the establishment and operation of the Kahuku Sugar Plantation. The previous archaeological survey that covered much of the current APE in the project area (Stride et al. 2003) did not record any of the sugar plantation components. This disregard for historic plantation era sites is not uncommon in Hawaiian archaeological studies probably because pineapple and sugar plantations have dominated the Hawaiian landscapes for so long and still exist on much smaller scales on some of the islands. The current study has documented considerable variability in the types of water control and transport features that were employed. The results of the recommended additional historical research on this irrigation system as part of the data recovery measures for this project have the potential to significantly add to our knowledge of this important aspect of Hawaiʻi's past.

10.1 RECOMMENDATIONS

Recommendations are provided below for the treatment of the archaeological resources found in the APE. The recommendations consist of no further work, data recovery, and preservation. See Table 12 for details.

No further work is recommended for the following sites:

- 7840
- 7841
- 7845
- 7848
- 7863
- 7864

Data Recovery is recommended for the following sites:

- 7844
- 7866
- 7867

Preservation is recommended for the following sites:

- 7842
- 7843
- 7844 (portion)
- 7846
- 7847
- 7865

In addition, a full AIS is recommended to be conducted in the area currently outside the current APE if future development takes place in this area. Sites documented in this area include:

- 7849
- 7850
- 7851
- 7852
- 7853
- 7854
- 7855
- 7856
- 7857
- 7858
- 7859
- 7860
- 7861
- 7862

Four of the traditional sites (7842, a possible habitation platform; 7846, two probable agricultural terraces; 7847, an agricultural terrace; and 7865, a habitation terrace and an agricultural terrace) inside the APE have been recommended for preservation. One traditional site (7867, a shelter cave) cannot be avoided by construction activities. Site 7867 is recommended for data recovery excavations and data recovery in the form of artifact collection and analysis at Site 7866 will also be undertaken. Data recovery investigations will add to our knowledge about traditional and early historic use of this portion of the North Shore of Oʻahu. No further work is recommended for two of the traditional sites (7841, a stone mound that was test excavated during the current AIS investigations; and 7863, a modified outcrop that has a low potential to yield any further information).

Thirty-eight of the recorded sites and site components within the APE are associated with the agricultural development and intensive use by the former Kahuku Plantation. The Kahuku Plantation was formed in 1890 and was in operation until 1971. By the mid-1930s, the plantation was cultivating nearly 4,500 acres and employed 1,137 people. The overwhelming majority of sugar plantation related features functioned mainly to control and transport water. A total of 68 features are related to water control and transport. These features include a variety of ditches, metal pipelines, wells, reservoirs, pump houses, and concrete foundations. The ditches are present in several forms, from simple earthen ditches, to stone-lined ditches, to concreted ditches. It is recommended that further historical documentation and analysis of the ditch system associated with the historic sugar complex (Site 7844) be undertaken.

The two military defensive bunkers identified on the west side of the APE (Site 7843.C1 and .C2) were associated with World War II and are part of the Coastal Defense System. These sites highlight the limited use of the area by the U.S. Military during the 1940s. Other than the temporary bivouac site (7840) found on the west side of the APE, no other evidence of military use was found in the APE.

Of the 14 sites located within the APE, four sites composed of 25 components (Site 7844.C8, .C9, .C10, .C13 through .C17, .C19, .C22, .C24, .C25, .C28, .C30, .C31, .C34, .C36, .C40, and .C41; Site 7848.C1 through C4; and Sites 7863 and 7864) are recommended to have no further work conducted but are outside of the area of disturbance and will thus not be impacted by construction activities. Thirteen sites and components (7840, 7841, 7844.C6, 7844.C7, 7844.C11, 7844.C12, 7844.C18, 7844.C21, 7844.C27, 7844.C29, 7844.C32, 7844.C37, and 7844.C38) are recommended for no further work and are tentatively scheduled to be destroyed. Seven sites and site components (7842, 7843, 7844.C23, a portion of 7844.C39, 7846, 7847, and 7865) are recommended for preservation based on their significance. Four of these sites (7842, 7846, 7847, and 7865) are pre-Contact or early post-Contact sites that were probably used for traditional habitation and agricultural purposes. Site 7843 is composed of two World War II defensive bunkers. Site 7844.C23 and C39, were associated with the Kahuku Plantation, and consist of water control features (ditches and an aqueduct). Component C23 is an extremely well built stone ditch that is illustrated on the report frontispiece. Component C39 contains two features that are recommended to be preserved (Features A and a portion of Feature B) and three features (Features C, D, and E) that require no further work. It is recommended that the entire water aqueduct (Feature A) and approximately half of the adjoining concrete ditch (Feature B) be preserved. The portion of Feature B is being preserved to provide a buffer for Feature A.

It is also recommended that data recovery occur at Sites 7866, and historic artifact scatter, and 7867, a habitation cave. Surface collection and laboratory analyses will be conducted on the materials found at Site 7866 in order to better define the age of this site and the activities that may have occurred here. Site 7867 is located within the vicinity of the proposed Turbine 10 and the laydown/building area and cannot be avoided. Marine shell midden is present throughout the surface of the cave floor and a shark tooth was also found on the floor of the cave. A test excavation placed within the cave identified additional abundant marine shell and non-human bone midden along with four basalt flakes and two historic household artifacts. The radiocarbon dates from the site indicate an occupation of between ca. AD 1650-1815 for the site. The presence of the marine midden and traditional artifacts supports this date range while the miniature picture frame and metal button post suggests use of the site into the early post-Contact period.

Finally, one site (7844.C39) associated with the Kahuku Plantation contains two features that are recommended to be preserved (Features A and a portion of B), and three features (Features C, D, and E) that require no further work and may be destroyed. It is recommended that the entire water aqueduct (Feature A) and approximately half of the adjoining concrete ditch (Feature B) be preserved. The portion of Feature B is being preserved to provide a buffer for Feature A.

Given the number of resources identified during the AIS and the potential to uncover additional subsurface sites during construction, archaeological monitoring is recommended during all ground disturbing activities within the project area.

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Map

United States Department of Interior (USDI)
1938 Transportation on Oahu.

APPENDIX A

SHPD AISP Acceptance Letter

Neil Abercrombie
GOVERNOR OF HAWAII

WILLIAM AILA JR.
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

JESSE K. SOUKI
FIRST DEPUTY

WILLIAM M. TAM
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND RESOURCE ENFORCEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
FORESTRY
FORESTRY AND WILDLIFE
INFORMATION TECHNOLOGY
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

STATE HISTORIC PRESERVATION DIVISION
601 KAMOKILA BOULEVARD, ROOM 555
KAPOLEI, HAWAII 96707

August 4, 2014

Paul Cleghorn, Ph.D.
Pacific Legacy
30 Aulike Street, Suite 301
Kailua, Hawaii 96734

LOG NO: 2014.02981
DOC NO: 1408NN02

Dear Dr. Cleghorn:

Subject: **Chapter 6E-42 Historic Preservation Review-**
Archaeological Inventory Survey Plan for the Proposed Nā Pua Makani Wind Farm
Kahuku Ahupua'a, Ko'olaupoko District, Island of O'ahu
TMK: (1) 5-6-006:018 and 5-6-008:006

Thank you for the opportunity to review the draft plan titled *Archaeological Inventory Survey Plan for the Proposed Nā Pua Makani Wind Farm in the Lands of Kahuku, Island of O'ahu [TMK (1): 5-6-006:018, 5-6-008:006]* by Cleghorn (June 2014), which was received by our office on June 24, 2014. This AISP was prepared in compliance with state historic preservation review legislation, Hawaii Revised Statutes (HRS) 6E-42 and Hawaii Administrative Rules (HAR) §13-284-5. The plan was prepared for Champlin/GEI Wind Holdings, LLC in support of the proposed development of a wind farm on approximately 450 acres of public (TMK: (1) 5-6-008:006) and private (TMK: (1) 5-6-006:018) lands in the ahupua'a of Kahuku. The project will involve the construction of thirteen wind turbines, associated laydown areas, access roads, a collector substation, underground collector lines, and transmission lines.

In 1992, Cultural Surveys Hawai'i, Inc. (CSH) surveyed ca. 785 acres that included the western portion of TMK: (1) 5-6-008:006, including the current project area. The original area comprising 1,600 acres was reduced without explanation, and findings were not presented for about 900 acres. The CSH report (Stride et al. 2003) states that twenty-one sites were identified in the overall 1,600 acre survey but only seven sites were located in the 785 acre portion. The seven sites include the following sixteen features: 8 overhang shelters (1 includes human remains), 3 walls, 3 terraces, 1 enclosure, and 1 U-shaped temporary shelter. Stride et al. (2003) also indicate that although large scale commercial agriculture severely impacted the current project area and vicinity, potential still exists for significant cultural resources to be present, but not subsurface resources. International Archaeological Research Institute, Inc. (IARII) conducted archival research on the western portion of the Na Pua Makani project area (TMK: (1) 5-6-008:006) for West Wind Works, LLC (Morrison 2009). Like Stride et al. (2003), Morrison (2009) concluded that the project area had been extensively modified by commercial agricultural activities. However, Morrison (2009) concluded that little potential existed for encountering any cultural remains.

The AISP explains the intent to identify and record any remaining historic sites and cultural deposits located within the project area. Pedestrian sweeps of the entire project area will be conducted with archaeological field crew spaced from 10-15 meters apart. The location of each site will be mapped using a hand held Trimble GeoExplorer X global positioning system. Because of the extensive development on this property, it is highly likely that any potential historic properties that still exist will be subsurface archaeological deposits, including human skeletal remains. Therefore, Pacific Legacy has outlined a program of subsurface testing involving 13 backhoe trenches in areas where wind turbines and other facilities are planned, and in areas that have been in-filled and potential exists for encountering buried cultural deposits. If site areas are identified, test excavations will be conducted to better assess the possible age and function of the sites.

The trench excavation methods will involve, where possible, identification and mapping in plan view and hand excavation of cultural layers, midden remains, artifacts, and pit features. Artifact assemblages present in fill deposits and large historic trash-filled pits will be subjected to field documentation (photographs of representative samples and qualitative and quantitative analysis) with collection of only a representative sample of artifacts for more detailed analysis in the laboratory. Traditional Hawaiian artifacts, faunal shell and bone, and charcoal and other botanical remains will be collected (or sampled, as appropriate) for analysis in the laboratory. Should samples of charcoal be recovered from secure proveniences at tested sites, the samples will be first submitted to International Archaeological Research Institute, Inc. for wood identified analysis, including determining the presence/absence of historically-introduced wood and differentiating between short lived and long lived species. Selected samples will be then sent for radiocarbon analysis.

The archaeological inventory survey plan is accepted, pursuant to Hawai'i Administrative Rule 13§13-284-5(c). Please send one hardcopy of the document, clearly marked FINAL, along with a copy of this review letter and a text-searchable PDF version on CD to the Kapolei SHPD office, attention SHPD Library.

Please call Deona Naboa at (808) 692-8015 if you have any questions or concerns regarding this letter.

Aloha,

Susan A. Lebo

Susan A. Lebo, PhD
Oahu Lead Archaeologist

APPENDIX B

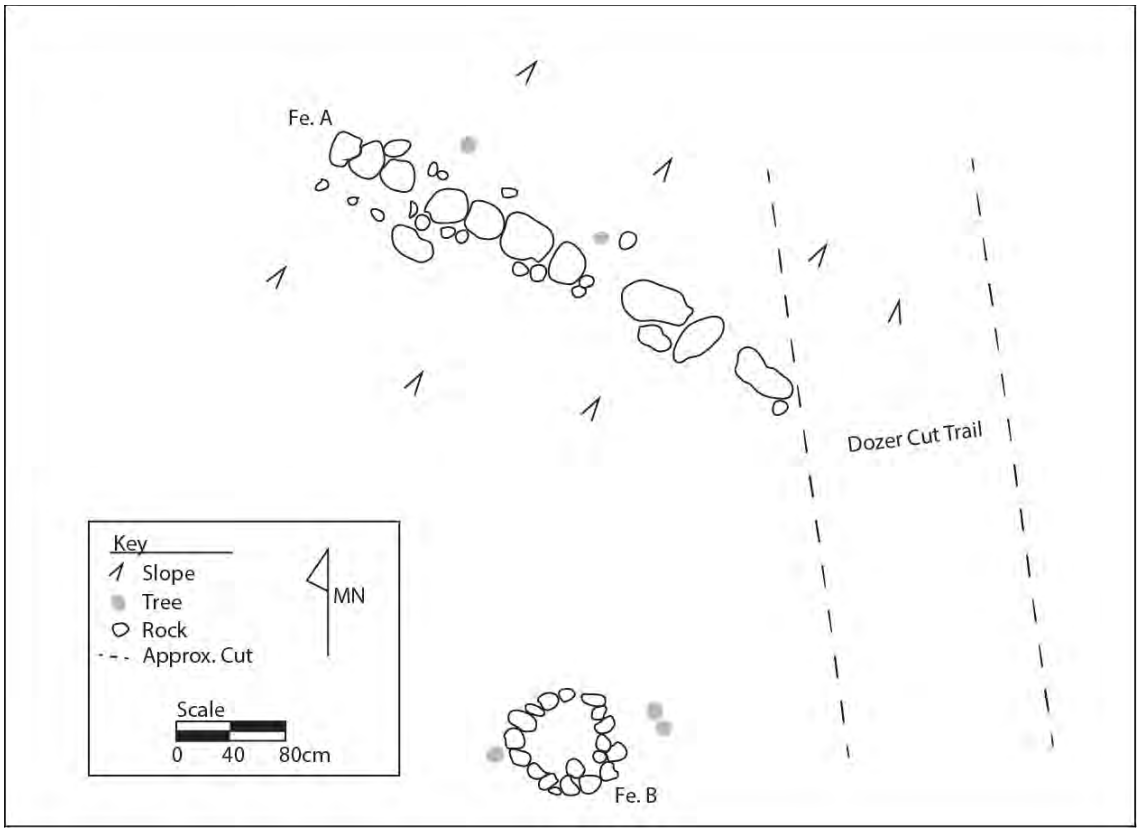
Site Descriptions

SIHP No.: 50-80-02-7840
Field No.: T-001
Site Type: Complex
Site Function: Bivouac
Site Condition: Good
No. of Features: 2
Age: Modern
Significance: Not significant
Description: Site 50-80-02-7840 is situated within a small saddle on the north slope of an unnamed ridge. The edges of the saddle to the east and west are slightly higher than the saddle itself. The east slope descends into an unnamed gulch and the west slope descends into ʻŌhiaʻai Gulch. A recent bull dozer cut trail is located immediately to the east of the site and appears to have possibly impacted the east edge of Feature A.

Feature A consists of a stone alignment constructed of small to large basalt cobbles. The alignment is oriented northwest to southeast (299˚-119˚) and measures approximately 3.8 meters in length by 0.5 meters in width. Several of the cobbles are slightly embedded into the ground.

Feature B consists of a circular stone hearth located ca. 3.5 meters up slope to the south of Feature A. The hearth is constructed of small to medium basalt cobbles and measures ca. 0.9 meter in length (east-west) by 0.8 meter in width (north-south).

Site 7840 appears to have functioned as a historic military era training campsite or bivouac.

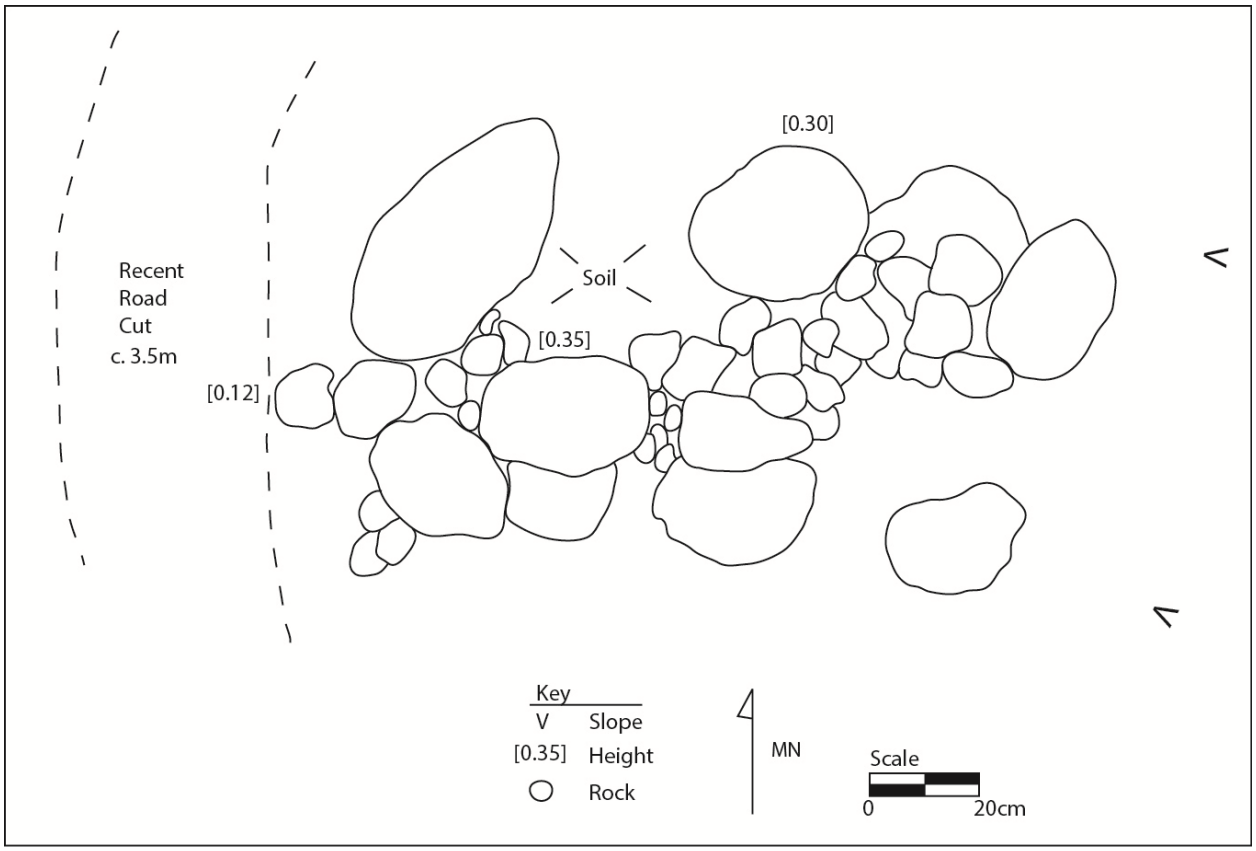


Planview map of Site 7840.

Site 7840, Fe. A, stone alignment, view to southwest.

Site 7840, Fe. B, stone hearth, view to southeast.

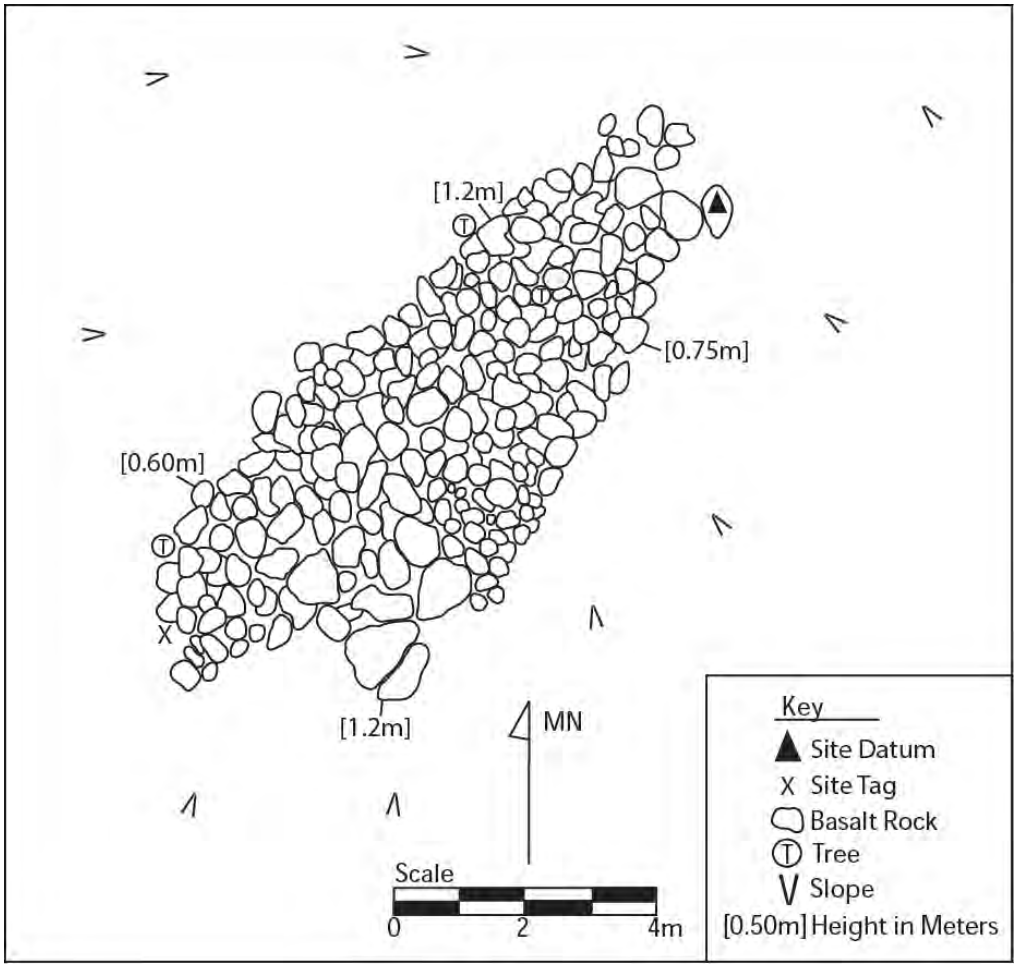
SIHP No.: 50-80-02-7841
Field No.: T-002
Site Type: Stone Mound
Site Function: Marker
Site Condition: Good
No. of Features: 1
Age: Pre-Contact or Early Post-Contact
Significance: d
Description: Site 50-80-02-7841 is situated on the crest of a ridge located approximately 177 meters south (188°) of Site 7840. Site 7841 consists of a roughly rectangular stone mound constructed of small basalt boulders and large basalt cobbles. The mound measures ca. 1.7 meters in length (east-west) by 0.9 meters in width (north-south) by 0.35 meter in height above the surrounding ground surface. Originally, the stone mound was thought to possibly represent a human burial mound. In order to test this hypothesis, a 1.0 meter by 1.0 meter test unit was excavated at this feature. Excavation of Test Unit 1 did not encounter any cultural material or human skeletal remains. Therefore, the function of the stone mound was revised to a traditional marker. The results of the excavation are presented in Section 7.0 of this report.



Planview map of Site 7841.

Site 7841, stone mound, view to southeast.

SIHP No.: 50-80-02-7842
Field No.: T-003
Site Type: Platform
Site Function: Habitation
Site Condition: Excellent
No. of Features: 3
Age: Pre-Contact or Early Post-Contact
Significance: d
Description: Site 50-80-02-7842 consists of a stone platform. It is situated near the beginning of a drainage that descends to the northeast. Vegetation in the area consists of Christmasberry, strawberry guava, and a variety of ground cover. A small cluster of *ti* plants is located immediately upslope of the platform. The platform is roughly rectangular in shape and is constructed of medium to large basalt boulders which have been loosely stacked and piled between two to three courses of stone in height. The surface of the platform is relatively level, but not paved. The platform measures ca. 11.5 meters in length by 5.4 meters in width at the southwest end and 2.8 meters in width at the northeast end. The platform ranges between ca. 0.6 to1.5 meters in height above the surrounding ground surface. The platform appears to have functioned as a traditional habitation site.



Planview map of Site 7842.

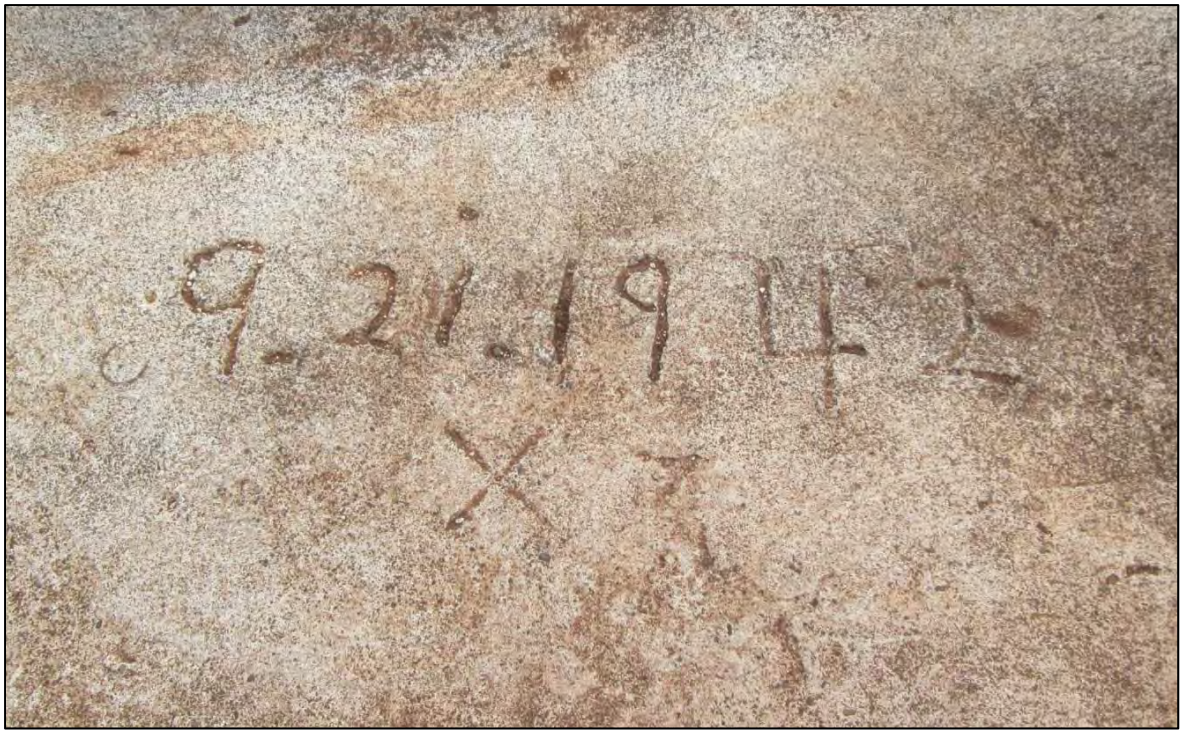
Site 7842, platform, view to southwest.

SIHP No.: 50-80-02-7843
Field No.: T-004
Site Type: Complex, Concrete Bunker
Site Function: Observation
Site Condition: Good
No. of Features: 2
Age: Historic
Significance: a, d
Description: Site 50-80-02-7843 consists of two concrete bunkers associated with the coastal defense of Oʻahu during World War II.

Feature A consists of a concrete bunker located on top of a relatively flat ridge near the permanent project related MET-Tower. The bunker is square in shape and is oriented roughly north to south (5˚-185˚). It has a flat roof, and there is an opening located on the southeast side with a staircase that descends into the structure. The large interior room measures ca. 6.1 meters in length (north-south) by 6.1 meters in width (east-west) by 2.1 meters in height. There are three large openings to the north, east, and west that provide ample views of the coastline. These windows measure ca. 0.4 meter in height. In the center of the main room is a raised concrete foundation with three metal bolts. A smaller room is located to the southwest of the main room and measures ca. 2.60 meters in length (north-south) by 2.10 meters in width (east-west). The exterior of the bunker only measures ca. 1.4 meters in height above the surrounding ground surface due to the partial subsurface nature of the structure. A wooden pole measuring ca. 4.5 meters in height is located at the northeast corner of the structure and was likely used to run telephone and electric wires to the bunker. There are metal frames on the exterior of the viewing windows which likely held some sort of covering. A "9.21.1942" construction date is inscribed on the exterior of the roof. Overall, the site is in good condition. Modern spray paint graffiti is visible on the exterior and interior of the bunker. The bunker appears to have functioned as part of the WWII coastal defense system.

Site 7843, Feature A exterior of bunker with MET-Tower in background, view to southwest.

Site 7843, Feature A interior, view to northeast.



Site 7843, Feature A, inscribed date (9.21.1942) on exterior roof, view to southeast.

Feature B consists of a concrete bunker located on the edge of a ridge overlooking Kahuku, situated ca. 75.0 meters east of Component 1. The bunker is partially embedded into the hillside, with the exposed exterior portion measuring ca. 4.4 meters in length (northwest-southeast) by 4.4 in width (northeast-southwest) by 0.75 meters in maximum height above the surrounding ground surface. An entrance to the bunker is located on the south side and consists of a soil ramp with three to four courses of stacked stone with mortar. The entrance is partially filled with soil, but measures ca. 1.2 meters in height by 0.8 meters in width. The interior of the bunker consists of a small room that measures ca. 3.0 meters in length (east-west) by 2.6 meters in width (north-south) by 1.75 meters in height. The interior floor is covered in soil and trash. The northeastern side of the interior room has a rounded extension with a small opening. The extension measures ca 1.7 meters in length by 1.5 meters in width. The viewing window measures ca. 0.4 meters in height. There are three ventilation holes visible on the roof. Overall, the site is in fair condition. Modern spray paint graffiti is visible on the exterior and interior of the bunker. The bunker appears to have functioned as part of the WWII coastal defense system.

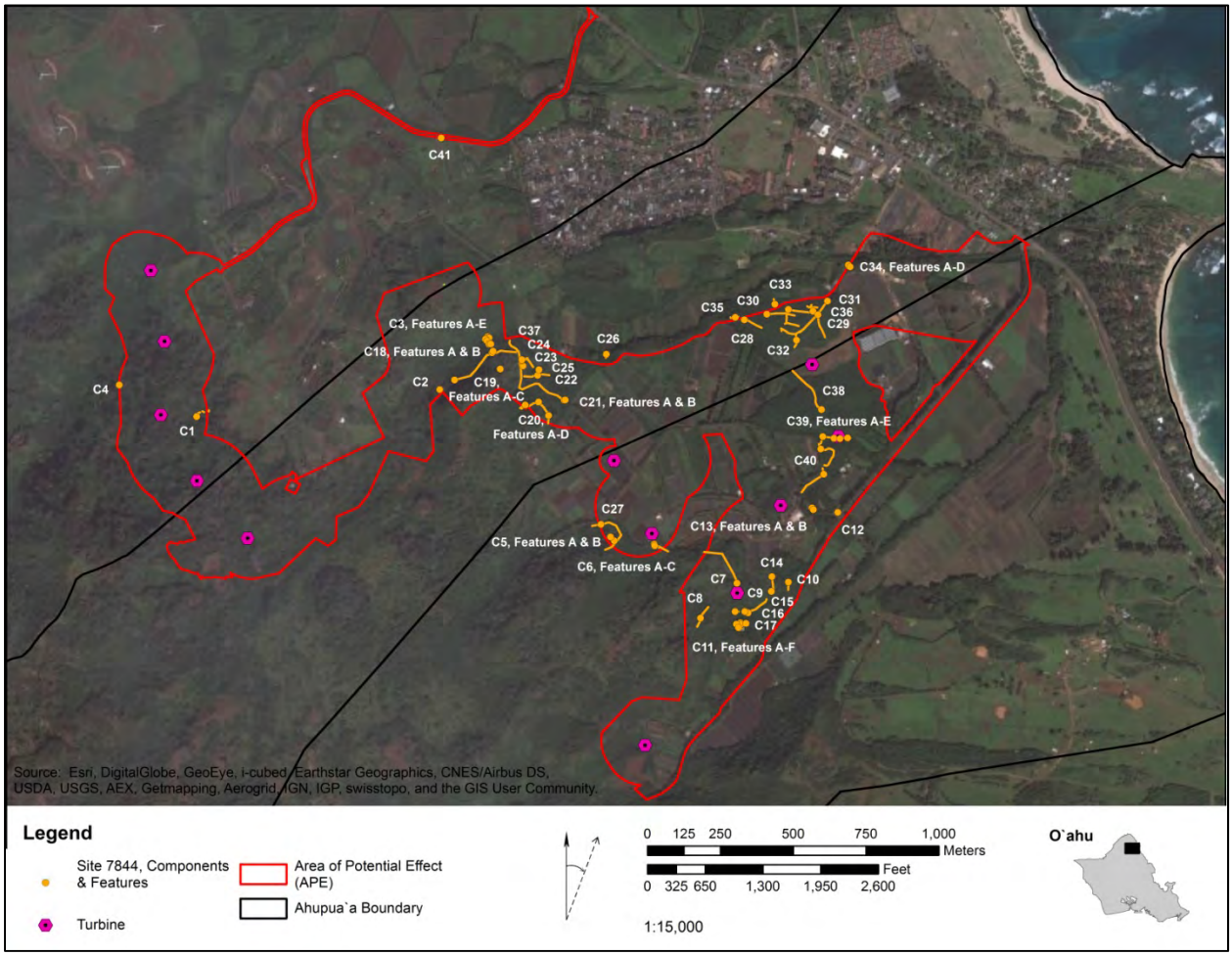
Site 7843, Feature B exterior of bunker, view to west.

Site 7843, Feature B, interior, view to northeast.

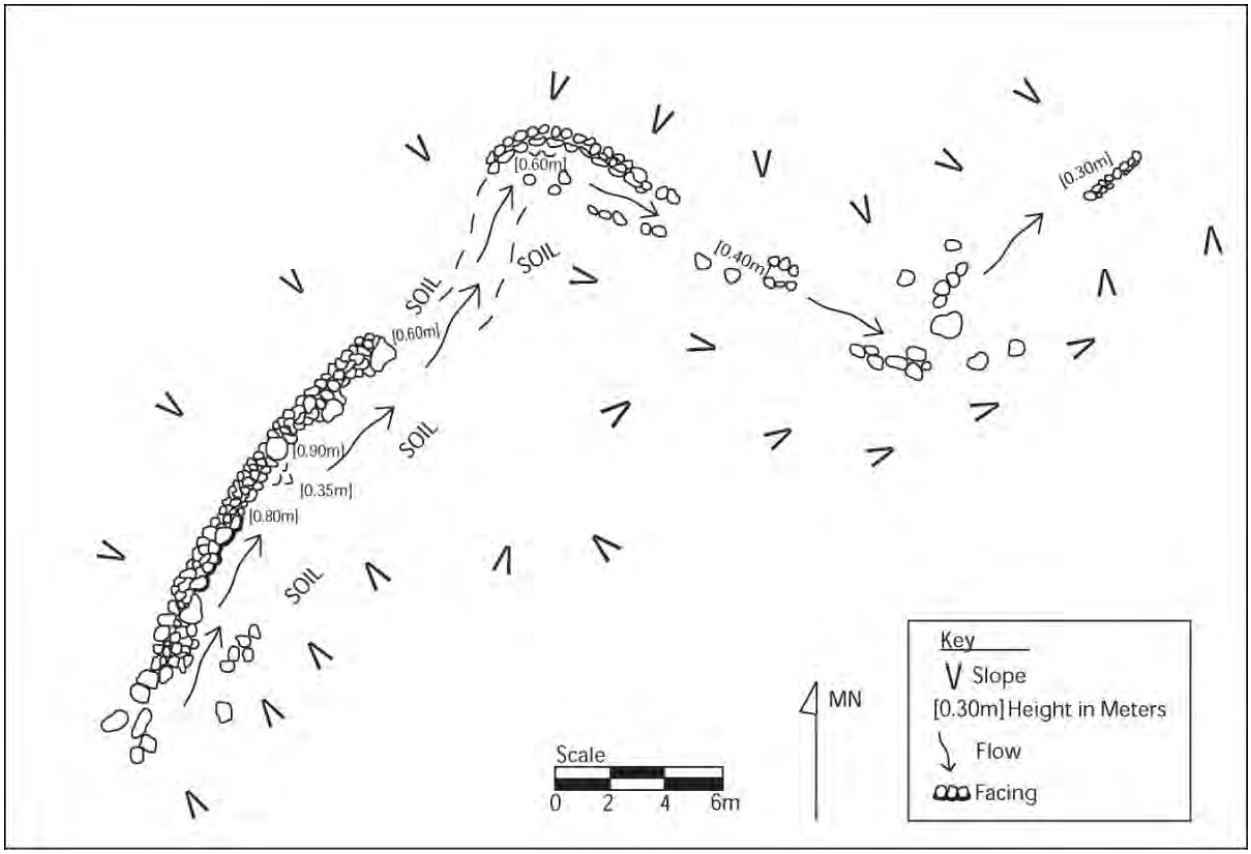
Site 7843, Feature B, interior, view to south.

SIHP No: 50-80-12-7844

Site 50-80-02-7844 is a large discontinuous district of structural remnants of the former Kahuku Sugar Plantation. The site complex contains 41 components, some of which are composed of more than one feature. Most of the structures consist of various forms of ditches. For ease of presentation the following descriptions are organized by components (abbreviated C#, which correlate with the temporary field numbers) and constituent features. The map below shows the spatial distribution of the Site 7844 components



SIHP No.: 50-80-02-7844, Component 1
Field No.: T-006
Site Type: Sugar Plantation Complex, Ditch
Site Function: Water Transport
Site Condition: Fair
No. of Features: 1
Age: Historic
Significance: a, d
Description: Site 50-80-02-7844.C1 consists of a stone and soil ditch. The site is situated along the northwest edge of a northeast running drainage. The ditch is constructed of loosely stacked and partially faced small to large basalt cobbles and boulders along the northwest side and a soil ditch and berm along the southeast side. The ditch runs approximately 16.8 meters down slope to the northeast (60˚), then bends and runs 10.0 meters to the southeast (120˚), then bends again and runs 12.0 meters to the northeast (50˚). The stone portion of the ditch measures between 0.7-1.1 meters in height along the southeast side and up to 0.4 meter in height along the northwest side. In places, one boulder is used, in other places cobbles are stacked four to five courses in height. The ditch measures ca. 2.0 meters in width and up to 0.5 meter in depth. Overall, the ditch is in fair condition. Site 7844.C1 appears to have functioned as a ditch constructed in order to transport water for the former commercial sugar plantation.



Planview map of Site 7844.C1.

Site 7844.C1, stacked stone portion of ditch, view to north.

SIHP No.: 50-80-02-7844, Component 2
Field No.: T-008
Site Type: Sugar Plantation Complex, Concrete Culvert
Site Function: Water Control
Site Condition: Fair
No. of Features: 1
Age: Historic
Significance: a, d
Description: Site 50-80-02-7844.C2 is of a concrete culvert consisting of a corrugated metal pipe, concrete wall, and basalt cobble retaining wall. The concrete wall measures ca. 2.44 meters in length by 0.3 meter in thickness by 1.6 meters in height above the surrounding ground surface. A corrugated metal pipe measuring ca. 3.0 meters in length by 0.9 meter in diameter extends through the lower portion of the concrete wall. The pipe extends ca. 0.9 meters from the edge of the concrete wall. Loosely stacked large basalt cobbles form a retaining wall that supports the concrete wall and holds the corrugated pipe in place. There is an orange plastic survey marker with "1061" written on it in Sharpie located next to the culvert. Site 7844.C2 appears to have functioned as a culvert constructed and utilized during the former commercial sugar plantation in order to divert water into a natural drainage.

Site 7844.C2, concrete culvert, view to north.

SIHP No.: 50-80-02-7844, Component 3
Field No.: T-009
Site Type: Sugar Plantation Complex
Site Function: Water Control
Site Condition: Poor
No. of Features: 5
Age: Historic
Significance: a, d
Description: Site 50-80-02-7844.C3 is complex consisting of a series of four concrete block foundations and a short section of a concrete retaining wall situated along a small dry streambed. The site is located on DLNR land, approximately 60.0 meters northeast from the property boundary.

Feature A consists of an irregularly shaped concrete block foundation measuring 1.50 meters in length by 1.0 meter in width by 1.3 meters in height above ground surface. There is a thin layer of black tar on a portion of the foundation. This feature is situated less than 1.0 meter north of the streambed.

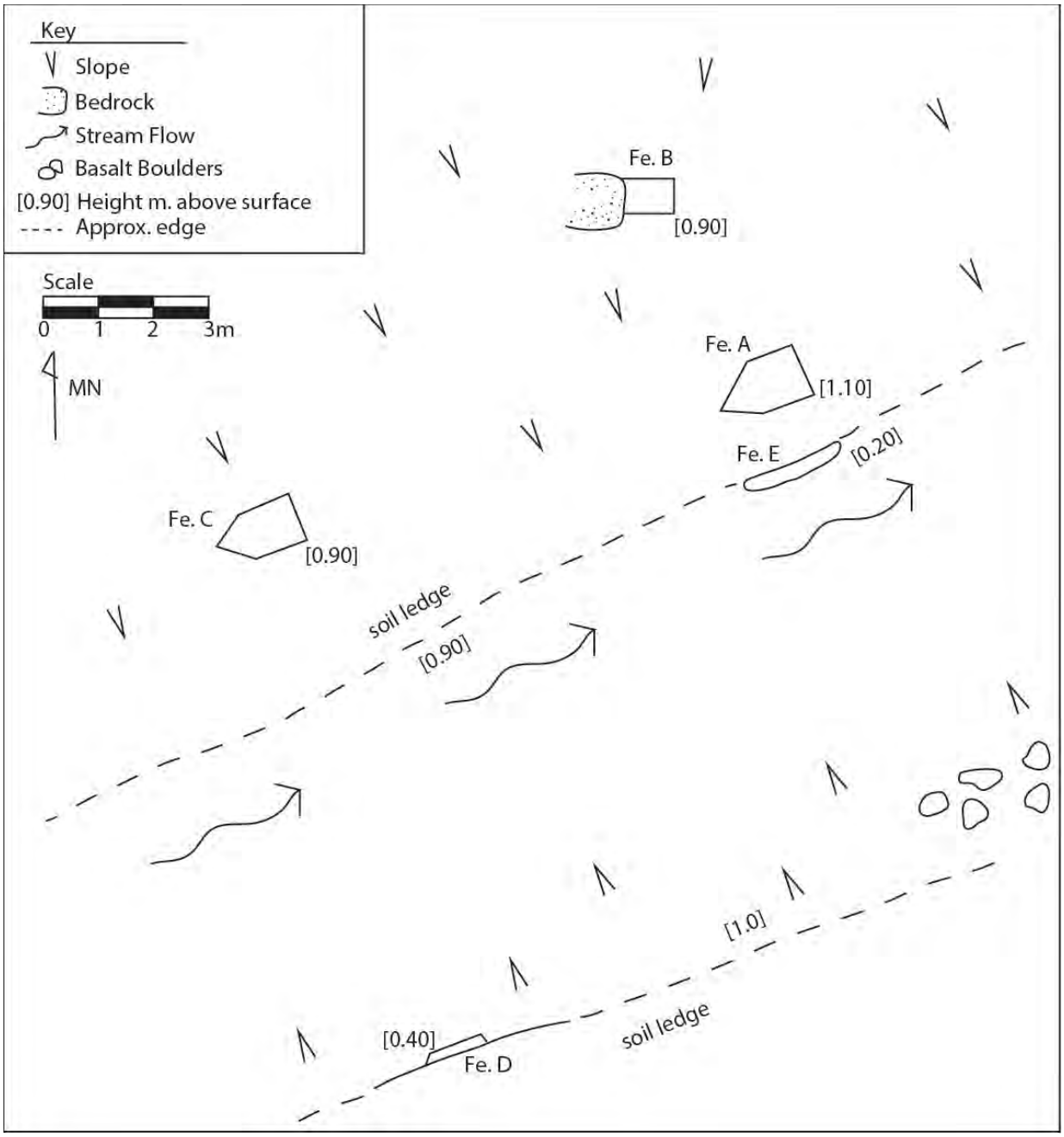
Feature B is another irregularly shaped concrete foundation located ca. 3.0 meters upslope to the northeast of Feature A. Feature B measures 0.95 meter in length by 0.76 meter in width by 1.06 meters in height. Basalt cobbles have been mortared together to form a concrete foundation that is connected to a basalt outcrop.

Feature C is an irregularly shaped concrete foundation located ca. 7.0 meters southwest of Feature A. It measures 1.5 meters in length by 1.15 meters in width by 0.9 meter in height. Like Feature A and Feature B, it is located on the north side of the streambed. It also has black tar staining on the top.

Feature D consists of a partially buried concrete foundation located ca. 6.0 meters southeast of Feature C, on the south side of the streambed. It measures ca. 1.4 meters in length by 0.35 meter in width by 0.4 meter in height above the ground surface. The exposed portion of the foundation is similar in size and construction to the other features. The soil burying Feature D was presumably pushed over from the dirt road-cut above Feature D to the south.

Feature E consists of a partially buried concrete retaining wall located ca. 0.9 meter south of Feature A. The wall is constructed of basalt cobbles and concrete, and measures 1.8 meters in length by 0.2 meter in width by 0.2 meter in height above the ground surface. It is situated within the streambed and was likely used to protect Feature A from flowing stream water.

Given its location in a narrow gulch, off a dirt road, and situated on both sides of a dry streambed, Site 7844.C3 appears to be associated with water control related to the former commercial sugar plantation.



Planview map of Site 7844.C3.

Site 7844.C3, Fe. A, concrete foundation, view to northeast.

Site 7844.C3, Fe. C, concrete foundation, view to northeast.

SIHP No.: 50-80-02-7844, Component 4
Field No.: T-010
Site Type: Sugar Plantation Complex
Site Function: Water Transport
Site Condition: Good
No. of Features: 4
Age: Historic
Significance: a, d
Description: Site 50-80-02-7844.C4 is a complex consisting of four connecting ditches situated along the edge of a drainage.

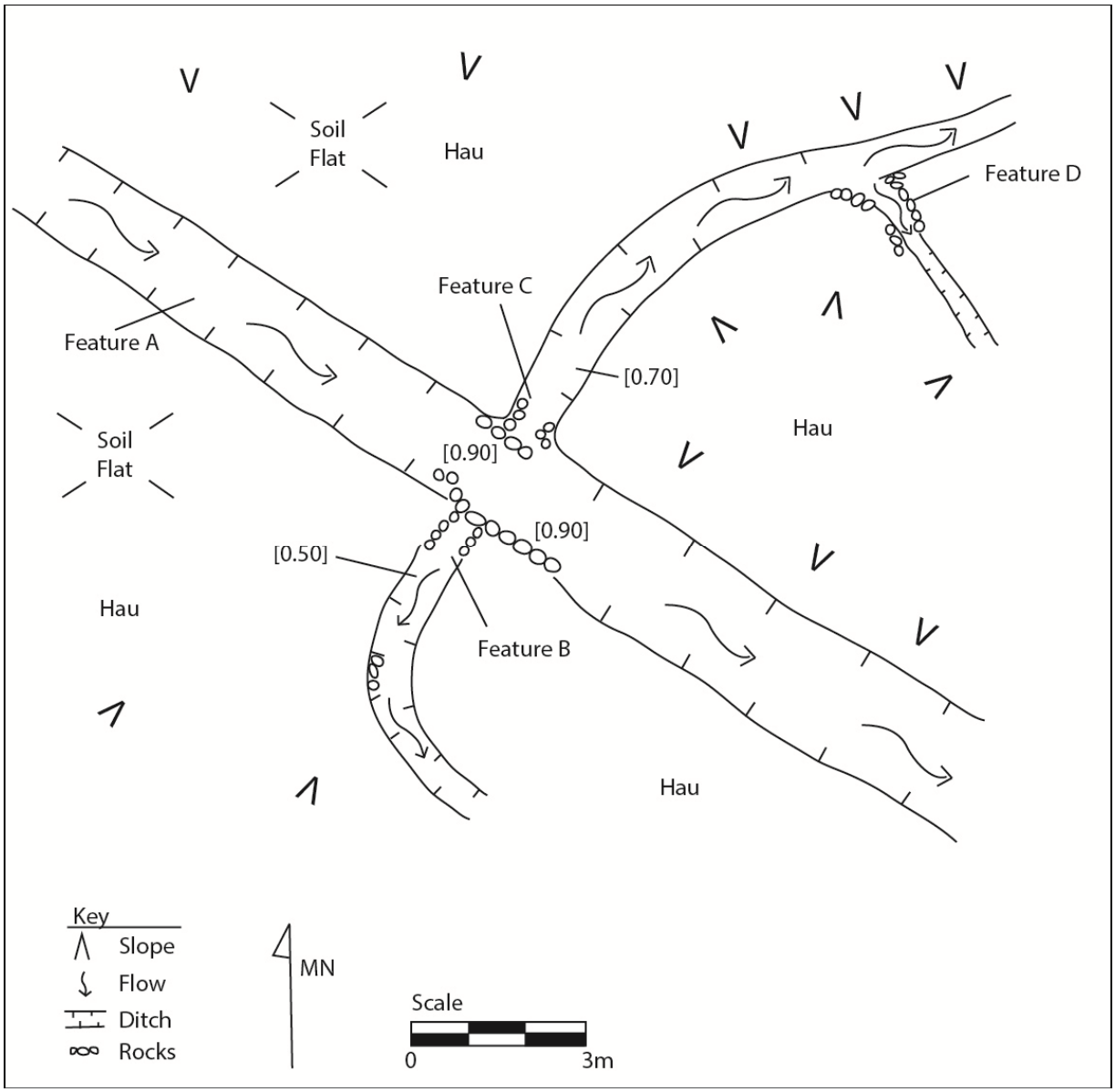
Feature A is a large ditch which runs northwest to southeast down the center of the site. The majority of the ditch consists of soil with portions of stacked basalt boulder and cobble retaining walls located at the intersections with Feature B and Feature C. The ditch measures ca. 40.0 meters in length by 3.3 meters in width with a maximum depth of 2.2 meters. The bottom of the ditch is relatively flat and the sides are relatively steep. The stone retaining wall located at the intersection with Feature B measures ca. 2.3 meters in length by 0.9 meter in height. The stone retaining wall located at the intersection with Feature C measures ca. 1.2 meters in length by 0.9 meter in height.

Feature B is a smaller, shallower ditch extending off from Feature A, located directly across from Feature C. It runs southwest from the intersection with Feature A for ca. 3.0 meters before turning to the southeast. The majority of the ditch consists of soil with short segments partially lined with basalt cobbles. The ditch measures ca. 20.0 meters in length by 0.7 meter in width by 0.5 meters in depth.

Feature C is also a smaller, shallower ditch extending off from Feature A, located directly across from Feature B. It runs northeast from the intersection with Feature A for ca. 5.0 meters before turning to the east. The majority of the ditch consists of soil with short segments partially lined with basalt cobbles. It measures ca. 20.0 meters in length by 1.0 meter in width by 0.7 meter in depth.

Feature D is a small ditch extending off from Feature C, located ca. 7.6 meters northeast of the intersection with Feature A. It runs southeast from the intersection with Feature C and measures ca. 3.5 meters in length by 0.3 meter in width by 0.3 meter in depth. The majority of the ditch consists of soil with a short segment located at the intersection with Feature C lined with basalt boulders and cobbles and a short piece of a preformed concrete ditch. The concrete ditch measures ca. 0.7 meter in length by 0.3 meter in width by 0.3 meter in depth.

Site 7844.C4 is in good condition. The site appears to be associated with water transport related to the former commercial sugar plantation.



Planview map of Site 7844.C4.

Site 7844.C4, Fe. D, view to southeast.

Site 7844.C4, Fe. A, view to northeast.

SIHP No.: 50-80-02-7844, Component 5
Field No.: T-011
Site Type: Sugar Plantation Complex
Site Function: Water Control
Site Condition: Poor
No. of Features: 2
Age: Historic
Significance: a, d
Description: Site 50-80-02-7844.C5 is a complex comprised of a valve (Feature A) and a well (Feature B). The site is situated on a gradual northwest facing slope that forms a reservoir that appears to be manmade. The site measures 14.2 meters in length (northwest-southeast) by 0.75 meter in width (northeast-southwest) by 0.3 meter in depth and 0.3 meter in height above ground surface. Feature A is located ca. 13.0 meters upslope of Feature B. Feature A consists of a valve constructed of iron and steel with an iron wheel at the top of the feature that turns an inner cog and controls the opening of the well (Feature B). Feature B is a subsurface well measuring ca. 0.6 meter in width by 0.3 meter in depth. The well is filled in with soil and debris, but still contains water. A metal cover partially blocks the well and resembles a man-hole cover. The features are adjoined by pipes and function as a pulley system to expose and/or cover the opening of the well. The pipes are set on concrete footings with straps. Site 7850 appears to be associated with water control related to the former commercial sugar plantation.

Site 7844.C5, Fe. A, valve, view to northwest.

Site 7844.C5, Fe. B, well, view to southeast.

SIHP No.: 50-80-02-7844, Component 6
Field No.: T-014
Site Type: Sugar Plantation Complex
Site Function: Water Transport
Site Condition: Poor
No. of Features: 3
Age: Historic
Significance: a, d
Description: Site 50-80-02-7844.C6 is a complex consisting of three associated features located on the north side of a natural drainage.

Feature A is a concrete foundation located ca. 2.0 meters to the west of Feature B. The foundation measures ca. 3.3 meters in length (east-west) by 3.2 meters in width (north-south) by at least 0.68 meter in depth. Rusted metal is visible along the interior of the foundation which is covered with soil and vegetation. Therefore, no interior depth could be obtained. The rusted metal may indicate there was a cover for the foundation. The concrete foundation may have been used for water control considering its proximity to the other features.

Feature B is a concrete ditch located ca. 2.0 meters to the east of Feature A. The ditch is oriented roughly northwest-southeast extending down slope, and is made up of preformed concrete sections that are broken into various segments. Overall, it measures ca. 15.8 meters in length by 0.28 meter in width by 0.17 meter in depth. The ditch appears to have transport water down slope.

Feature C is a large iron pipeline located ca. 2.4 meters north of Feature B and oriented roughly northwest-southeast. Overall, it measures ca. 53.0 meters in length, but only 30.0 meters is within the current APE. The remaining 23.0 meters is located outside the APE. The pipeline measures ca. 0.61 meter in diameter (2 feet), and appears to have transported water down slope.

Site 7844.C6 appears to be associated with water transport related to the former commercial sugar plantation.

Site 7844.C6, Fe. A, concrete foundation, view to west.

Site 7844.C6, Fe. A concrete foundation (on left) and Fe. C. pipeline (on right), view to NW.

Site 7844.C6, Fe. C, pipeline, view to northeast.

Site 7844.C6, Fe. B, concrete ditch, view to southeast.

SIHP No.: 50-80-02-7844, Component 7
Field No.: T-015
Site Type: Sugar Plantation Complex, Pipeline
Site Function: Water Transport
Site Condition: Fair
No. of Features: 1
Age: Historic
Significance: a, d
Description: Site 50-80-02-7844.C7 consists of a steel pipeline oriented roughly northwest-southeast along the toe of a slope. The pipeline measures approximately 174.3 meters in length by 0.61 meters (24 inches) in diameter. The south end of the pipeline terminates into the ground, while the north end simply ends. The pipeline segments appear to be riveted together, and a concrete or asbestos like white lining is visible on the interior of the pipe. The south end of the pipeline that terminates into the ground contains a wheel valve with a concrete and stone ditch extending down slope to the east for ca. 10.0 meters. The concrete and stone ditch measures ca. 1.0 meter in width by 0.2 to 0.3 meter in depth. Additional concrete ditch segments are loosely scattered on the surface near the north end of the pipeline. Site 7844.C7 appears to be associated with water transport related to the former commercial sugar plantation.

Site 7844.C7, pipeline, view to southwest.

SIHP No.: 50-80-02-7844, Component 8
Field No.: T-016
Site Type: Sugar Plantation Complex, Soil Ditch
Site Function: Water Transport
Site Condition: Fair
No. of Features: 1
Age: Historic
Significance: a, d
Description: Site 50-80-02-7844.C8 consists of a soil ditch. The ditch is situated on a gradual east facing slope, and is oriented roughly north to south. It measures ca. 68.0 meters in total length and ranges from 1.1 to 1.75 meters in width by 0.5 to 0.75 meter in depth. A filled-in area measuring ca. 9.0 meters in length is located ca. 23.0 meters north of the southern end of the ditch. Site 7844.C8 appears to be associated with water transport related to the former commercial sugar plantation.

Site 7844.C8, soil ditch, view to south.

SIHP No.: 50-80-02-7844, Component 9
Field No.: T-018
Site Type: Sugar Plantation Complex, Stone/Concrete Ditch
Site Function: Water Transport
Site Condition: Fair
No. of Features: 1
Age: Historic
Significance: a, d
Description: Site 7844.C9 consists of a stone and concrete ditch. It is oriented roughly east to west, and runs across a south facing slope. The linear ditch is split into two separate segments by a gap measuring ca. 20.0 meters in length. The western segment of the ditch is constructed of loosely stacked small basalt boulders and small to medium basalt cobbles between three to five courses of stone in height. The stones have been secured in place with concrete mortar. The western segment measures ca. 12.7 meters in length by 1.0 meter in width by 0.70 meter in height. The eastern segment is also constructed of loosely stacked small basalt boulders and small to medium basalt cobbles between three to five courses of stone in height. The stones have been secured in place with concrete mortar, except at the eastern end, where no concrete mortar was used in the construction of the ditch. The eastern segment measures ca. 11.3 meters in length by 1.0 meter in width by 0.70 meter in height.

Overall, the ditch is in fair condition. Some portions of the ditch have tumbled. Several modern plastic planting pots were observed within the ditch. Site 7844.C9 appears to be associated with water transport related to the former commercial sugar plantation.

Site 7844.C9, stone/concrete ditch, view to west.

Site 7844.C9, stone/concrete portion of ditch, view to northeast.

Site 7844.C9, stacked stone portion of ditch, view to north.

SIHP No.: 50-80-02-7844, Component 10
Field No.: T-019
Site Type: Sugar Plantation Complex, Concrete Ditch
Site Function: Water Transport
Site Condition: Fair
No. of Features: 1
Age: Historic
Significance: a, d
Description: Site 50-80-02-7844.C10 consists of a concrete ditch oriented roughly northwest to southeast and measuring ca. 27.0 meters in length by 0.48 meter in width and 0.2 meter in height. The ditch is constructed of preformed concrete segments each measuring ca. 0.9 meter in length. The southeastern end of the ditch has been bulldozed and broken apart. The north end of the ditch has a Y-shaped intersection. A short concrete section running down slope to the east from the main ditch measures ca. 0.80 meter in length and flows into a soil ditch. This short section of ditch has a sliding metal door with handle at the Y-shaped intersection to control water flow down slope. Site 7844.C10 appears to be associated with water transport related to the former commercial sugar plantation.

Site 7844.C10, concrete ditch, Y-shaped intersection, view to south.

SIHP No.: 50-80-02-7844, Component 11
Field No.: T-021
Site Type: Sugar Plantation Complex
Site Function: Water Control
Site Condition: Poor
No. of Features: 5
Age: Historic
Significance: a, d
Description: Site 50-80-02-7844.C11 is a complex comprised of six associated features of an abandoned water storage facility located immediately north of an active water pump facility.

Feature A consists of a large rectangular concrete water storage area located in the center of Site 7844.C11. It measures ca. 17.5 meters in length (north-south) by 11.0 meters in width (east-west) with a maximum depth of 4.0 meters. The interior of Feature A is filled in with soil and several large *hao* trees. Two large metal pipes are visible protruding into the northern portion of the feature. The pipe protruding into the northwest corner measures ca. 0.61 meter (24 inches) in diameter. The pipe protruding into the northeast corner of the feature measures ca. 0.91 meter (36 inches) in diameter, with an old pump connected to the pipe.

Feature B consists of a circular concrete well located ca. 1.0 meter west of Feature A, and has a metal cap covering the opening. The well measures ca. 2.0 meters in diameter by 0.3 meters in height above ground surface. A depth could not be obtained for the feature.

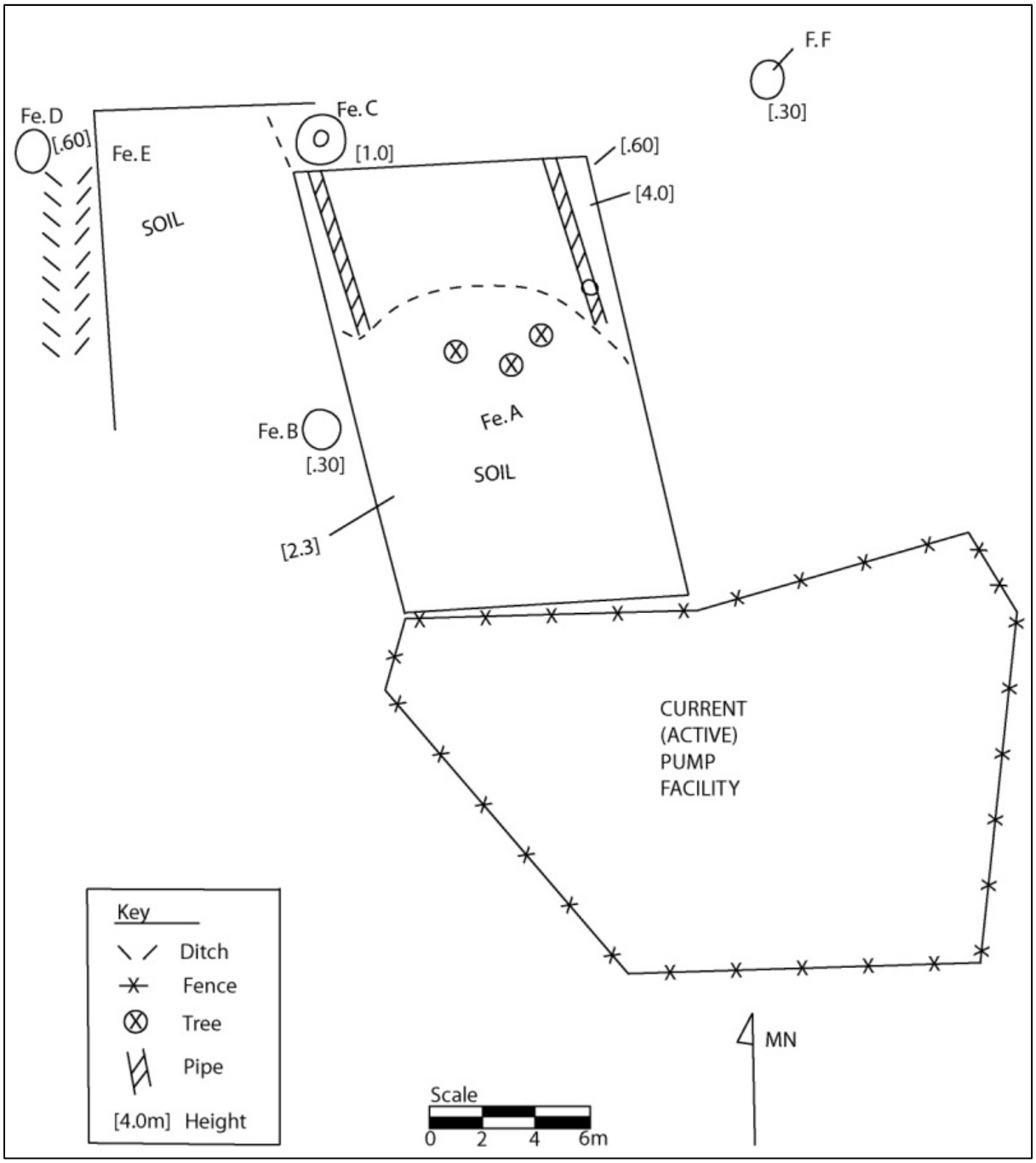
Feature C is a circular brick and mortar well located ca. 0.5 meter north of the northwest corner of Feature A. The well measures ca. 2.4 meters in diameter by 1.16 meters in depth. A metal pipe measuring ca. 0.36 meter (14 inches) in diameter and 2.0 meters in length is sticking out of the center of the well, which is mostly filled in with soil.

Feature D consists of a circular brick and mortar well located at the northwest side of Site 7844.C11. The well measures ca. 1.8 meters in diameter by 0.6 meters in depth. A metal pipe measuring ca. 0.36 meter (14 inches) in diameter and 1.5 meters in length is sticking out of the center of the well, which is mostly filled in with soil.

Feature E is an L-shaped concrete and stone retaining wall located at the northwest side of Site 7844.C11, immediately east of Feature D. The retaining wall runs north to south for ca. 12.0 meters then turns and runs east to west for ca. 8 meters. Overall, it measures ca. 20.0 meters in length by 0.6 meter in width by 0.4 meters in height. A soil ditch is located immediately to the west of the retaining wall.

Feature F is a circular brick and mortar well located ca. 6.0 meters northeast of Feature A. The well measures ca. 2.0 meters in diameter and 1.18 meters in depth. A metal pipe measuring ca. 0.36 meter (14 inches) in diameter and 1.5 meters in length is sticking out of the center of the well, which is mostly filled in with soil.

In addition, an old telephone pole is located 4.0 meters north of Feature A, and the site is littered with corrugated metal and modern trash. Site 7844.C11 appears to be associated with water control related to the former commercial sugar plantation.



Planview map of Site 7844.C11.

Site 7844.C11, Fe. A, concrete water storage area, view to southwest.

SIHP No.: 50-80-02-7844, Component 12
Field No.: T-022
Site Type: Sugar Plantation Complex, Pump House
Site Function: Water Control
Site Condition: Fair
No. of Features: 1
Age: Historic
Significance: a, d
Description: Site 50-80-02-7844.C12 is an active pump house located just off of the Mālaekahana access road. The structure is identified as "K12 Pump House" written on an internal electric panel. The structure is surrounded by a chain-linked fence. Over all, the structure measures ca. 6.2 meters in length by 6.0 meters in width, and is constructed of a concrete foundation with plywood and plank sides and corrugated metal roofing. There are two concrete steps located on the southeast side of the structure. A white PVC pipe drains water into an abandoned concrete ditch located on the northeast side. There is an active power pole located on the southwest side of the structure, with an active HECO meter and electric box attached to the southeast side. Site 7844.C12 appears to be associated with water control related to the former commercial sugar plantation and is still in use today, as water can be heard flowing through and seen dripping from internal pipes, as well as draining out of the PVC pipe at the rear of the structure. The abandoned concrete ditch appears to be an over flow device since it is sealed by soil on both ends and flows nowhere.

Site 7844.C12, pump house, view to north.

Site 7844.C12, drainage at rear of pump house, view to northwest.

Site 7844.C12, pump house, view to northwest.

SIHP No.: 50-80-02-7844, Component 13
Field No.: T-023
Site Type: Sugar Plantation Complex, Shed and Concrete Slab
Site Function: Storage
Site Condition: Poor
No. of Features: 2
Age: Historic
Significance: a, d
Description: Site 50-80-02-7844.C13 consists of a plywood shed (Feature A) and a concrete slab (Feature B) located just off of the Mālaekahana access road. There is a weighted lift-gate at the front of the property.

Feature A is a plywood shed with a corrugated metal A-frame roof constructed on top of a concrete foundation. The shed measures ca. 15.0 meters in length by 6.8 meters in width by 4.0 meters in height above ground surface. The shed is still in use, and is currently storing various pieces of equipment and supplies.

Feature B is a small concrete slab located to the southeast of the shed. The slab measures ca 7.4 meters in length by 4.1 meters in width. The slab may have been used for parking vehicles. Currently, a black metal trailer frame is parked to the northeast of Feature A and a camouflaged "military" trailer is parked to the north of Feature A.

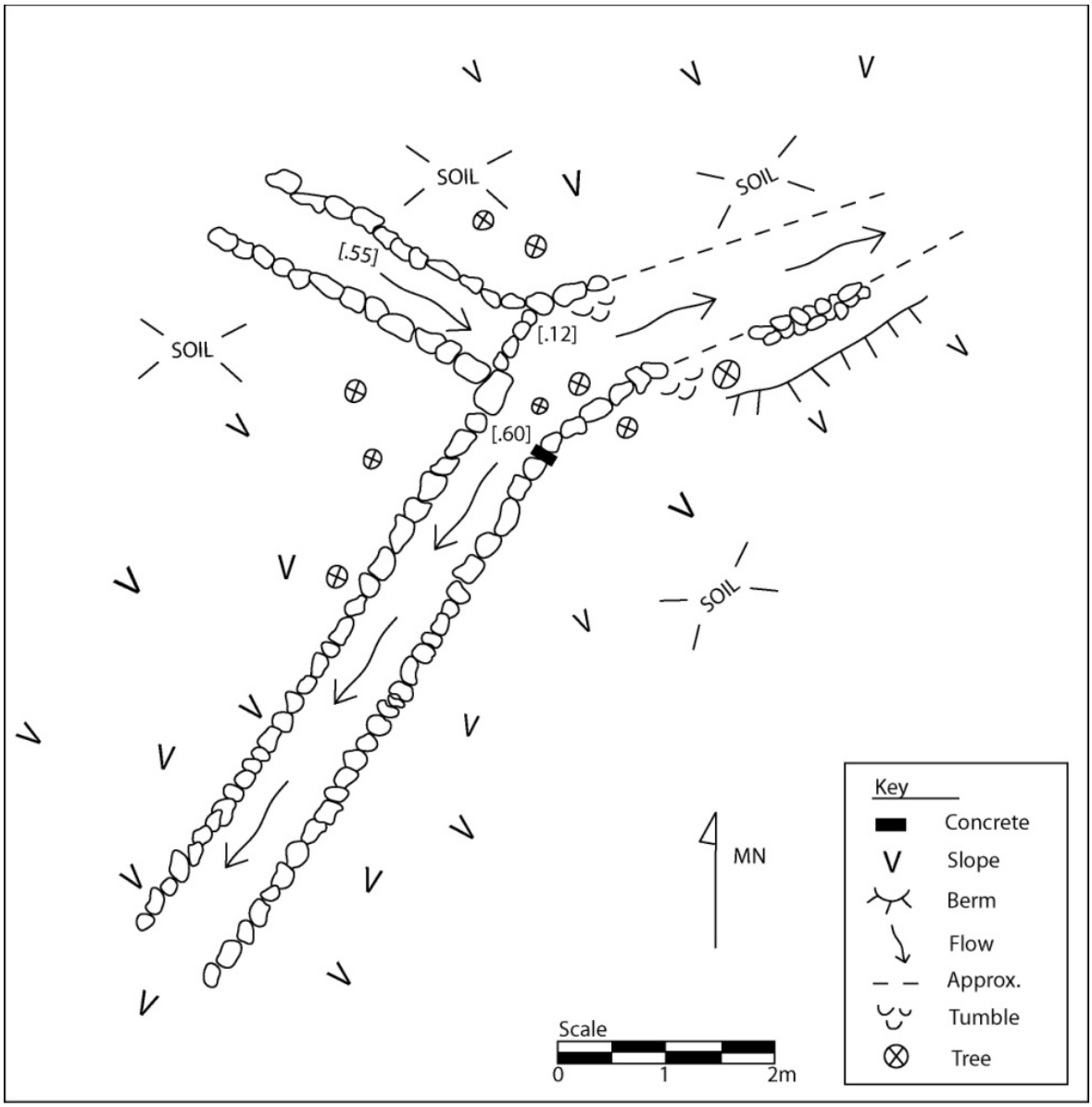
Site 7844.C13 appears to have functioned as a storage area constructed during the historic period and currently still in use.

Site 7844.C13, Fe. A, shed, view to west.

SIHP No.: 50-80-02-77844, Component 14
Field No.: T-024
Site Type: Sugar Plantation Complex, Concrete Ditch
Site Function: Water Transport
Site Condition: Fair
No. of Features: 1
Age: Historic
Significance: a, d
Description: Site 50-80-02-7844.C14 consists of a concrete ditch located ca. 5.0 meters east of an active agricultural field. The ditch is oriented roughly north to south. It is constructed with preformed concrete sections, each measuring ca. 0.9 meter in length. Every two to three sections, there are openings on both sides of the ditch, some of which have metal pieces that may have functioned as adjustable gates regulating water flow. The ditch measures ca. 44.0 meters in length by 0.28 meter in width by 0.21 meter in height. Site 7844.C14appears to be associated with water transport related to the former commercial sugar plantation.

Site 7844.C14, concrete ditch, view to northwest.

SIHP No.: 50-80-02-7844, Component 15
Field No.: T-025
Site Type: Sugar Plantation Complex, Stone Ditch
Site Function: Water Transport
Site Condition: Fair
No. of Features: 1
Age: Historic
Significance: a, d
Description: Site 50-80-02-7844.C15 consists of a Y-shaped stone ditch intersection located on a southeast facing slope. It is constructed of loosely stacked basalt boulders and cobbles up to four courses of stone in height. The main portion of the ditch is oriented roughly northeast to southwest and measures ca. 10.4 meters in length by 0.5 meter in width by 0.3 to 0.6 meter in height. The other segment of the ditch flows into the main portion from upslope to the northwest. This ditch segment is oriented northwest to southeast and measures ca. 3.0 meters in length by 0.6 meter in width by 0.5 meter in height. In addition, several concrete pieces that may have been used to block the flow of water are incorporated into the stacked stone. Site 7844.C15 appears to be associated with water transport related to the former commercial sugar plantation.



Planview map of Site 7844.C15.

Site 7844.C15, stone ditch, view to north.

Site 7844.C15, stone ditch, view to view to west.

SIHP No.: 50-80-02-7844, Component 16
Field No.: T-026
Site Type: Sugar Plantation Complex, Stone Retaining Wall
Site Function: Roadway
Site Condition: Fair
No. of Features: 1
Age: Pre-Contact or Early Post-Contact
Significance: a, d
Description: Site 50-80-02-7844.C16 consists of a stone retaining wall constructed of medium to large basalt boulders. It is oriented roughly northeast to southwest, but does bend to the north. The wall supports an old road-cut upslope on the west side of the hillside. At the base of the wall are vestiges of a soil ditch that is mostly destroyed. The retaining wall measures ca. 88.0 meters in length by 2.0-3.0 meters in height. The boulders measure ca 0.35 to 1.3 meters in diameter. Site 7844.C16 appears to have functioned as a retaining wall for a roadway constructed and utilized during the former commercial sugar plantation.

Site 7844.C16, stone retaining wall, view to northwest.

SIHP No.: 50-80-02-7844, Component 17
Field No.: T-027
Site Type: Sugar Plantation Complex, Stone/Concrete Ditch
Site Function: Water Transport
Site Condition: Fair
No. of Features: 1
Age: Historic
Significance: a, d
Description: Site 50-80-02-7844.C17 consists of a concrete ditch with several channels. The ditch is constructed of basalt cobbles cemented in place with concrete, as well as preformed concrete ditch segments. The main ditch is oriented roughly east to west and measures ca. 10.5 meters in length by 0.45 meter in width by 0.3 meter in height. The main ditch flows into a larger concrete ditch, which flows down slope to the southeast and measures ca. 4.0 meters in length by 1.0 meter in width by 1.0 meter in height. A secondary ditch veers off from the main ditch to the northeast and extends for ca. 3.0 meters before it terminates into soil. Another ditch extends to the south for 2.0 meters before ending. Site 7844.C17 appears to be associated with water transport related to the former commercial sugar plantation.

Site 7844.C17, stone/concrete ditch, view to west.

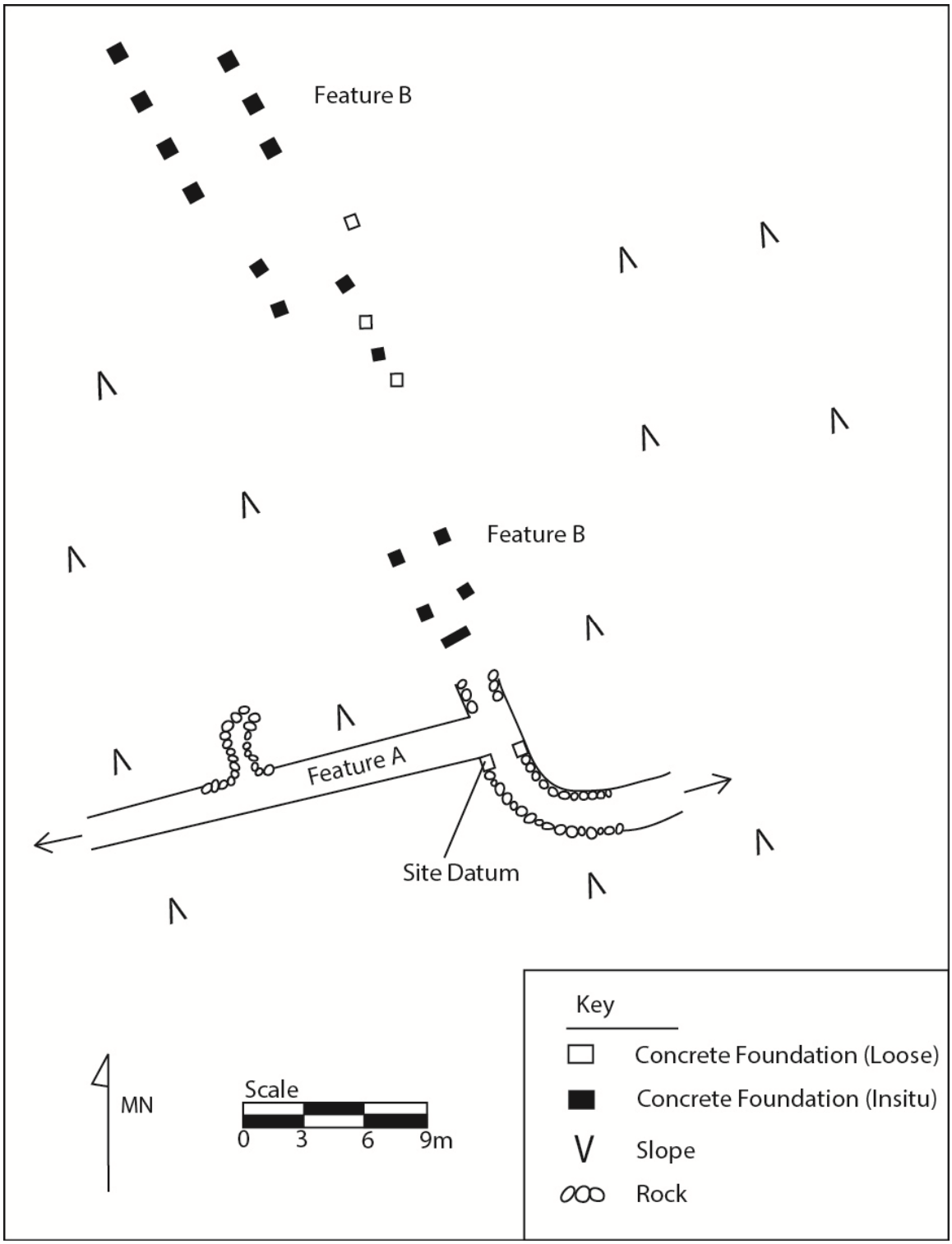
SIHP No.: 50-80-02-7844, Component 18
Field No.: T-028
Site Type: Complex
Site Function: Sugar Plantation Complex, Water Transport
Site Condition: Fair
No. of Features: 2
Age: Historic
Significance: a, d
Description: Site 50-80-02-7844.C18 consists of a ditch (Feature A) and a series of concrete foundations (Feature B) located on a northwest facing slope. The ditch is oriented roughly northeast to southwest running across the slope of the hill. The western portion of the ditch is narrower than the eastern portion, although it is longer. The western portion measures ca. 175.0 meters in length by 1.3 meters in width by 0.4 meter in depth. It is constructed predominantly of soil, although several segments are lined with basalt cobbles on the down slope (north) side. The west end terminates at a large boulder outcrop. There are at least two outflow ditches that are partially stone-lined. The outflow ditch to the west measures ca. 5.0 meters in length by 0.4 meter in width by 0.35 meter in height, extending down slope before turning to the northeast and becoming indiscernible.

The eastern portion of the ditch measures ca. 75.0 meters in length by 1.4 meters in width by 0.7 meter in height. The eastern portion is slightly curved and is constructed of basalt cobbles mortared into place with concrete. There is a concrete foundation on both sides of the intersection where the eastern ditch merges with the west. These foundations measure ca. 0.5 meter in length by 0.4 meter in width by 0.75 meter in height. The foundations appear to have been used to support a gate for water. This segment of the ditch was constructed to accommodate large quantities of water. This ditch flows down slope into the vestiges of Feature B and measures ca. 2.6 meters in length by 0.8 meter in width by 0.2 meter in height.

Feature B consists of a series of concrete foundations extending down slope from Feature A towards the valley floor. There are a total of eight sets of concrete foundations oriented roughly northwest to southeast in two parallel lines. The foundations are set ca. 1.2 meters apart in each row, with the rows separated by ca. 3.0 meters. Each foundation is pyramid-shaped with a flat top and indentation where a beam or stand may have been. They measure ca. 0.30 meters in length by 0.30 meters in width by 0.35 meter in height. These footings were likely used to support a pipe or open ditch, although there is no current evidence of such a structure.

In addition, three historic glass bottles were observed at Site 7844.C18, including a clear glass soda bottle with no markings, a green Rycroft bottle, and a green Gilbey gin bottle.

Site 7844.C18 appears to be associated with water transport related to the former commercial sugar plantation.



Planview map of Site 7844.C18.

Site 7844.C18, Fe. A, ditch, view to south.

Site 7844.18, Fe. B, concrete foundations, view to northwest.

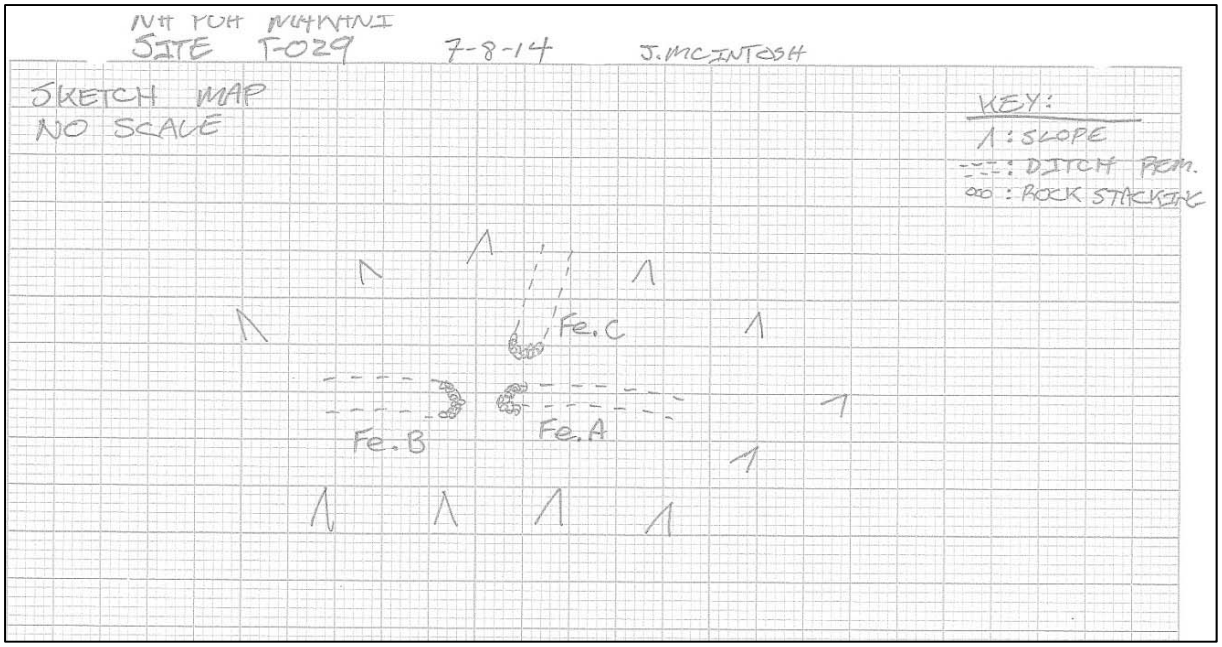
SIHP No.: 50-80-02-7844, Component 19
Field No.: T-029
Site Type: Sugar Plantation Complex
Site Function: Water Transport
Site Condition: Fair
No. of Features: 3
Age: Historic
Significance: a, d
Description: Site 50-80-02-7844.C19 consists of three semicircular (c-shaped) abutting stone-lined ditch features located on a north facing slope. The ditches are shallow and short in length without well-defined beginnings to indicate the origins of the water flow.

Feature A is the longest ditch and is constructed of loosely stacked basalt cobbles between three to four courses of stone in height along a soil ditch. It measures ca. 1.2 meters in length by 1.1 meters in width by 0.5 meter in depth. The soil ditch runs to the southeast and measures ca. 7.0 meters in length by 0.7 meter in width by 0.5 meter in depth.

Feature B is located ca. 0.70 meter to the west of Feature A and is similar in style, but smaller in size. Features A and B are constructed back to back and form a small walkway over the ditches. The area between the features consists of soil, and there appears to be no opening for water to flow between them. Feature B measures ca. 0.4 meter in length by 0.5 meter in width by 0.25 meter in depth. It is constructed of basalt cobbles that have been loosely stacked up to two courses of stone in height. The soil ditch runs to the west for ca. 3.0 meters.

Feature C is situated ca. 0.5 meter to the northeast of Feature A. It is the smallest feature, although it is similar in shape and style to Features A and B. Feature C is constructed of basalt cobbles that have been loosely stacked between two to three courses of stone in height. The ditch measures ca. 0.5 meter in length by 0.7 meter in width by 0.4 meter in height. The soil ditch runs to the northeast for ca. 10.0 meters before terminating down slope. Like Features A and B, the gap between Features A and C consists of soil and resembles a walkway.

Site 7844.C19 appears to be associated with water transport related to the former commercial sugar plantation.



Sketch Map of Site 7844.C19.

Site 7844.C19, Fe. A, stone-lined ditch, view to northwest.

Site 7844.C19, Fe. B, stone-lined ditch with Fe. A in background, view to east.

Site 7844.C19, Fe. C, stone-lined ditch with Fe. A in background, view to south.

SIHP No.: 50-80-02-7844, Component 20
Field No.: T-030
Site Type: Sugar Plantation Complex
Site Function: Water Transport
Site Condition: Fair
No. of Features: 4
Age: Historic
Significance: a, d
Description: Site 50-80-02-7844.C20 consists of a complex located along the southwestern edge of the current APE.

Feature A consists of a long soil ditch oriented roughly northeast to southwest. It measures ca. 142.0 meters in overall length by 0.8-1.0 meter in width by 0.0-0.3 meter in depth. The ditch extends at least ca. 9.0 meters outside of the current project area to the southwest.

Feature B is a stone retaining wall constructed along the exterior bend of Feature A, near the northeast end of the ditch. The retaining wall is constructed of basalt cobbles that have been loosely stacked between three to six courses of stone in height. The wall supports a 90° bend in the Feature A, ditch. The northern portion of the wall runs to the northwest and measures ca. 5.6 meters in length by 0.3-0.7 meter in height. The southern segment runs to the southwest and measures ca. 12.0 meters in length by 0.45-0.8 meter in height. The corner where the two retaining wall segments meet is partially tumbled, exposing soil and stacked stones, one course deep. An orange plastic survey stake is located adjacent to Feature B indicating the approximate location of the property boundary.

Feature C consists of a stone retaining wall located ca. 4.0 meters down slope to the north of the Feature A, ditch, and 39.0 meters southwest of the Feature B, retaining wall. The retaining wall is oriented roughly northwest to southeast and is constructed of basalt cobbles and boulders loosely stacked between one to six courses of stone in height. The wall measures ca. 3.4 meters in length by 0.4 and 0.9 meters in width by 1.0 meter in height. There is a visible corner located at the northwest end of the feature. The wall continues for 1.1 meters from the corner, where it terminates into the slope of the hill. The retaining wall appears to have been constructed to support the down slope side of the Feature A, ditch.

Feature D is a concrete ditch situated within the Feature A, ditch, located ca. 18.0 meters north of the southern terminus of Feature A. Feature D is oriented roughly north to south and measures ca. 7.5 meters in length by 0.5-0.95 meter in width by 0.53-0.70 meter in depth. The northern third of Feature D is constructed of basalt cobbles cemented in place. There is steel pipe measuring ca. 0.28 meter (11 inch) in diameter, protruding from the ditch, extending down slope to the northeast. The central portion of the ditch is constructed of loosely stacked basalt cobbles on the upslope side and cemented basalt cobbles on the down slope side. The southern third of the ditch is constructed of solid concrete that has been formed and poured in place. On both ends of this section, slits are present indicating gates were once in place. This section also contains a steel pipe measuring ca. 0.28 meter (11 inch) in diameter, with the opening sealed

shut with concrete. The angle of both of the metal pipes indicates water in this portion of the trench flowed to the north. Site 7844.C20 appears to be associated with water transport related to the former commercial sugar plantation.

Site 7844.C20, Fe. B, stone retaining wall, view to southeast.

Site 7844.C20, Fe. D, concrete ditch, view to north.

SIHP No.: 50-80-02-7844, Component 21
Field No.: T-034
Site Type: Sugar Plantation Complex
Site Function: Water Transport/Control
Site Condition: Fair
No. of Features: 2
Age: Historic
Significance: a, d
Description: Site 50-80-02-7844.C21 consists of a complex comprised of a soil ditch (Feature A) and a concrete footing (Feature B) located in the southwest portion of the current project area.

Feature A consists of a long soil ditch oriented roughly east to west and measuring ca. 350.0 meters in total length by 0.80-1.5 meters in width by 1.0 meter in depth. The east end of the ditch terminates near a dirt access road. Near the east end of the ditch is a segment lined with basalt and limestone cobble and boulder stacking on the south side of the ditch. The stacking is slightly curved and was appears to have been used to retain the soil slope above the ditch. The stone stacking measures ca. 4.8 meters in length by 0.4 meter in width by 0.95 meter in height. There is also a second set of stone stacking located near the east end of the ditch, to the west of Feature B, that measures ca. 2.7 meters in length by 0.3 meter in width by 0.5 meters in height. Located ca. 0.3 meter northeast of this stacking are the concrete supports of a gate which is no longer present. The concrete supports measure ca. 1.5 meters in length by 0.63 meter in height and there is a 0.6 meter opening where the gate used to be. Basalt and limestone cobble stacking is present on both sides of the concrete supports in order to hold them in place. The west end of the ditch terminates into a natural drainage above an active agricultural farm. Feature A appears to be associated with water transport related to the former commercial sugar plantation.

Feature B is a concrete footing located at the eastern end of the Feature A, ditch, approximately 1.5 meters north of the small stone lined portion of the ditch. The footing measures ca. 3.6 meters in length by at least 2.6 meters in width by 0.6 meter in height. The southern portion of the feature extends into the existing slope making it impossible to determine the overall width. The surface of the footing is filled in with soil and there is a broken off steel pipe measuring ca. 0.15 meters (6 inches) in diameter that extends out of the concrete. The pipe likely connected to another pipe with a 90˚ bend that is sticking out of the ground in front of the footing. A metal grate is also located near the pipe. Four pieces of rebar also extend out of the ditch near the footing. Feature B appears to be associated with water control related to the former commercial sugar plantation.

A clear glass wine bottle with a screw cap was found on the surface of the Feature B, concrete footing. The base is embossed with "CALIFORNIA WINE ASSOC. –SAN FRANCISCO CA.- REFILLING PROHIBITED- 3665 L." It is a half-gallon jug with diamonds embossed around the neck. The bottle was not collected.

Site 7844.C21 appears to be associated with water transport and control related to the former commercial sugar plantation.

Site 7844.C21, Fe. A, soil ditch, view to east.

Site 7844.C21, Fe. A, soil ditch, view to west.

Site 7844.C21, Fe. B, concrete footing, view to south.

Site 7844.C21, glass bottle, view to east.

SIHP No.: 50-80-02-7844, Component 22
Field No.: T-035
Site Type: Sugar Plantation Complex, Concrete Ditch
Site Function: Water Transport
Site Condition: Poor
No. of Features: 1
Age: Historic
Significance: a, d
Description: Site 50-80-02-7844.C22 consists of a concrete ditch located in the southwestern portion of the project area, ca. 50.0 meters southwest of an active agricultural farm. The ditch curves around the contour of a slope in a roughly east to west direction. The west end of the ditch ties into the Site 7844.C21, soil ditch, and the east end terminates at an area that has been previously bull-dozed. The ditch is constructed of preformed concrete segments, each measuring ca. 1.22 meters in length. Every other segment has openings on both sides measuring ca. 0.15 meter in length by 0.09 meter in width, with a metal cover used to allow water to flow out of the ditch. Overall, the ditch measures ca. 88.0 meters in length by 0.28 meter in exterior width by 0.23 meter in interior width by 0.2 meters in exterior height by 0.16 meters in interior depth. The concrete walls of the ditch are ca. 0.025 meters thick, but at each opening the concrete is slightly thicker measuring ca. 0.09 meters in thickness. Site 7844.C22 appears to be associated with water transport related to the former commercial sugar plantation.

Site 7844.C22, concrete ditch, view to southeast.

SIHP No.: 50-80-02-7844, Component 23
Field No.: T-036
Site Type: Sugar Plantation Complex, Stacked Stone Ditch
Site Function: Water Transport
Site Condition: Good
No. of Features: 1
Age: Historic
Significance: a, d
Description: Site 50-80-02-7844.C23 consists of a stacked stone ditch located approximately 8.0 meters down slope to the northeast of the Site 7844.C21, soil ditch, and ca. 10.0 meters south of the Site 7844.C24, concrete ditch. It is likely that Site 7844.C21 fed into Site 7844.C23. It is situated on an east facing slope. The ditch runs down slope to the east and then feeds into a T-shaped intersection that is oriented roughly north to south across the slope.

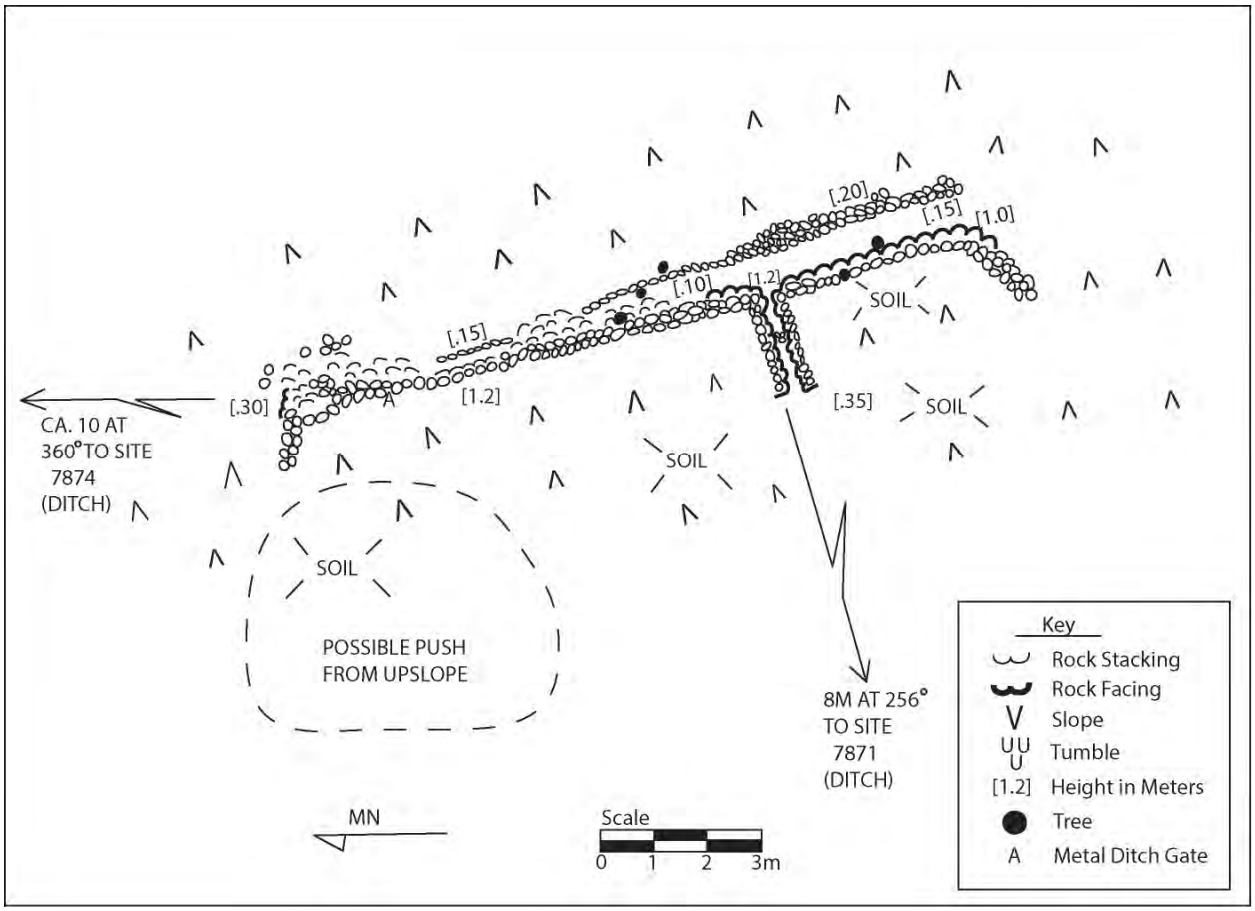
The east to west portion of the ditch is constructed of basalt boulders and cobbles that have been nicely stacked between two to five courses of stone in height. It measures ca. 2.0 meters in length by 0.75 meters in width by 0.5-1.2 meters in height. The south wall is ca. 0.2 meters thick and the north wall is 0.25 meters thick. The interior of the ditch measures ca. 0.3 meter in width and the ground is littered with rocks and leaves, as well as two tree stumps. There are two vertical concrete slabs facing one another at the west end of the east to west portion of the ditch. These likely would have housed a metal gate.

The north-south portion of the ditch extends along the slope and is constructed of basalt boulders and cobbles that have been nicely stacked between five to six courses of stone in height along the west side. It measures ca. 14.0 meters in length by 0.10 meter in width by 1.2 meters in height. The east side of the ditch is significantly shorter and constructed of basalt boulders that have been loosely stacked between one to two courses of stone in height, measuring ca. 0.3 meters in width by 0.1-0.3 meter in height. The interior of the ditch measures ca. 0.35-0.45 meters in width and is littered with rocks, leaves, and deadfall. The ditch merges into the slope at both the north and the south end.

Site 7844.C23 appears to be associated with water transport related to the former commercial sugar plantation.

Site 7844.C23, stacked stone ditch, view to north.

Site 7844.C23, stacked stone ditch, view to west.



Planview map of Site 7844.C23.

SIHP No.: 50-80-02-7844, Component 24
Field No.: T-037
Site Type: Sugar Plantation Complex, Concrete Ditch
Site Function: Water Transport
Site Condition: Fair
No. of Features: 1
Age: Historic
Significance: a, d
Description: Site 50-80-02-7844.C24 is a concrete ditch located immediately down slope of the Site 7844.C21, soil ditch, and ca. 10.0 meters north of the Site 7844.C23, stacked stone ditch. The ditch is oriented roughly northeast to southwest and is constructed of preformed concrete segments each measuring ca. 0.8 meters in length. The slope of the hill is relatively steep at the southwest end, but gradually becomes flatter as it extends down slope to the northeast. At the southwest end, Site 7844.C24 connects with Site 7844.C21, which would have fed into Site 7844.C24. Overall, the ditch measures ca. 60.0 meters in length by 0.48 meters in width by 0.27 meters in height. The sides of the concrete segments measure ca. 0.03 meters in thickness. Every 2.0-3.0 meters there is a square or rectangular opening in the side of the ditch which holds a metal gate used to allow water to flow out of the ditch. The first ca. 4.0 meters at the southwest end are lined with sheet metal. In some areas, tree growth has disturbed some of the segments. Site 7844.C24 appears to be associated with water transport related to the former commercial sugar plantation.

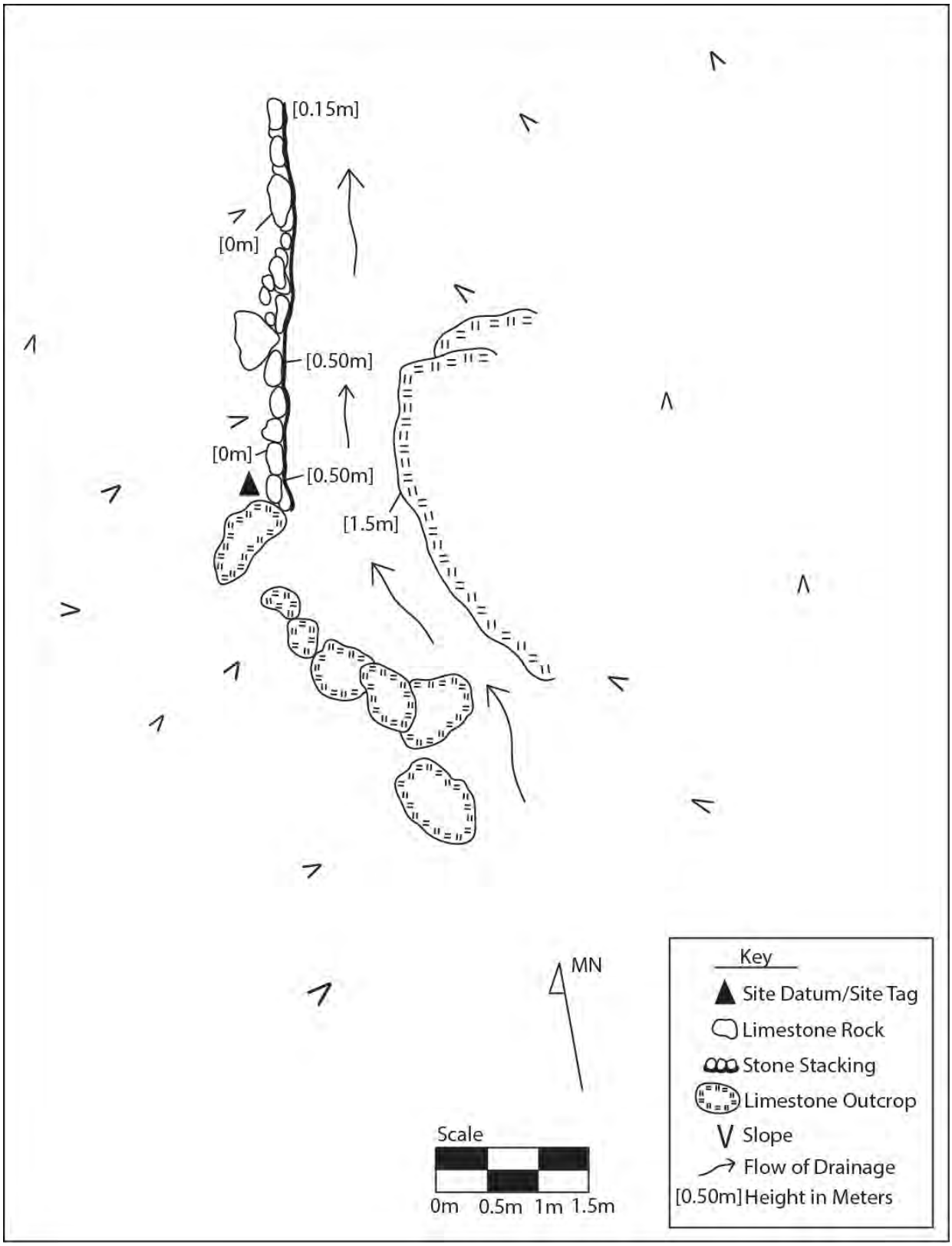
Site 7844.C24, concrete ditch, view to southwest.

SIHP No.: 50-80-02-7844, Component 25
Field No.: T-038
Site Type: Sugar Plantation Complex, Stone Alignment
Site Function: Water Transport
Site Condition: Poor
No. of Features: 1
Age: Historic
Significance: a, d
Description: Site 50-80-02-7844.C25 consists of a linear stone alignment located ca. 19.0 meters southwest of the Site 7844.C22, concrete ditch. The alignment is situated in a shallow drainage between two relatively flat soil areas. It is oriented roughly east to west and measures 5.0 meters in length by 0.4 meters in width by 0.5 meter in height. The alignment is constructed of basalt boulders set in a line. Tucked within the alignment are several small pieces of limestone which does not occur naturally in the area. There is a piece of metal measuring ca. 3.0 meters in length located on the south side of the alignment. It is possible that the metal was used in conjunction with the alignment, perhaps resting on or alongside the alignment to transport water down slope. Site 7844.C25 is in poor condition. The east and west ends appear to have been damaged by water flow. Site 7844.C25 appears to be associated with water transport related to the former commercial sugar plantation.

Site 7844.C25, stone alignment, view to southeast.

SIHP No.: 50-80-02-7844, Component 26
Field No.: T-043
Site Type: Sugar Plantation Complex, Stone Lined Drainage
Site Function: Water Control
Site Condition: Fair
No. of Features: 1
Age: Historic
Significance: d
Description: Site 50-80-02-7844.C26 consists of a stone-lined drainage located at the base of a limestone ridge in the north-central portion of the project area. Vegetation in the area includes *hau*, rubber tree, mango, *koa haole* and *ti*. The drainage appears natural in origin, but has been modified at its base with limestone stacking along the west side. The stacking measures 4.2 meters in length by 0.15-0.5 meter in height, and is constructed of loosely stacked limestone cobbles and slabs. At the base of the slope, the drainage measures ca. 1.1 meters wide. The east side of the drainage is a soil slope. The drainage is situated ca. 10.0 meters to the south above active agricultural fields and most likely fed the fields at one time. A modern, but abandoned chicken coop is located ca. 4.0 meters to the northeast. Modern trash is scattered throughout the site and includes aluminum soda cans, plastic bags, mattress springs, corrugated sheet metal, and plastic water bottles. This site is likely historic and was used to supply water to the nearby agricultural fields. Site 7844.C26 appears to be associated with water control related to the former commercial sugar plantation.

Site 7844.C26, stone-lined drainage, view to west.



Planview map of Site 7844.C26.

SIHP No.: 50-80-02-7844, Component 27
Field No.: T-053
Site Type: Sugar Plantation Complex, Reservoir
Site Function: Water Control
Site Condition: Fair
No. of Features: 1
Age: Historic
Significance: a, d
Description: Site 50-80-02-7844.C27 consists of a small reservoir located on the south-central boundary of the APE. The reservoir is a roughly circular soil depression measuring ca. 85.0 meters in length by 55.0 meters in width by 5.0 meters in depth. Site 7844.C5 is located on the edge of Site 7844.C27. The reservoir extends outside of the APE for an undetermined distance. The site is covered with buffalo grass and *koa haole* trees. Active farms abut the reservoir on the north and west sides. Recent trash associated with the farmers is scattered throughout the area. This reservoir is one of two located in the area. The second reservoir is located directly adjacent to Site 7844.C27, but is outside the current project area to the south and was not recorded. Site 7844.C27 appears to be associated with water control related to the former commercial sugar plantation.

Site 7844.C27, reservoir, view to southeast.

SIHP No.: 50-80-02-7844, Component 28
Field No.: T-054
Site Type: Sugar Plantation Complex, Concrete Ditch
Site Function: Water Transport
Site Condition: Fair
No. of Features: 1
Age: Historic
Significance: a, d
Description: Site 50-80-02-7844.C28 consists of a concrete ditch located in the north-central portion of the project area. The ditch meanders around the contours of the slope in a roughly east-southeast direction and is constructed of formed concrete along the interior and limestone cobbles concreted into place along the exterior. Overall, the ditch measures ca. 65.0 meters in length by 0.61 meter in width on the exterior by 0.3 meter in width on the interior by 0.3 meter in depth. There are two "Y" branches extending off of the main ditch. These branches only measure ca. 1.0 meter in length before terminating. Two historic glass bottles were observed near the west end of the ditch. The first bottle is a machine made clear glass bottle manufactured by Owens-Illinois Glass Company in 1959. The second bottle is a mouth blown aqua glass bottle neck and finish fragment that was manufactured using a turn mold. Neither artifact was collected. Site 7844.C28 appears to be associated with water transport related to the former commercial sugar plantation.

Site 7844.C28, concrete ditch, view west.

Site 7844.C28, clear glass bottle.

Site 7844.C28, aqua glass bottle fragment.

SIHP No.: 50-80-02-7844, Component 29
Field No.: T-055
Site Type: Sugar Plantation Complex, Concrete Ditch
Site Function: Water Transport
Site Condition: Fair
No. of Features: 1
Age: Historic
Significance: a, d
Description: Site 50-80-02-7844.C29 consists of a concrete ditch located in the north-central portion of the project area. The ditch is oriented in a roughly east to west direction, but meanders around the contour of the slope. The ditch is constructed of formed concrete along the interior and limestone cobbles concreted into place along the exterior. There are numerous off-shoots from the main ditch extending down slope to the north. The west end of the ditch consists of a Y-shaped intersection that fed into what maybe the remnants of a soil ditch. The east end of the ditch has been impacted by bulldozing, but continues after a ca. 5.8 meter break. Overall, the ditch measures ca. 100.0 meters in length by 0.95 meter in width (exterior) by 0.36 meter in width (interior) by 0.34 meter in depth (interior) by 0.25 meter in height (exterior).

Other ditches and an iron pipeline (Site 7844.C31) are located in the vicinity. An off-shoot appears to have fed water into a limestone ditch (Site 7844.C36) which was used to dispense the water further down slope. Site 7844.C29 continues east and actually dives under Site 7844.C31 (iron pipeline) then turns south, east, and then south again. A metal gate and a release valve are located at the intersection of Site 7844.C31 and Site 7844.C29, which appears to have controlled the flow of the pipeline into the ditch. This segment of Site 7844.C29 extends south almost out of the project area. It terminates ca. 12.0 meters north of the southern project boundary. A "Jan. 10, 1929" date is inscribed at the intersection of Site 7844.C29 and Site 7844.C31. Site 7844.C29 appears to be associated with water transport related to the former commercial sugar plantation.

Site 7844.C29, inscribed date of "Jan. 10, 1929", view to east.

Site 7844.C29, concrete ditch intersection, view to southeast.

SIHP No.: 50-80-02-7844, Component 30
Field No.: T-056
Site Type: Sugar Plantation Complex, Limestone Ditch
Site Function: Water Transport
Site Condition: Poor
No. of Features: 1
Age: Historic
Significance: a, d
Description: Site 50-80-02-7844.C30 consists of a limestone ditch located in the northern portion of the project area. The ditch is constructed of a cut limestone outcrop and loosely stacked limestone slabs and cobbles. Large portions of the ditch are highly degraded and overgrown with vegetation. Where intact, the ditch measures ca. 0.4-0.5 meter in width by 0.2-0.3 meter in depth. The ditch walls measure ca. 0.15-0.4 meter in thickness. The ditch forks ca. 4.0 meters northeast of the southwest end, with one ditch extending to the north for ca. 29.0 meters. The other ditch extends to the east for ca. 48.0 meters, at which point it splits again, extending an additional 29.0 meters to the east and 69.0 meters to the west. Near the initial split, there are two concrete slabs situated opposite each other with a small slot where a metal gate would have been. This gate would be used to control the flow of water into this portion of the ditch. On one of the concrete slabs, the phrase "No 3" has been carved into the surface. Site 7844.C30 appears to be associated with water transport related to the former commercial sugar plantation.

Site 7844.C30, limestone ditch, view to southwest.

SIHP No.: 50-80-02-7844, Component 31
Field No.: T-057
Site Type: Sugar Plantation Complex, Iron Pipeline
Site Function: Water Transport
Site Condition: Fair
No. of Features: 1
Age: Historic
Significance: a, d
Description: Site 50-80-02-7844.C31 consists of a cast-iron pipeline located in the north-central portion of the project area, on the southeast side of a nearby dirt access road. The pipeline is oriented roughly northeast to southwest and measures ca. 136.0 meters in length by 0.28 meter diameter. The southwest end of the pipeline ties directly into the Site 7844.C32, concrete ditch. It appears that water would flow from Site 7844.C32 into Site 7844.C31, which flows down slope to the north. At one point, Site 7844.C31 crosses over the Site 7844.C29, concrete ditch, where a valve with a circular wheel could control the flow of water into Site 7844.C29. Site 7844.C31 then continues down slope to the north, where it dives underground. Segments of the pipeline are supported by concrete footings as well as concrete and possibly wooden footings, although there are no remnants of the wooden supports. Site 7844.C31 appears to be associated with water transport related to the former commercial sugar plantation.

Site 7844.C31, iron pipeline, view to southwest.

SIHP No.: 50-80-02-7844, Component 32
Field No.: T-059
Site Type: Sugar Plantation Complex, Concrete Ditch
Site Function: Water Transport
Site Condition: Fair
No. of Features: 1
Age: Historic
Significance: a, d
Description: Site 50-80-02-7844.C32 consists of a concrete ditch located in the northern portion of the project area. The ditch is constructed of formed concrete along the interior and limestone cobbles concreted into place along the exterior. The main portion of the ditch measures ca. 0.8 meter in width by 0.55 meter in depth with walls that are 0.1 meter thick. The depth of the ditch decreases to ca. 0.4 meter, while wall thickness increases to 0.25 meter, although the overall width remains at 0.8 meter, as ditch continues in a southwesterly direction. The northeast end of Site 7844.C32 connects to the Site 7844.C31, iron pipeline. Approximately 13.0 m southwest of the connection with 7844.C31, there is significant damage to the ditch, likely caused by bulldozer activity in the area. Approximately 17.3 meters southwest of the intersection with Site 7844.C31 is a fork in the ditch. One branch extends in a southeasterly direction for ca. 45.0 meters before terminating at a bulldozer push-pile. Approximately 4.0 meters past the fork, this branch of the ditch reduces to 0.3 meter in height by 0.6 meter in width with walls 0.15 meter thick. The second branch extends west and terminates after ca. 52.0 meters, measuring ca. 0.8 meter in width by 0.1 meter in depth with walls 0.25 meter thick. Site 7844.C32 appears to be associated with water transport related to the former commercial sugar plantation.

Site 7844.C32, concrete ditch, view to west.

Site 7844.C32, concrete ditch, view to west.

SIHP No.: 50-80-02-7844, Component 33
Field No.: T-060
Site Type: Sugar Plantation Complex, Concrete Ditch
Site Function: Water Transport
Site Condition: Poor
No. of Features: 1
Age: Historic
Significance: a, d
Description: Site 50-80-02-7844.C33 consists of a concrete ditch located in the north-central portion of the project area. The ditch is oriented roughly northwest to southeast and is constructed of pre-formed concrete sections that are fitted together and sealed with a tar-like substance. Overall, the ditch measures ca. 19.0 meters in length by 0.47 meter in width by 0.28 meter in depth. The southern end of the ditch has been impacted by a bulldozer, possibly when a nearby access road was constructed. There is a Y-shaped intersection on the south end of the ditch with rock and soil debris pushed into it. The north end is much narrower measuring only ca. 0.29 meter in width by 0.16 meter in depth. Each concrete piece measures ca. 0.88 meter in length. Every other segment contains small openings on each side measuring 0.09 meter in width by 0.12 meter in height. Several openings contain a small metal door that likely blocked or allowed water to flow out of the openings. Presumably all of the openings had doors, but most are now missing. The Y-shaped branch on the south end is oriented to the northeast and measures ca. 2.0 meters in length. The rest of this branch has been destroyed by bulldozing. On the exterior of the intersection is a small pile of limestone cobbles placed in order to reinforce the intersection. Site 7844.C33 appears to be associated with water transport related to the former commercial sugar plantation.

Site 7844.C33, concrete ditch, view to southwest.

SIHP No.: 50-80-02-7844, Component 34
Field No.: T-061
Site Type: Sugar Plantation Complex
Site Function: Water Control/Transport
Site Condition: Fair
No. of Features: 4
Age: Historic
Significance: a, d
Description: Site 50-80-02-7844.C34 is a complex comprised of four associated features located approximately 4.5 meters southeast of the dirt access road which serves as the main access road for the zip line. The entire site is surrounded by a chain link fence with a locked gate located on the northwest side.

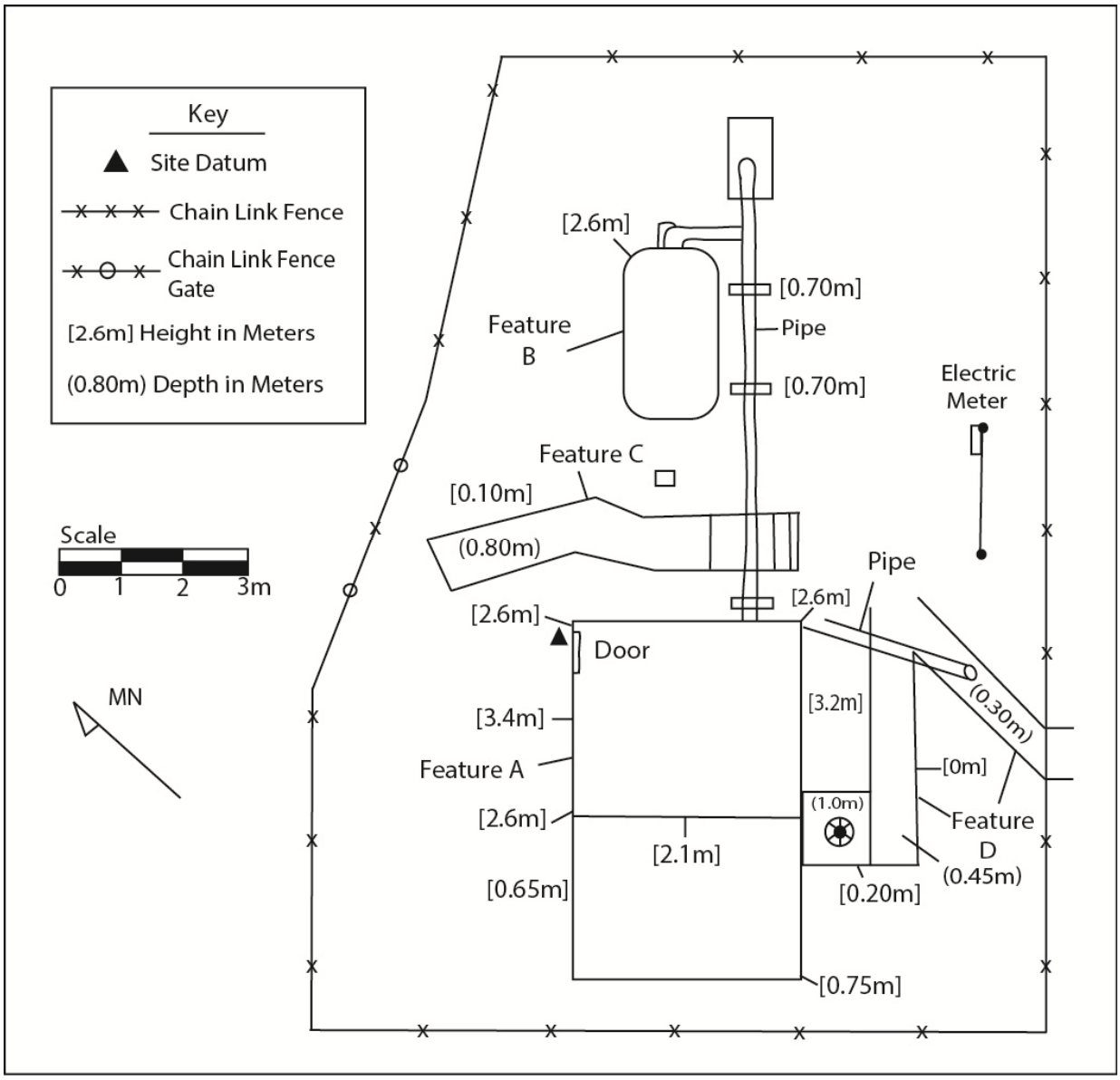
Feature A consists of a pump house located in the western portion of Site 7844.C34. The structure measures ca. 3.5 meters in length by 3.0 meters in width by 3.4 meters in total height. The structure is wood plank and plywood constructed on top of a concrete foundation. A door and two small stairs are located at the northern corner of the structure. On the south side of the structure is a concrete footing covered with plywood and roofing material. The footing measures ca. 3.5 meters in length by 2.5 meters in width by 0.6 meter in height. The footing appears to be hallow inside. Inside the structure, there are two electrical boxes on the northwest facing wall and a metal pipe coming up through the floor boards which exits through the northeast facing wall and runs to the Feature B, tank. Feature A appears to be associated with water control related to the former commercial sugar plantation.

Feature B is a metal tank located at the northeast side of Site 7844.C34. The tank measures ca. 1.2 meters in diameter and is sitting on top of two concrete slabs ca. 1.0 meter above the ground. A metal pipe measuring ca. 0.2 meter in diameter extends out of the northeast side of the tank and then turns and runs at ca. 0.7 meters above the ground surface southwest towards the northeast wall of the Feature A, pump house. The pipe is supported by several concrete slabs. Feature B appears to be associated with water control related to the former commercial sugar plantation.

Feature C consists of a concrete ditch located in between Feature A and Feature B. The ditch is oriented roughly northeast to southwest and measures ca. 5.5 meters in length by 1.0 meter in width by 1.0 meter in maximum depth. The walls of the concrete ditch measure ca. 0.25 meter in thickness. The southeast end of the ditch is filled with soil. Feature C appears to be associated with water transport related to the former commercial sugar plantation.

Feature D is a concrete ditch located immediately south of the Feature A, pump house. The ditch runs northeast to southwest for ca. 4.0 meters along the southeast side of Feature A, then turns abruptly and runs north to south and continues under the chain link fence that encompasses the site. The ditch measures ca. 0.9 meter in width by 0.3 meter in depth. The walls of the ditch measure ca. 0.15 meter in thickness. Feature D appears to be associated with water transport related to the former commercial sugar plantation.

Site 7844.C34 appears to be associated with water control and transport related to the former commercial sugar plantation and appears to still partially be in use today. An active electrical meter is located along the southeast side of the site.



Planview map of Site 7844.C34, pump house.

Site 7844.C34, Fe. A, pump house, view to east.

Site 7844.C34, Fe. B, tank, view to east.

SIHP No.: 50-80-02-7844, Component 35
Field No.: T-064
Site Type: Sugar Plantation Complex, Concrete Ditch
Site Function: Water Transport
Site Condition: Fair
No. of Features: 1
Age: Historic
Significance: a, d
Description: Site 50-80-02-7844.C35 consists of a concrete ditch located in the north-central portion of the project area, ca. 2.0 meters north of a dirt access road, and 15.0 meters south of a zip line run. The ditch is oriented roughly east to west, paralleling the north side of the dirt access road along the top edge of a steep north facing slope.

The interior portion of the ditch is constructed of concrete, while the exterior portion is faced with limestone cobbles. Overall, the ditch measures ca. 25.0 meters in length by 0.85 meter in exterior width by 0.43 meter in interior width by 0.6 meter in exterior height. The east end of the ditch terminates, while the west end forms a T-shaped intersection. One branch continues north for ca. 1.8 meter before terminating. It is constructed of concrete and limestone cobbles and measures ca. 0.7 meters in exterior width and 0.26 meter in interior width by 0.2 meter in depth. The main ditch continues west, but is badly impacted and mostly destroyed.

There is a stone retaining wall located under a portion of the north side of the ditch. The retaining wall is constructed of loosely stacked limestone cobbles and measures ca. 15.0 meters in length by 0.8 meter in width by 0.4 meter in height.

Site 7844.C35 appears to be associated with water transport related to the former commercial sugar plantation.

Site 7844.C35, concrete ditch, view to east.

SIHP No.: 50-80-02-7844, Component 36
Field No.: T-065
Site Type: Sugar Plantation Complex, Limestone Ditch
Site Function: Water Transport
Site Condition: Poor
No. of Features: 1
Age: Historic
Significance: a, d
Description: Site 50-80-02-7844.C36 consists of a limestone ditch located in the north-central portion of the project area. The ditch is situated directly north of, and connected to, the Site 7844.29, concrete ditch. Site 7844.C36 is very rough in appearance and may be partially natural. The ditch appears to have been at least partially excavated into an exposed limestone outcrop. It is oriented roughly northwest to southeast on a northwest facing slope. The main portion of the ditch measures ca. 13.0 meters in length by 0.7 meters in width by 0.7 meter in depth. Near the base of the slope the ditch splits into three separate ditches, one continuing straight downhill to the northwest, one veering west, and one veering east. The ditch to the northwest runs for an additional 13.0 meters before terminating. The ditch to the east resembles more of a soil-like ditch. It measures ca. 21.0 meters in length by 0.9 meter in width by 0.25 meter depth and simply ends. The ditch to the west runs along the base of an exposed limestone slope for ca. 17.0 meters before terminating. The western ditch measures ca. 1.0 meter in width by 0.25 meter in depth.

Site 7844.C36 appears to be associated with water transport related to the former commercial sugar plantation.

Site 7844.C36, limestone ditch, view to northwest.

SIHP No.: 50-80-02-7844, Component 37
Field No.: T-066
Site Type: Sugar Plantation Complex, Stacked Stone Ditch
Site Function: Water Transport
Site Condition: Fair
No. of Features: 1
Age: Historic
Significance: a, d
Description: Site 50-80-02-7844.C37 consists of a stacked stone ditch that runs parallel to the Site 7844.C24, concrete ditch, ca. 1.0 meter to the north. It is constructed of basalt cobbles and boulders that have been loosely stacked up to two courses of stone in height. The ditch is oriented roughly northeast to southwest and measures ca. 23.0 meters in length by 1.3 meters in width by 0.4 meter in depth. The walls of the ditch measure ca. 0.3 meter in thickness. The northeastern end of the ditch is blocked by several basalt boulders. The southwestern end terminates at an area that appears to have been bull-dozed, similar to Site 7844.C24. Based on the location of Site 7844.C36, it may have connected to the Site 7844.C21, soil ditch, at one time.

Site 7844.C37 appears to be associated with water transport related to the former commercial sugar plantation.

Site 7844.C37, stacked stone ditch, northwest.

SIHP No.: 50-80-02-7844, Component 38
Field No.: T-073
Site Type: Sugar Plantation Complex, Concrete Ditch
Site Function: Water Transport
Site Condition: Fair
No. of Features: 1
Age: Historic
Significance: a, d
Description: Site 50-80-02-7844.C38 consists of a concrete ditch located in the central-eastern portion of the project area. The ditch is oriented roughly northwest to southeast and measures ca. 175.0 meters in length by 0.8-1.0 meter in width by 0.46-1.0 meter in depth. It is constructed formed concrete along the interior and stacked limestone cobbles and concrete along the exterior. Both ends of the ditch have been destroyed by bull-dozing activities. Site 744.C38 appears to be associated with water transport related to the former commercial sugar plantation.

Site 7844.C38, concrete ditch, view to southeast.

SIHP No.: 50-80-02-7844, Component 39
Field No.: T-074
Site Type: Sugar Plantation Complex
Site Function: Water Transport
Site Condition: Fair
No. of Features: 5
Age: Historic
Significance: a, d
Description: Site 50-80-02-7844.C39 is located in the central-eastern portion of the project area within the new survey area. The site consists of five associated features; an aqueduct (Feature A), two concrete ditches (Feature B and Feature E), a soil ditch (Feature C), and a limestone retaining wall (Feature D). Overall, Site 7844.C39 measures ca. 117.0 meters in length.

Feature A consists of a concrete aqueduct located on the west side of Site 7844.C39. It is oriented roughly north to south and spans a small drainage. The aqueduct measures ca. 21.0 meters in length by 1.08 meters in width and has a maximum height of 2.4 meters. Feature A has two gentle arches and a third rectangular gap located on the south end. These arches allow water to pass underneath the aqueduct without damaging the structure. Each arch measures ca. 5.6 meters in width by 1.8 meters in height. The rectangular gap measures ca. 2.6 meters in width by 1.2 meters in height. A large banyan tree is growing near the center of the aqueduct, and has actually encased part of structure and broken through in several sections. The northern portion of the aqueduct flows directly into the Feature B, concrete ditch.

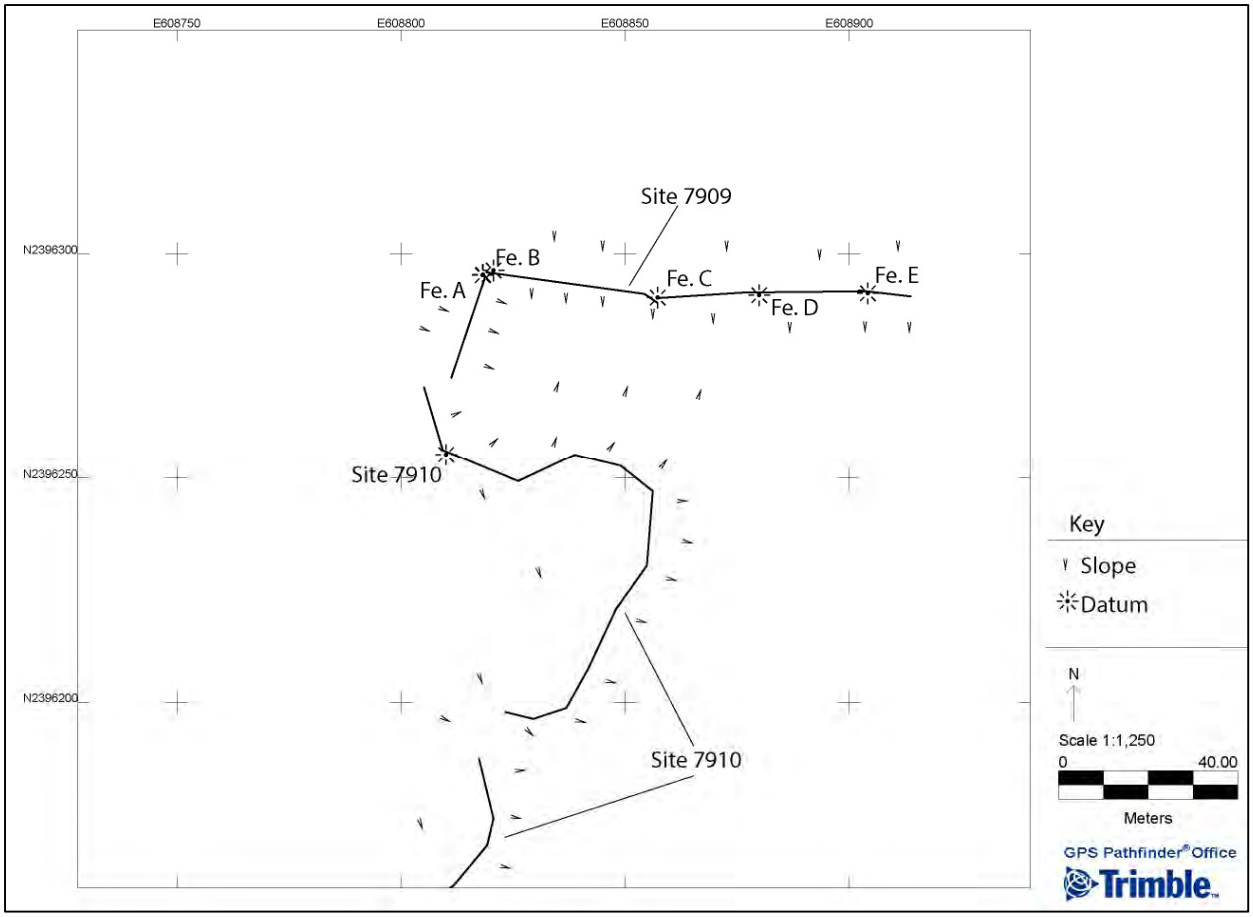
Feature B is a concrete ditch that is connected to the north end of the Feature A, aqueduct. The ditch is oriented roughly east to west along the northern slope of the drainage. It measures ca. 38.0 meters in length by 1.04 meters in width (exterior) by 0.61 meter in width (interior) by 0.36 meter in depth. It is constructed of red brick and rebar, covered by concrete. The exterior portion of the ditch consists of stacked and cemented limestone cobbles. The east end of Feature B gradually flows into the Feature C, soil ditch.

Feature C consists of a soil ditch connected to the east end of the Feature B, concrete ditch. Feature C measures ca. 46.3 meters in length by 1.2 meters in width by 0.3 meters in depth. The ditch abuts a section of the Feature D, limestone retaining wall, to the south, and flows directly into the Feature E, concrete ditch, at the east end.

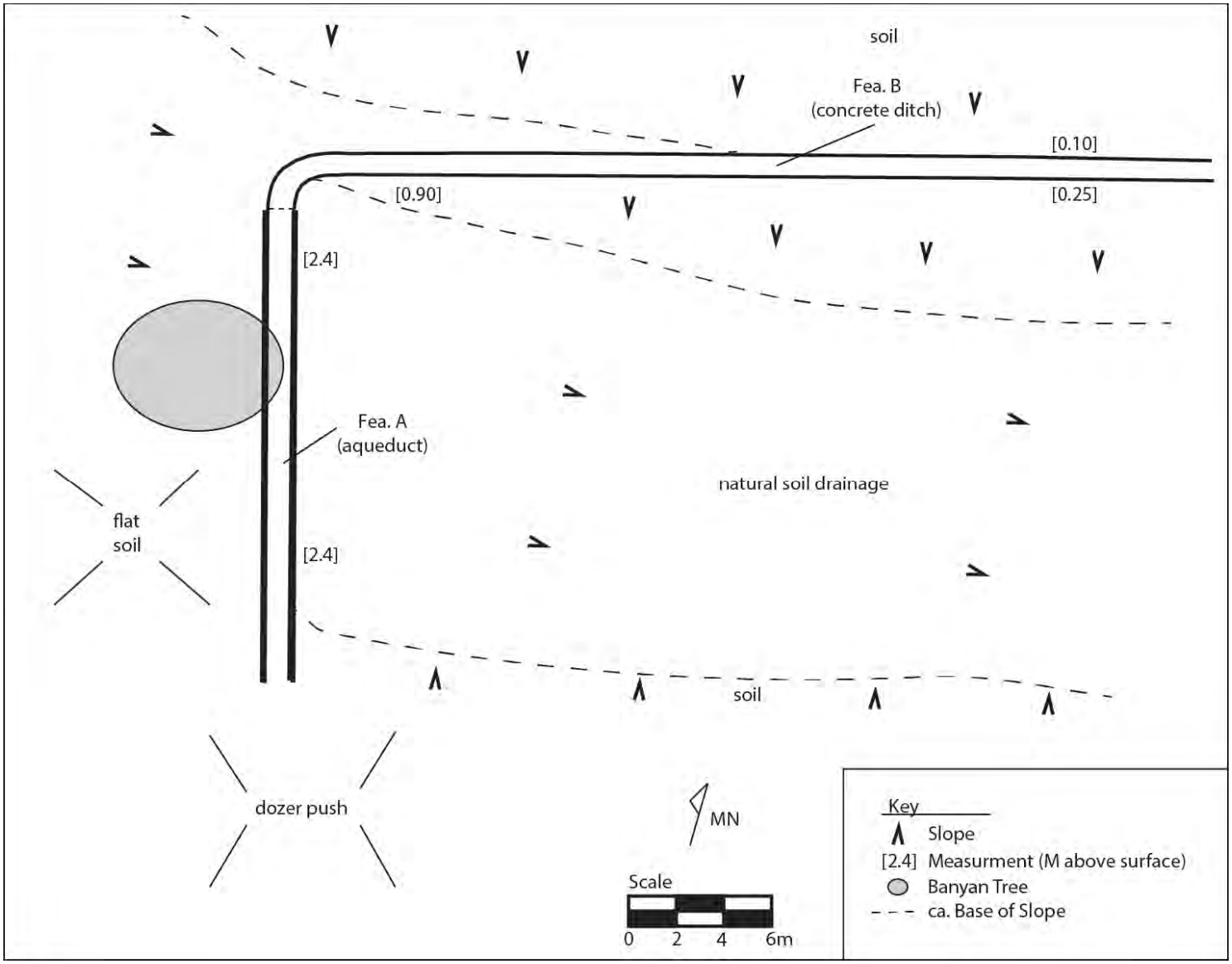
Feature D is a limestone retaining wall located along the south side of the Feature C, soil ditch. The retaining wall is constructed of limestone boulders and cobbles that have been loosely stacked between three to five courses of stone in height. Overall, Feature D measures ca. 3.0 meters in length by 1.0 meter in depth by 0.8 meter in height. It was likely used to support and retain the Feature C, soil ditch.

Feature E consists of a concrete ditch connected to the east end of the Feature C, soil ditch. The ditch is constructed of concrete and fragments of red brick and stacked limestone cobbles. Overall, Feature E measures ca. 11.7 meters in length by 1.0 meter in width by 0.3 meter in depth. Only the south edge of the ditch is visible. The north side of the ditch is covered with soil and debris from bull-dozing upslope. The east end of the ditch terminates at an active

agricultural field. A large track excavator is parked nearby. A metal/iron railroad spike was observed on the surface of Feature E and measures ca. 12.0 centimeters in length by 1.0 centimeter in width. It was likely deposited on the ditch from the bull-dozing disturbance above, although there is no evidence of a railroad in the area. Site 7844.C39 appears to be associated with water transport related to the former commercial sugar plantation.



Site 7844.C39, overall site map, showing relationship of features.



Planview map of Site 7844.C39, Features A and B.

Site 7844.C39, Fe. A, aqueduct, view to southwest.

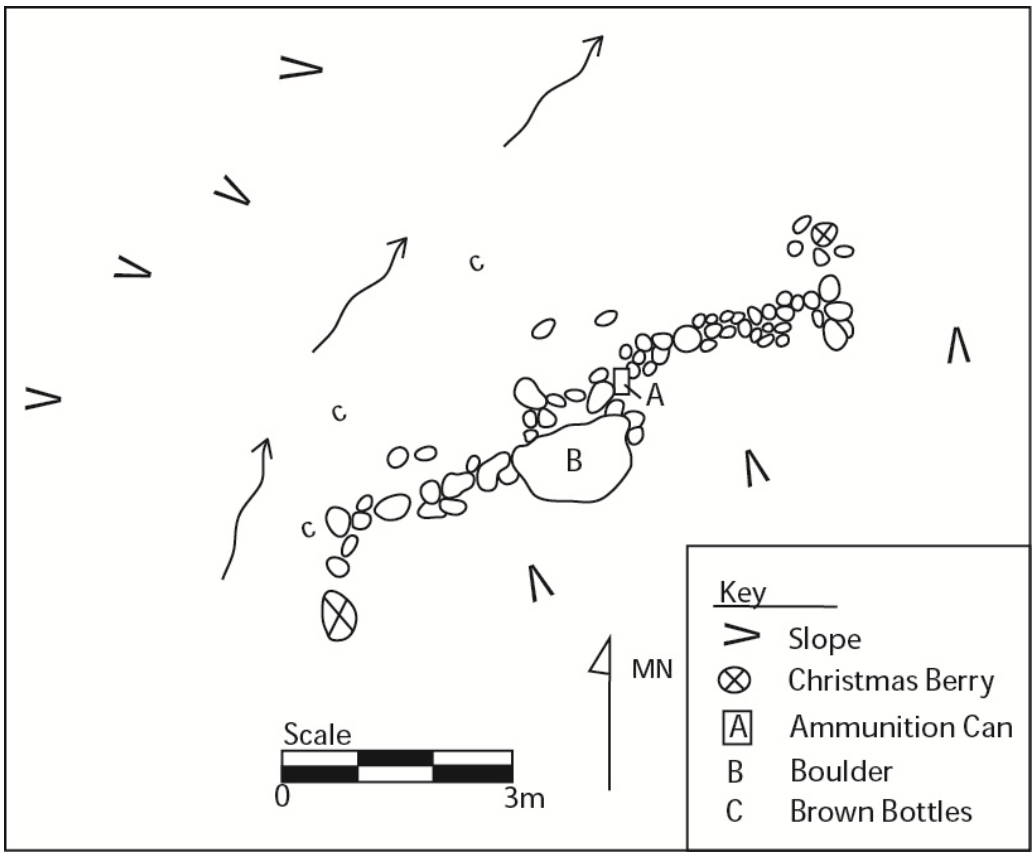
SIHP No.: 50-80-02-7844, Component 40
Field No.: T-077
Site Type: Sugar Plantation Complex, Soil Ditch
Site Function: Water Transport
Site Condition: Fair
No. of Features: 1
Age: Historic
Significance: a, d
Description: Site 50-80-02-7844.C40 consists of a soil ditch located in the central-eastern portion of the project area, ca. 5.0 meters east of an active banana farm. The northern end of the ditch is located ca. 10.0 meters south of the Site 7844.C39, Feature A, concrete aqueduct. There is a bulldozed area between the two sites. The ditch is oriented roughly north to south, and overall, measures ca. 258.0 meters in length by 2.0-3.0 meters in width by 0.5-1.0 meter in depth. The ditch is split into two sections with an 11.0 meter gap bulldozed in between them. The northern portion of the ditch measures ca. 140.0 meters in length and the southern portion measures ca. 118.0 meters in length. The ditch curves around the contour of the slope and terminates on the south end where it has been filled in with soil and deadfall. Site 7844.C40 appears to be associated with water transport related to the former commercial sugar plantation.

Site 7844.C40, soil ditch, view to north.

SIHP No.: 50-80-02-7844, Component 41
Field No.: T-078
Site Type: Sugar Plantation Complex, Concrete Ditch
Site Function: Water Transport
Site Condition: Poor
No. of Features: 1
Age: Historic
Significance: a, d
Description: Site 50-80-02-7844.C41 consists of a concrete ditch intersection located ca. 2.5 meters south of the existing Department of Agriculture road "A". The site is situated on a small slope beneath an existing agricultural lot. Vegetation in this area includes Christmas berry and *koa haole* trees. The ditch is constructed of concrete along the interior and basalt cobbles concreted in place along the exterior. Overall, the site measures ca. 5.0 meters in length (east-west) by 3.5 meters in width (north-south). The ditch is ca. 0.6 meter in width by 0.55 meter in interior depth and 0.9 meter in maximum exterior height. There are built in slots for a gate. A modern PVC pipe is used by the farm to transport water. Site 7844.C41 appears to be associated with water transport related to the former commercial sugar plantation.

Site 7844.C41, concrete ditch, view to south.

SIHP No.: 50-80-02-7845
Field No.: T-007
Site Type: Terrace
Site Function: Agriculture
Site Condition: Fair
No. of Features: 1
Age: Pre-Contact or Early Post-Contact, with some Modern re-use
Significance: d
Description: Site 50-80-02-7845 consists of a terrace located within the same drainage as Site 7842 and 7844.C1. It is approximately 150.0 meters northeast of Site 7842 and 150.0 meters southwest of Site 7844.C1. The terrace is situated along the southeast side of the northeast running drainage and consists of a roughly L-shaped stone retaining wall constructed of piled small basalt boulders and small to large cobbles along the west and north edges of the feature. The surface of the terrace is roughly paved with basalt cobbles except for a large basalt boulder located in the center. The terrace measures ca. 7.0 meters in length by 1.5 meters in width by 0.35 meters in height above the surrounding ground surface. Several historic artifacts were observed at Site 7846 including three glass beer bottles and one metal ammunition can. Overall, Site 7845 is in fair condition, although the terrace does appear to have been impacted by water flow within the drainage and vegetation growth. Site 7846 appears to have functioned as an agricultural terrace constructed and utilized during the pre-Contact or early post-Contact period, with some re-use in modern times.



Planview map of Site 7845.

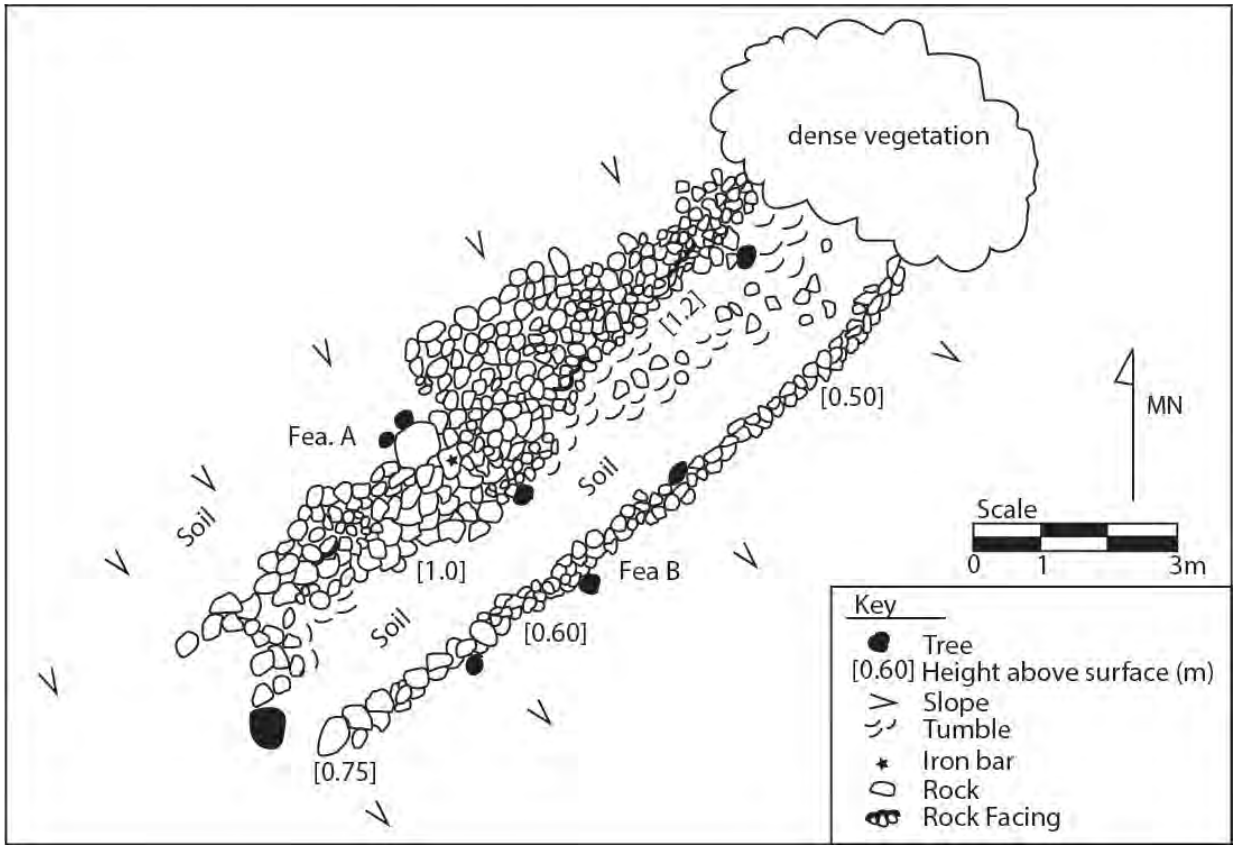
Site 7845, terrace, view to southeast.

SIHP No.: 50-80-02-7846
Field No.: T-017
Site Type: Complex
Site Function: Agriculture
Site Condition: Fair
No. of Features: 2
Age: Pre-Contact or Early Post-Contact
Significance: a, d
Description: Site 50-80-02-7846 is a complex comprised of a stone terrace (Feature A) and a soil terrace (Feature B). The site is situated on a southeast facing slope and overall measures ca. 12.5 meters in length by 4.2 meters in width by 1.2 meters in maximum height.

Feature A consists of an irregularly shaped stone terrace located immediately upslope to the northwest of Feature B. The terrace is constructed of loosely stacked small to medium subangular basalt boulders and cobbles between two to four courses of stone in height along the southeast side. The interior surface of the terrace consists of a relatively flat subangular basalt boulder and cobble fill that has been severely jumbled by tree growth. A large rounded basalt boulder sits atop the southwest portion of the terrace. Feature A measures ca. 11.0 meters in length (northeast-southwest) by ca. 2.0-3.0 meters in width (northwest-southeast). The maximum height of Feature A is ca. 1.2 meters along the southeast side and 0.5 meter along the northwest side. The terrace is in fair condition. Tumbling has occurred along the southeast side and the surface stone fill has been jumbled by tree growth. A historic iron bar and metal wire were observed on the surface of Feature A. The bar measures ca. 2.2 meters in length by 0.03 meter in width by 0.02 meter in thickness. The metal wire is bent and measures 0.4 meter in length by 0.01 meter in diameter.

Feature B consists of a soil terrace with stone retaining wall located immediately down slope to the southeast of Feature A. The stone retaining wall is oriented roughly northeast to southwest and supports the soil terrace to the northwest. The retaining wall is constructed of small to medium subangular basalt boulders that have been loosely stacked up to two courses of stone in height. The interior surface of the terrace consists of a relatively flat area of soil. Feature B measures ca. 12.5 meters in length (northeast-southwest) by 1.0-2.0 meters in width (northwest-southeast). The maximum height of the retaining wall is ca. 0.75 meter along the southeast side. The terrace is in good condition, with minimal tumbling of the retaining wall and limited tree growth in the soil fill. No cultural material was observed at Feature B.

Site 7846 appears to have functioned as a traditional agricultural complex comprised of a stone terrace and an adjoining soil terrace. The site may have been modified and/or utilized into the historic period.

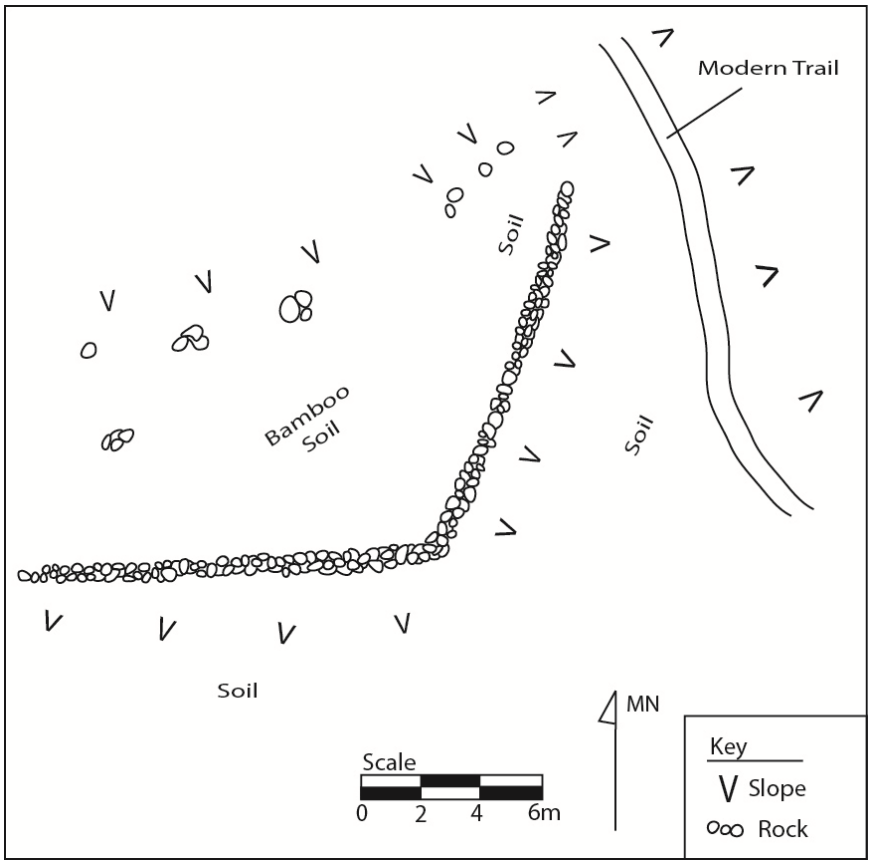


Planview map of Site 7846.

Site 7846, Fe. A, terrace, view to west.

Site 7846, Fe. B, terrace, view to northwest.

SIHP No.: 50-80-02-7847
Field No.: T-020
Site Type: Terrace
Site Function: Agriculture
Site Condition: Fair
No. of Features: 1
Age: pre-Contact or early post-Contact
Significance: d
Description: Site 50-80-02-7847 consists of a large soil terrace with stone retaining wall located at the farthest southern point of the current project area. The terrace is located on the southeast facing side of a ridge, within a large stand of bamboo. Upslope of the terrace consists of a naturally eroding slope with trees, and down slope consists of soil. A walking trail oriented roughly northwest to southeast winds through the bamboo ca. 4.0 meters east of the terrace. The stone retaining wall runs roughly northeast to southwest for ca. 14.0 meters, then turns and runs east to west for ca. 14.0 meters. The retaining wall is constructed of loosely stacked medium to large basalt cobbles and small boulders between one to four courses of stone in height. The interior surface of the terrace consists of a relatively flat area of soil. Overall, the terrace measures ca. 28.0 meters in length by 3.0-4.0 meters in width by 0.6-1.0 meter in height. An L-shaped wall is located to the southwest of Site 7847, but it is outside the current APE by ca. 10.0 meters and was not recorded. Site 7847 appears to have functioned as a traditional agricultural terrace.



Planview map of Site 7847.

Site 7847, terrace, view to northeast.

Site 7847, terrace, view to northwest.

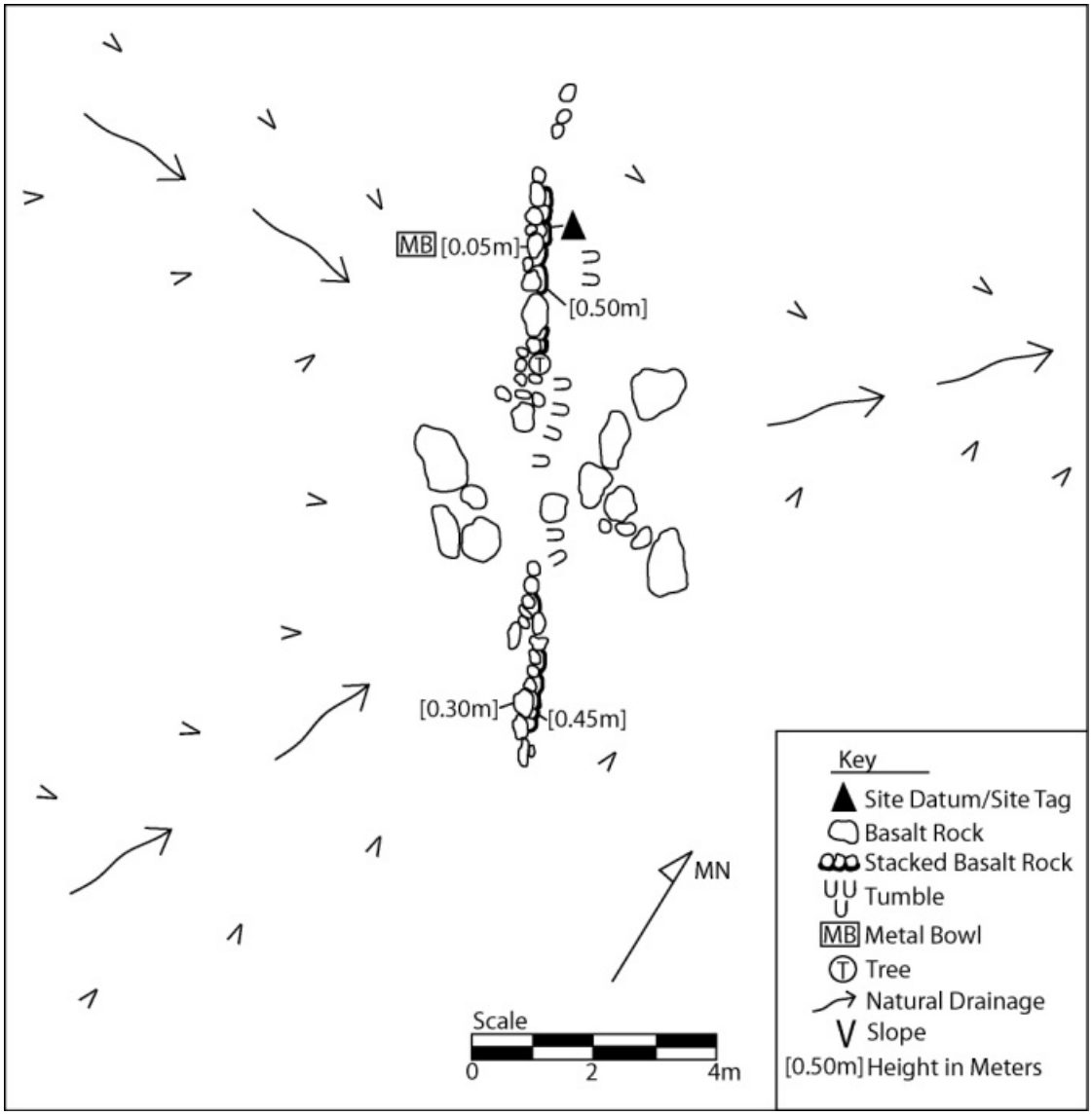
SIHP No.: 50-80-02-7848
Field No.: T-031
Site Type: Complex, Terraced Soil Furrows
Site Function: Agriculture
Site Condition: Fair
No. of Features: 4
Age: Historic
Significance: d
Description: Site 50-80-02-7848.C1 consists of three series of terraced soil furrows and a soil terrace located along the southwest edge of the project area. These features appear to have functioned as agricultural fileds duirn eh historic perion. It does not seem that these fetures were associated with the large historic sugar plantation complex (Site 7844)

Feature A measures ca. 40.0 meters in length (north-south) by 30.0 meters in width (east-west). The furrows are relatively uniform in appearance and each measures ca. 30.0 meters in length (east-west) by 1.3 meters in width (north-south) by 0.15 meter in height

Site 7848, Featur A, terraced soil furrows, view to southeast.

Featrure B consists of a soil terrace with a linear stone retaining wall located near the southwest edge of the current APE. The terrace is oriented roughly northwest to southeast, and spans the convergence of two small drainages. The stone retaining wall is constructed of large basalt cobbles and small to medium basalt boulders that have been loosely stacked between one to two courses of stone in height. The surface of the terrace consists of a relatively flat area of soil. Overall, the terrace measures ca. 10.0 meters in length by 2.5 meters in width by 0.5 meter in height along the northeast edge. There is a gap at the center of the terrace measuring ca. 2.0 meters in length. Both ends of the terrace extend up into the sides of the drainage. The central portion of the terrace has been impacted by water flowing through the drainages. The western side of the terrace is in better condition and contains more soil than the eastern portion. A small historic metal bowl was observed on the western portion of the terrace. The bowl is gray and rusted, and measures ca. 18.0 centimeters in diameter by 8.0 centimeters deep.

Site 7848, Feature B, terrace, view to south.



Planview map of Site 7848, Feature B.

Feature C consists of a series of terraced soil furrows located near the southwest edge of the current APE, ca. 0.5 meter northeast of Site 7869. The furrows run roughly northeast to southwest along a southeast facing slope. Overall, the site measures ca. 31.0 meters in length (northeast-southwest) by 26.0 meters in width (northwest-southeast). There are approximately 10 furrows going up the slope, where they disappear into a thick mass of lantana bushes. The furrows are relatively uniform in appearance and each measures ca. 31.0 meters in length by 1.0 meter in width by 0.15 meter in height. Site 7848.C3 appears to have functioned as an agricultural field during the historic period.

Site 7848, Feature B, terraced soil furrows, view to north.

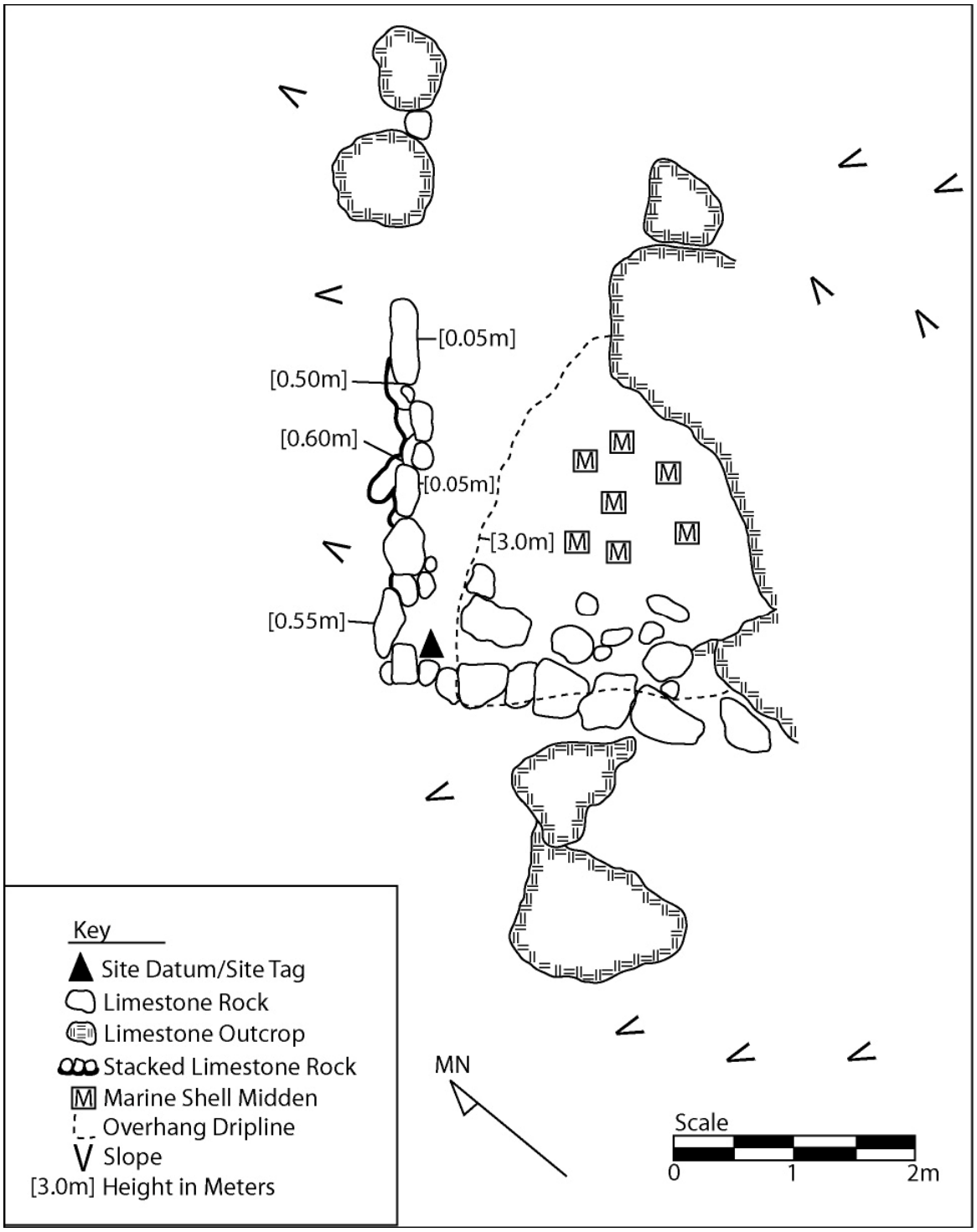
Feature D is located in southwestern portion of the project area, just inside the project boundary and ca. 5.0 meters south of the Site 7867, soil ditch. Vegetation in the area consists of a large banyan tree, guava, Christmas berry and rubber trees. Site 7906 consists of a series of between 25 to 50 terraced soil furrows evenly spaced across a gentle to moderate slope. Each furrow is similar in size and shape, measuring ca. 80.0-100.0 meters in length by 1.7 meters wide by 0.25 meter in height. Overall, the site measures ca. 103.0 meters in length (northeast-southwest) by 46.0 meters in width (northwest-southeast). The area is mostly devoid of rock, although some small basalt cobbles are loosely scattered about. Site 7848.C4 appears to have functioned as an agricultural field in Historic times.

Site 7848Feature D, terraced soil furrows, view to west.

SIHP No.: 50-80-02-7849
Field No.: T-039
Site Type: Overhang Shelter with Terrace
Site Function: Habitation
Site Condition: Fair
No. of Features: 2
Age: pre-Contact or early post-Contact
Significance: d
Description: Site 50-80-02-7849 consists of a limestone overhang shelter (Feature A) and a soil terrace with an L-shaped stone retaining wall (Feature B) located in the north-central portion of the project area. It is situated along a limestone cliff face.

Feature A consists of a limestone overhang shelter that opens to the northwest. It measures 3.2 meters in length by 2.0 meters in depth by 3.0 meters in height. The interior surface of the overhang consists of soil with limestone pebbles and small cobbles, as well as leaves and dead branches. The surface has been disturbed by chickens living in the vicinity. Several fragments of marine shell midden were observed on the interior surface of the overhang including one complete cone shell, one fragment of a cone shell, and five *pipipi*.

The interior surface of the overhang is supported by Feature B, which consists of a soil terrace with an L-shaped stone retaining wall. The retaining wall is constructed of partially stacked limestone boulders. The terrace extends ca. 1.0 meter out beyond the drip line of the overhang. The long axis of the retaining wall is oriented northeast to southwest and measures ca. 3.25 meters in length by 0.1-0.4 meters in width by 0.6 meter in height along the northwest edge and 0.05 meter in height along the southeast edge. The short axis is oriented roughly northwest to southeast and measures ca. 3.5 meters in length by 0.2-0.5 meters in width by 0.2-0.5 meters in height. The soil surface of the terrace measures ca. 3.0 meters in length (northeast-southwest) by 3.0 meters in depth (northwest-southeast). Site 7849 appears to have functioned as a traditional habitation site.



Planview map of Site 7849.

Site 7849, Fe. A, overhang shelter and Fe. B, terrace, view to southeast.

Site 7849, sample of marine shell observed on interior surface of overhang.

SIHP No.: 50-80-02-7850
Field No.: T-040
Site Type: Complex
Site Function: Habitation/Agriculture
Site Condition: Fair
No. of Features: 5
Age: pre-Contact or early post-Contact
Significance: d
Description: Site 50-80-02-7850 is a complex comprised of five associated terraces located in the central portion of the project area, ca. 25.0 meters upslope to the south of an active agricultural farm. The site is situated along the north side of a limestone cliff face.

Feature A consists of a soil terrace with a stone retaining wall situated along the north side of a limestone cliff face in the eastern portion of the site, immediately east of Feature B. It is the largest terrace at Site 7850, measuring ca. 11.0 meters in length by 3.5 meters in depth by 0.05-0.8 meters in height. The stone retaining wall is constructed of limestone boulders and cobbles that have been loosely stacked between two to three courses of stone in height. The terrace also utilizes several natural limestone outcrops. Some of the stones from the retaining wall have tumbled down slope. The surface of the terrace consists of a relatively flat area of soil that abuts the limestone cliff face to the south, which measures ca. 6.0 meters in overall height. There are some small overhangs along the cliff face, but they do not appear to have been utilized. There is a small circular soil depression located on the eastern portion of the surface of the terrace measuring ca. 0.7 meter in length by 0.6 meter in width by 0.12 meter in depth. It is unclear what the depression is, but it may be the hole left by an old fallen tree. A historic aqua glass bottle base is located within the depression. The bottle base is embossed with the "Diamond O-I" maker's mark indicating Owens-Illinois Glass Company manufacture. A few small unmodified basalt cobbles were also observed on the surface of the terrace. Feature A appears to have functioned as a traditional habitation terrace.

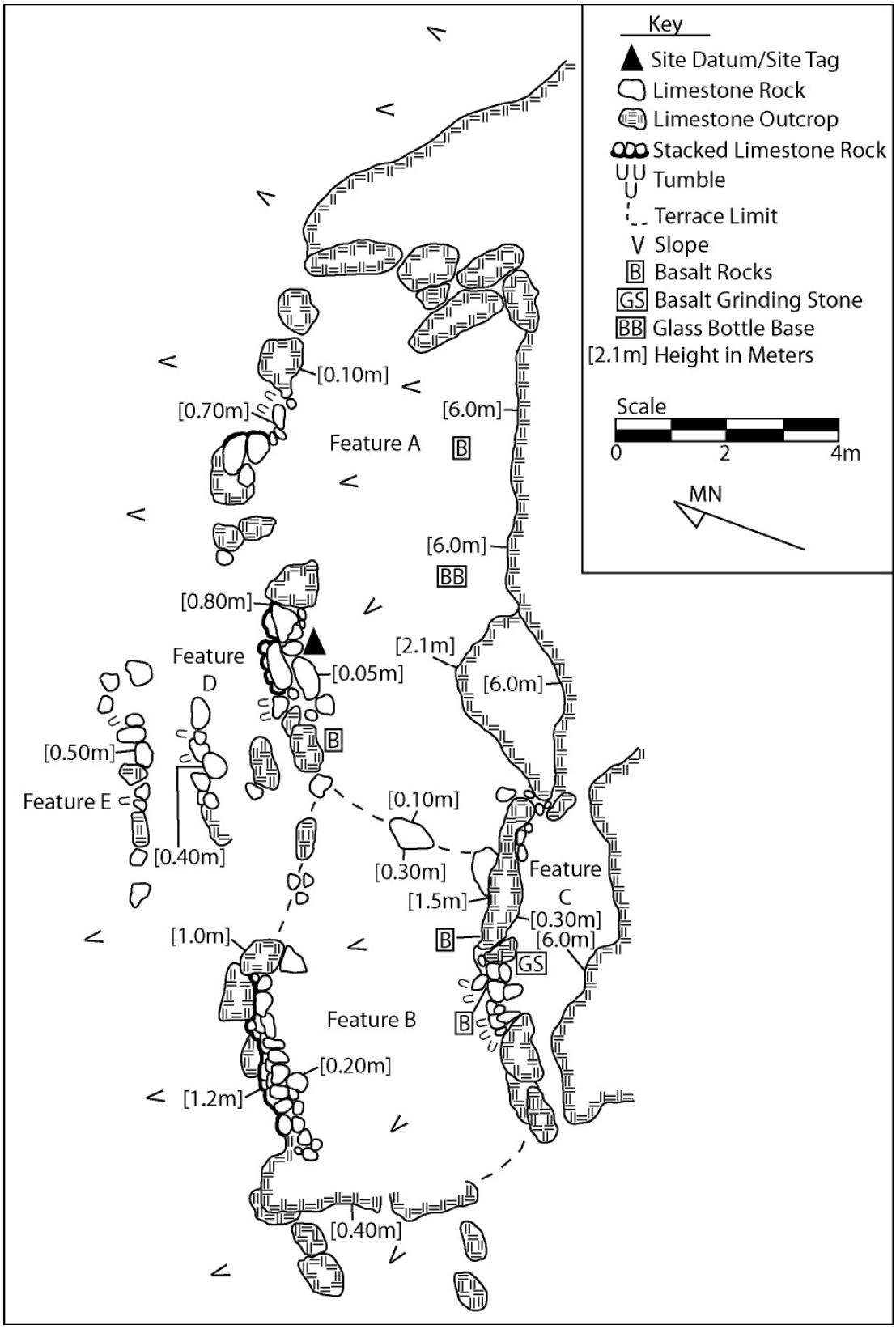
Feature B consists of a soil terrace with stone retaining wall situated on the west side of Site 7850, immediately west of Feature A and northwest of Feature C. The terrace measures ca. 6.0 meters in length by 4.0 meters in depth by 0.20-1.2 meters in height. The stone retaining wall is constructed of limestone boulders and cobbles that have been loosely stacked between two to six courses of stone in height. The terrace also utilizes several natural limestone outcrops. The surface of the terrace consists of a relatively flat area of soil that abuts Feature C to the southeast. There is a step down between Feature A and Feature B measuring ca. 0.1-0.3 meters in height which was likely edged with stone at one time, but most of the stone are now missing. Feature B appears to have functioned as a traditional habitation terrace.

Feature C is a small soil terrace with stone retaining wall located up against the base of the limestone cliff, at the rear of the Feature B, terrace. The terrace measures ca. 3.9 meters in length by 2.5 meters in depth by 0.3-1.5 meters in height. The stone retaining wall is constructed of limestone boulders and cobbles that have been loosely stacked up to three courses of stone in height in between several medium to large natural limestone outcrops. The surface of the terrace consists of an uneven area of soil and loose rock that abuts the cliff face which measures ca. 6.0 meters in overall height. The stacked portion of the retaining wall has partially tumbled

out onto the surface of Feature B. One artifact was observed consisting of a basalt grinding stone located on the surface of Feature C, near the stone retaining wall. The stone is smooth and has visible use wear on at least two of the sides. It measures ca. 20.0 centimeters in length by 15.0 centimeters in width by 13.0 centimeters in thickness. The grinding stone was photographed, but not collected. At least two unmodified basalt cobbles were observed near the tumble from the stone retaining wall. Feature C appears to have functioned as a traditional habitation terrace.

Feature D consists of a soil terrace with stone retaining wall located immediately down slope to the northwest of Feature A. The terrace measures ca. 2.9 meters in length by 1.0 meter deep by 0.0-0.4 meter in height. The stone retaining wall is constructed of limestone boulders and cobbles that have been loosely stacked up to two courses of stone in height. A natural limestone outcrop is also incorporated into the western end of the retaining wall. Some of the stones from the retaining wall have tumbled down slope. The surface of the terrace consists of a sloped area of soil and rock that abuts the retaining wall of Feature A at the rear. Feature D appears to have functioned as a traditional agricultural terrace.

Feature E is a soil terrace with stone retaining wall located immediately down slope to the northwest of Feature E. The terrace measures ca. 3.9 meters in length by 1.0 meter deep by 0.0-0.5 meter in height. The stone retaining wall is constructed of limestone boulders and cobbles that have been loosely stacked up to two courses of stone in height. The terrace also utilizes several natural limestone outcrops. Some of the stones from the retaining wall have tumbled down slope. The surface of the terrace consists of a sloped area of soil and rock that abuts the retaining wall of Feature D at the rear. Feature E appears to have functioned as a traditional agricultural terrace.



Planview of Site 7850.

Site 7850, Fe. A, terrace, view to northeast.

Site 7850, Fe. B, terrace, view to southeast.

Site 7850, Fe. C, terrace, view to east.

Site 7850, Fe. D, terrace, view to southeast.

Site 7850, Fe. E, terrace, view to north.

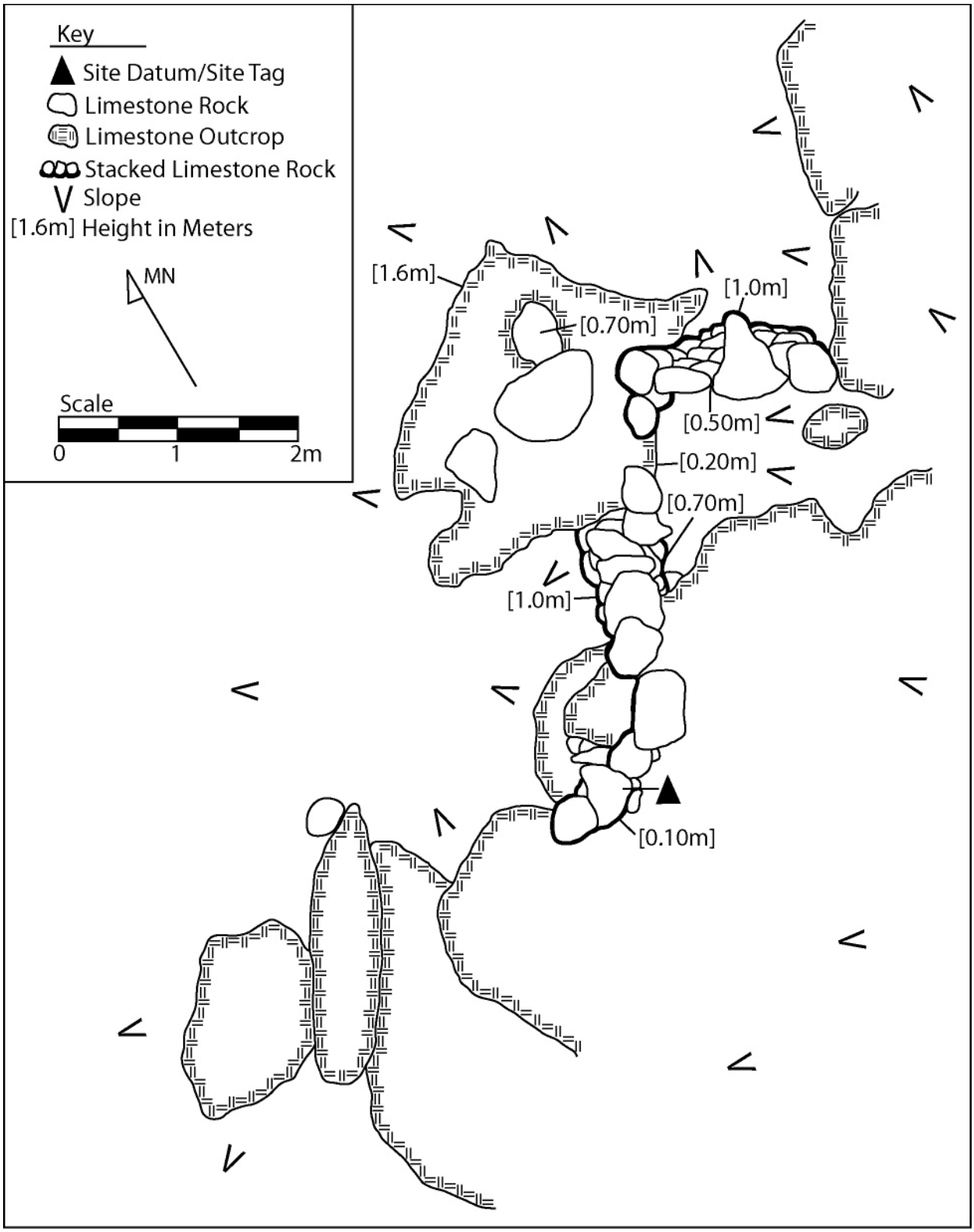
Grinding stone located at Site 7850.

SIHP No.: 50-80-02-7851
Field No.: T-041
Site Type: Filled Crevice
Site Function: Possible Burial
Site Condition: Fair
No. of Features: 1
Age: Pre-Contact or Early Post-Contact
Significance: d
Description: Site 50-80-02-7851 is a filled limestone crevice located in the north-central portion of the project area, and situated along a limestone cliff on a ca. 35˚ slope. The surrounding vegetation includes *koa haole*, banyan, and a stand of *ti* located ca. 3.0 meters away. The crevice is near the top of a limestone cliff, but under a large limestone boulder slab which creates a small, cave-like overhang. The crevice measures ca. 0.9 meter in length by 0.3 meter in width, and is filled with small limestone slabs measuring ca. 0.15-0.3 meter in diameter by 0.05-0.1 meter in thickness. The area adjacent to the filled crevice does not contain any roof fall or debris suggesting that the material within the crevice is likely intentional. No cultural material was observed in the area. Site 7851 appears to be traditional in construction. Although no human skeletal remains were observed at the site, based on the style of construction, it is possible that a human burial may be present within the filled crevice.

Site 7851, filled crevice, view to east.

SIHP No.: 50-80-02-7852
Field No.: T-042
Site Type: Terrace
Site Function: Agriculture
Site Condition: Fair
No. of Features: 1
Age: Pre-Contact or Early Post-Contact
Significance: d
Description: Site 50-80-02-7852 consists of a terrace located in the north-central portion of the project area, near the top of a limestone cliff. The site is situated ca. 20.0 meters north/northeast of the Site 7852, filled crevice, on the same slope. Vegetation in the area includes *koa haole*, *noni*, banyan, *hau*, and Christmas berry. The feature is a stacked limestone terrace incorporating natural limestone outcrops. Overall, the terrace measures ca. 5.5 meters in length by 2.5 meters in width by 1.0 meter in height. The terrace wall is roughly L-shaped and built into the slope. The stone retaining wall is constructed of loosely stacked limestone boulder slabs and cobbles. The interior portion of the retaining wall is two courses of stone in height, while the exterior portion of the wall is between four to five courses high. The northern portion of the terrace is hollowed out and resembles a planting area. A small banyan tree is growing within the terrace on the north side, where a soil deposit is present. The south end of the terrace consists of soil and limestone outcrop. Site 7852 appears to have functioned as a traditional agricultural terrace.

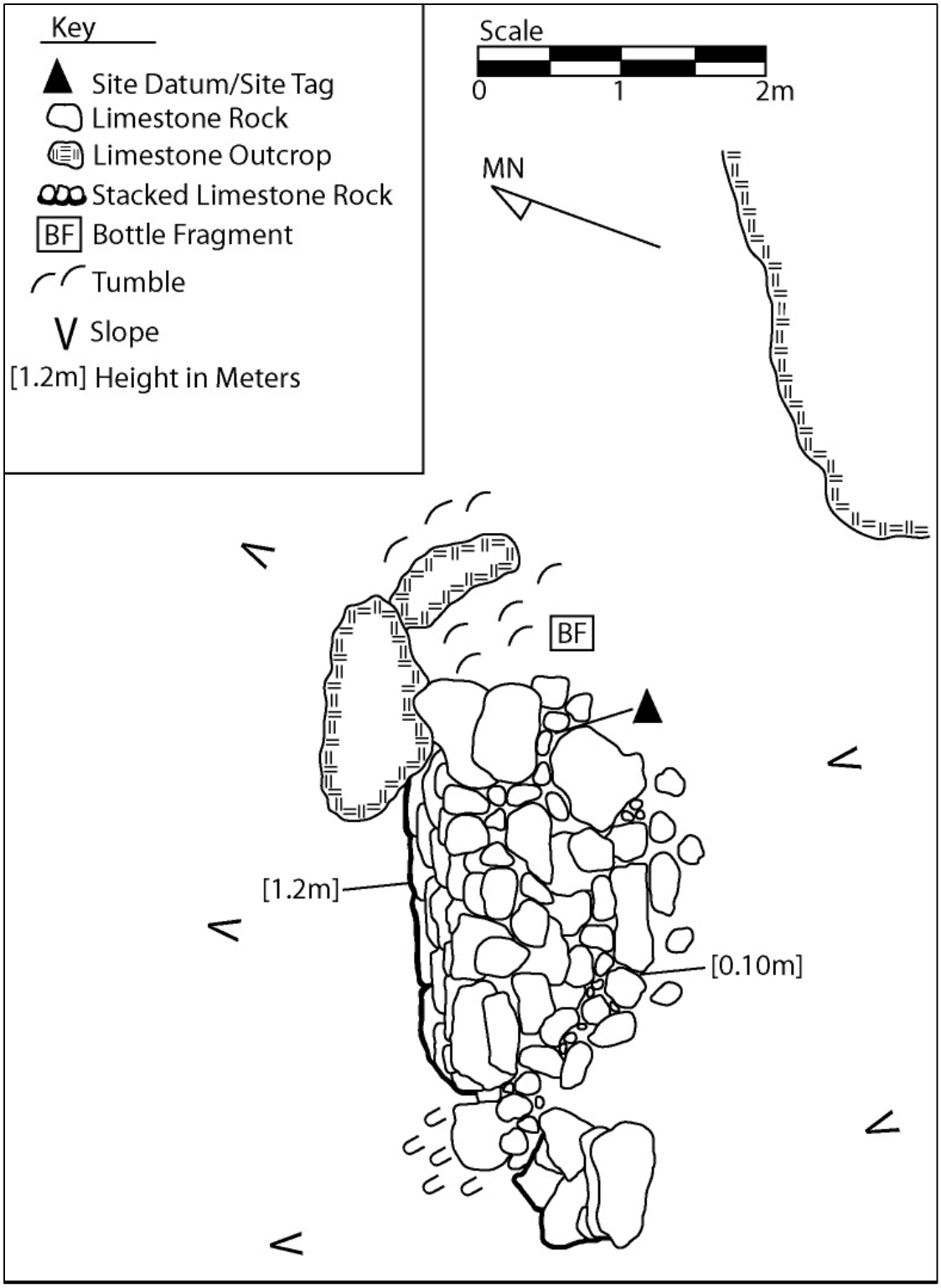
Site 7852, terrace, view to south.



Planview map of Site 7852.

SIHP No.: 50-80-02-7853
Field No.: T-044
Site Type: Terrace
Site Function: Uncertain
Site Condition: Fair
No. of Features: 1
Age: Pre-Contact or Early Post-Contact
Significance: d
Description: Site 50-80-02-7853 consists of a stone terrace located on the north side of a limestone slope. Limestone outcrops are present on both the northeast and southwest sides of the site. The terrace is constructed of limestone slabs and boulders that have been loosely stacked between five to six courses of stone in height. Several limestone outcrops are also utilized. The interior surface of the terrace consists of limestone slabs, boulders, and cobbles. The terrace is oriented roughly northeast to southwest, and measures ca. 4.1 meters in length by 1.4 meters in depth by 0.1-1.2 meters in height. Both ends of the terrace have partially tumbled down slope. An aqua glass bottle fragment was observed on the east end of the terrace, but was not collected. The bottle fragment, which measures ca. 8.0 centimeters in length by 8.0 centimeters in width, is likely a secondarily deposited artifact from the above hillside. There is abundant trash and debris in the surrounding area. Site 7853 was likely constructed during the pre-Contact or early post-Contact period, but the specific function is uncertain.

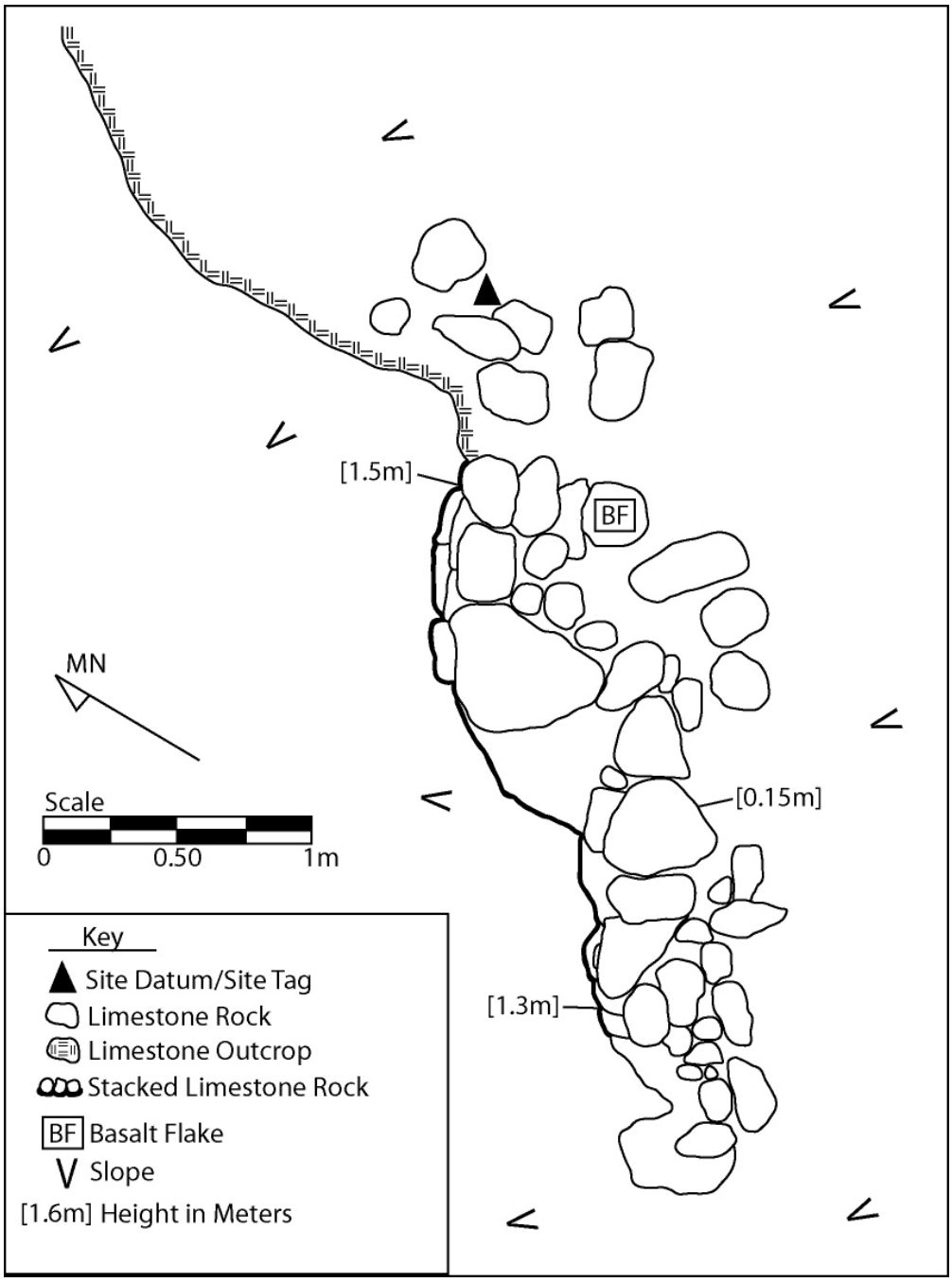
Site 7853, terrace, view to southwest.



Planview map of Site 7853.

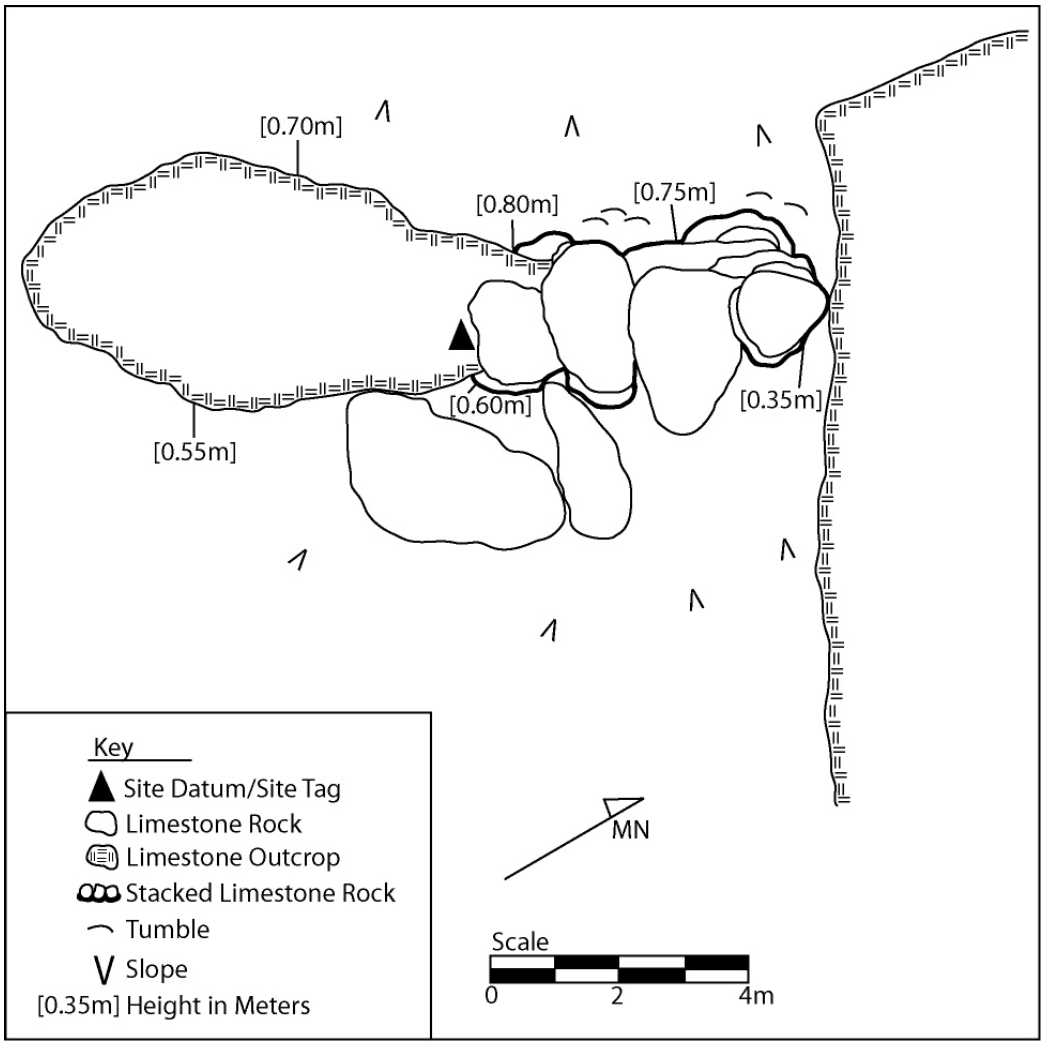
SIHP No.: 50-80-02-7854
Field No.: T-046
Site Type: Terrace
Site Function: Agriculture
Site Condition: Fair
No. of Features: 1
Age: Pre-Contact or Early Post-Contact
Significance: d
Description: Site 50-80-02-7854 consists of a single limestone terrace located along a ridgeline in the central portion of the project area. The terrace is oriented roughly northeast to southwest on a fairly steep northwest facing slope. It is constructed of loosely stacked limestone cobbles, boulders, and slabs. Some of the slabs have been placed vertically on end. Portions of the terrace are constructed on top of an exposed limestone outcrop. The surface of the terrace consists of an area of soil that blends into the slope of the hillside. The terrace measures ca. 4.0 meters in length by 1.25 meters deep by 0.15-1.5 meters in height. An area of disturbed bulldozer push is located ca. 15.0 meters to the east of the terrace. A large basalt flake measuring ca. 14.0 centimeters by 11.0 centimeters was observed on the northeast portion of the terrace, but was not collected. Site 7854 appears to have been constructed and utilized during the pre-Contact or early post-Contact period for agricultural purposes.

Site 7854, terrace, view to southeast.



Planview map of Site 7854.

SIHP No.: 50-80-02-7855
Field No.: T-047
Site Type: Terrace
Site Function: Agriculture
Site Condition: Fair
No. of Features: 1
Age: Pre-Contact or Early Post-Contact
Significance: d
Description: Site 50-80-02-7855 consists of a single terrace located near the top of the limestone cliff. The terrace measures ca. 2.4 meters in length by 1.0 meter deep by 0.35-0.80 meter in height. The terrace is constructed of limestone slabs, boulders, and cobbles that have been loosely stacked in between two large limestone outcrops. Some of the stones have tumble down slope. The interior surface of the terrace consists of an area sloping soil. Approximately 2.0 meters to the south of the terrace is a possible modified outcrop. Site 7855 appears to have been constructed and utilized during the pre-Contact or early post-Contact period for agricultural purposes.



Planview map of Site 7855.

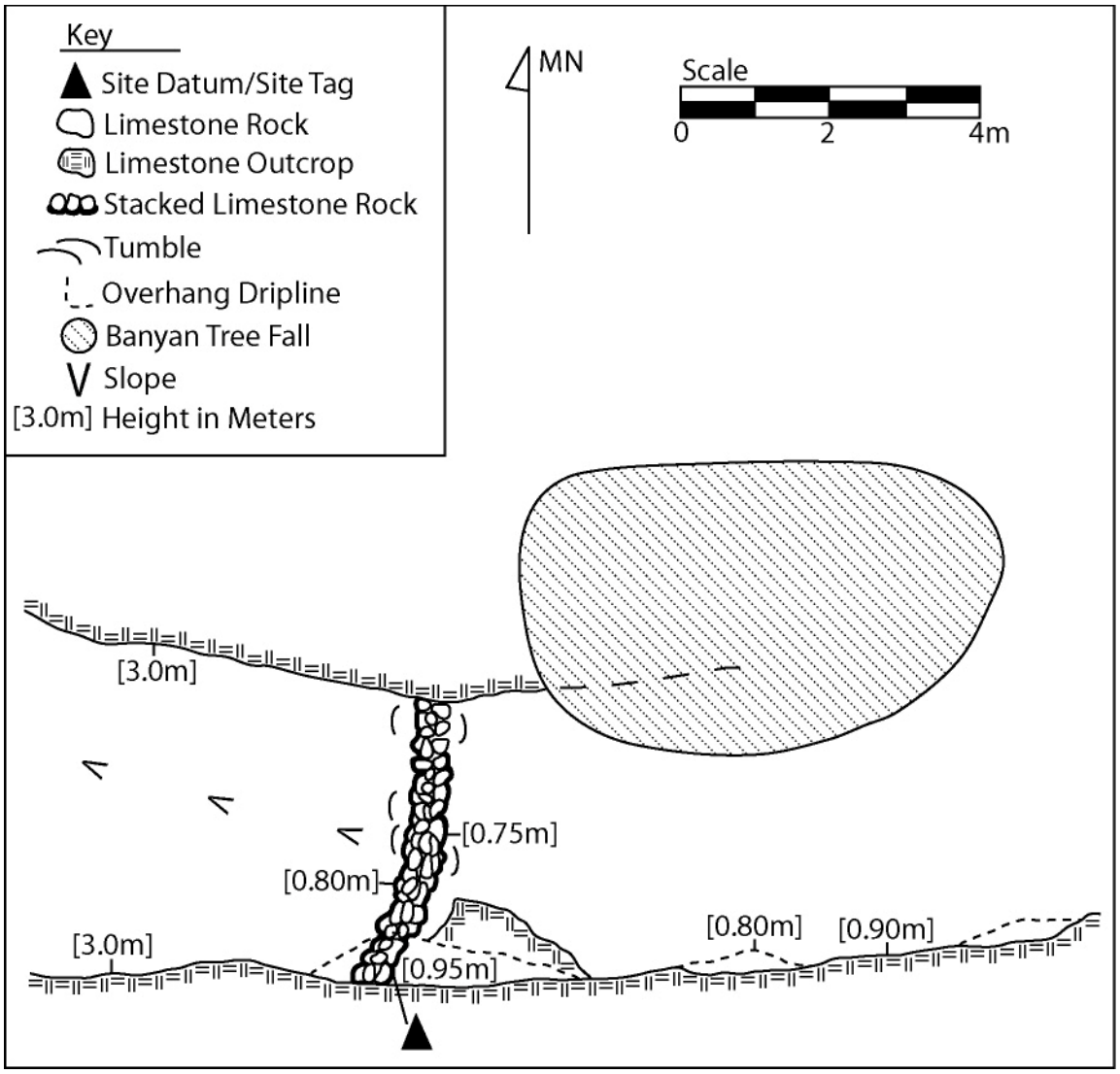
Site 7855, terrace, view to east.

SIHP No.: 50-80-02-7856
Field No.: T-048
Site Type: Wall
Site Function: Uncertain
Site Condition: Fair
No. of Features: 1
Age: Pre-Contact or Early Post-Contact
Significance: not determined
Description: Site 50-80-02-7856 consists of a limestone wall located in the central portion of the project area. The wall is situated along the north side of a limestone cliff. The wall is constructed of loosely stacked limestone slabs, boulders, and cobbles. Some of the slabs have been placed vertically on end. The wall is oriented roughly northwest to southeast and measures ca. 4.9 meters in length by 0.9 meter in width by 0.5 meter in height. Site 7856 was likely constructed during the pre-Contact or early post-Contact period, but the specific function is uncertain.

Site 7856, wall, view to east.

SIHP No.: 50-80-02-7857
Field No.: T-049
Site Type: Wall
Site Function: Habitation
Site Condition: Fair
No. of Features: 1
Age: Pre-Contact or Early Post-Contact
Significance: d
Description: Site 50-80-02-7857 consists of a limestone wall located in the north-central portion of the project area, situated at the top of a limestone ridge. The wall is oriented roughly north to south and is constructed of small to large limestone slabs and boulders which have been loosely stacked between one to four courses of stone in height in between two natural limestone outcrops. The limestone outcrop to the south forms a small overhang at the south end of the wall. The wall measures ca. 3.8 meters in length by 0.9 meter in width by 0.8 meter in height along the western edge and 0.75 meter in height along the eastern edge. The small overhang measures ca. 2.5 meters in length by 1.3 meters deep by 1.0 meter in interior height. The ground surface underneath the overhang consists of soil and loose limestone cobbles. The southern end of the wall is well preserved, but the northern end is partially tumbled. No cultural material was observed at Site 7857, except for one modern plastic water bottle.

The wall runs in between the two natural limestone outcrops, blocking access to the small overhang from the west. The south end of the wall helps to form a small protected area to the east, underneath the small overhang. Although no cultural material was observed, it appears likely that the soil area underneath the overhang and directly east of the wall was utilized as a small protected shelter. There is a large accumulation of soil, tree fall, and debris on the ground surface. Site 7857 appears to have been constructed and utilized during the pre-Contact or early post-Contact period for temporary habitation.



Planview map of Site 7857.

Site 7857, wall, view to west.

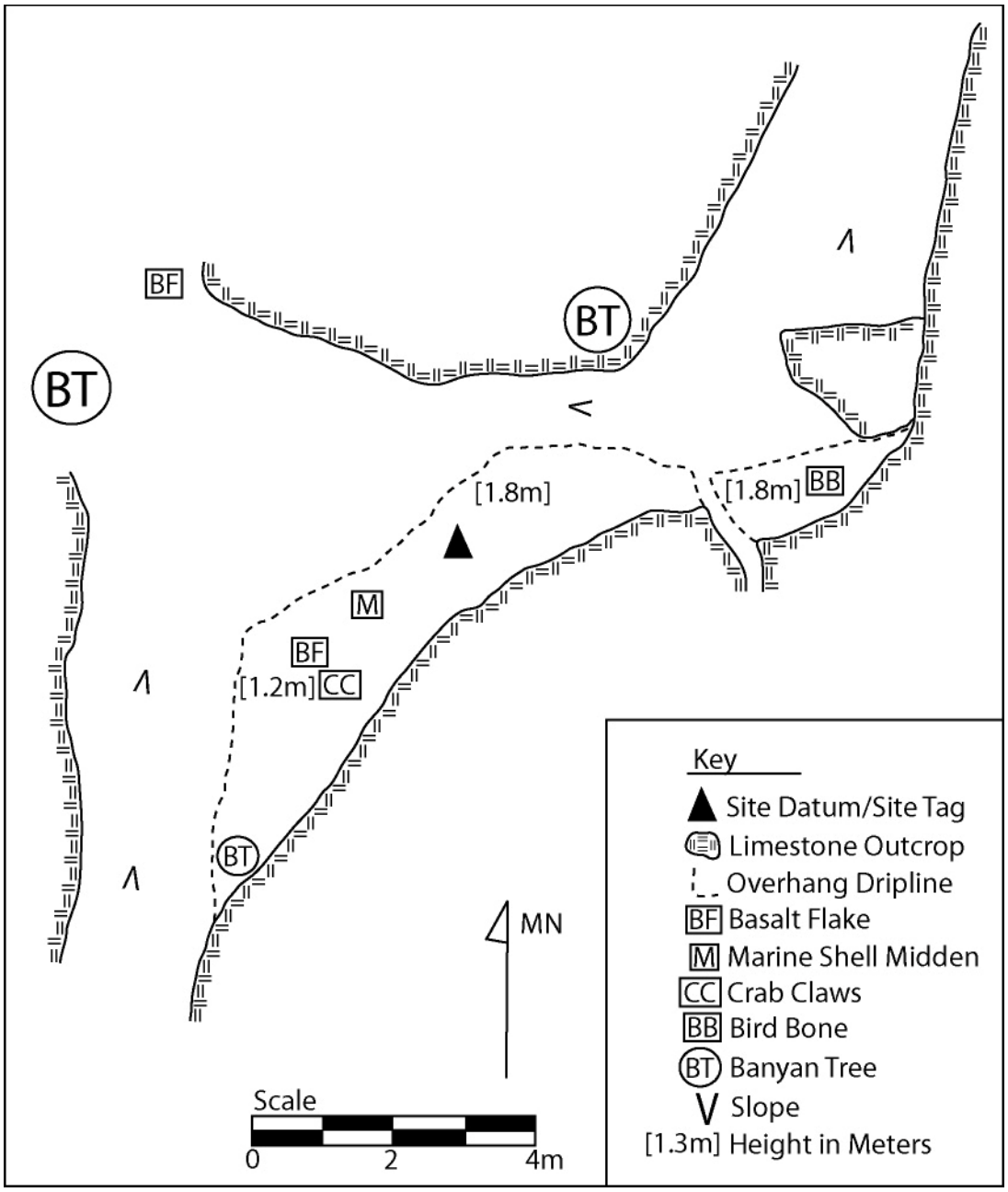
Site 7857, wall at overhang, view to south.

SIHP No.: 50-80-02-7858
Field No.: T-050
Site Type: Wall
Site Function: Uncertain
Site Condition: Fair
No. of Features: 1
Age: Pre-Contact or Early Post-Contact
Significance: d
Description: Site 50-80-02-7858 consists of a limestone wall located in the north-central portion of the project area, situated along a limestone ridge. The wall is oriented roughly east to west and is constructed of limestone boulder slabs that have been loosely stacked both vertically and horizontally. A few of the limestone slabs are very large in size measuring ca. 0.9 meter in length by 0.9 meter in width by 0.2 meter in thickness. Overall the wall measures ca. 50.0 meters in length by 0.7 meter in width by 0.6 meter in height. In several places the wall is overgrown with large banyan trees. The area contains numerous limestone outcrops, some of which are parallel to the slope, forming natural channel-like features. No cultural material was found in the immediate vicinity of the site. Site 7858 was likely constructed during the pre-Contact or early post-Contact period, but the specific function is uncertain.

Site 7858, wall, view to northeast.

SIHP No.: 50-80-02-7859
Field No.: T-051
Site Type: Overhang Shelter
Site Function: Habitation
Site Condition: Fair
No. of Features: 1
Age: Pre-Contact or Early Post-Contact
Significance: d
Description: Site 50-80-02-7859 consists of a limestone overhang shelter located along a northwest facing limestone cliff in the north-central portion of the project area. The limestone cliff measures ca 2.5 meters in height. The surrounding vegetation includes several banyan trees, and the ground slopes gently to the northwest. The interior of the overhang measures ca. 11.0 meters in length by 2.2 meters in depth with a maximum interior height of 1.8 meters. The overhang, which faces northwest, is flanked by limestone outcrops on three sides. The outcrops range in height from ca. 0.9-2.20 meters in height. Traditional cultural material was observed at Site 7859, most of which was located within the southwestern portion of the overhang. Cultural material included marine shell midden, crab claws, *kukui* nut shell fragments, and charcoal flecking. Fragments of bird bone were observed in the northeastern portion of the overhang. Several basalt flakes were also observed within the overhang, and one basalt flake was encountered ca. 5.0 meters to the northwest of the shelter. No artifacts were collected. Site 7859 appears to have been utilized during the pre-Contact period or early post-Contact period for habitation.

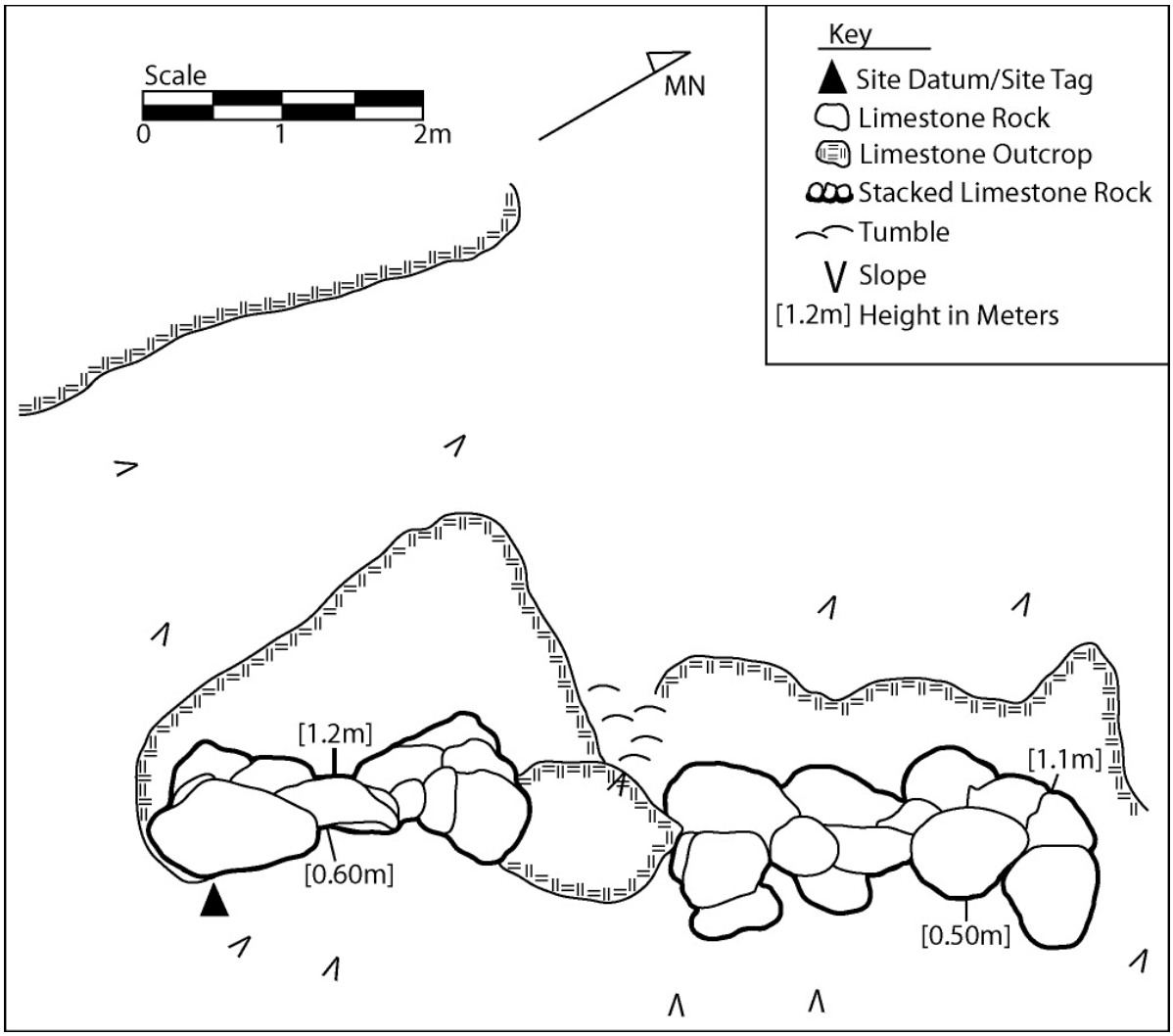
Site 7859, overhang shelter, view to northeast.



Planview map of Site 7859.

SIHP No.: 50-80-02-7860
Field No.: T-052
Site Type: Wall
Site Function: Uncertain
Site Condition: Fair
No. of Features: 1
Age: Pre-Contact or Early Post-Contact
Significance: d
Description: Site 50-80-02-7860 consists of a limestone wall located along along a limestone slope in the north-central portion of the project area. The wall is situated directly upslope to the east of a natural limestone channel. The wall is constructed of limestone slabs, boulders, and cobbles that have been loosely stacked between three to five courses of stone in height on top of several exposed limestone outcrops. Overall, the wall measures ca. 7.0 meters in length, although there is a small gap located in the central portion of the wall that measures ca. 0.8 meter in length. The northeastern wall segment measures ca. 3.2 meters in length by 0.75 meter in width by 0.5-1.1 meters in height. The southwestern wall segment measures ca. 2.3 meters in length by 0.5 meter in width by 0.6-1.1 meters in height. Several stones have tumbled down slope from the central portion of the wall, which may explain the small gap. Site 7860 was likely constructed during the pre-Contact or early post-Contact period, but the specific function is uncertain.

Site 7860, wall, view to southeast.



Planview map of Site 7860.

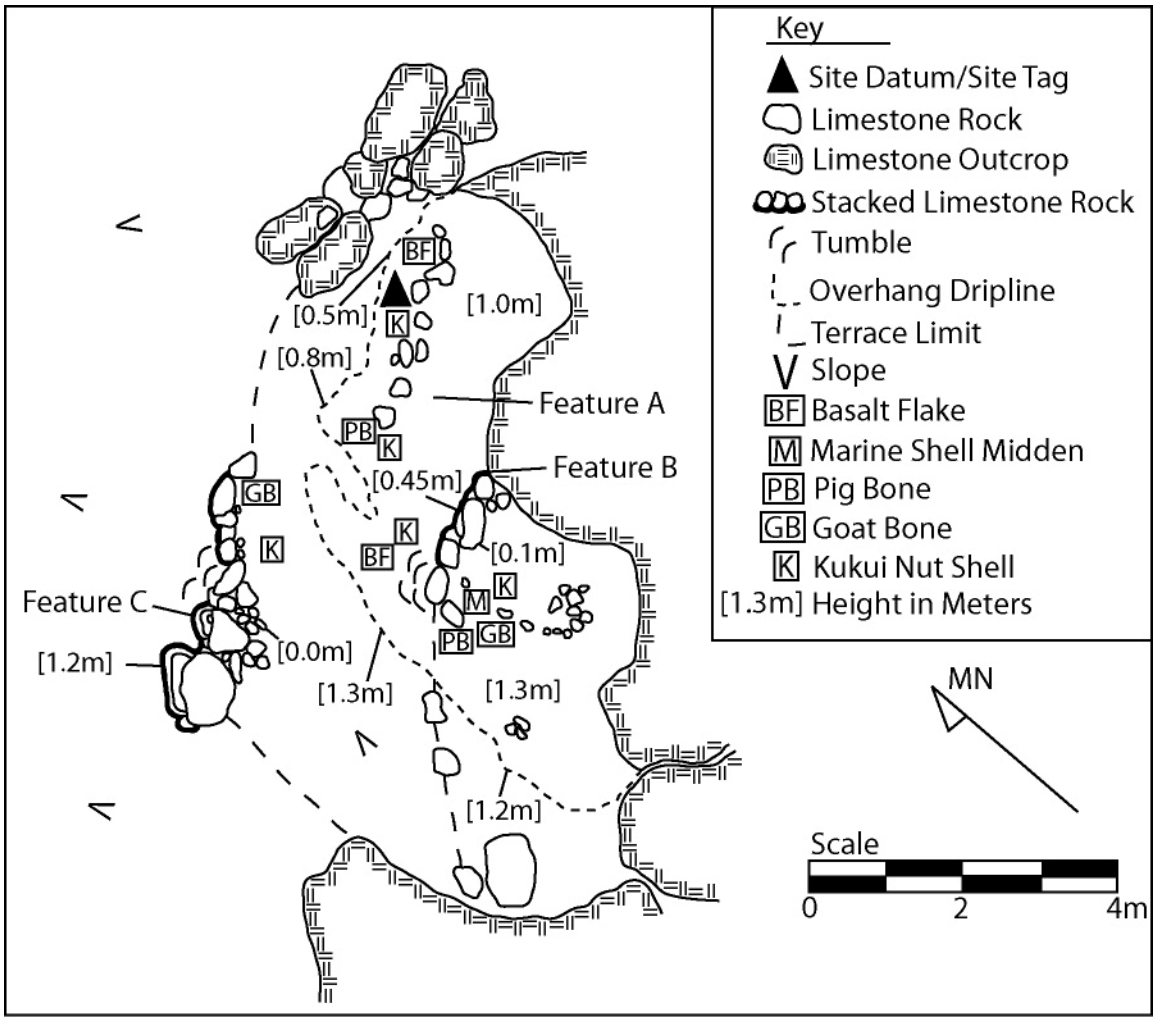
SIHP No.: 50-80-02-7861
Field No.: T-062
Site Type: Overhang Shelter with Terraces
Site Function: Habitation
Site Condition: Fair
No. of Features: 3
Age: Pre-Contact or Early Post-Contact
Significance: d
Description: Site 50-80-02-7861 is comprised of an overhang shelter with two associated terraces located in the north-central portion of the project area. The site is situated along the northwest side of a large limestone outcrop located near a series of fallow agricultural fields to the northwest. The site consists of an overhang shelter (Feature A) with an internal terrace (Feature B) and an exterior terrace (Feature C).

Feature A consists of a limestone overhang shelter located along the northwest side of a limestone cliff face. The interior of the overhang measures ca. 8.0 meters in length by 3.5 meters in depth by 1.3 meters height. The interior surface of the overhang consists mostly of soil with some scattered limestone boulders and cobbles. The Feature B, terrace, is also located within the overhang. Traditional cultural material including fragments of *kukui* nut shell, sea urchin, and two basalt flakes was observed on the surface of the interior of the overhang. The larger of the two basalt flakes is located at the east end of the overhang and measures ca. 11.2 centimeters in length by 10.4 centimeters in width by 5.0 centimeters in thickness. It has a prominent striking platform and bulb of percussion, with multiple flake scars visible on the dorsal surface. The second flake is located in the central portion of the overhang and measures ca. 3.0 centimeters in length by 2.5 centimeters in width by 0.4 centimeters in thickness. It is snapped in half and exhibits a prominent striking platform, but no bulb of percussion. Several fragments of non-human medium mammal bone, likely pig and goat, were also observed within the overhang. Feature A appears to have functioned as a traditional habitation shelter.

Feature B consists of a soil terrace with stone retaining wall located within the central-western portion of the Feature A, overhang. The terrace measures ca. 1.9 meters in length by 2.0 meters in depth by 0.1-0.45 meters in height. The stone retaining wall is constructed of limestone boulder and cobble slabs that have been loosely stacked between two to three courses of stone in height. Some of the stones forming the retaining wall have tumbled outward. The surface of the terrace consists of soil with several loose limestone boulders and cobbles. Traditional cultural material including fragments of *kukui* nut shell and marine shell midden was observed on the surface of the terrace. Several fragments of non-human medium mammal bone, likely pig and goat, were also observed on the terrace. Feature B appears to have functioned as a traditional habitation terrace.

Feature C consists of a soil terrace with stone retaining wall located just outside of the Feature A, overhang drip line. The terrace measures ca. 3.6 meters in length by 2.3 meters in depth by 0.0-1.2 meters in height. The stone retaining wall is constructed of limestone boulder slabs and cobbles that have been loosely stacked between two to four courses of stone in height. Some of the stones forming the retaining wall have tumbled outward. Fragments of *kukui* nut shell and

non-human medium mammal bone, likely goat, were also observed on the terrace. Feature C appears to have functioned as a traditional habitation terrace. Site 7861 appears to have functioned as traditional habitation site.



Planview map of Site 7861.

Site 7861, overview, view to south.

Site 7861, Fe. A, overhang shelter, view to south.

Site 7861, Fe. B, terrace, view to south.

Site 7861, Fe. C, terrace, view to southwest.

SIHP No.: 50-80-02-7862
Field No.: T-063
Site Type: Cave with Terrace
Site Function: Habitation
Site Condition: Good
No. of Features: 2
Age: Pre-Contact or Early Post-Contact
Significance: d
Description: Site 50-80-02-7862 consists of a limestone cave (Feature A) with an interior terrace (Feature B) located in the north-central portion of the project area. The site is situated along the north side of a limestone cliff face. There is a dirt access road located ca. 10.0 meters upslope to the south of the cave entrance, and one of the zip line runs is located ca. 5.0 meters to the north. Near the center of the entrance to the cave is a large debris pile of modern trash measuring ca. 5.0 meters in length by 4.0 meters in width. It consists of plastic trash bags with aluminum cans, plastic gallon jugs, a TV, refrigerator, miscellaneous metal fragments, car parts, etc. The trash appears to have been dumped into the site from slope above the entrance. The hillside above the cave entrance is also littered with modern trash.

Feature A consists of a large limestone cave. The entrance to the cave is also large and faces to the north, measuring ca. 19.0 meters in length by 3.2 meters in maximum height. The interior of Feature A measures ca. 30.0 meters (east-west) by 20.0 meters (north-south) by 3.2 meters in maximum height. The interior of the cave consists of limestone outcrops, loose limestone boulders, and relatively flat areas of accumulated soil.

The largest areas of soil are located in the eastern portion of the cave. The main area of occupation is located in the center of the eastern portion of the cave and consists of a relatively flat, cleared area of soil that is demarcated by large limestone boulders and limestone outcrops that form a natural terrace-like area. This area measures ca. 6.0 meters in length by 3.0 meters in width with an interior ceiling height of ca. 2.4 meters. The west edge of this area abuts the modern trash pile located at the drip line of the cave. The surface of this area is covered with fine ash-like soil, and likely contained one or several hearths, although there is no evidence of any on the surface. Fragments of charcoal, *kukui* nut shell, and marine shell midden are visible on the surface.

Immediately to the south of the main living area is a natural ledge that drops ca. 1.1 meters. This ledge is appears to be natural, but does contains a fair amount of soil with several loose limestone boulders. It measures ca. 6.8 meters in length by 2.5 meters in width with an interior ceiling height of 2.7 meters. Fragments of charcoal, *kukui* nut shell, and marine shell midden was observed on the surface of this ledge.

Located immediately to the south of this ledge, and situated at the southern most point of the cave, is the lowest internal area which appears to have been created by large limestone boulder roof fall that is lodged between the ceiling and floor of the cave creating an interior chamber. This chamber measures ca. 5.0 meters in length by 4.5 meters in width with an interior ceiling height of ca. 1.4 meters. The floor of the chamber consists of limestone pebbles, cobbles, and boulders, with no soil present. Within this chamber, a variety of traditional cultural material

was observed consisting of one basalt adze (Artifact 1), one limestone hammerstone (Artifact 2), at least one basalt flake, numerous unmodified basalt cobbles, as well as fragments of charcoal, burnt *kukui* nut shell, and marine shell midden. Several other internal chambers similar to this one were observed along the southern portion of the cave.

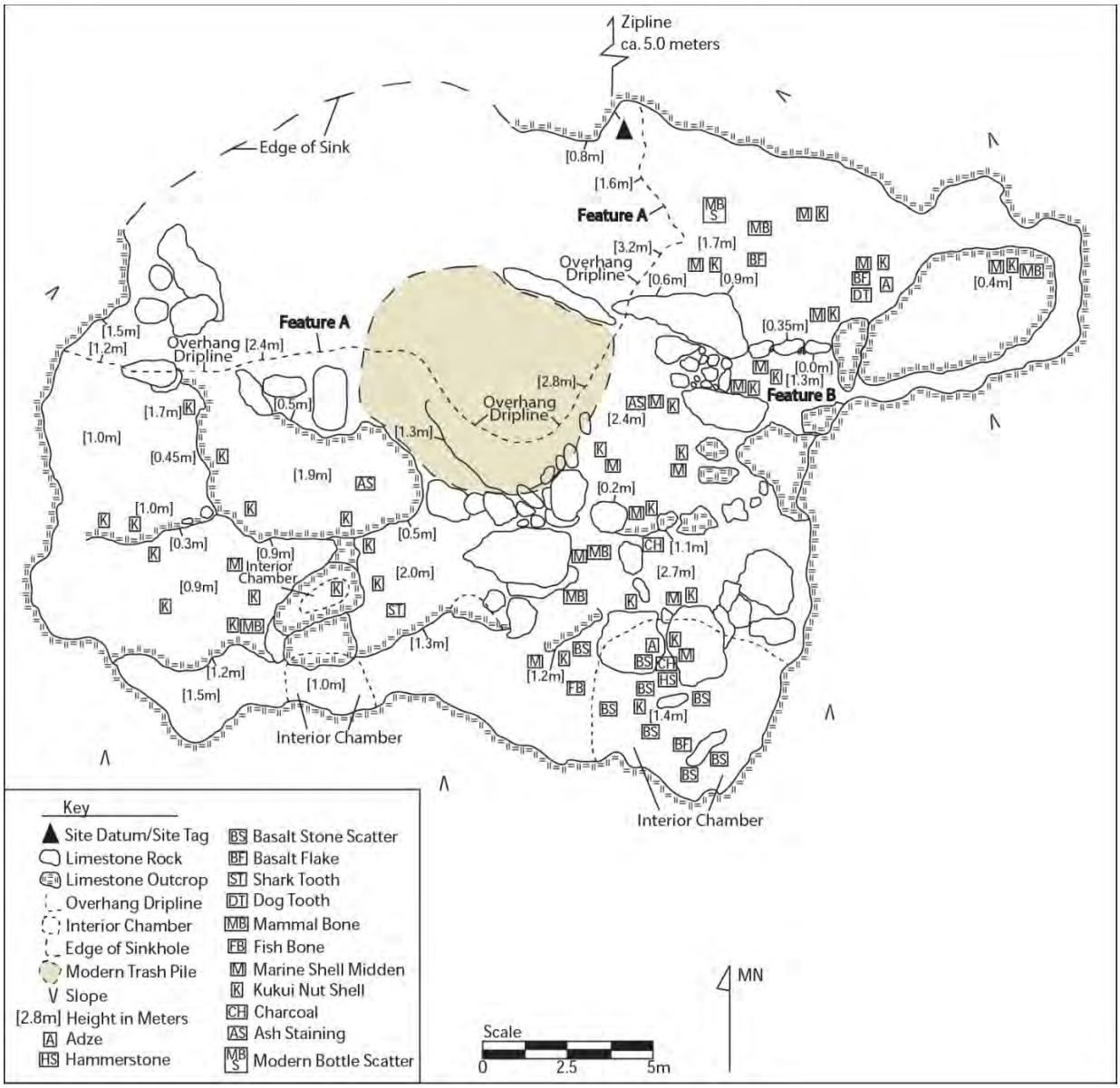
A second cleared soil area is located in the northeastern most portion of the cave, immediately north of the main area of occupation. This area measures ca. 7.5 meters in length by 6.0 meters in width with an interior ceiling height of ca. 1.7 meters. A large variety of traditional cultural material was observed on the surface of this area consisting of one basalt adze (Artifact 3), two basalt flakes, one dog tooth, fragments of non-human medium mammal bone, marine shell midden (cowrie, cone, *pipipi*), and *kukui* nut shell fragments. African land snails and smaller land snails are covering the floor. A scatter of eight modern glass beer bottles was also observed near the edge of the drip line. The Feature B, terrace, is located immediately south of this cleared area of soil.

Feature B consists of a small soil terrace with stone retaining wall located in between the two main cleared areas of soil in the eastern portion of the cave. The terrace measures ca. 2.8 meters in length by 2.0 meters in depth by 0.0-0.35 meters in height. The ceiling height at Feature B is ca. 1.3 meters. The stone retaining wall is constructed of three limestone boulders set in a line and several limestone cobbles. The terrace also utilizes several limestone outcrops to the east and set limestone boulders to the west. The surface of the terrace consists of soil with loose limestone pebbles. Traditional cultural material was observed on the surface of Feature B including fish bone, marine shell midden (cowrie, operculum, *pipipi*, crab, sea urchin), and numerous fragments of *kukui* nut shell.

The western portion of the cave contains less soil and limestone boulders. The floor surface consists of undulating sharp limestone with pockets of red silt clay soil. Numerous *kukui* nut shell fragments are present, but there is a significant lack of marine shell midden in this portion of the cave. A single shark tooth was observed on surface of this area, but did appear to be associated with any feature.

Aside from the modern trash, Site 7862 is in good condition. The area outside the cave entrance contains *koa haole* and banyan trees, and scrub vegetation. The vegetation under the adjacent zip line has been cut and appears to have been bulldozed, although it does not appear that this has had an effect on the cave site. There is evidence of people using the cave recently, including several partially burnt mosquito coils that were found tucked among the rocks on the west side of the cave, however, the cave does not appear to have been looted given the types of artifacts recovered.

Given the large size of the cave, the large variety and amount of traditional cultural material observed, and the proximity to other traditional sites in the vicinity, Site 7898 appears to have functioned as a traditional habitation site. The cave was likely well known and significant to those living in this area during the pre-Contact or early post-Contact periods. All three artifacts were collected and are presented in Section 8.0 of this report.



Planview map of Site 7862.

Site 7862, Fe. A, cave, with main soil area in foreground, view to south.

Site 7862, Fe. B, terrace, view to southeast.

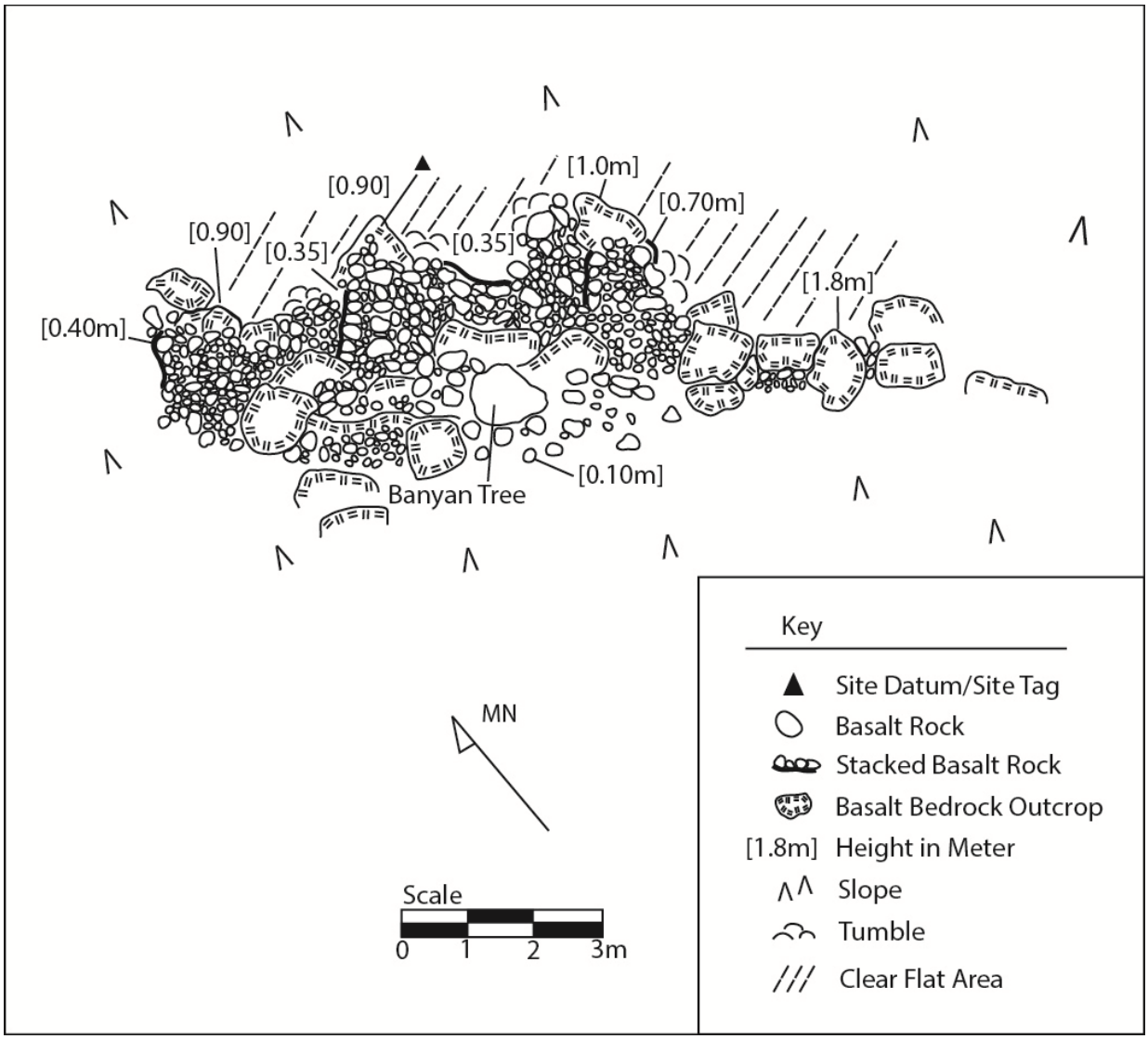
Site 7862, shark tooth.

SIHP No.: 50-80-02-7863
Field No.: T-067
Site Type: Modified Outcrop
Site Function: Uncertain
Site Condition: Poor
No. of Features: 1
Age: Pre-Contact or Early Post-Contact
Significance: d
Description: Site 50-80-02-7863 consists of a single modified outcrop located within the southwest portion of the current project area. The site is situated on a moderate to steep north facing slope, in an area of natural basalt outcrops and loose subangular basalt boulders and cobbles. The vegetation surrounding the site consists of *koa haole* trees, one banyan tree, several undetermined species of tree, as well as a ground cover of non-native grass.

Site 7863 consists of an irregularly shaped modified outcrop constructed of small subangular basalt boulders and large cobbles that have been partially piled and partially loosely stacked up to two courses of stone in height on top of several adjacent large basalt bedrock outcrops. The modified outcrop measures ca. 9.0 meters in length (northwest-southeast) by 5.0 meters in width (northeast-southwest) by 0.9 meters in height along the northeast down slope edge and 0.1 meter in height along the southwest upslope edge. There is a narrow, relatively clear, flat area located along the northeast down slope edge of the modified outcrop which measures ca. 8.0 meters in length (northwest-southeast) by 0.7-2.0 meters in width (northeast-southwest). No cultural material was observed at Site 7863.

Site 7863 is in poor condition. Some of the stone stacking and piling remains intact, however there appears to be a significant amount of stone tumble located along the northeast down slope edge. A banyan tree is growing out of the southeast-central portion of the feature which appears to have caused additional disturbance.

The function of the Site 7863, modified outcrop, is uncertain. Due to the steep slope of the area, it appears unlikely that the upslope portion of the feature was utilized as a terrace, either for habitation or agriculture. The small, relatively clear, flat area along the northeast down slope edge of the feature appears to have been the area of focus, although it is unclear whether the space was used for habitation or agriculture based on the lack of cultural material observed and the poor condition of the feature itself. The modified outcrop does appear to have been constructed and utilized during the pre-Contact or early post-Contact periods based on the style of construction.



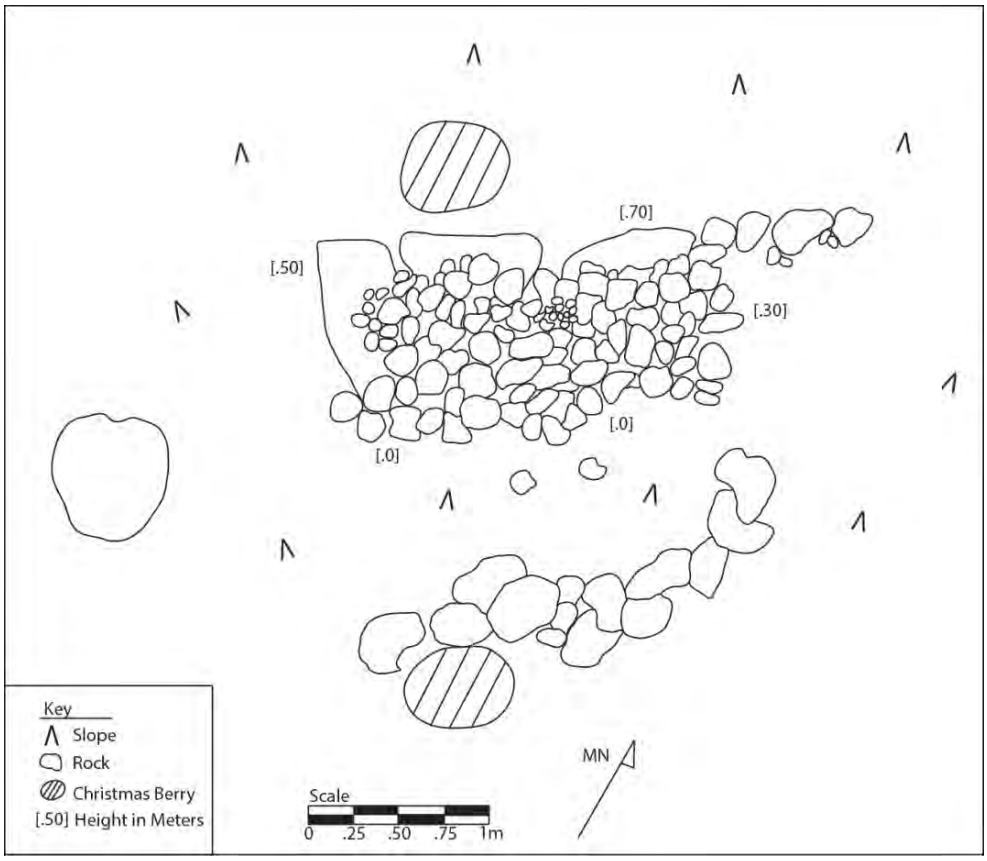
Site 7863, modified outcrop.

Site 7863, modified outcrop, view to southwest.

SIHP No.: 50-80-02-7864
Field No.: T-068
Site Type: Stone Terrace
Site Function: Uncertain
Site Condition: Fair
No. of Features: 1
Age: Pre-Contact or Early Post-Contact
Significance: d
Description: Site 50-80-02-7864 consists of a stone terrace located in the southwest portion of the project area. The site is situated on a steep northwest facing slope. Vegetation in the area consists of rubber tree, Christmas berry, banyan, *koa haole*, guava, and *ti*. The hillside is fairly rocky with basalt pebbles, cobbles, and boulders evenly spread out.

Site 7864 is a single stone terrace oriented roughly northeast to southwest and measuring ca. 2.2 meters in length by 1.3 meters in depth by 0.7 meter in height. The terrace is constructed of basalt boulders on the north and southwest sides. The boulders are ca. 0.7 meter in diameter while the cobbles are ca. 0.12-0.2 meter in diameter. The interior surface of the terrace consists of piled basalt cobbles. The upslope side (southeast) of the terrace blends into the hillside. No artifacts, coral, or midden was observed at the terrace, and no human remains were present.

The function of the Site 7864 is uncertain. The terrace appears too small and rocky for habitation or agriculture. The surrounding area is too rocky for the feature to be a clearing mound, and the terrace does not resemble a burial feature. The stone terrace does appear to have been constructed and utilized during the pre-Contact or early post-Contact periods based on the style of construction.



Planview map of Site 7864, stone terrace.

Site 7864, stone terrace, view to southwest.

SIHP No.: 50-80-02-7865
Field No.: T-069
Site Type: Terraces (2)
Site Function: Habitation/Agriculture
Site Condition: Good
No. of Features: 2
Age: Pre-Contact or Early Post-Contact
Significance: d
Description: Site 50-80-02-7865 consists of two terraces (Feature A and B) located at the southwest edge of the current project area. The current project boundary runs through the Feature B, terrace. The site is situated on a moderate west-northwest facing slope in an area with natural basalt bedrock outcrops and scattered basalt boulders and cobbles. The vegetation surrounding the site consists of *koa haole* trees and several undetermined species of trees and shrubs, as well as a few *noni* trees, and a few stands of *ti* located down slope to the west-northwest. Overall, Site 7865 measure ca. 10.0 meters in length (northeast-southwest) by 9.0 meters in width (northwest-southeast).

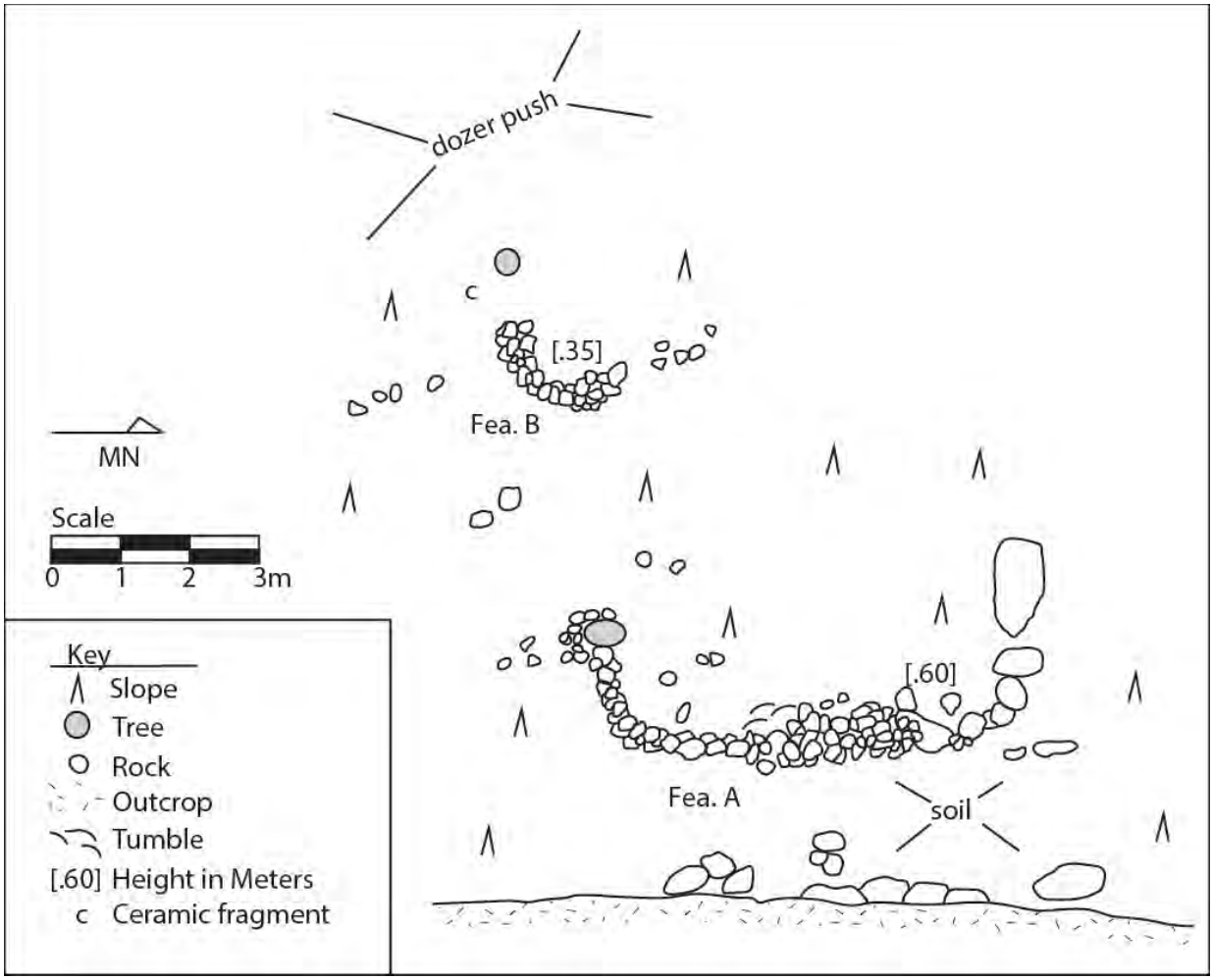
Several features are in close proximity to Site 7865. A small unrecorded stone mound (no site number) is located ca. 5.0 meters southwest of Feature B, just outside the current project boundary. A large circular depression and historic bottle/ceramic scatter (Site 7866) is located between ca. 1.0-5.0 meters northwest, west, and southwest of the site. A linear bulldozer push pile is located ca. 3.0-10.0 meters southwest of Site 7865.

Feature A consists of a roughly linear soil terrace with stone retaining wall which has been constructed near the base of a linear natural basalt outcrop. The stone retaining wall is constructed of small to medium subangular basalt boulders and large cobbles which have been loosely stacked between one to three courses of stone in height along the northwestern exterior edge. The stone retaining wall is oriented roughly northeast to southwest and curves down slope to the northwest at both ends. The retaining wall measures ca. 6.5 meters in length (northeast-southwest) by 0.3-0.8 meter in width (northwest-southeast) by 0.3-0.6 meter in height along the northwestern exterior edge and ca. 0.0-0.25 meter in height along the interior southeastern edge. The interior surface of the terrace consists of a relatively cleared, flat area of soil with a few basalt boulders at the northeast and southwest ends. The soil interior surface measures 8.0 meters in length (northeast-southwest) by 2.5 meters in width (northwest-southeast) from the stone retaining wall to the natural bedrock outcrop. Feature A appears to have function as a habitation terrace constructed and utilized during the pre-Contact period based on the style of construction and the relatively clear, flat, soil area at the base of the natural bedrock outcrop.

Feature B is located ca. 3.2 meters west of Feature A, and consists of a soil terrace with curved stone retaining wall. The retaining wall is constructed of small subangular basalt boulders and large cobbles which have been loosely stacked between one to two courses of stone in height. The wall is oriented roughly northeast to southwest and curves down slope to the northwest at both ends. The wall measures ca. 2.0 meters in length (northeast-southwest) by 0.3-0.5 meter in width (northwest-southeast) by 0.2-0.35 meter in height along the northwestern exterior edge and ca. 0.0-0.15 meter in height along the interior southeastern edge. The interior surface

consists of a relatively flat area of soil with scattered basalt cobbles. The interior surface measures ca. 2.5 meters in length (northeast-southwest) by 1.5 meters in width (northwest-southeast). Feature B appears to have functioned as a small agricultural terrace constructed and utilized during the pre-Contact period based on the style of construction, small size, and the stone wall which retains a small amount of soil on the west-northwest facing slope.

Site 7865 appears to have functioned as a traditional site constructed and utilized during the pre-Contact or early post-Contact periods. Feature A likely functioned as a habitation terrace, while Feature B likely functioned as an agricultural terrace. It is possible that the site was also utilized into the historic period based on the close proximity of nearby historic features and artifacts.



Planview map of Site 7865.

Site 7865, Fe. A, terrace, view to north.

Site 7865, Fe. A, terrace, view to south.

Site 7865, Fe. B, terrace, view to southeast.

SIHP No.: 50-80-02-7866
Field No.: T-070
Site Type: Artifact Scatter
Site Function: Dump
Site Condition: Fair
No. of Features: 1
Age: Historic
Significance: d
Description: Site 50-80-02-7866 is located in the southwestern portion of the project area near the southern project boundary on a moderate northwest facing slope. Vegetation in the area consists of *noni*, *ti,* Christmas berry, and guava. Site 7866 consists of a historic artifact scatter comprised of glass bottles and ceramics that covers a large area measuring ca. 28.0 meters in length (north-south) by 7.0 meters in width (east-west). Numerous beer and soda bottles are present including several clear glass bottles with "Hawaiian Soda Works, Honolulu T.H." embossed on the body and an "It" embossed on the base. Several aqua glass bottles with "AB" and "ES" embossed on the base were also observed. Other artifacts included a clear glass bottle fragment with "HONOLULU B+M CO, LTD- HONOLULU, T.H." embossed on the body and an unidentifiable embossing on the base, an amber beer bottle with "WF& S MIL. 46" embossed on the base, at least five clear glass unmarked wine bottles, and two clear glass, screw-top bottles with chamfered corners. Ceramics observed included several white ceramic plate fragments, and a hand-painted blue on white rice bowl with kanji on the base. Site 7866 appears to represent a dump which occurred during the historic period.

Site 7866, artifact scatter, Hawaiian Soda Works bottle.

Site 7866, artifact scatter, rice bowl.

Site 7866, artifact scatter, rice bowl base.

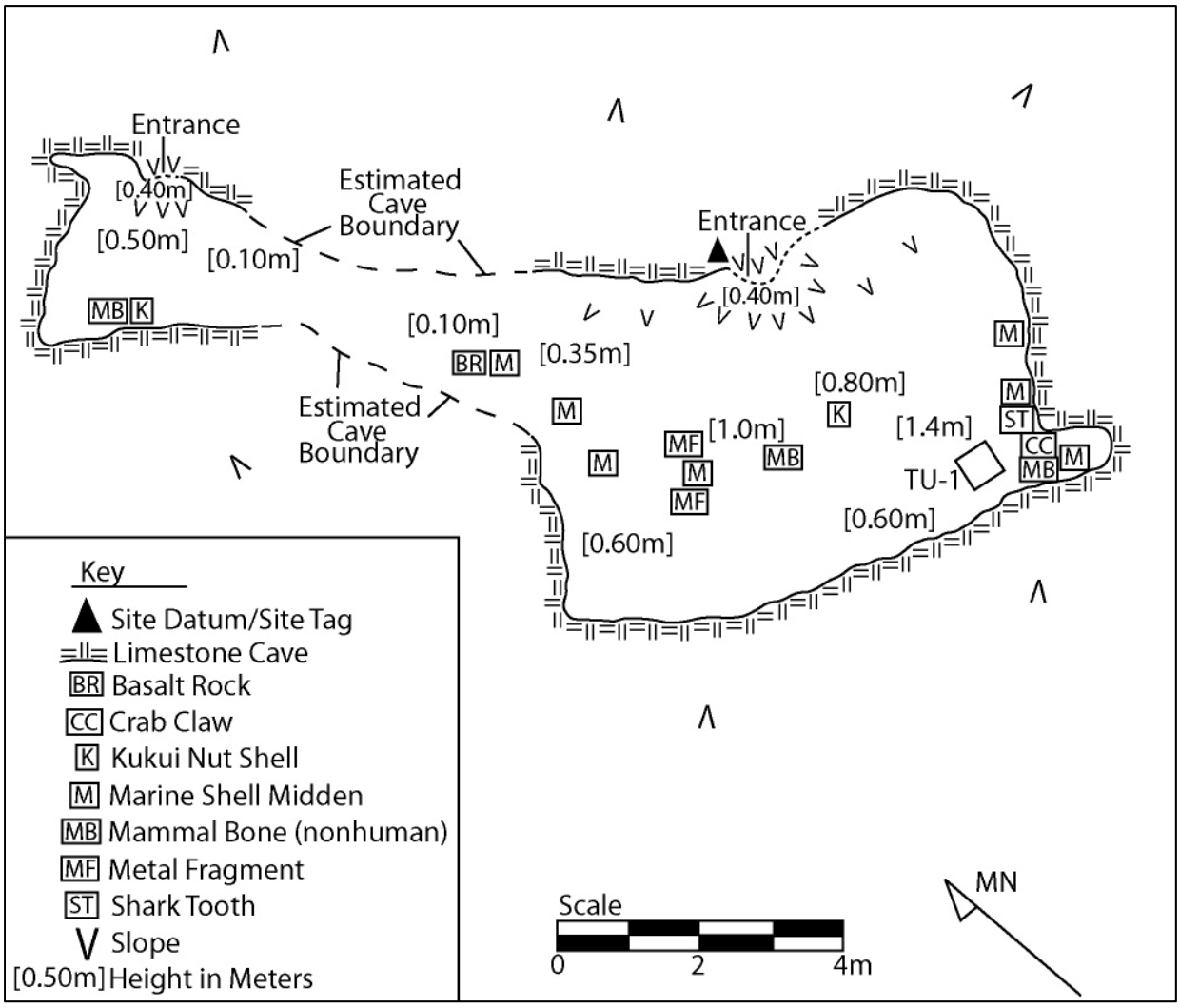
SIHP No.: 50-80-02-7867
Field No.: T-072
Site Type: Cave
Site Function: Habitation
Site Condition: Fair
No. of Features: 1
Age: Pre-Contact or Early Post-Contact
Significance: d
Description: Site 50-80-02-7867 consists of a limestone cave located in the central-eastern portion of the project area situated on a gentle northeast facing slope, within the newly added survey area. The surrounding area appears to have been graded by the former sugar plantation and is covered in *koa haole* and guava with loosely scattered limestone cobbles and boulders.

Site 7867 consists of a relatively small limestone cave with two separate small entrances. Overall, the interior of the cave measures ca. 15.0 meters in length (northwest-southeast) by 5.0 meters in width (northeast-southwest) with a maximum interior height of 1.4 meters. The main entrance to the main chamber is located at the southeast side of the cave. This entrance measures ca. 0.6 meters in length by 0.4 meters in width by 0.4 meters in height and is partially filled in with soil that appears to have been pushed in from around the entrance. This was likely done by the former sugar plantation, possibly in an attempt to seal the cave. The southeastern chamber is the largest portion of the cave measuring ca. 8.0 meters in length by 5.0 meters in width with a maximum interior height of 1.4 meters. The interior surface consists of soil with several loosely scattered limestone boulders and cobbles. A large variety of cultural material was observed on the interior surface of the cave including fragments of marine shell midden (cone, cowrie, *pipipi*, turban, sea urchin), one shark tooth, one crab claw, *kukui* nut shell, non-human medium mammal bone (likely cow and goat), at least one basalt cobble, as well as one fragment of metal, possibly a cover of some sort. No human skeletal remains were observed. The northwestern portion of the main chamber leads to the smaller chamber located at the northwest side of the cave, however, this portion of the cave is extremely small, measuring ca. 4.0 meters in length by 1.0 meter in width with a maximum ceiling height of only 0.1 meter. This portion of the cave was too small to be thoroughly inspected.

The smaller northwestern chamber is accessible from an entrance on the surface located at the northwest side of the cave. This entrance measures ca. 0.3 meter in length by 0.3 meter in width by 0.4 meter in height, and is also partially filled in with soil. The interior surface of the northwestern chamber also consists of soil with loosely scattered limestone cobbles and pebbles. This chamber measures ca. 4.0 meters in length by 3.0 meters in width with a maximum interior height of 0.5 meter. Fragments of *kukui* nut shell and non-human medium mammal bone (likely cow) were observed. No human skeletal remains were observed.

Site 7867 appears to have functioned as a traditional habitation cave that was likely utilized from the pre-Contact period into the historic period.

A single 50 by 50 centimeter test unit was excavated at the back of the main southeastern chamber of the cave. The test unit uncovered a buried cultural deposit containing metal at the top of the excavation, along with basalt flakes, marine shell midden and non-human bone. Two charcoal samples were submitted for radiocarbon analysis and returned a date between the mid-1600s and 1800s. The results of the excavation are presented in Section 7.0 of this report and the results of the laboratory analyses, including radiocarbon dating, are presented in Section 8.0.



Planview map of Site 7867.

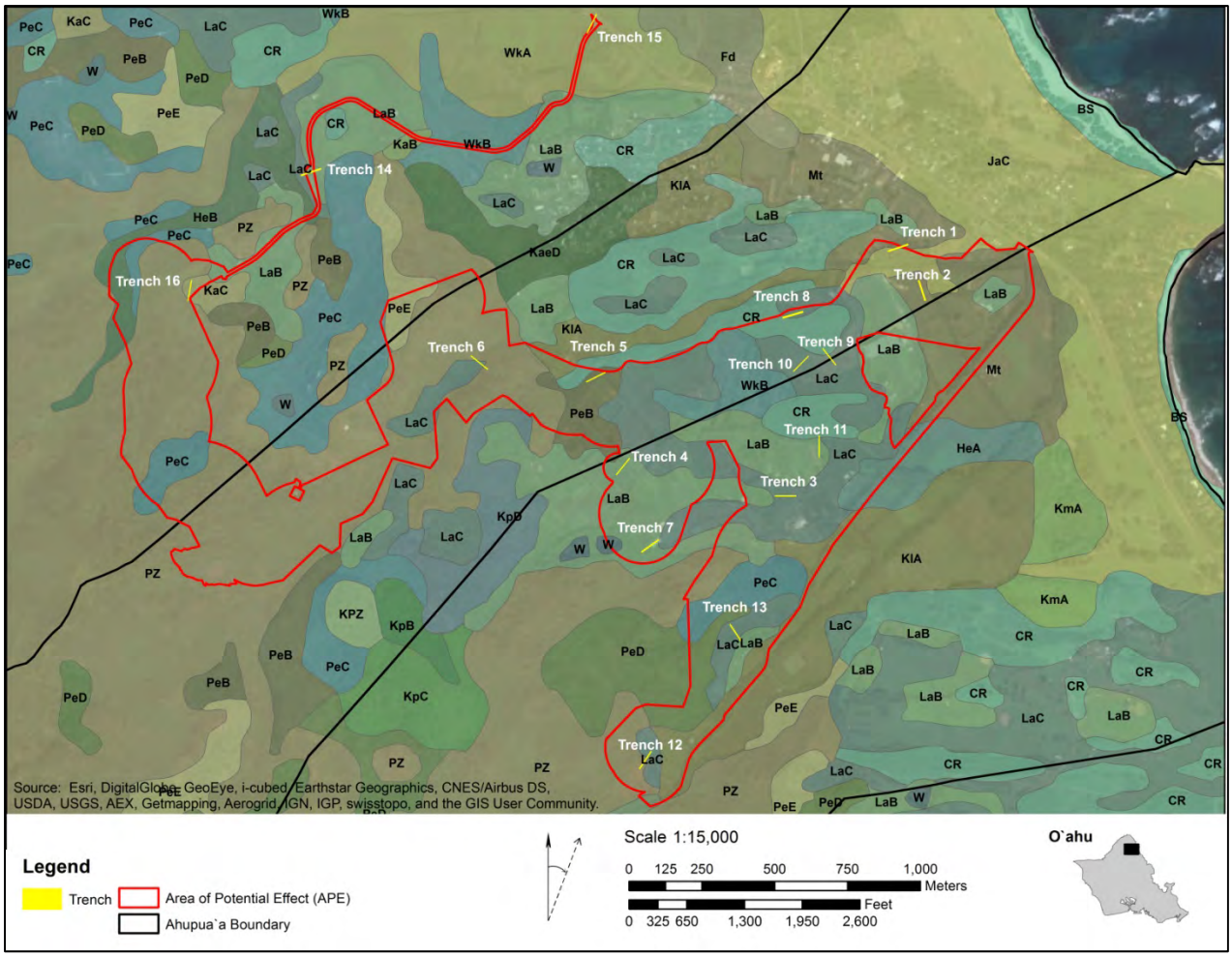
Site 7867, main cave entrance, view to southwest.

Site 7867, main cave entrance, view to southwest.

APPENDIX C

TRENCH DESCRIPTIONS

This appendix presents descriptions of the stratigraphic profiles revealed in the 16 backhoe trenches excavated within the project APE. The locations of the backhoe trenches are shown in Figure 19. The locations of the backhoe trenches are also provided on the soils map below. Information of the location, orientation, and size of each trench is presented; the soil layers are described, drawn in profile, and a photograph is presented.

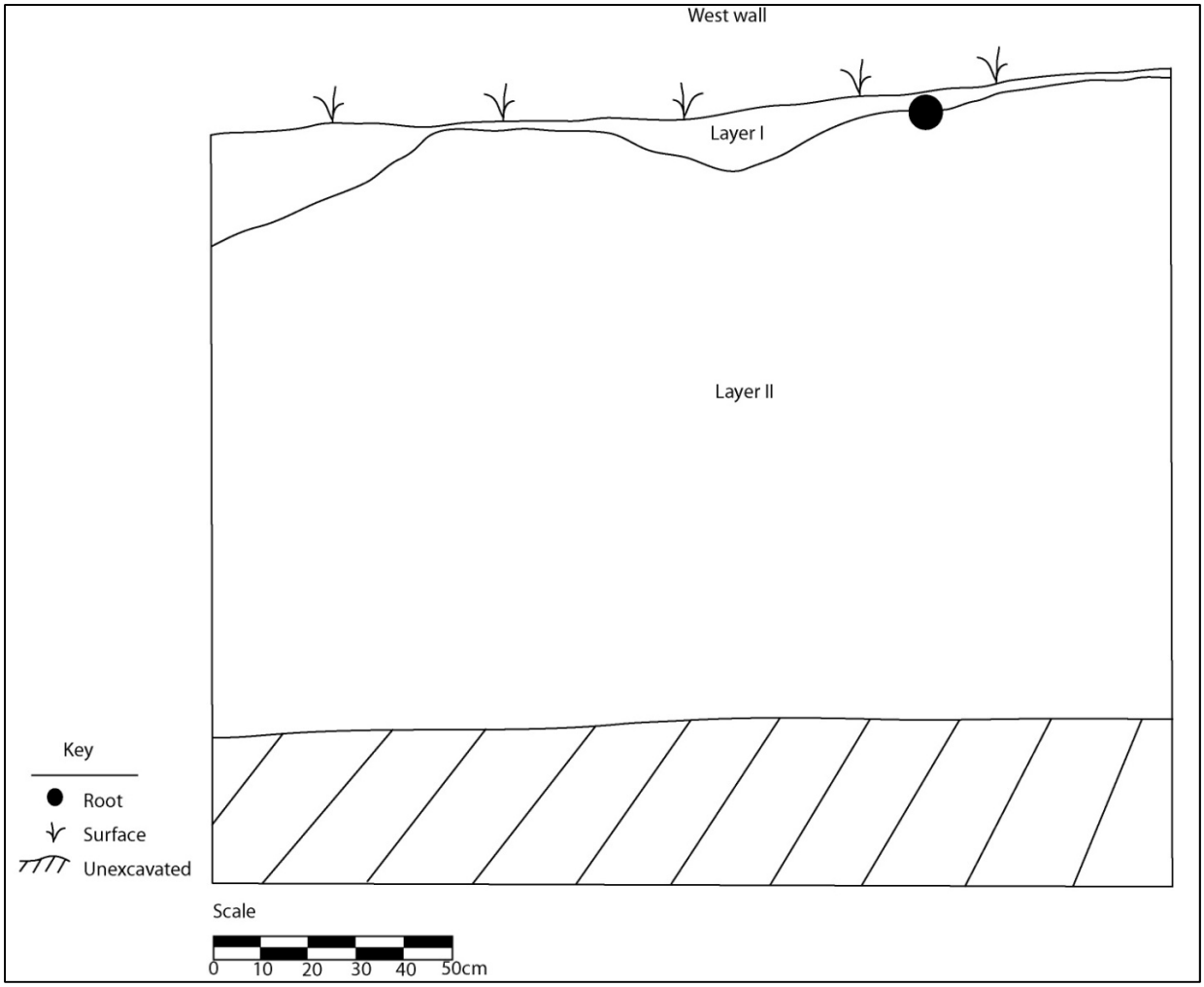


Location of backhoe trenches superimposed on a soils map

Trench 1

Trench 1 is located in the N/E portion of the project area, c. 5 meters south of a E/W dirt access road, c. 20 meters south of an active agricultural field (basil), and c. 10 meters north of a N/E-S/W drainage (Figure 19). The trench is located in a natural sand deposit. The trench is oriented N-S (350°-170°) and measures c. 5.50 meters in length (N-S) by 0.80-1.20 meters in width (E-W) by 1.35 meters in depth.

Trench 1, west wall.



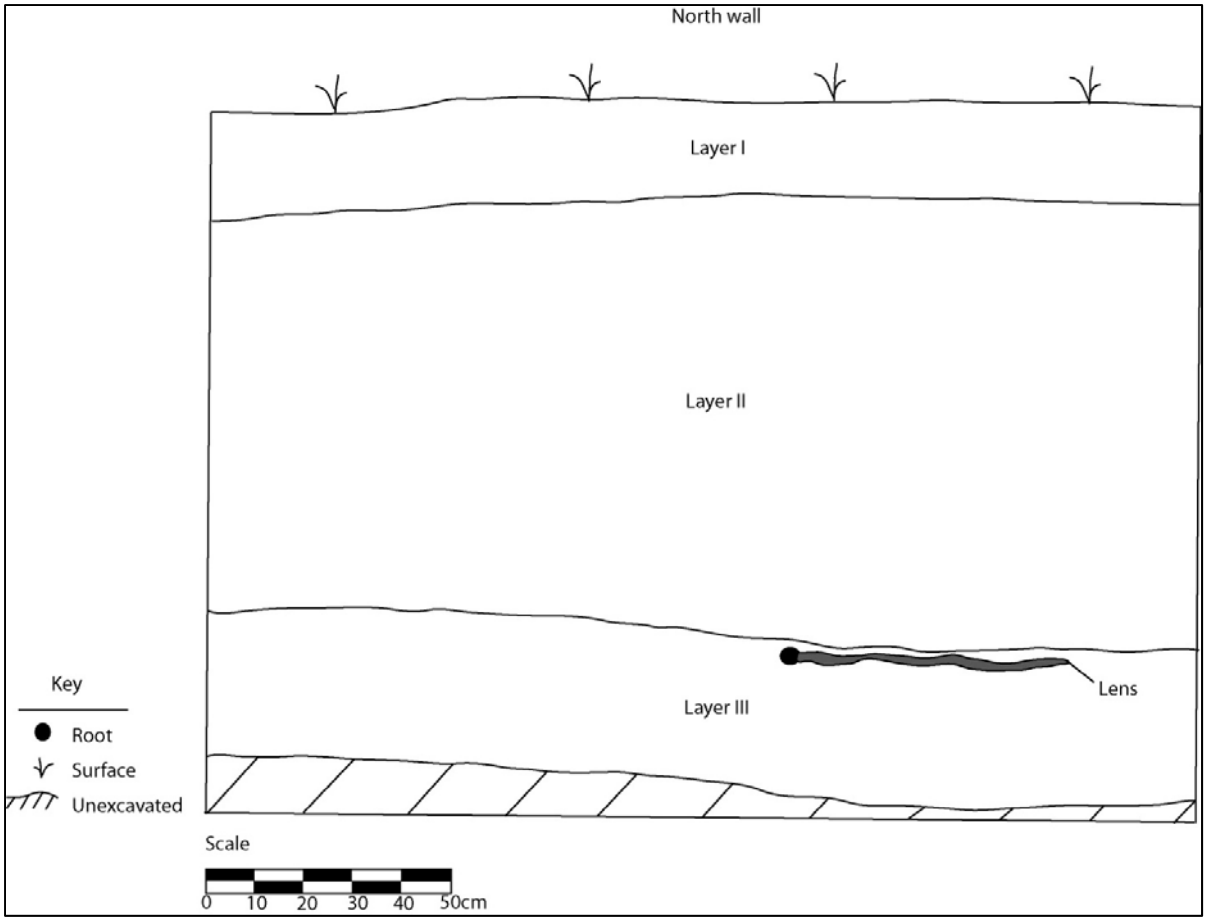
Trench 1, west wall profile.

Layer	Depth	Description
Layer I	0-22 cmbs (22 cm)	Very dark brown (10YR 2/2) sandy loam; weak, fine granular; loose, noncoherent, nonsticky, nonplastic; abrupt wavy boundary.
Layer II	2-135 cmbs (133 cm)	Pale yellow (2.5Y 8/3) sand; structureless, fine, single grain; loose, noncoherent, nonsticky, nonplastic. Sand is calcarious.

Trench 2

Trench 2 is located in the N/E portion of the project area, in between two active agricultural fields, c. 2 meters south of a dirt access road (Figure 19). Trench 2 is located in a sand deposit. Trench 2 is oriented E/W (90°-270°) and measures 5.5 meter long.

Trench 2, north wall.



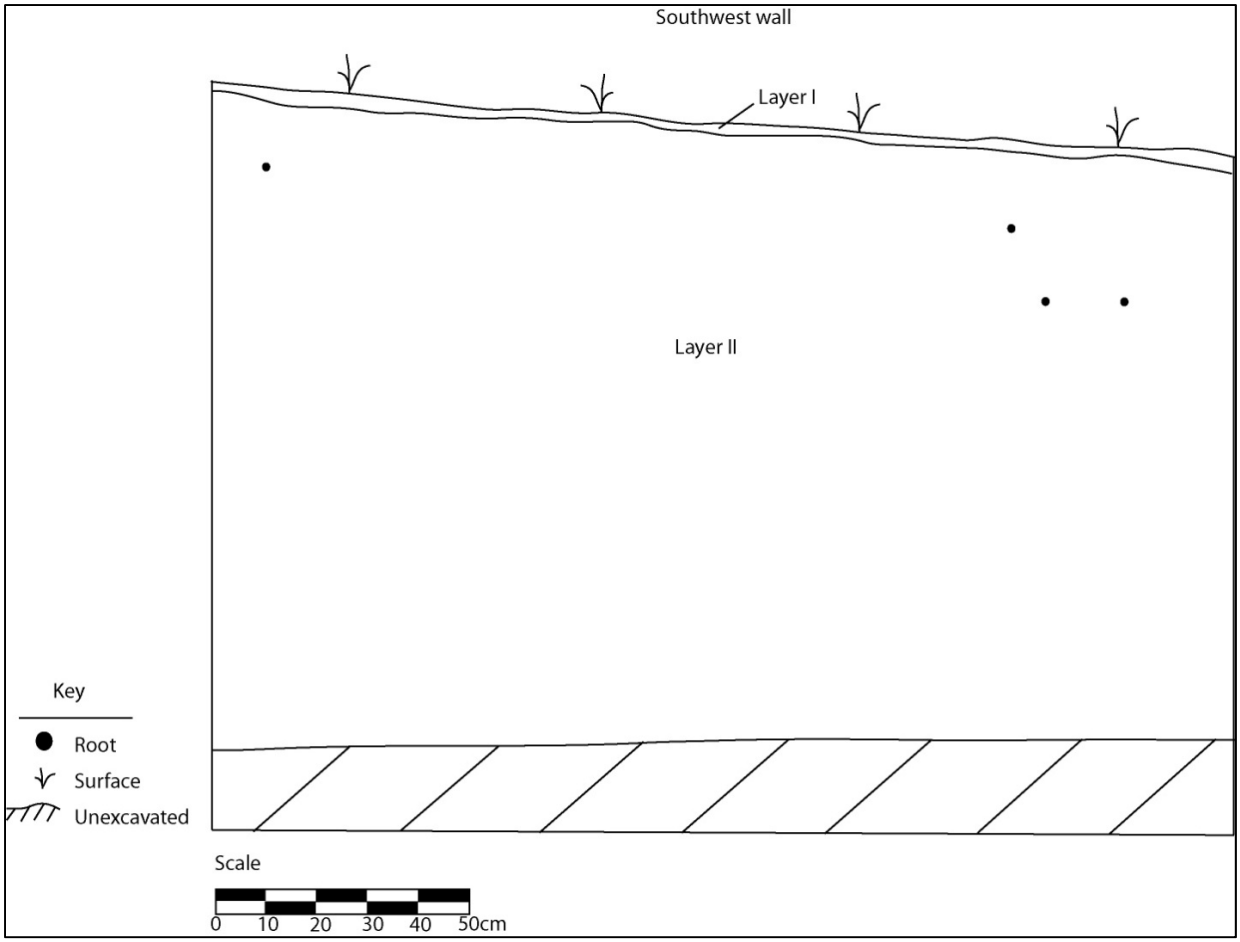
Trench 2, north wall profile.

Layer	Depth	Description
Layer I	0-22 cmbs (22 cm)	Dark yellowish brown (10 YR 3/4) sandy loam; weak, fine, granular; very friable, nonsticky, nonplastic; abrupt smooth boundary.
Layer II	20-110 cmbs (90 cm)	Very pale brown (10YR 8/3) sand; structureless, fine, single grain; loose, noncoherent, nonsticky, nonplastic; abrupt smooth boundary. Sand is calcarious.
Layer III	101-141 cmbs (31 cm)	Dark brown (7.5YR 3/3) silty clay; moderate, coarse, crumb; friable, sticky, plastic. .
Lens	112-115 cmbs (3 cm)	Dark brown with charcoal flecking and ash (7.5 YR 3/3) silty clay with charcoal/ash; moderate, coarse, crumb; friable, sticky, plastic; abrupt smooth boundary. Soil with charcoal/ash, root burn.

Trench 3

Trench 3 is located in the eastern portion of the project area, within the proposed pad for Turbine #9, north of the center point for Turbine #9 (Figure 19). Trench 3 is situated c. 2 meters west of a N-S dirt access road and c. 2 meters N/E of an active agricultural field. Trench 3 is oriented N/W-S/E (310°-130°) and measures c. 3.5 meters in length (N/W-S/E) by 0.70-0.80 meters in width (N/E-S/W) by 1.2 meters in depth.

Trench 3, southwest wall.



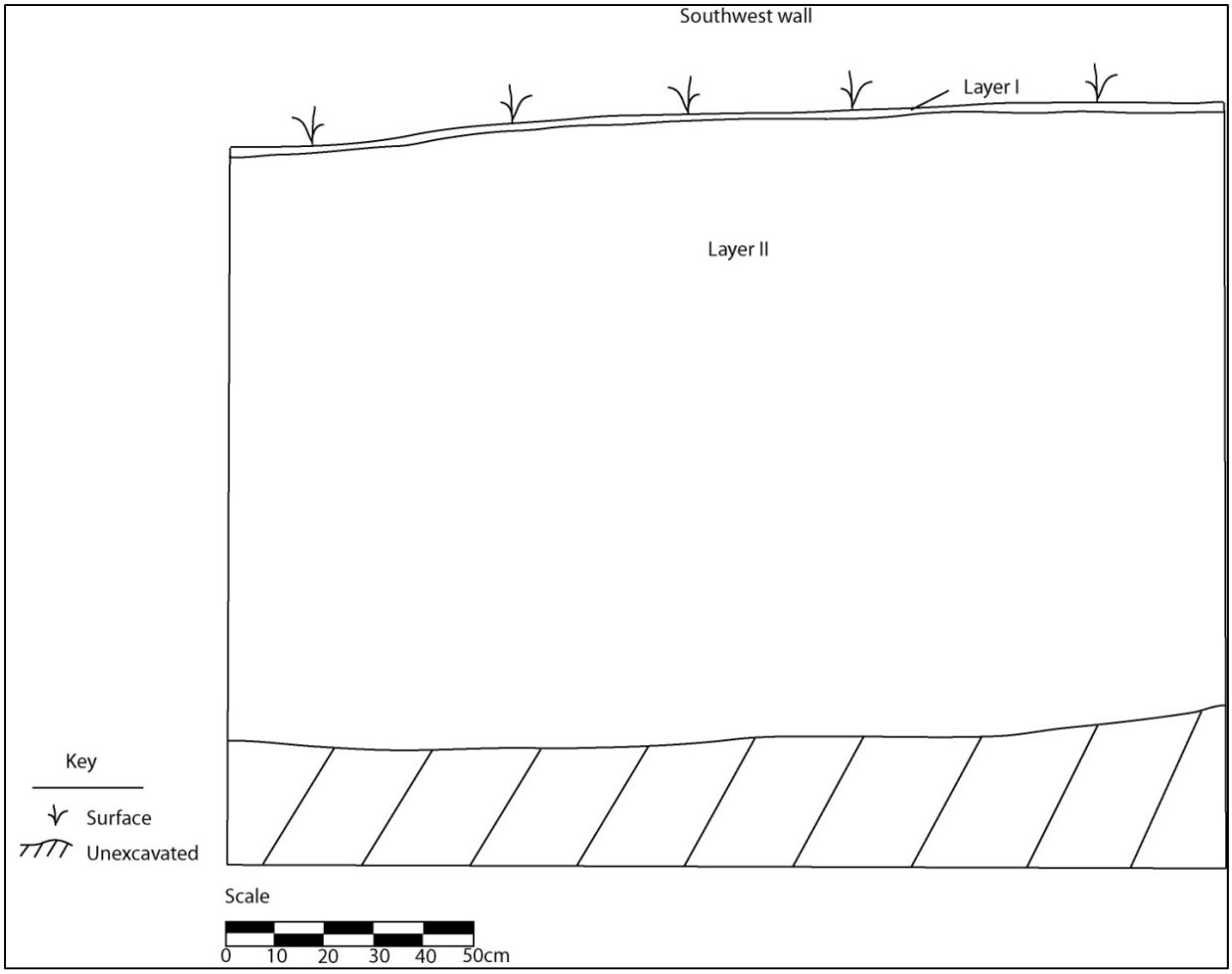
Trench 3, Southwest wall profile.

Layers	Depth	Description
Layer I	0-2 cmbs (2 cm)	Dark reddish brown (5YR 3/3) silty clay with recent organics; moderate, coarse, crumb; friable, sticky, plastic; abrupt smooth boundary. Contains recent organic material.
Layer II	2-127 cmbs (125 cm)	Dark reddish brown (5YR 3/4) silty clay; moderate, medium, platy; friable, sticky, plastic.

Trench 4

Trench 4 is located in the central portion of the project area, within the proposed pad for Turbine #6, east of the center point for Turbine #6 (Figure 19). Trench 4 is situated on a N/W-S/E dirt access road, c. 2 meters east of an active agricultural field (taro). Trench 4 is oriented N/W-S/E (310°-130°) and measures c. 4 meters in length (N/W-S/E) by 0.60-0.80 meters in width (N/E-S/W) by 1.20 meters in depth. Trench 4 consists of Layer I and Layer II.

Trench 4, southwest wall.



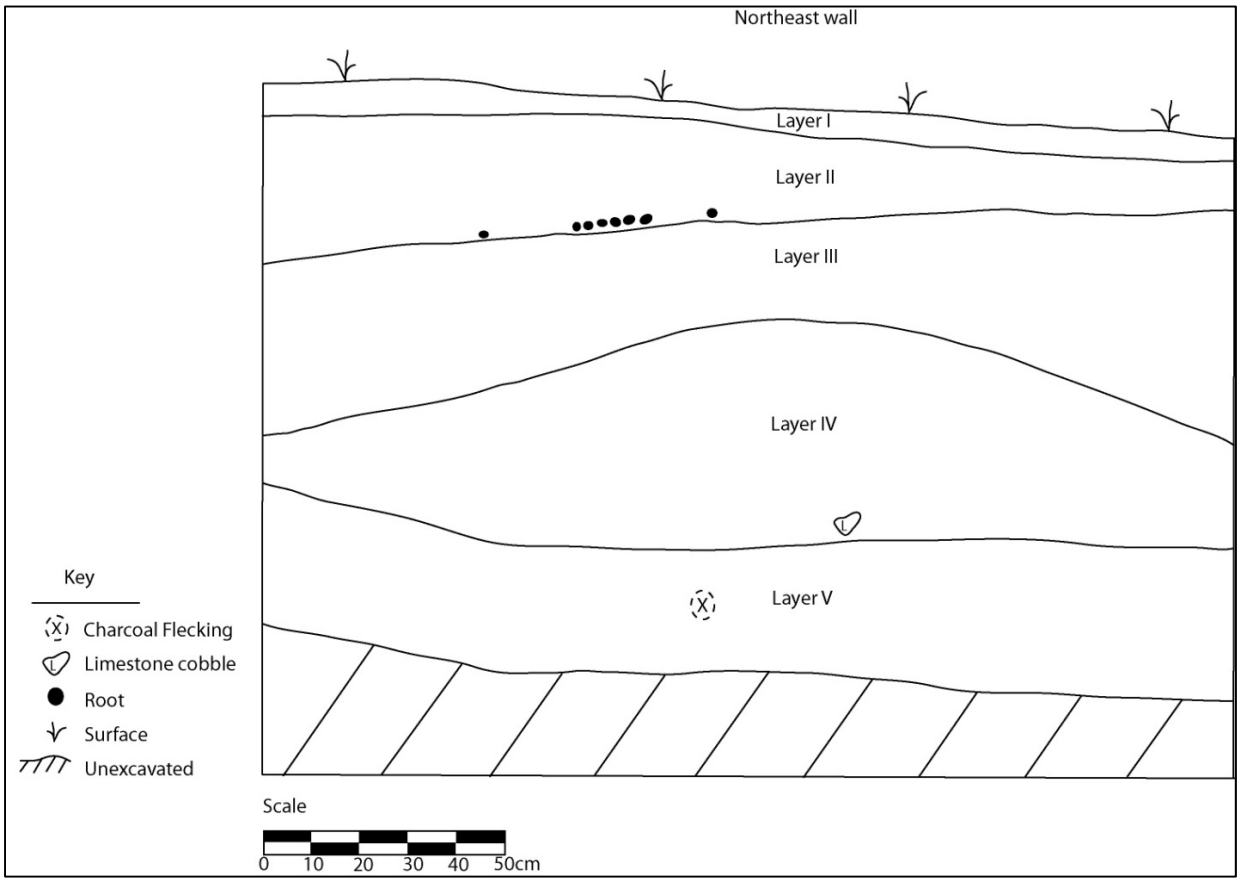
Trench 4, southwest wall profile.

Layer	Depth	Description
Layer I	0-2 cmbs (2 cm)	Dark reddish brown (5YR 3/2) silty clay with grass; strong, medium, subangular blocky; very firm, sticky, plastic; abrupt smooth boundary. Contains grass and recent organic material.
Layer II	2-119 cmbs (117 cm)	Dark reddish brown (2.5 YR 3/4) silty clay; moderate, coarse, crumb; firm, sticky, plastic. Contains small amounts of charcoal flecking.

Trench 5

Trench 5 is located in the northern central portion of the project area, along the proposed transmission line route (Figure 19). Trench 5 is situated c. 2 meters S/E of a N/E-S/W dirt access road. Trench 5 is oriented N/W-S/E (320°-140°) and measures c. 3.8 meters in length (N/W-S/E) by 0.90 meters in width (N/E-S/W) by 1.25 meters in depth. Trench 5 consists of Layer I, Layer II, Layer III, Layer IV, and Layer V.

Trench 5, northeast wall.



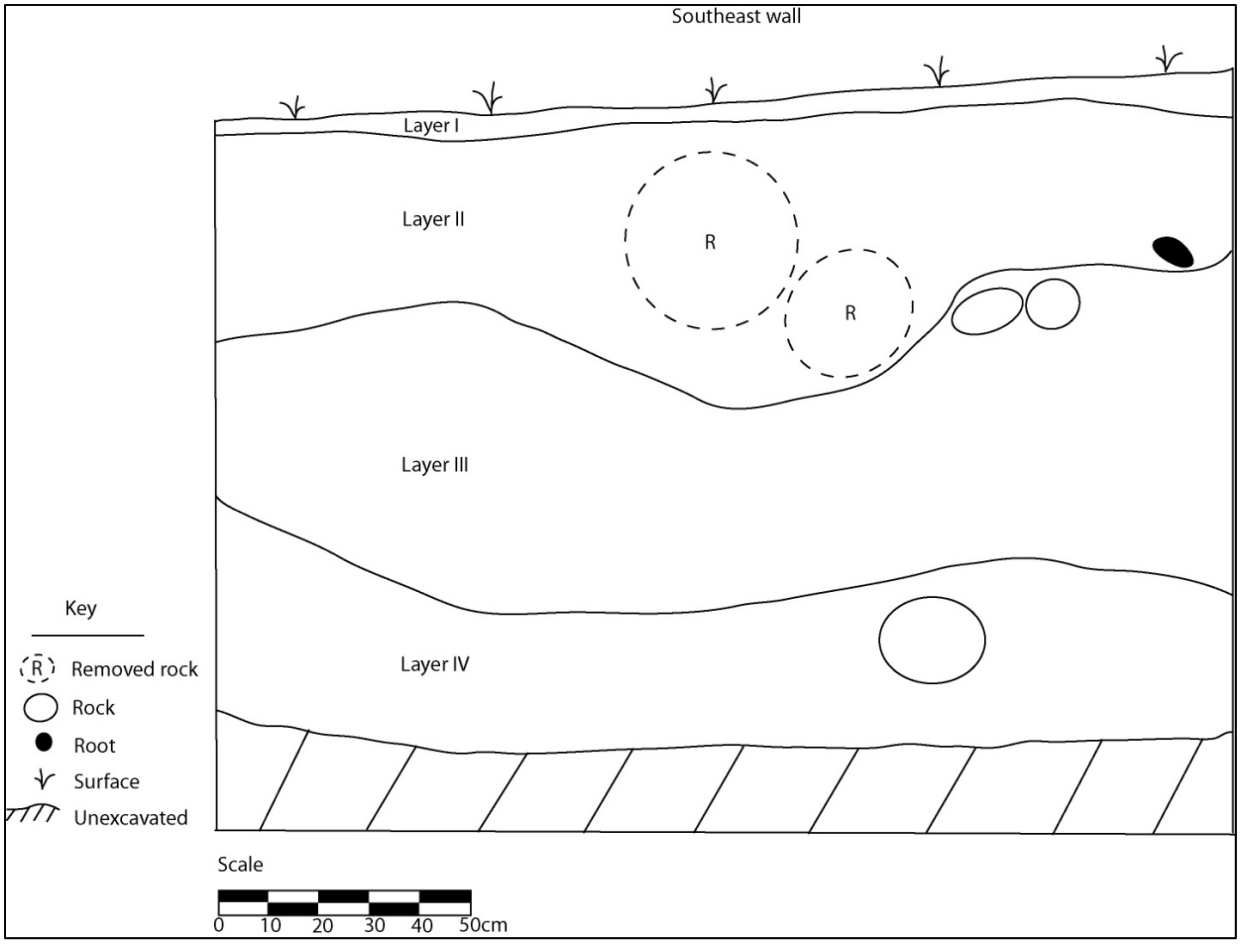
Trench 5, northeast wall profile.

Layer	Depth	Description
Layer I	0-9 cmbs (9 cm)	Dark Reddish Brown (5YR 3/3) silty clay; strong, medium, subangular blocky; firm, sticky, plastic; abrupt smooth boundary. Contains grass and recent organic material.
Layer II	9-37 cmbs (30 cm)	Dark Reddish Brown (5YR 3/3) silty clay; strong, medium, subangular blocky; firm, sticky, plastic; abrupt smooth boundary. Contains fragments of limestone.
Layer III	25-79 cmbs (47 cm)	Dark reddish brown (5YR 3/3) silty clay; strong, fine, subangular blocky; very firm, sticky, plastic, abrupt wavy boundary.
Layer IV	42-90 cmbs (40 cm)	Dark brown (7.5 YR 3/3) silty clay; strong very fine, subangular blocky; very firm, sticky, plastic; abrupt smooth boundary. Contains fragments of limestone.
Layer V	83-125 cmbs (30 cm)	Dark Reddish brown (5YR 3/4) silty clay; moderate, very fine, subangular blocky; friable, sticky, plastic. Contains a small amount of charcoal flecking.

Trench 6

Trench 6 is located in the north central portion of the project area, along the proposed transmission line (Figure 19). Trench 6 is situated on a N/E-S/W dirt access road c. 5 meters S/E of a natural N/E-S/W drainage. Trench 6 is oriented N/E-S/W (40°-220°) and measures 4.5 meters in length (N/E-S/W) by 0.90-1.10 meters in width (N/W-S/E) by 1.25 meters in depth. Trench 6 consists of Layer I, Layer II, Layer III, Layer IV.

Trench 6, southeast wall.



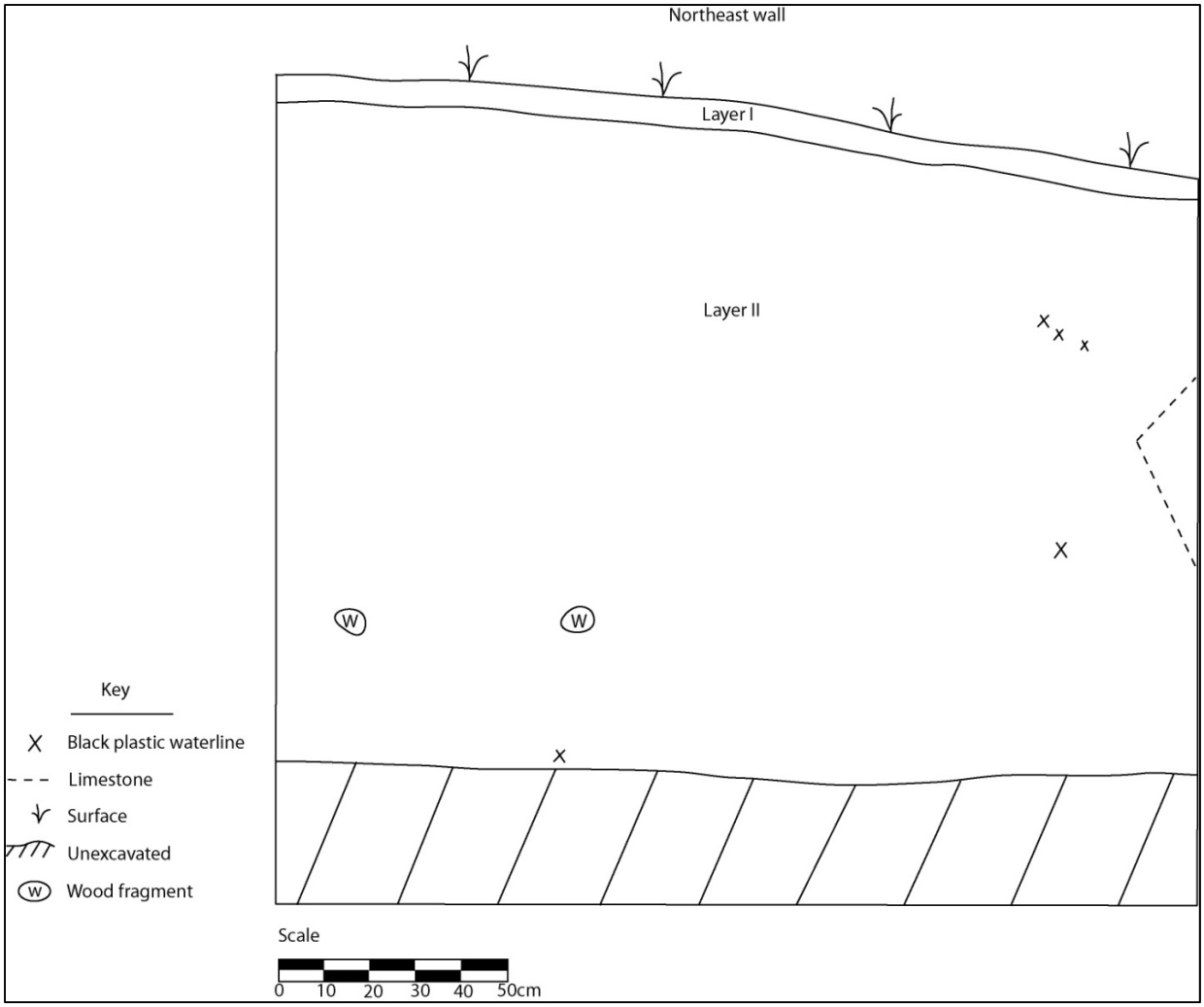
Trench 6, southeast wall profile.

Layer	Depth	Description
Layer I	0-9 cmbs (9 cm)	Very dark brown (7.5 YR 2.5/3) silty clay; moderate, medium, subangular blocky; friable, very sticky, very plastic; abrupt smooth boundary. Contains grass and recent organic material.
Layer II	6-67 cmbs (65 cm)	Very dark brown (7.5 YR 2.5/2) silty clay; moderate, fine, subangular blocky; friable, sticky, plastic, abrupt wavy boundary. Contains basalt boulders.
Layer III	36-102 cmbs (65 cm)	Very dark brown (7.5 YR 2.5/3) silty clay; moderate, medium, platy; firm, very sticky, very plastic; abrupt wavy boundary. Contains basalt boulders
Layer IV	86-125 cmbs (40 cm)	Brown (7.5 YR 4/3) silty clay; moderate, fine, subangular blocky; friable, sticky, plastic. Contains basalt boulders and decomposing rock.

Trench 7

Trench 7 is located in the south central portion of the project area, within the proposed pad for Turbine #7, S/W of the center point for Turbine #7 (Figure 19). Trench 7 is situated c. 3 meters S/E of a N/E-S/W dirt access road and c. 3 meters S/W of an active agricultural field (tomato). Trench 7 is oriented N/W-S/E (320°-140°) and measures c. 4.7 meters in length (N/W-S/E) by 0.70-0.90 meters in width (N/E-S/W) by 1.5 meters in depth. Trench 7 consists of Layer I, Layer II.

Trench 7, northeast wall.



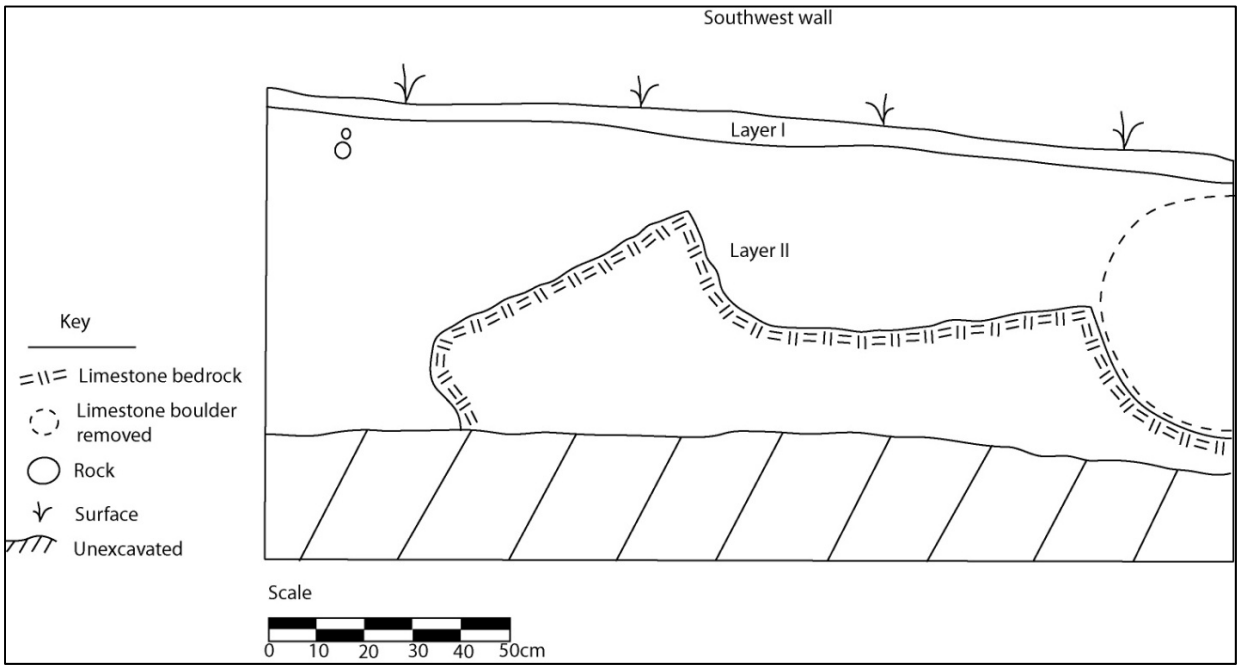
Trench 7, northeast wall profile.

Layer	Depth	Description
Layer I	0-9 cmbs (9 cm)	Very dark brown (7.5 YR 2.5/3) silty clay; strong, medium, subangular blocky; firm, sticky, plastic; abrupt smooth. Contains recent organic material and modern agricultural rubbish.
Layer II	9-150 cmbs (141 cm)	Very dark brown (7.5 YR 2.5/3) silty clay; moderate, fine, subangular blocky; friable, very sticky, very plastic. Contains modern agricultural rubbish and fragments of limestone and decomposing natural wood fragments.

Trench 8

Trench 8 is located in the north eastern portion of the project area, c. 15 meters S/E of an E-W dirt access road (Figure 19). Trench 8 is oriented N/W-S/E (340°-160°) and measures c. 3.7 meters in length (N/W-S/E) by 0.90-1.6 meters in width (N/E-S/W) by 0.72 meters in depth. Trench 8 consists of Layer I, Layer II.

Trench 8, southwest wall.



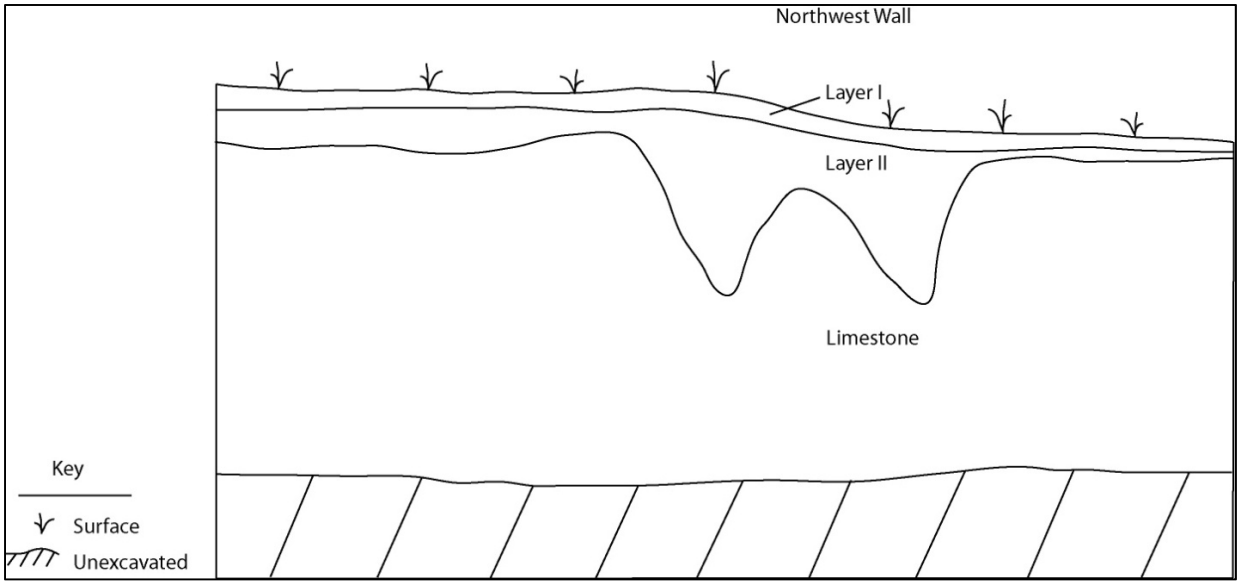
Trench 8, southwest wall profile.

Layer	Depth	Description
Layer I	0-6 cmbs (6 cm)	Dark brown (7.5 YR 3/3) silty clay; moderate, medium, crumb; very friable, slightly sticky, slightly plastic; abrupt smooth. Contains rootlets and recent organic material.
Layer II	6-72 cmbs (66 cm)	Dark brown (7.5 YR 3/4) silty clay; moderate, coarse, subangular blocky; friable, sticky, plastic.
-	20-72 cmbs	Limestone bedrock and boulders.

Trench 9

Trench 9 is located in the central eastern portion of the project area, within the eastern portion of the proposed lay down area, east of the center for the proposed Turbine #10 (Figure 19). Trench 9 is situated in an old sugar cane field that is overgrown with *koa haole* trees. Trench 9 is oriented N/E-S/W (50°-230°) and measures c. 4 meters in length (N/E-S/W) by 0.60-0.90 meters in width (N/W-S/E) by 0.82 meters in depth. Trench 9 consists of Layer I, Layer II.

Trench 9, northwest wall.



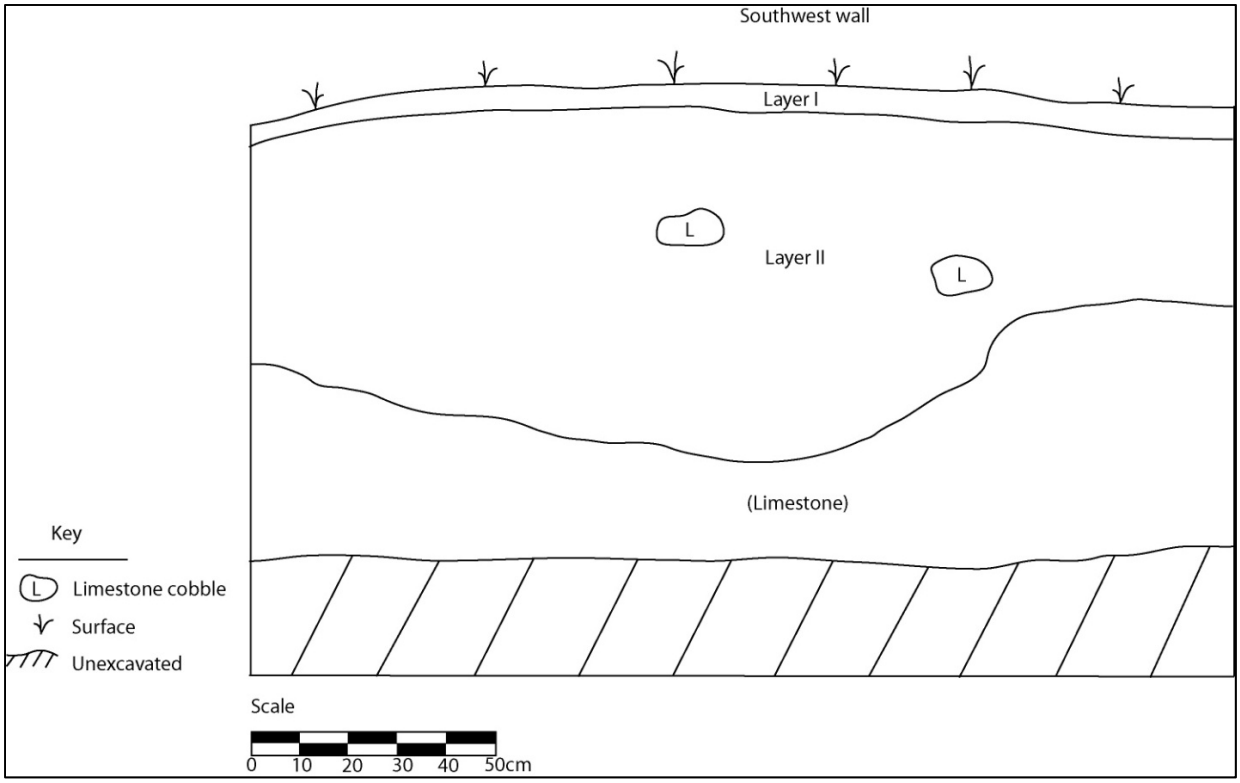
Trench 9, northwest wall profile.

Layer	Depth	Description
Layer I	0-12 cmbs (6 cm)	Dark yellowish brown (10YR 4/4) silty clay; moderate, medium, crumb; very friable, slightly sticky, slightly plastic, abrupt smooth boundary. Contains grass and recent organic material. Also contains fragments of limestone.
Layer II	5-42 cmbs (37 cm)	Strong brown (7.5YR 4/6) silty clay; moderate, fine, subangular blocky; friable, sticky, plastic. Apparent depressions at lower boundary appear to be the result of undulations in the limestone substrate.
-	10-82 cmbs (70 cm)	Limestone bedrock.

Trench 10

Trench 10 is located in the central eastern portion of the project area, within the N/W portion of the proposed lay down area, N/W of the center point for the proposed Turbine #10 (Figure 19). Trench 10 is situated in an old sugarcane field that is overgrown with *koa haole* trees. Trench 10 is oriented N/W-S/E (310°-130°) and measures c. 3.5 meters in length (N/W-S/E) by 0.85-1.40 meters in width (N/E-S/W by 1.0 meters in depth. Trench 10 consists of Layer I, Layer II.

Trench 10, southwest wall.



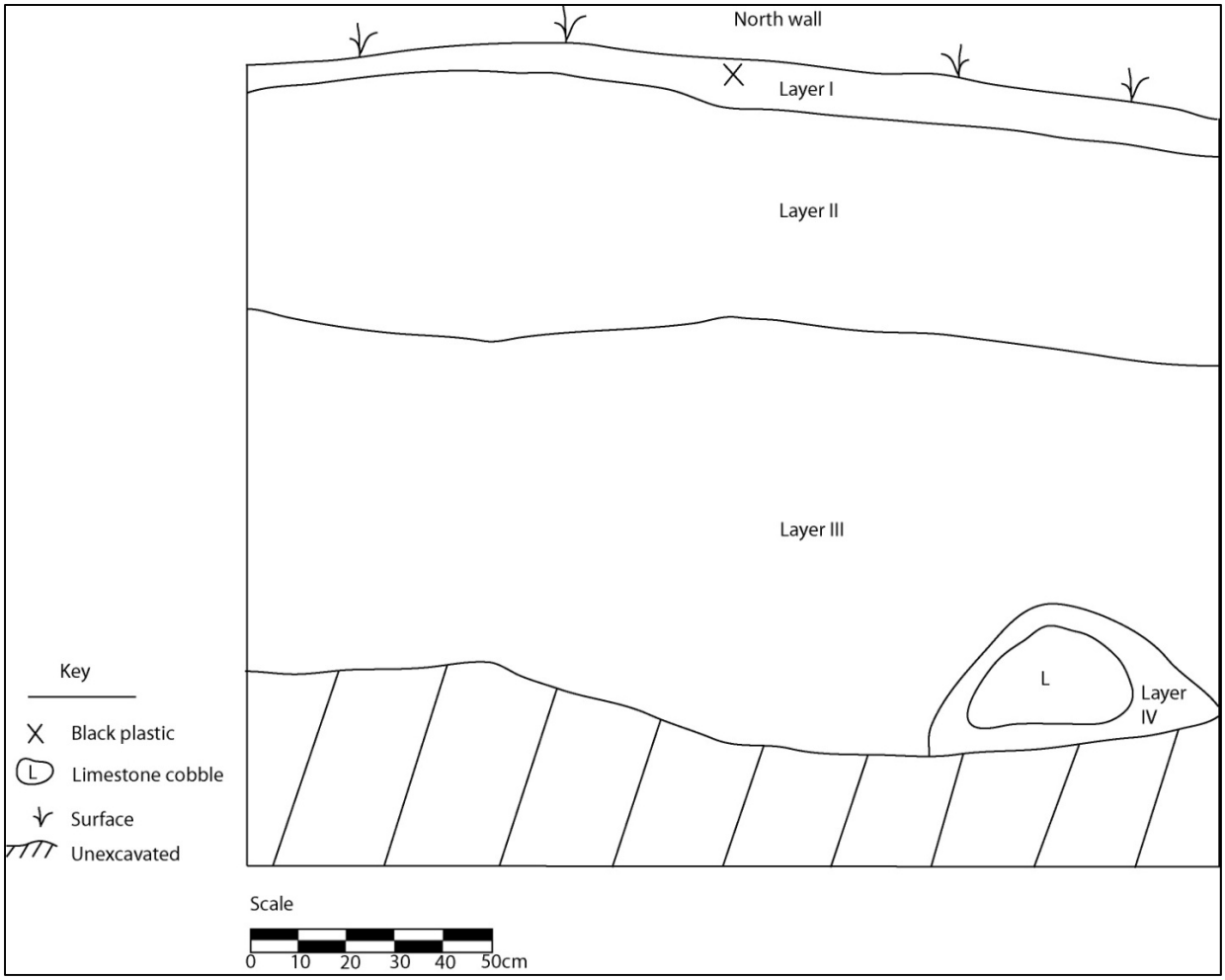
Trench 10, southwest wall profile.

Layer	Depth	Description
Layer I	0-12 cmbs (7 cm)	Dark brown (7.5 YR 3/4) silty clay; moderate, medium, crumb; friable, slightly sticky, slightly plastic; abrupt smooth boundary. Contains recent organic material.
Layer II	6-79 cmbs (74 cm)	Dark reddish brown (5 YR 3/4) silty clay; moderate, fine, subangular blocky; friable, sticky, plastic. Contains fragments of limestone. Outside of profile, contains some pieces of modern agricultural plastic.
	45-100 cmbs (55 cm) +	Limestone.

Trench 11

Trench 11 is located in the northeastern portion of the project area, S/W of the proposed road to Turbine #11 (Pad #11) and west of the center point for Turbine #11 (Figure 19). Trench 11 is situated c. 2 meters east of an active agricultural field (bananas). Trench 11 is oriented E-W (90°-270°) and measures c. 3.8 meters in length (E-W) by 0.60-0.65 meters in width (N-S) by 1.46 meters in depth. Trench 11 consists of Layer I, Layer II, Layer III, Layer IV.

Trench 11, north wall.



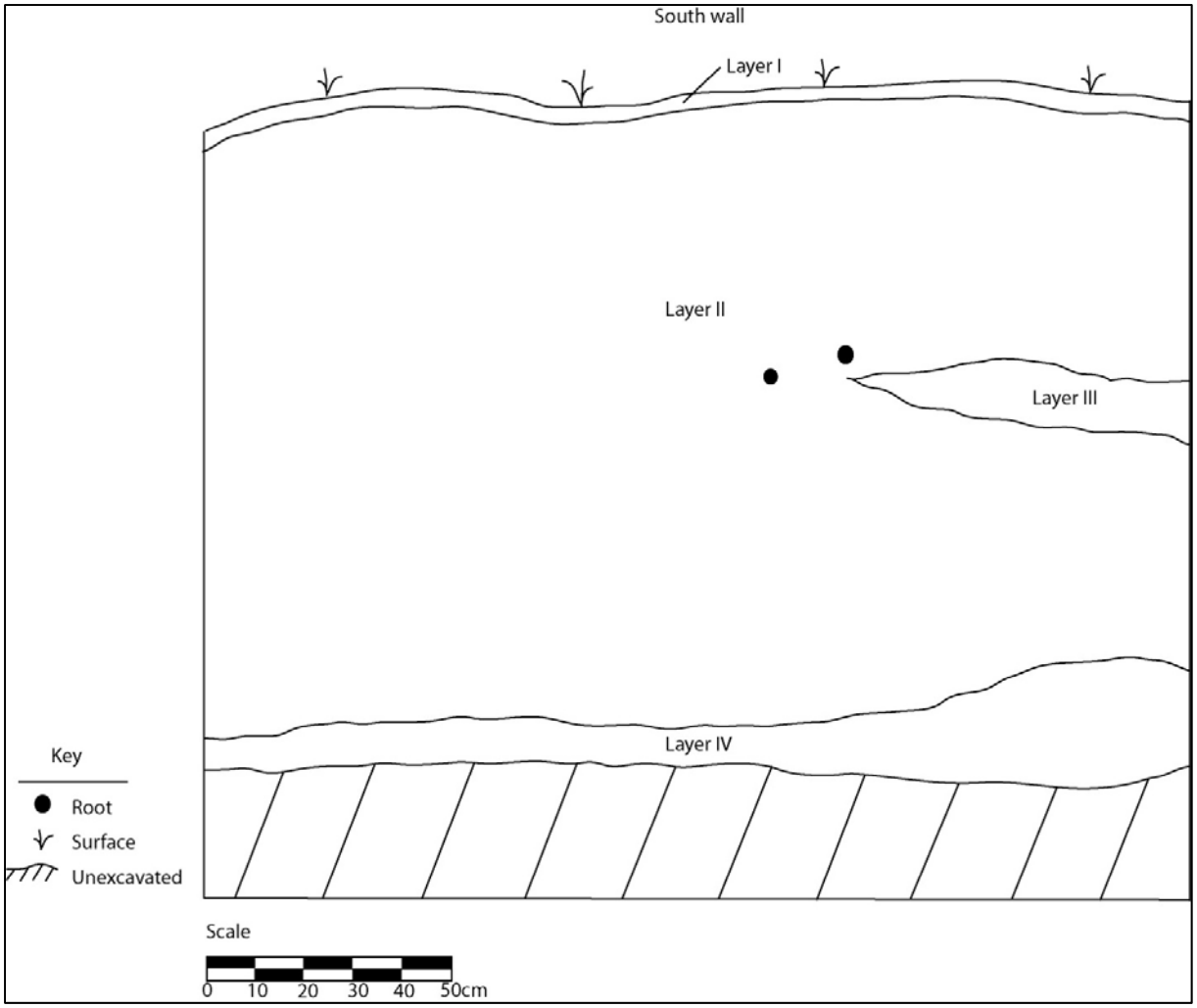
Trench 11, north wall profile.

Layer	Depth	Description
Layer I	0-25 cmbs (12 cm)	Dark brown (7.5 YR 3/3) silty clay; strong, fine, subangular blocky; very firm, very sticky, very plastic; abrupt smooth boundary. Contains grass and recent organic material. Also contains fragment of modern black bag plastic.
Layer II	5-67 cmbs (57 cm)	Dark brown (7.5 YR 3/3) silty clay; strong, medium, subangular blocky; firm, very sticky, very plastic; abrupt smooth boundary.
Layer III	58-146 cmbs (90 cm)	Dark brown (7.5 YR 3/4) silty clay; weak, medium, platy; firm, very sticky, very plastic. Contains some charcoal flecking.
Layer IV	115-146 cmbs (30 cm)	Strong brown (7.5 YR 4/6) silty clay; moderate, fine, subangular blocky; firm, sticky, plastic. Contains limestone.

Trench 12

Trench 12 is located in the southeastern portion of the project area, in the southwestern portion of the proposed pad for Turbine #12, S/W of the center point for Turbine #12 (Figure 19). Trench 12 is situated on an E-W dirt access road. Trench 12 is oriented E-W (110°-290°) and measures c. 4 meters in length (E-W) by 0.60-.80 meters in width (N-S) by 1.41 meters in depth. Trench 12 consists of Layer I, Layer II, Layer III, Layer IV.

Trench 12, south wall.



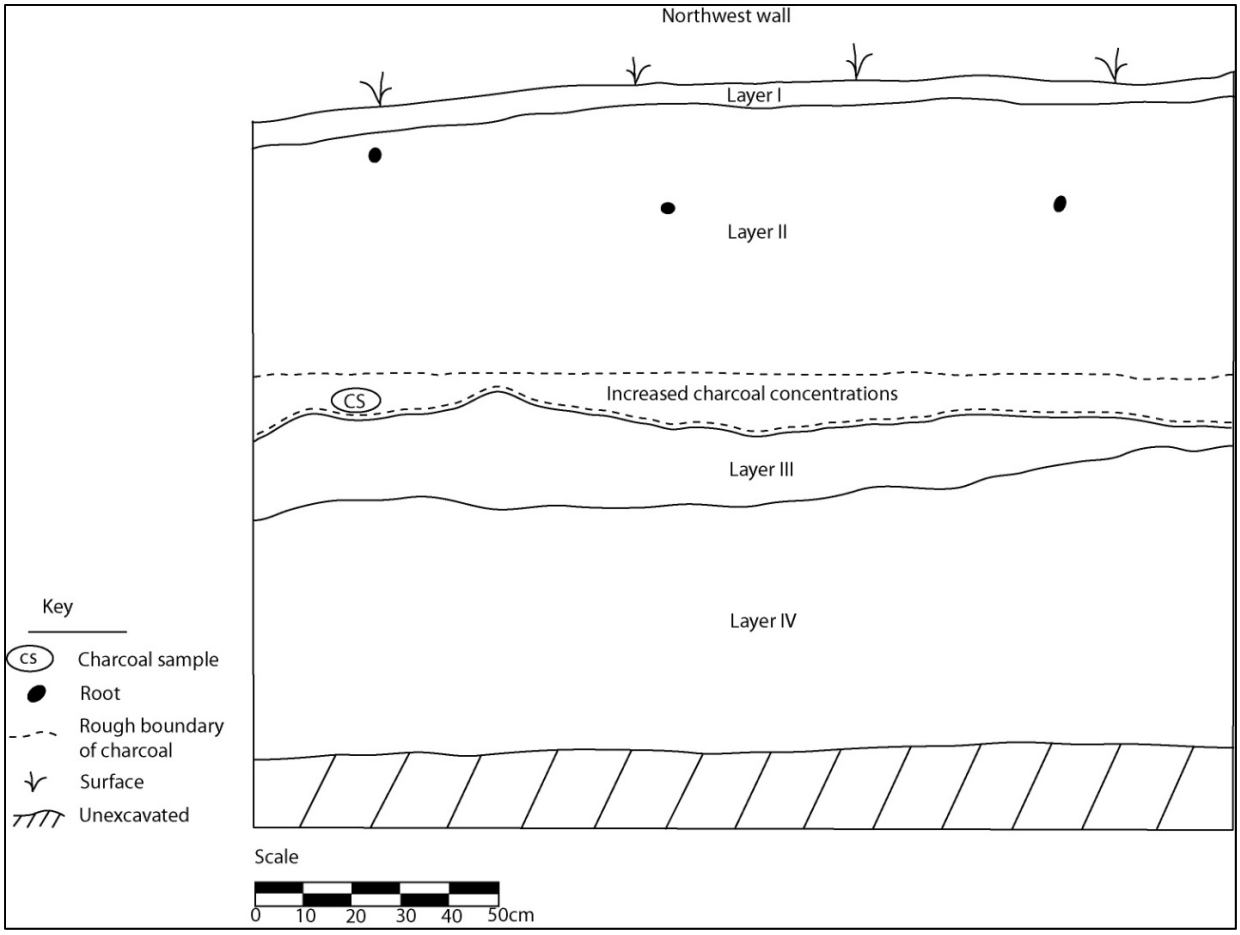
Trench 12, south wall profile.

Layer	Depth	Description
Layer I	0-3 cmbs (3 cm)	Dark reddish brown (5 YR 3/3) silty clay; moderate, coarse, crumb; firm, very sticky, very plastic; abrupt smooth boundary. Contains leaves and roots and recent organic material.
Layer II	3-123 cmbs (125 cm)	Dark reddish brown (5 YR 3/4) silty clay; weak, medium, crumb; friable, sticky, plastic; abrupt smooth boundary.
Layer III	56-69 cmbs (13 cm)	Dark reddish brown (5 YR 3/4) with brown (7.5 YR 4/4) silty clay; weak, medium, crumb; friable, slightly sticky, slightly plastic; abrupt smooth boundary.
Layer IV	115-141 cmbs (26 cm)	Dark reddish brown (5 YR 3/4) with brown (7.5 YR 4/4) silty clay; weak, medium, crumb; friable, slightly sticky, slightly plastic.

Trench 13

Trench 13 is located in the eastern portion of the project area, within the proposed access road to Pad #8/Turbine #8, southwest of Pad #8/Turbine #8 (Figure 19). Trench 13 is situated in a previously cleared area that is now overgrown with grass and weeds. Trench 13 is oriented N/E-S/W (40°-220°) and measures c. 4.5 meters in length (N/E-S/W) by 0.55-0.80 meters in width (N/W-S/E) by 1.38 meters in depth. Trench 13 consists of Layer I, Layer II, Layer III, and Layer IV. The charcoal identified between layers II and III is the result of modern agricultural activities.

Trench 13, northwest wall.



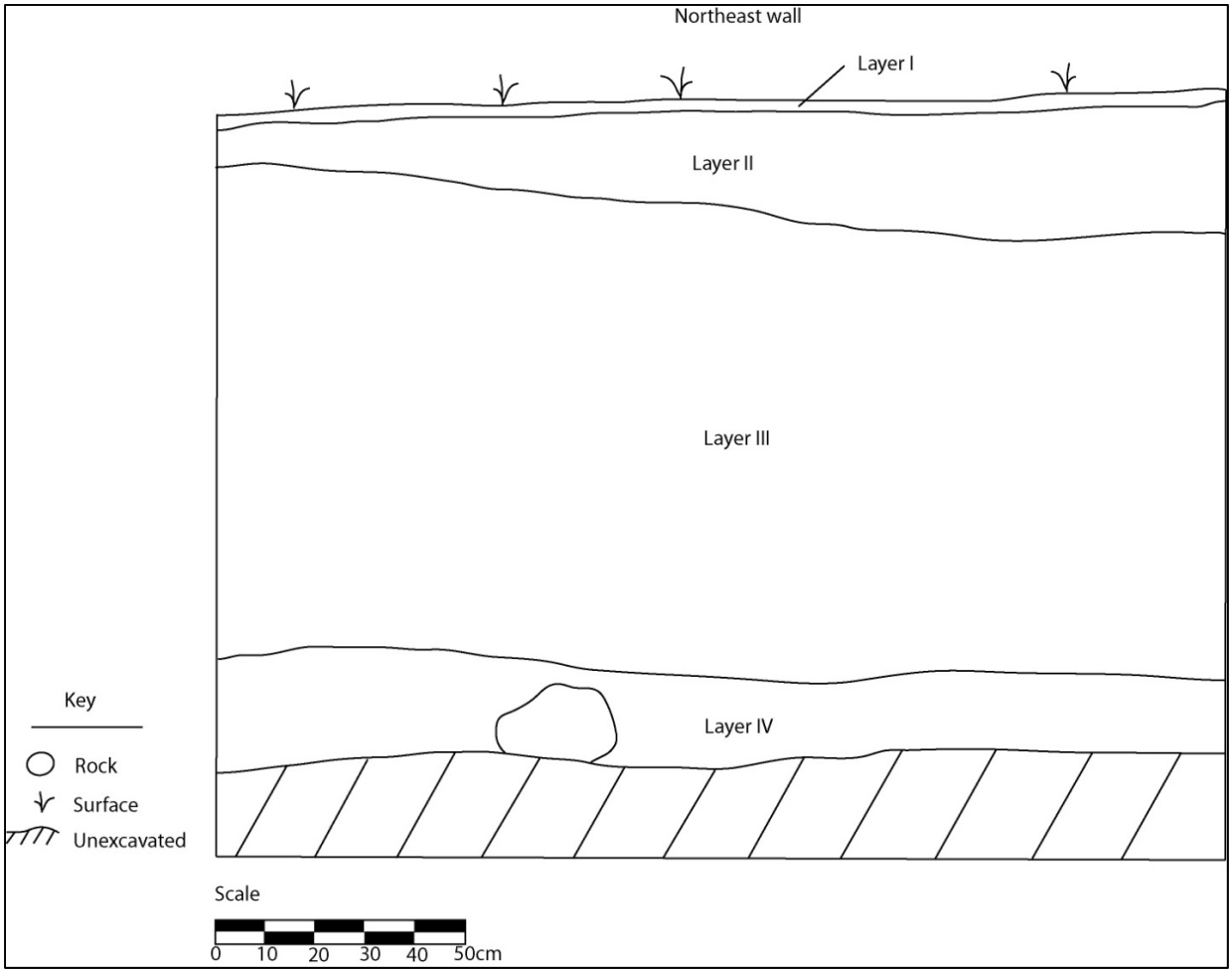
Trench 13, northwest wall profile.

Layer	Depth	Description
Layer I	0-6 cmbs (6 cm)	Very dark brown (7.5 YR 2.5/3) silty clay; moderate, coarse, crumb; friable, very sticky, very plastic; abrupt smooth boundary. Contains grass and recent organic material.
Layer II	4-72 cmbs (65 cm)	Very dark brown (7.5 YR 2.5/3) silty clay; weak, medium, subangular blocky; friable, very sticky, very plastic; abrupt smooth boundary. Contains chunks of charcoal towards the base of the layer. Charcoal sample 67cmbs.
Layer III	61-84 cmbs (24 cm)	Dark reddish brown (5 YR 3/4) silty clay; weak, medium, subangular blocky; firm, very sticky, very plastic; abrupt smooth boundary.
Layer IV	76-138 cmbs (62 cm)	Dark reddish brown (5 YR 3/3) silty clay; weak, fine, crumb; friable, very sticky, very plastic.

Trench 14

Trench 14 is located in the northwestern portion of the project area, on Department of Agriculture Land, within the proposed access road from Kamehameha Highway to Pad/Turbine #1 (Figure 19). Trench 14 is situated in an active agricultural field, in between several active agricultural fields (DOA). Trench 14 is oriented N/W-S/E (330°-150°) and measures c. 4 meters in length (N/W-S/E) by 0.65-0.80 meters in width (N/E-S/W) by 1.4 meters in depth. Trench 14 consists of Layer I, Layer II, Layer III, Layer IV.

Trench 14, northeast wall.



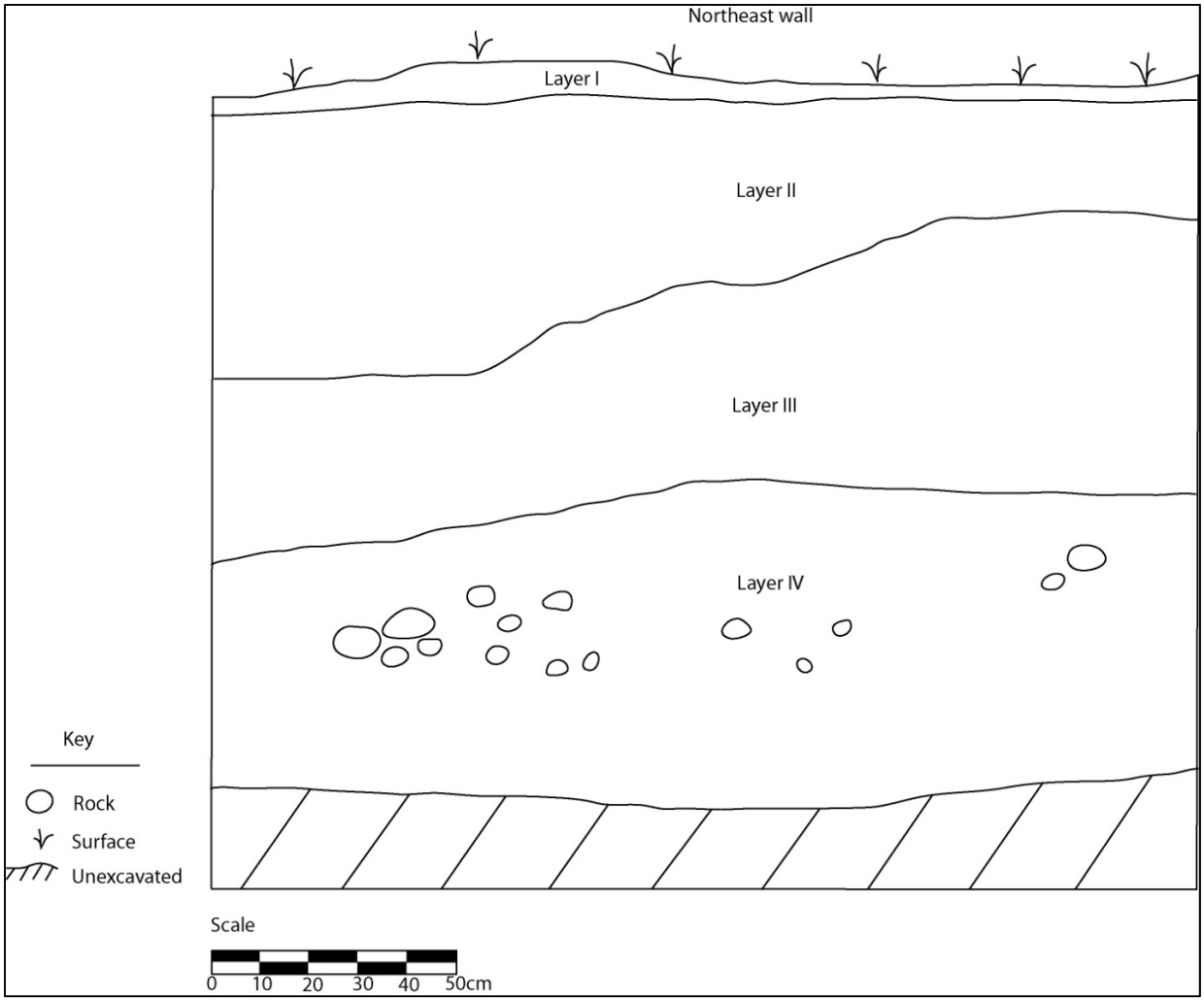
Trench 14, northeast wall profile.

Layer	Depth	Description
Layer I	0-8 cmbs (4 cm)	Dark reddish brown (5 YR 3/3) silty clay loam; moderate, medium, crumb; friable, sticky, plastic; abrupt smooth boundary. Contains grass and recent organic material.
Layer II	2-32 cmbs (26 cm)	Strong brown (7.5 YR 4/6) with dark reddish brown (5 YR 3/3) sandy loam with silty clay loam; weak, fine, granular with moderate, medium, crumb; friable slightly sticky, slightly plastic with friable, sticky, plastic; abrupt smooth boundary. Mottled.
Layer III	16-116 cmbs (100 cm)	Dark red (2.5 YR 3/6) silty clay; moderate, medium, crumb; friable, very sticky, very plastic; abrupt smooth boundary.
Layer IV	112-135 cmbs (22 cm)	Dusky red (10YR 3/4) silty clay with decomposing basalt rock; moderate, coarse, crumb; friable, very sticky, very plastic. Contains decomposing basalt rock.

Trench 15

Trench 15 is located in the northwestern portion of the project area, on DOA land, c. 20 meters S/W of Kamehameha Highway and c. 5 meters N/W of DOA road (Figure 19). Trench 15 is situated in a previously cleared area that is now overgrown with grass. Trench 15 is oriented N/W-S/E (300°-120°) and measures c. 3.6 meters in length (N/W-S/E) by 0.60-0.70 meters in width (N/E-S/W) by 1.51 meters in depth. Trench 15 consists of Layer I, Layer II, Layer III, Layer IV.

Trench 15, northeast wall.



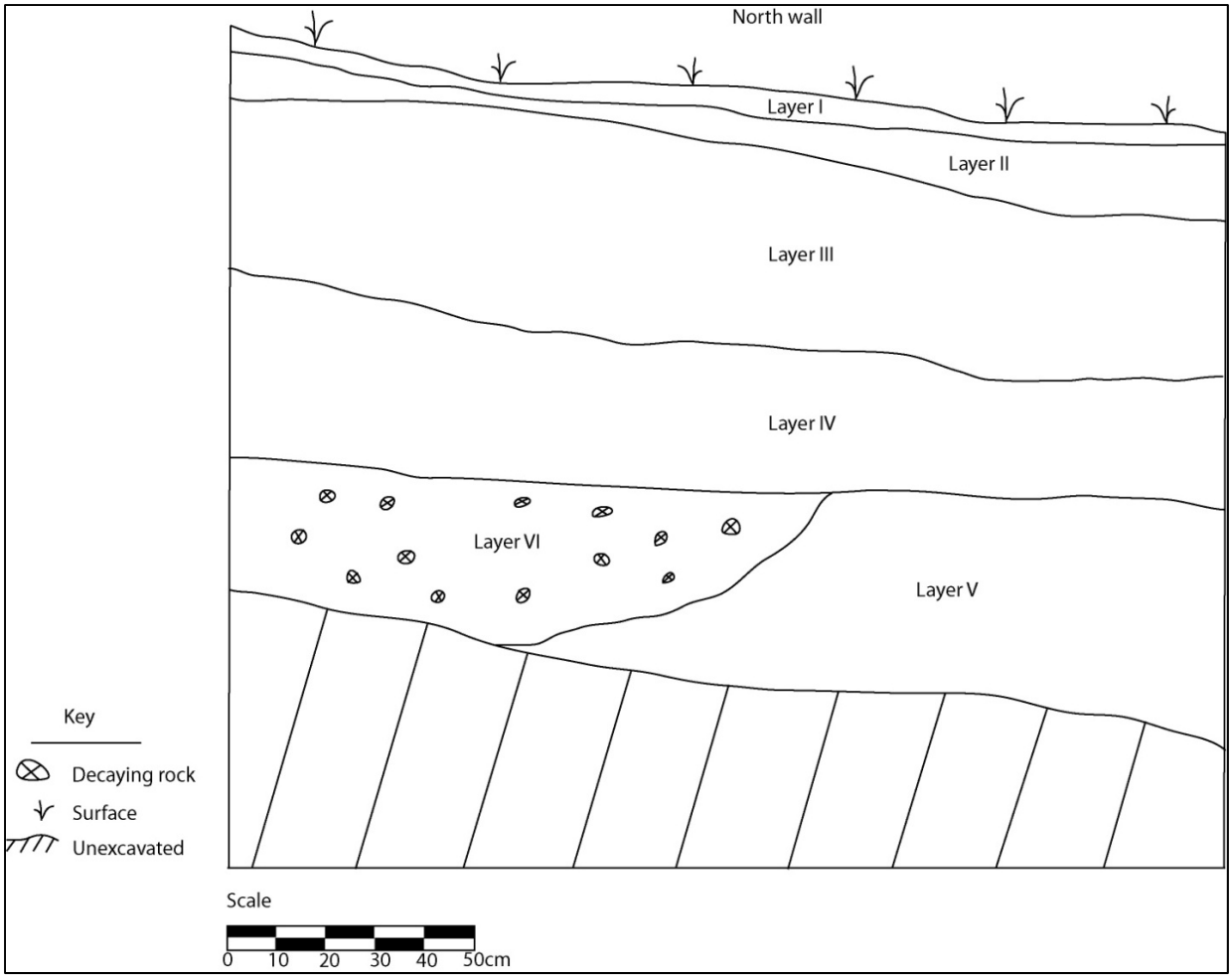
Trench 15, northeast wall profile.

Layer	Depth	Description
Layer I	0-12 cmbs (10 cm)	Very dark brown (7.5 YR 2.5/3) silty clay; strong, fine, subangular blocky; firm, sticky, plastic; abrupt smooth boundary. Contains grass and recent organic material. Also contains modern rubbish. Also contains fragments of charcoal.
Layer II	10-65 cmbs (57 cm)	Dark brown (7.5 YR 3/3) silty clay; moderate, medium, subangular blocky; firm, very sticky, very plastic; abrupt wavy boundary.
Layer III	30-103 cmbs (57 cm)	Dark brown (7.5 YR 3/3) silty clay; weak, medium, platy; firm, very sticky, very plastic; abrupt smooth boundary.
Layer IV	85-151 cmbs (65 cm)	Dark brown (7.5 YR 3/4) silty clay; moderate, medium, subangular blocky; friable, very sticky, very plastic. Contains roughly waterworn basalt cobbles and pebbles.

Trench 16

Trench 16 is located in the western portion of the project area, within the proposed access road to Pad/Turbine #1 (Figure 19). Trench 16 is situated on a previously cleared E/W dirt access road leading to a MET tower, east of Pad/Turbine #1. Trench 16 is oriented E/W (100°-280°) and measures c. 4 meters in length (E/W) by 0.70-1.2 meters in width (N/S) by 1.45 meters in depth. Trench 16 consists of Layer I, Layer II, Layer III, Layer IV, Layer v, Layer VI.

Trench 16, north wall.



Trench 16, north wall profile.

Layer	Depth	Description
Layer I	0-22 cmbs (2 cm)	Dark yellowish brown (10 YR 3/6) loam; moderate, medium, crumb; firm, slightly sticky, slightly plastic; abrupt smooth boundary. Contains grass and recent organic material.
Layer II	3-40 cmbs (18 cm)	Dark yellowish brown (10YR 3/6) loam; moderate, medium, crumb; firm, slightly sticky, slightly plastic; abrupt smooth boundary.
Layer III	16-70 cmbs (55 cm)	Very dark brown (10 YR 2/2) silty clay; moderate, fine, crumb; friable, very sticky, very plastic; abrupt smooth boundary. Contains basalt boulders and cobbles.
Layer IV	50-96 cmbs (37 cm)	Dark brown (10 YR 3/3) silty clay; moderate fine, crumb; friable, very sticky, very plastic; abrupt smooth boundary. Contains basalt boulders and cobbles.
Layer V	96-145 cmbs (50 cm)	Dark brown (10 YR 3/3) silty clay; moderate, thick, platy; friable, very sticky, very plastic
Layer VI	88-126 cmbs (35 cm)	Dark gray (2.5 Y 4/1) with yellowish red (5 YR 4/6) silty clay; moderate, coarse, subangular blocky; friable, very sticky, very plastic. Mottled. Contains decaying basalt rocks.

APPENDIX D

WOOD IDENTIFICATION

RADIOCARBON SAMPLE SCREENING FOR THE NA PUA MAKANI ARCHAEOLOGICAL INVENTORY SURVEY, PACIFIC LEGACY PROJECT 2780.04, KAHUKU, O'AHU

Gail M. Murakami
International Archaeological Research Institute, Inc.

January 7, 2015

INTRODUCTION

This report presents the results of taxa identification in charcoal samples from Pacific Legacy's Na Pua Makani Archaeological Inventory Survey (AIS) Project 2780.04 on O'ahu Island. Identification of charcoal found in archaeological context can give insight into the vegetation of the surrounding area at the time that the woods were burned. This information can then be used to interpret the environment as well as possible cultural use of specific plants. In this way charcoal samples may be viewed as partial records of the environmental and cultural history of an area.

METHODS

The freshly fractured transverse and tangential facets of the charcoal pieces were viewed under magnification of a dissecting microscope. Taxa identifications were made by comparing the anatomical characteristics seen during examination against those of known woods in the Pacific Islands Wood Collection at the Department of Botany, University of Hawai'i, and published descriptions.

RESULTS

Two charcoal samples collected from a small shelter during the Na Pua Makani project were examined for taxa identification. One taxon was identified in each of the samples, totaling two taxa for the assemblage. The results are summarized in Table 1. Descriptions of the taxa identified are presented in the review below.

Table 1. Charcoal Taxa Identification in Samples from the Na Pua Makani Project, O'ahu Island.

WIDL #	Taxa	Common/ Hawaiian Name	Origin/Habit	Part	Count	Weight, g
Bag 11, T-72, TU 1, Layer I/Level 2, Sample #1						
1426-1	*Chamaesyce* sp.	*'Akoko*	Native/Shrub	Wood	1	0.07
Bag 28, T-72, TU 1, 37 cm bd, west wall post-ex, Sample #3						
1426-2	*Hibiscus tiliaceus*	*Hau*	Native/Shrub-Tree	Wood	3	0.09

TAXA REVIEW

Chamaesyce spp. (*'Akoko*)

The distribution of the 15 endemic shrubs and small trees in this genus range from coastal environments to upper forest zones on the main Hawaiian Islands. Nine of these native species are found on O'ahu (Wagner et al. 1990:602-617; Rock 1974:243-262). *'Akoko* was once valued for firewood by the Hawaiians (Hillebrand 1981:396). The milky sap was once considered a possible source for rubber (Rock 1974:261).

Hibiscus tiliaceus L. (*Hau*)

This indigenous plant is described by Handy and Handy (1972:232-233) as a "large-leaved shrublike tree" which was planted near houses and gardens. The straight-stemmed variety was once planted for bast fibers from which cords, ropes, and coarse *tapa* cloth were made. Its soft wood was used to make canoe outriggers, fishnet floats, and fire by rubbing a harder wood against it. The creeping variety was used for windbreaks. This species occurs primarily along coasts, streams, and other wet areas up to 1,220 m in elevation on all main islands although not documented from Ni'ihau and Kaho'olawe (Wagner et al. 1990:888).

REFERENCES CITED

Handy, E. S. Craighill and Elizabeth G. Handy
1972 *Native Planters of Old Hawaii: Their Life, Lore, and Environment*. Bishop Museum Bulletin 233. Bishop Museum Press, Honolulu.

Hillebrand, William
1981 *Flora of the Hawaiian Islands: A Description of their Phanerograms and Vascular Cryptogams*. Lubrecht & Cramer, New York. Originally published in 1888.

Rock, Joseph F.
1974 *The Indigenous Trees of the Hawaiian Islands*. Charles E. Tuttle Company, Inc.

Wagner, Warren L., Derral R. Herbst, and S. H. Sohmer
1990 *Manual of the Flowering Plants of Hawai'i*. University of Hawaii and Bishop Museum Presses, Honolulu.

APPENDIX E

RADIOCARBON DATING RESULTS

Beta Analytic Inc.
4985 SW 74 Court
Miami, Florida 33155 USA
Tel: 305 667 5167
Fax: 305 663 0964
Beta@radiocarbon.com
www.radiocarbon.com

Consistent Accuracy . . .
. . . Delivered On-time

Darden Hood
President

Ronald Hatfield
Christopher Patrick
Deputy Directors

February 5, 2015

Dr. Paul Cleghorn
Pacific Legacy, Incorporated
30 Aulike Street, #301
Kailua, HI 96734
USA

RE: Radiocarbon Dating Results For Samples NPM T72 CH3, NPM T72 CH1

Dear Dr. Cleghorn:

Enclosed are the radiocarbon dating results for two samples recently sent to us. As usual, the method of analysis is listed on the report with the results and calibration data is provided where applicable. The Conventional Radiocarbon Ages have all been corrected for total fractionation effects and where applicable, calibration was performed using 2013 calibration databases (cited on the graph pages).

The web directory containing the table of results and PDF download also contains pictures, a cvs spreadsheet download option and a quality assurance report containing expected vs. measured values for 3-5 working standards analyzed simultaneously with your samples.

Reported results are accredited to ISO/IEC 17025:2005 Testing Accreditation PJLA #59423 standards and all chemistry was performed here in our laboratories and counted in our own accelerators here in Miami. Since Beta is not a teaching laboratory, only graduates trained to strict protocols of the ISO/IEC 17025:2005 Testing Accreditation PJLA #59423 program participated in the analyses.

As always Conventional Radiocarbon Ages and sigmas are rounded to the nearest 10 years per the conventions of the 1977 International Radiocarbon Conference. When counting statistics produce sigmas lower than +/- 30 years, a conservative +/- 30 BP is cited for the result.

When interpreting the results, please consider any communications you may have had with us regarding the samples. As always, your inquiries are most welcome. If you have any questions or would like further details of the analyses, please do not hesitate to contact us.

The cost of the analysis was charged to the VISA card provided. Thank you. As always, if you have any questions or would like to discuss the results, don't hesitate to contact me.

Sincerely,

Darden Hood

Digital signature on file

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BETA ANALYTIC INC.
DR. M.A. TAMERS and MR. D.G. HOOD
4985 S.W. 74 COURT
MIAMI, FLORIDA, USA 33155
PH: 305-667-5167 FAX:305-663-0964
beta@radiocarbon.com

REPORT OF RADIOCARBON DATING ANALYSES

Dr. Paul Cleghorn — Report Date: 2/5/2015

Pacific Legacy, Incorporated — Material Received: 1/23/2015

Sample Data	Measured Radiocarbon Age	13C/12C Ratio	Conventional Radiocarbon Age(*)
Beta - 402614	100 +/- 30 BP	-24.2 o/oo	110 +/- 30 BP

SAMPLE : NPM T72 CH3
ANALYSIS : AMS-Standard delivery
MATERIAL/PRETREATMENT : (charred material): acid/alkali/acid
2 SIGMA CALIBRATION : Cal AD 1680 to 1765 (Cal BP 270 to 185) and Cal AD 1800 to 1940 (Cal BP 150 to 10) and Post AD 1950 (Post BP 0)

Beta - 402615	100.7 +/- 0.4 pMC	-10.3 o/oo	180 +/- 30 BP

SAMPLE : NPM T72 CH1
ANALYSIS : AMS-Standard delivery
MATERIAL/PRETREATMENT : (charred material): acid/alkali/acid
2 SIGMA CALIBRATION : Cal AD 1655 to 1695 (Cal BP 295 to 255) and Cal AD 1725 to 1815 (Cal BP 225 to 135) and Cal AD 1835 to 1840 (Cal BP 115 to 110) and Cal AD 1855 to 1865 (Cal BP 95 to 85) and Cal AD 1920 to Post 1950 (Cal BP 30 to Post 0)

Dates are reported as RCYBP (radiocarbon years before present, "present" = AD 1950). By international convention, the modern reference standard was 95% the 14C activity of the National Institute of Standards and Technology (NIST) Oxalic Acid (SRM 4990C) and calculated using the Libby 14C half-life (5568 years). Quoted errors represent 1 relative standard deviation statistics (68% probability) counting errors based on the combined measurements of the sample, background, and modern reference standards. Measured 13C/12C ratios (delta 13C) were calculated relative to the PDB-1 standard.

The Conventional Radiocarbon Age represents the Measured Radiocarbon Age corrected for isotopic fractionation, calculated using the delta 13C. On rare occasion where the Conventional Radiocarbon Age was calculated using an assumed delta 13C, the ratio and the Conventional Radiocarbon Age will be followed by "*". The Conventional Radiocarbon Age is not calendar calibrated. When available, the Calendar Calibrated result is calculated from the Conventional Radiocarbon Age and is listed as the "Two Sigma Calibrated Result" for each sample.

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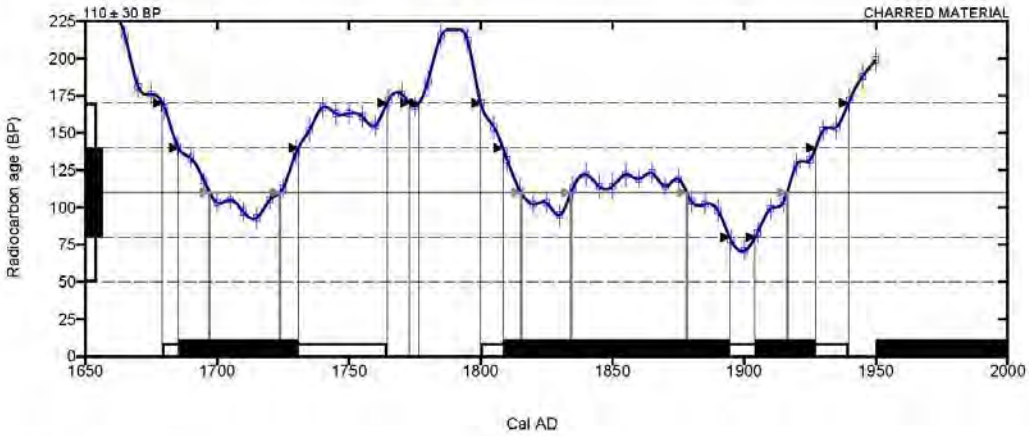
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12 = -24.2 o/oo ; lab. mult = 1)

Laboratory number	**Beta-402614**
Conventional radiocarbon age	**110 ± 30 BP**
Calibrated Result (95% Probability)	**Cal AD 1680 to 1765 (Cal BP 270 to 185)** **Cal AD 1800 to 1940 (Cal BP 150 to 10)** **Post AD 1950 (Post BP 0)**
Intercept of radiocarbon age with calibration curve	Cal AD 1695 (Cal BP 255) Cal AD 1725 (Cal BP 225) Cal AD 1815 (Cal BP 135) Cal AD 1835 (Cal BP 115) Cal AD 1880 (Cal BP 70) Cal AD 1915 (Cal BP 35) Post AD 1950 (Post BP 0)
Calibrated Result (68% Probability)	Cal AD 1685 to 1730 (Cal BP 265 to 220) Cal AD 1810 to 1895 (Cal BP 140 to 55) Cal AD 1905 to 1925 (Cal BP 45 to 25) Post AD 1950 (Post BP 0)



Database used
INTCAL13

References
Mathematics used for calibration scenario
A Simplified Approach to Calibrating C14 Dates, Talma, A. G., Vogel, J. C., 1993, Radiocarbon 35(2):317-322
References to INTCAL13 database
Reimer PJ et al. IntCal13 and Marine13 radiocarbon age calibration curves 0–50,000 years cal BP. Radiocarbon 55(4):1869–1887, 2013.

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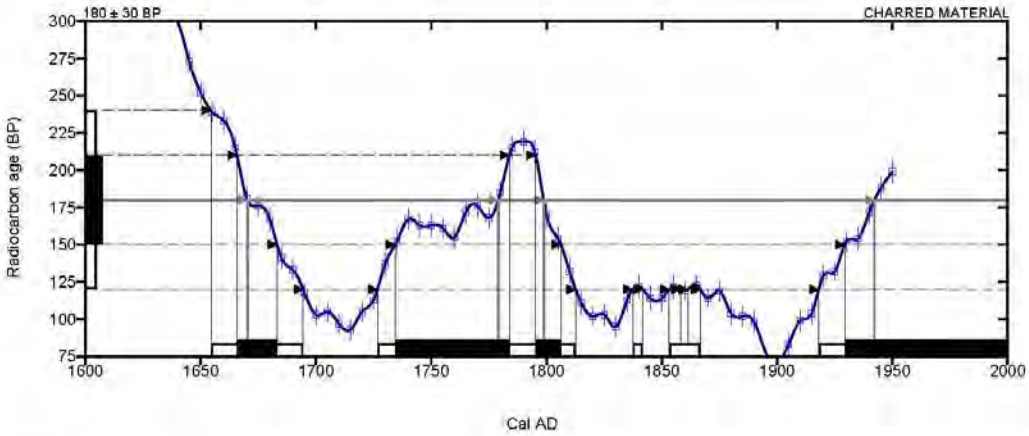
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12 = -10.3 o/oo ; lab. mult = 1)

Laboratory number	**Beta-402615**
Conventional radiocarbon age	**180 ± 30 BP**
2 Sigma calibrated result **95% probability**	**Cal AD 1655 to 1695 (Cal BP 295 to 255)** **Cal AD 1725 to 1815 (Cal BP 225 to 135)** **Cal AD 1835 to 1840 (Cal BP 115 to 110)** **Cal AD 1855 to 1865 (Cal BP 95 to 85)** **Cal AD 1920 to Post 1950 (Cal BP 30 to Post 0)**
Intercept of radiocarbon age with calibration curve	Cal AD 1670 (Cal BP 280) Cal AD 1780 (Cal BP 170) Cal AD 1800 (Cal BP 150) Cal AD 1940 (Cal BP 10) Post AD 1950 (Post BP 0)
1 Sigma calibrated results 68% probability	Cal AD 1665 to 1685 (Cal BP 285 to 265) Cal AD 1735 to 1785 (Cal BP 215 to 165) Cal AD 1795 to 1805 (Cal BP 155 to 145) Cal AD 1930 to Post 1950 (Cal BP 20 to Post 0)



Database used
INTCAL13

References

Mathematics used for calibration scenario
A Simplified Approach to Calibrating C14 Dates, Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2):317-322

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Reimer PJ et al. IntCal13 and Marine13 radiocarbon age calibration curves 0–50,000 years cal BP. Radiocarbon 55(4):1869–1887, 2013

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APPENDIX G
CULTURAL IMPACTS ASSESSMENT (CIA)

Pacific Legacy

Historic Preservation

CULTURAL IMPACT ASSESSMENT FOR THE NĀ PUA MAKANI WIND PROJECT, KAHUKU, KEANA, AND MĀLAEKAHANA AHUPUAʻA, KOʻALAU LOA DISTRICT, ISLAND OF OʻAHU

[TMK (1) 5-6-005:018; (1) 5-6-006:018, 047, 051, 055; and (1) 5-6-008:006]

Pacific Legacy: Exploring the past, informing the present, enriching the future.

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CULTURAL IMPACT ASSESSMENT FOR THE NĀ PUA MAKANI WIND PROJECT, KAHUKU, KEANA, AND MĀLAEKAHANA AHUPUA‘A, KO‘OLAU LOA DISTRICT, ISLAND OF O‘AHU

[TMK (1) 5-6-005:018; (1) 5-6-006:018, 047, 051, 055; and (1) 5-6-008:006]

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December 2015

ABSTRACT

As part of the Environmental Impact Statement process, Nā Pua Makani Power Partners, LLC, a subsidiary of Champlin Hawai‘i Wind Holdings, LLC, has requested a Cultural Impact Assessment (CIA) for the proposed Nā Pua Makani Wind Project, which is slated for a 464 acre parcel spanning the *kula* and *mauka* portions of Kahuku, Keana, and Mālaekahana Ahupua‘a, in Ko‘olau Loa District, O‘ahu [TMK (1) 5-6-005:018; (1) 5-6-006:018, 047, 051, 055; and (1) 5-6-008:006]. This assessment is based upon archival research as well as ethnographic interviews. Under Act 50, the Hawai‘i State Department of Health "Guidelines for Cultural Impact Assessments" mandate that the subject property be studied as well as surrounding areas where construction or development have impact potential. These guidelines also recommend personal interviews with traditional cultural practitioners and knowledgeable informants on cultural practices. For this study, three interviews with four cultural informants were performed, while only two informant summaries are included as two were withdrawn.

The results of archival research indicate that the vicinity of Kahuku, Keana, and Mālaekahana Ahupua‘a has a long and rich cultural and legendary history. However, little is mentioned of the specific property in which the Nā Pua Makani Wind Project is to be built. Regardless, some traditional Hawaiian practices were found to be practiced in and around the project area, including pig hunting and plant gathering, according to the testimony of two of the five interviewees. Yet, neither informant expressed that the areas in which the cultural practices were occurring were exceptional, legal, or even ideal, as the lands are private and/or reserved for military use. Further, it is uncertain that the locations in which the activities occur are within the Area of Potential Effect (APE). Hence, the proposed development of the Nā Pua Makani Wind Project is not forecasted to significantly impact any ongoing cultural practices. It is reportedly a common belief that the area in general has a mystical past and retains some supernatural qualities. To respect the spiritual connections that people have with the *‘āina*, as the general area is known as a *wahi pana* (legendary place), it is recommended that any major event or construction related activity be preceded with a traditional Hawaiian Blessing ceremony performed by a *kahuna* (priest or priestess) or *kahu pule* (minister/preacher). Another interviewee provided important information of the possible cultural significance of several birds and the endemic bat that live in the area. This possible cultural importance should be considered in the development and operation of the wind farm.

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1.0 INTRODUCTION

Pacific Legacy, Inc., under contract to Nā Pua Makani Power Partners, LLC, a subsidiary of Champlin Hawai‘i Wind Holdings, LLC, conducted a Cultural Impact Assessment (CIA) as part of the Environmental Impact Statement (EIS) for the proposed Nā Pua Makani Wind Project. The subject area is situated on approximately 464 acres of land spanning *kula* (plains) and *wao* (upland) portions of three *ahupua‘a*: Kahuku, Keana and Mālaekahana [TMK (1) 5-6-005:018; (1) 5-6-006:018, 047, 051, 055; and (1) 5-6-008:006], Ko‘olau Loa District, O‘ahu (Figure 1).

The main objective of a CIA is to promote and protect cultural beliefs, practices, and resources of Native Hawaiians, other ethnic groups, as well as other collective groups associated with the subject area and surrounding areas (OEQC 2011:3-4).

1.1 PURPOSE

In keeping with Articles IX and XII of the state constitution, the goal of a CIA is to promote and protect cultural beliefs, practices, and resources of Native Hawaiians as well as other ethnic groups and collective groups (OEQC 2011: 3-4). The general purpose of this CIA is to protect and preserve all cultural practices and resources within the project area and surrounding areas that may be impacted by the proposed project. To do so, cultural practices, features, and practitioners must be identified and assessed for potential impacts by the Proposed Action and alternative options. Finally, recommendations are provided to mitigate the potential impacts.

In the State of Hawai‘i, under Chapter 343 HRS, and Act 50, SLH 2000, a CIA is required as part of the EIS process, and has the stated purpose to:

1. require that environmental impact statements include the disclosure of the effects of a proposed action on the cultural practices of the community and State; and
2. amend the definition of "significant effect" to include adverse effects on cultural practices.

According to these guidelines, types of cultural practices and beliefs may include those relating to subsistence, commercial, residential, agricultural, access-related, recreational, as well as religion and spirituality. The guidelines further state that cultural resources subject to a CIA may include: "traditional cultural properties or other types of historic sites, both manmade and natural, including submerged cultural resources, which support such cultural practices and beliefs" (OEQC 2011:4). To determine the effects of the proposed development on cultural practices, resources, and beliefs, the following tasks are undertaken:

1. identify and consult with individuals and organizations knowledgeable about cultural practices that may have taken place in the area;
2. conduct archival research about traditional practices that may have been conducted in the area;

3. describe the cultural practices that took place within the potentially affected area;
4. assess the impact of the proposed development on the cultural practices that may have taken place within the potentially affected area; and
5. prepare a report on the findings resulting from the above investigations.

Appendix A provides a copy of the Guidelines for Assessing Cultural Impacts, adopted by the State of Hawai‘i Environmental Council in 1997 and amended in 2000 (OEQC 2011).

1.2 METHODS

According to the Office of Environmental Quality Control (OEQC) Guidelines for Assessing Cultural Impacts (OEQC 2011), it is recommended that preparers of CIA implement the following protocol:

1. identify and consult with individuals and organizations with expertise concerning the types of cultural resources, practices and beliefs found within the broad geographical area, e.g., district or ahupua‘a;
2. identify and consult with individuals and organizations with knowledge of the area potentially affected by the proposed action;
3. receive information from or conduct ethnographic interviews and oral histories with persons having knowledge of the potentially affected area;
4. conduct ethnographic, historical, anthropological, sociological, and other culturally related documentary research;
5. identify and describe the cultural resources, practices and beliefs located within the potentially affected area; and
6. assess the impact of the proposed action, alternatives to the proposed action, and mitigation measures, on the cultural resources, practices and beliefs identified.

These methods were strictly adhered to in the subject assessment. A rigorous effort was made to identify and locate persons knowledgeable about traditional practices that took place in the past or that are currently taking place in project area and broader geographical area that could potentially be impacted by the expansion project. In addition to prior CIA reports written about the Kahuku, Keana, and Mālaekahana areas (Hammatt 2008; McGerty and Spear 2009; Voegler et al. 2011; Mooney and Cleghorn 2012), the State Office of Environmental Quality Control (OEQC) and Office of Hawaiian Affairs (OHA) were consulted for a listing of Cultural Assessment Providers. Various Neighborhood Boards and civic clubs, were also contacted to obtain cultural informants. Appendix B provides a listing of potential cultural informants and their detailed contact history. Contact information was found for 24 individuals and organizations, all of which were solicited for participation. While no response was received from 14 of those asked to participate, eight individuals responded; interviews were secured with five individuals; and three interview summaries are included. Transcripts of interviews were not attempted in this assessment; however, audio recordings of the interviews were obtained and are kept on file at Pacific Legacy office in Kailua, Hawai‘i.

2.0 PROJECT AREA DESCRIPTIONS

The proposed Project is located in the Koʻolau Loa District, west of the town of Kahuku in the City and County of Honolulu and covers three *ahupuaʻa*: Kahuku, Keana, and Mālaekahana [TMK (1) 5-6-005:018; (1) 5-6-006:018, 047, 051, 055; and (1) 5-6-008:006]. It includes portions of two parcels which would be leased from the DLNR (approximately 234 acres [95 hectares]) and from the Mālaekahana Hui West, LLC (MHW) (approximately 452 acres [183 hectares]), as well as the use of non-leased State land for roadways into the project area. These lands are situated in the *kula* and *wao* portions of the following *ahupuaʻa*: Kahuku, Keana, and Mālaekahana in the District of Koʻolau Loa, Oʻahu Island, Hawaiʻi. According to the Nā Pua Makani Wind Project's Environmental Impact Statement Preparation Notice (EISPN), the environmental setting of the project area is as follows:

> The Project lies on a portion of . . . leased land in Kahuku, Oahu, of which approximately [464 acres] comprise the Project Area. The operational Kahuku Wind Power facility abuts the Project Area to the northwest... It is surrounded by agricultural farm lands to the north; residential housing, community infrastructure, and agricultural farm lands to the east; a mixture of agricultural farm lands and undeveloped forest lands to the south; and undeveloped forest lands to the west. James Campbell National Wildlife Refuge is approximately 0.75 miles (1.2 kilometers) to the north and Mālaekahana State Recreation area is 0.1 miles (0.2 kilometers) to the east (Tetra Tech Inc. 2014:9).

Within the larger project area is the Area of Potential Effect (APE), the area where all construction related activities will take place. The APE consists of approximately 464 acres and is composed of:

- Access Roads;
- Turbines;
- Laydown Area;
- O & M Facility;
- Collector Substation;
- Underground Collector Lines; and
- Underground Transmission Lines.

The APE also includes:

- 2-acre buffers around each turbine;
- 450-foot buffer around each project component (e.g., O & M Facility); and
- The existing Department of Agriculture road on the north side of the APE that provides access to the State-owned portion of the project.

Currently, the project area is largely used for modern agriculture by various farming entities under Keana Farms. Recently, a recreational zip line has been established, which meanders throughout the project area. The OEQC Guidelines recommend that the "broader geographical area" be the subject unit (OEQC 2011), thus this assessment will not be limited to the project area, but areas adjacent to it as well.

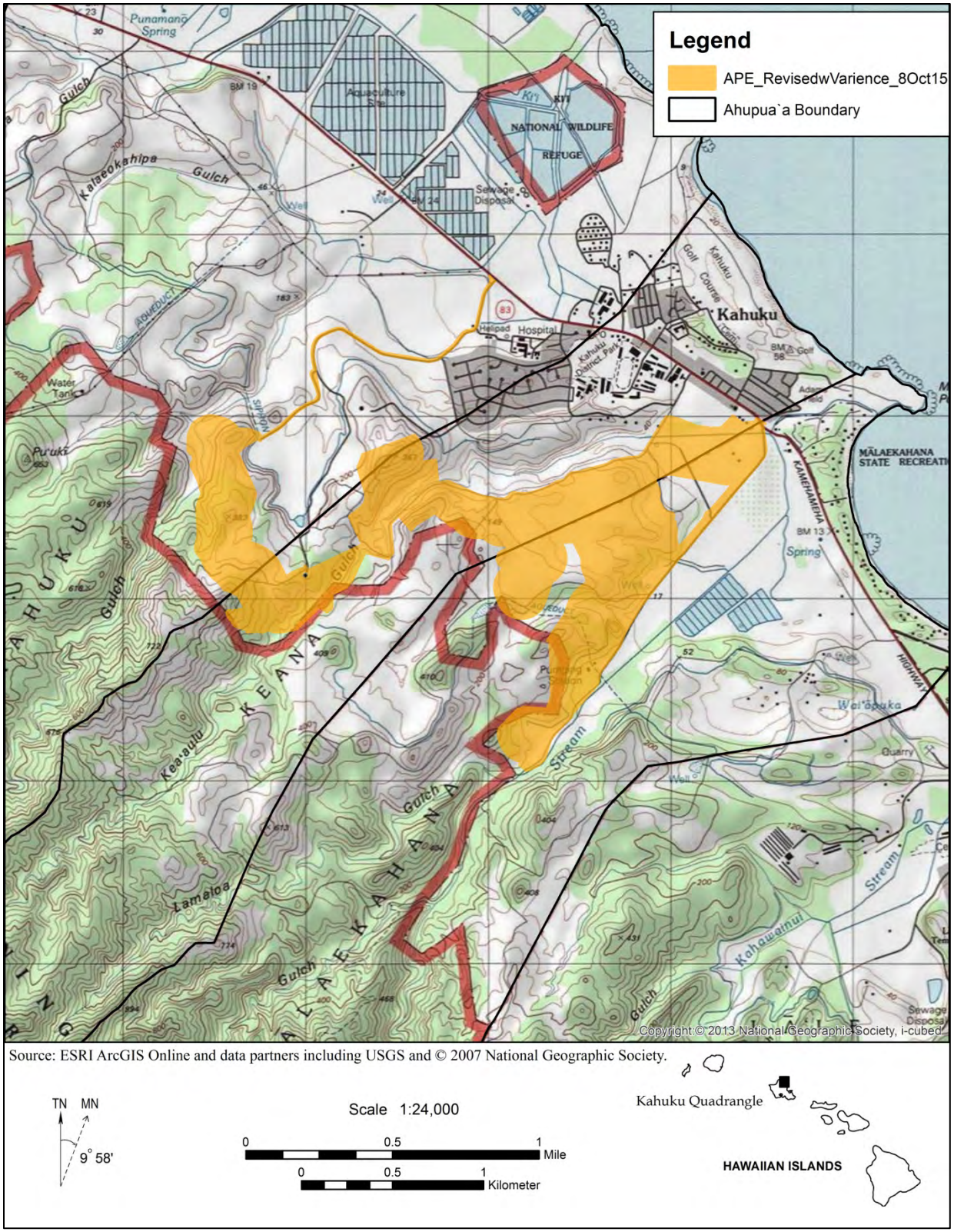

Figure 1. Project Area/APE on USGS map.

2.1 GEOLOGY, HYDROLOGY, AND SEDIMENTS

Several geological processes including shield-building volcanism, subsidence, weathering, erosion, sedimentation, followed by rejuvenated volcanism created the island of Oʻahu. Generally, the island is made up of heavily eroded remnants of the Pliocene era Waiʻanae and Koʻolau shield volcanoes. The project area is located at the foot of the Koʻolau Mountains, which were created by shield-building volcanism about 2.2 to 2.5 million years ago (Lau and Mink 2006). These mountains are mostly comprised of Koolau Basalt, a shield lava as well as basalt from later volcanic stages (Juvik and Juvik 1998).

Topography, stratigraphy, and hydrology of the general subject area result from a series of complex geological processes. Koolau Basalt lava flows ranging from 1.8 to 3 million year old underlie the majority of the vicinity. After these basalts were laid, they were subject to periods of erosion as well as periods of deposition of eroded upland sediment that occurred in the area. In the mid-to-late Quaternary period (ca 120,000 years ago), mean sea levels rose globally over seven meters higher than what they are today, permitting a coral reef system to build up along the coast in the area that now lies inland of the current coastline. After the sea level receded, these coral reefs were exposed and over time encapsulated in alluvium, becoming the karstic limestone of the Kahuku Plain (Ku et al. 1974; Stearns 1978; Gillespie et al. 2004). These deposits of terrestrial and marine sediments along the coast form a relatively impermeable wedge of sedimentary material known as caprock, which extends from Punaluʻu to Kahuku Point (Group 70 2009:2-7, 2-9). Generally, most high elevation water in Koʻolau Loa is controlled by volcanic dikes that prevent groundwater from flowing freely to coastal areas from the upper elevations of the watershed (ibid.:2-9). The Kahuku, Keana, and Mālaekahana area contains several large marshes, which are a result of seepage that arises at the caprock.

In the Nā Pua Makani Wind Project EISPN, Tetra Tech Inc. (2014) describe the geology and soils of the project as follows:

> The Project area consists of steep, dissected ridges surrounding gently sloping valleys...Elevations range from approximately 3 feet (1 meter) above mean sea level (amsl) on the northern edge to 614 feet (187 meters) amsl on the southern edge. The dominant soil types in the Project Area include Lahaina silty clay (3-15 percent slopes) soils and Paumalu-Badland complex soils (10-70 percent slopes), with coral outcrops at elevations below 100 feet (30 meters) amsl (Foote et al. 1972, NRCS 2013). Agricultural lands within the Malaekahana Hui West portion of the Project Area are classified as Prime Agricultural Lands under the ALISH system (Tetra Tech Inc. 2014:9).

2.2 CLIMATE

While seasonal variability is relatively mild, the climate of the Hawaiian Islands exhibits warm temperatures, dry conditions, and persistent trade winds that originate from the northeast during the summer season (May through September). Hawaiʻi's winter season (October through April) is typically characterized by cooler temperatures, elevated precipitation, and variable winds, including Kona (southerly) winds and storms (Juvik and Juvik 1998).

The climatic conditions of the subject area are characteristic of lowland and coastal areas of O‘ahu’s windward side, having relatively consistent temperatures as well as persistent northeast trade winds. While the annual average maximum temperature is 81 degrees Fahrenheit (ºF), the Kahuku area has daily maximum temperatures in the range from the high 70s (˚F) during the winter to the low-to-mid 80s (˚F) during the summer. Average temperature lows range from the mid-to-high 60s (˚F) during the winter to the low-to-mid 70s (˚F) during the summer, with an annual minimum temperature of 70 ºF (WRCC 2011).

In general, rainfall is heaviest in October and April for the entire state of Hawai‘i. However, rainfall averages are greatly affected by terrain. Further, great variation in rainfall can occur over small distances with extreme topographical changes. In the subject area, rainfall is relatively moderate, with a median annual rainfall of approximately 36 inches. Approximately two-thirds of the rainfall in the subject area occurs between October and April. Annual rainfall also varies significantly from year-to-year in the area (WRCC 2011).

2.3 VEGETATION

While the project area is dominated with active farms, growing a wide variety of non-native food crops, some areas exist where invasive exotics such as *koa haole* (*Leucaena glauca*), Christmas-berry (*Schinus teribinthifolius*), guava (*Psidium guajava*), as well as various grasses, weeds, ferns, shrubs, and vines dominate. Yet, some endemic species still persist in small pockets. According to Tetra Tech Inc. (2014:11), vegetation in the project is as follows:

> The vegetation within the Project area is dominated by a mixture of aggressive non-native weedy species that took over following the abandonment of sugar cane (*Saccharum officinarum*) cultivation. Several common native species occupy some of the ridge tops. The most abundant species in the Project area is the common ironwood (*Casuarina equisetifolia*). Native species are largely intermixed with non-native species with the exception of a few ridge tops where the native ‘*ulei* (*Osteomeles anthyllidifolia*), forms large monotypic patches. Other common native species include ‘*uhaloa* (*Waltheria indica*) and ‘*akia* (*Wikstroemia oahuensis*).

3.0 ARCHIVAL RESEARCH SUMMARY

This section is a synthesis of records documenting traditional and mythological accounts associated with the Nā Pua Makani Wind Project lands and surrounding areas as well as Historical documentation and archaeological record. The names and locations of *ahupuaʻa* used in this section of the report are largely derived from information in the *Oʻahu Pre-Māhele Moku and Ahupuaʻa* map created by Kamehameha School's Hawaiian Studies Institute in 1987 (Figure 2) and *Place Names of Hawaiʻi* (Pukui et al. 1974). According to this map, the project area spans an area that incorporates inland portions of three *ahupuaʻa*: Kahuku, Keana, and Mālaekahana.

The subject *ahupuaʻa* are located within the district, or *moku*, of Koʻolau Loa, within which the Nā Pua Makani Wind Project lands are located, extends from the *ahupuaʻa* of Kaʻaʻawa on the central east side of Oʻahu, rounding the northern tip of the island to Pūpūkea. In *Sites of Oʻahu* (Sterling and Summers 1978:142), writer for *Ka Nūpepa Kuokoa*, S. M. Kaui, holds that Koʻolau Loa District stretches from Keahu-o-Hapuʻu to the Point of Kaʻōʻio, which is between Kualoa and Kaʻaʻawa (Figure 3). The name of this district, spelt as "Koʻolau Loa" by Pukui et al. (1974:117), literally translates to "long Koʻolau" (ibid.), Koʻolau being the windward mountain range that runs along the entire eastern side of Oʻahu.

3.1 PRE-EUROPEAN CONTACT CULTURAL LANDSCAPE

In general, traditional and mythological accounts from pre-European contact Hawaiʻi represent a belief system explaining all aspects of the physical universe and spirit realm, the origin and nature of mankind, and the history of the community, as well as collectively remembering the heroic adventures, exceptional feats, and cautionary tales of their ancestors. These traditional accounts are contained in the hearts and minds of cultural practitioners and customarily passed on through oration. Throughout the passage of time, figures transcend earthly legends into the cosmic, divine, and fearsome realm of the gods that is only separated from the mundane world by a thin veil and has the power to interact with and cast influence on the mundane. To this day, a sense of respect, reverence, and fear is still held on to by cultural practitioners and those indoctrinated in these traditions, as it is believed that the very landscape is imbued with the *mana* (life force or supernatural energy) of the divine.

3.1.1 The Natural World

Conversely, the mundane, or lifeways and land use, of pre-European contact Hawaiians are also part of the cultural landscape and are interpreted through archaeological research in conjunction with oral histories and recorded traditional accounts. Handy and Handy (1991) provide some commentary on general land use patterns of ancient Hawaiians that are applicable to the general Kahuku area. As marine resources represent the main source of protein in the traditional Hawaiian diet, Handy and Handy (ibid.) suggest that upland agriculture was typically preceded by or correlated with the productiveness of an area's coastal fishing grounds. *Mauka* lands were intensively developed in areas where coastal fishing

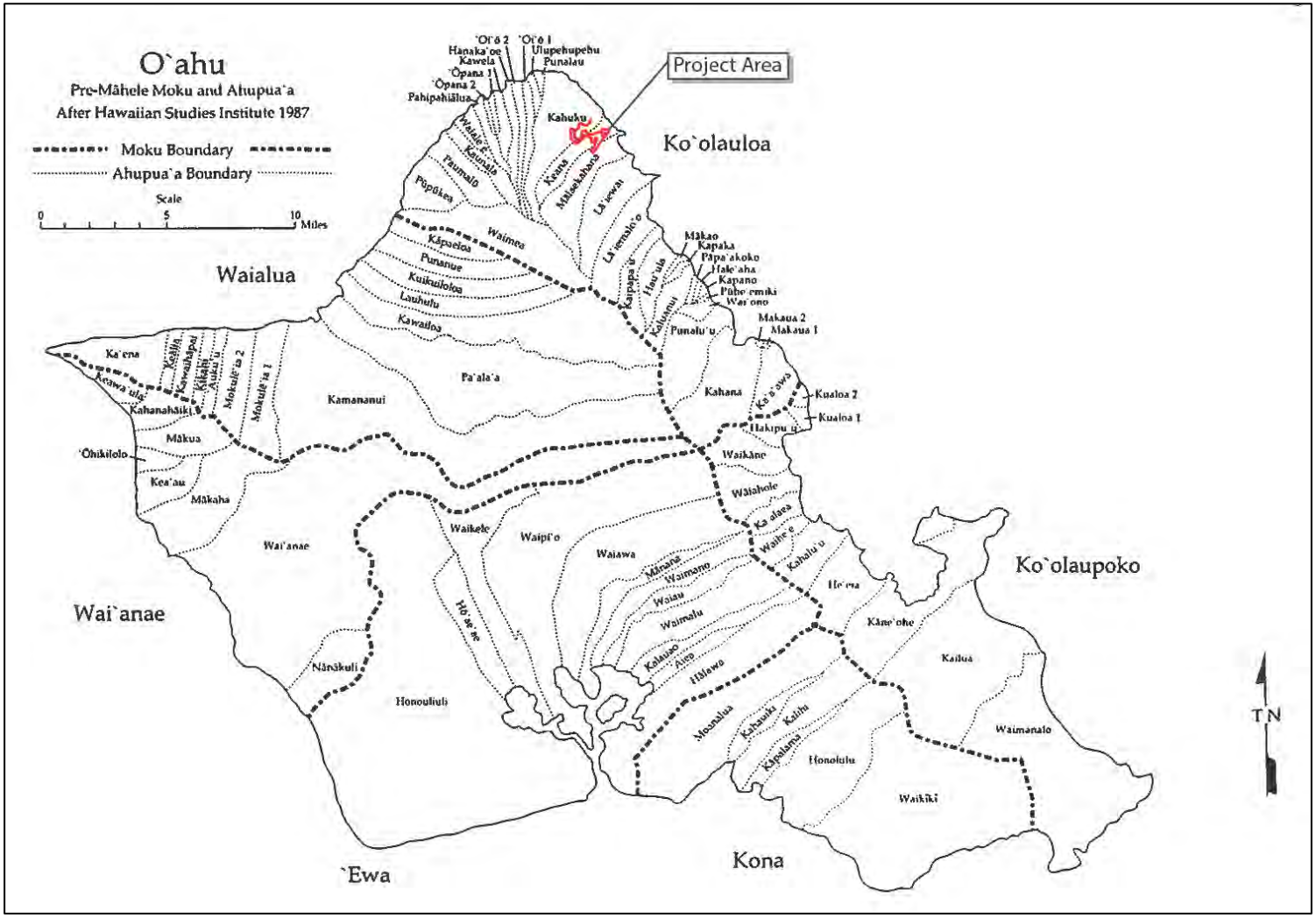

Figure 2. Map of O‘ahu, showing approximate location of project area in relation to pre-Māhele *moku* and *ahupua‘a* (courtesy of Hawaiian Studies Institute 1987).

grounds were easily accessed. On O‘ahu, sweet potatoes were cultivated to supplement taro, the main starch of the Hawaiian diet, when soils were too sandy or dry to grow taro. Further, sweet potato cultivation, typically grown inland, appeared to correlate with high population densities in general.

Traditionally in Hawai‘i, environmental zones were perceived and determined by various natural features and resource criteria (Handy and Handy 1991:54-56). . The following is a summary of Handy and Handy (1991:54-56) description of the terrestrial environmental zones:

1. *Ko Kaha Kai*: Land by the sea, or coastal region providing marine resources (fish and other marine animals, seaweed and salt). “Kaha was a special term applied to areas facing the shore but not favorable for planting.
2. *Kula*: The plains or sloping lands (without trees) above the coastal region.
   a) *Kula kai:* Seaward plains.
   b) *Kula uka*: Inland or upland slopes (towards the mountains).
3. *Kahawai:* The place (having) water. The area beyond or intersecting the *kula* lands. This upland zone provided suitable agricultural sites and abundant naturally occurring resources which were used for religious, domestic, and economic purposes.
4. *Wao:* Wilderness
   a) *Wao kanaka:* Region of man. Lower forest, providing hard wood (*koa*) for spears, utensils, and logs for canoes; *lau hala* (pandanus leaves) for thatch and mats; *māmaki* for bark cloth (*tapa*); *kukui* (candlenut) for oil; wild yams, roots, and sandalwood.
   b) *Wao akua*: Region of deities. …remote, awesome, seldom penetrated, source of supernatural influences, both evil and beneficent.
   c) *Wao ma‘ukele*: Rain forest. Here grew giant trees and tree ferns (*‘ama‘u*) under almost perpetual cloud and rain.

The Nā Pua Makani Wind Project lands are predominantly located in the following environmental zones: *Kula uka* and *Wao kanaka*. Numerous traditional accounts, *mo‘olelo*, and Land Claim Native Testimonies allude to the cultivation of lands, varying in intensity, from *kula* to *wao* (Hall 1839; Fornander 1917; Thrum 1919; Handy 1940; Handy and Handy 1991; Sterling and Summers 1978; Silva 1984; Maly and Maly 2003; Hammatt 2008; Vogeler et al. 2011).

3.1.2 Life in the Ahupua‘a

With great variations of geological features, each *ahupua‘a* had its own dynamic resource management system that was based on traditional customs upheld by the *kapu* system, or ancient religious law. The *ahupua‘a* typically extended form the coast to the nearest mountain top or ridge and resources from the land and sea were equally distributed within the *ahupua‘a*. Lyons (1875) describes the geographic nature of the *ahupua‘a* as well as the movement of resources from mountain to sea and vice versa, stating:

> The Ahupuaa ran from the sea to the mountain, theoretically. That is to say the central idea of the Hawaiian division of land was emphatically central, or rather radial. Hawaiian life vibrated from *uka,* mountain, whence came wood, kapa, for clothing, olona, for fish line, ti-leaf for wrapping paper, *ie* for rattan lashing, wild birds for food, to the *kai,* sea, whence came *ia*, fish, and all connected therewith.

> Mauka and makai therefore fundamental ideas to the native of an island (Lyons 1875: 104).

The *ahupua‘a* was also an important socio-political unit in the pre-Contact era, each unit with its own hierarchy. Kirch (1985) holds that *moku* were independent chiefdoms, divided into a number of radial land divisions, referred to as *ahupua‘a,* with subdivisions of *‘ili* and *mo‘o* within. According to Kirch (1985),

> Each ahupua‘a was controlled by a lesser chief, who in turn appointed one or more stewards to oversee production, organize work parties, collect tribute, and in other ways represent the chief. Ahupua‘a were economically self-sufficient to some degree, although differences in the local resource base (agricultural land, water resources, stone for tools, and so on) resulted in differences in the production patterns of individual land sections. Within the ahupua‘a, there were yet smaller sections and divisions, especially the ‘ili and mo‘o, which were held and worked by extended households or groups of commoners.

According to Handy and Handy (1991), for the purpose of taxation, the chief political subdivision of the pre-Contact era was the *ahupua‘a,* which was generally under the management of the *konohiki* (steward or caretaker). The term *ahupua‘a* itself is derived from the fact that each coastal *ahupua‘a* boundary was marked with an altar (*ahu*) which held a carved wooden effigy of a pig (*pua‘a*) head during the Makahiki festival, when harvest tributes (taxes) were offered to the god of rain. Handy and Handy (1991) refer to the lower chief who represented the *ahupua‘a* as *ali‘i ‘ai ahupua‘a*, which translates to English as "chief who eats the ahupua‘a" (1991:48). Yet, according to Malo (1951:142) the *konohiki* was tasked with collecting levies from the *maka‘āinana* (commoners; literally "people that attend the land") of the *ahupua‘a* for the king and of the *ali‘i ‘ai ahupua‘a.* The word *konohiki* is defined by Pukui and Elbert (1986) as the, "Headman of an ahupua‘a land division under the chief; land or fishing rights under control of the konohiki; such rights are sometimes called konohiki rights" (1986:166). Thrum (1924) wrote that the *konohiki* was a local representative or steward of the landlord owner whose privileges and duties were, "…practically those which go with that position in any land and in common with his brethren today in Russia or Ireland he had his failings and was not always popular among his fellows…" (1924:60).

Handy and Handy (1991) liken the *ahupua‘a* tenure system to western share cropping, where "sharing between the chief and tenant was comprehensive and reciprocal in benefits" (1991:48). Kirch and Sahlins (1992) delve further into the social dynamics of the *ahupua‘a* in their historical ethnography, *Anahulu: The Anthropology of History in the Kingdom of Hawai‘i, Volume One*. Kirch and Sahlins (1992:17) state the following about variations in land use in the ancient *ahupua‘a*:

> Economically more highly valued, the coastal areas were also generally preferred for chiefly residence. Here were the most extensive wet taro lands, offshore and onshore fish ponds, as well as access to the sea and the fishing and surfing that in Hawaii were sports of kings. Still, the uplands were also necessary for the Hawaiian existence. In addition, to things mentioned by Lyons, people were specifically dependent on the uplands for the timber and thatching of their houses; the materials for their canoes, bowls, weapons, images, agricultural tools, and other objects using hardwoods; rope, line, fishnetting; lighting (from

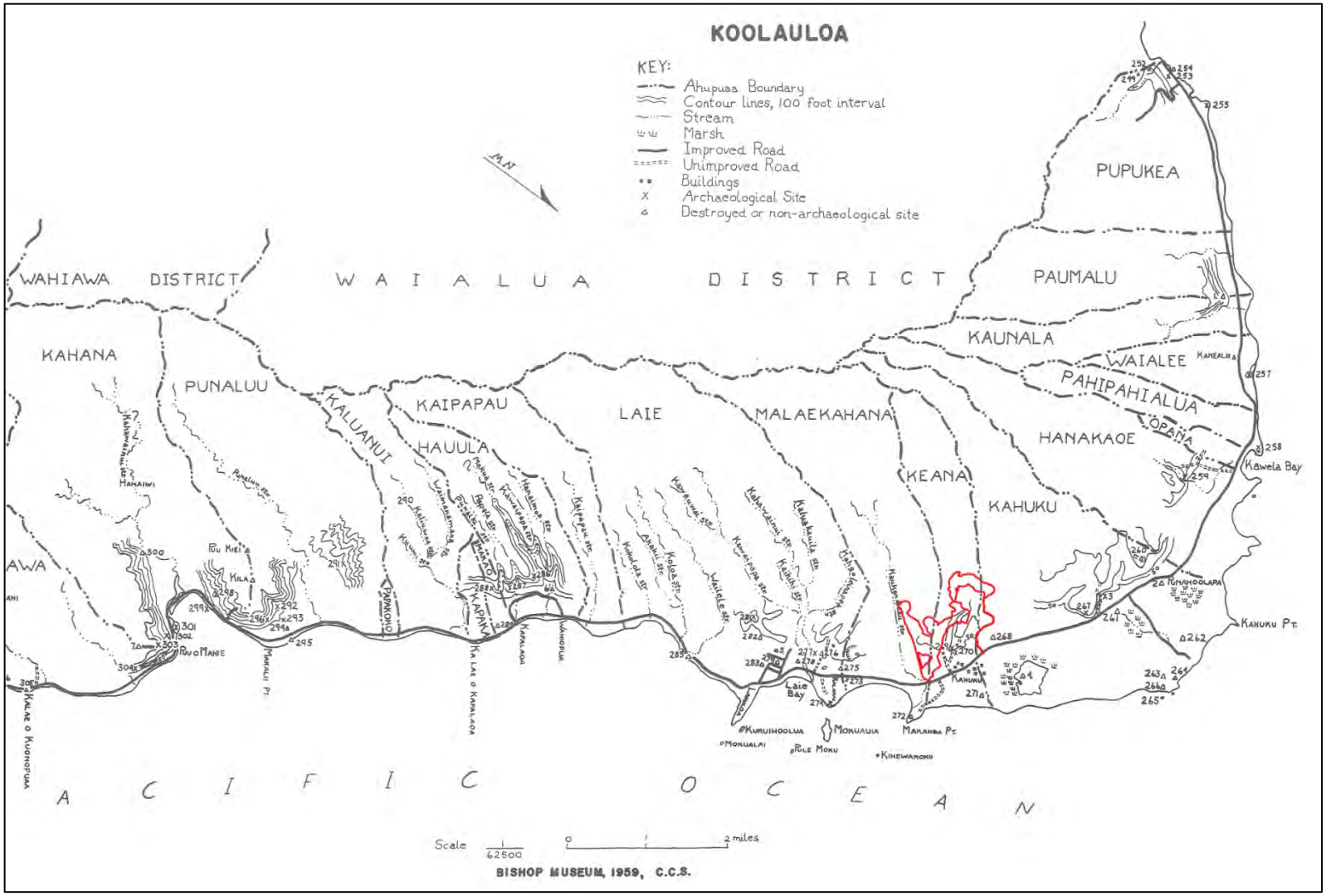

Figure 3. Sterling and Summers (1978) map of Koʻolau Loa showing approximate location of project area.

> candlenuts); pasture for domestic animals (in the nineteenth century); various fruit trees; and more (Kirch and Sahlins 1992:19).

Thus, resources needed for daily life were best grown in or collected from the habitats that they were best suited for and likely distributed, through trade, gifting, or taxes, from *mauka* to *makai* or vice versa within the *ahupuaʻa*. Further evidence of this is found in the archaeological record, where most upland habitation features in the area contain significant amounts of marine shell and fish bone in midden deposits, which suggests that people inhabiting the *mauka* areas of the *ahupuaʻa* had a steady diet of marine resources (Jensen 1989; Williams and Patolo 1998).

3.1.3 Traditional Hawaiian Land Divisions

The pre-Contact economy of the Hawaiian Islands was based upon agricultural production that worked within a tiered system of land divisions (Lyons 1875; Malo 1951; Handy and Handy 1991; Kirch 1985; AKAC 2010). In 1875, Curtis J. Lyons, the distinguished surveyor published an article in *The Islander* on land issues, which identified the *ahupuaʻa* as the principal subdivision in a *moku* (district). In this article, he states:

> ...Its name is derived from the *Ahu* or altar; (literally, pile, *kuahu* being the specific term for altar) which was erected at the point where the boundary of the land was intersected by the main road, *alaloa,* which circumferenced each of the islands. Upon this altar at the annual progress of the *akua makahiki* (year god) was deposited the tax paid by the land whose boundary it marked, and also an image of a hog, *puaa,* carved out of kukui wood and stained with red ochre. How long this was left on the altar, I do not know, but from this came the name, *ahupuaʻa,* of the pile of stones, which title was also given to the division of land marked thereby…(Lyons 1875:103-104).

The islands are divided into several sections called *moku* (districts), in which are particular subdivisions referred to as *ʻokana* (a portion) or *kalana* (a division) (Lyons 1868:67-68; Malo 1951:16-17). According to Curtis J. Lyons (1868) in *Nūpepa Kuakoa*, these units are further divided into *ahupuaʻa*, which are the main units of traditional Hawaiian land division. Within *ahupuaʻa* are *ʻili*, followed by *ʻili paʻa, ʻili kūpono, ʻili lele, lele, moʻo, moʻo ʻāina, paukū, kīhāpai, kōʻele,* and *kuleana* (Pukui and Elbert 1986). However, in some cases, the *ʻili kūpono* or *kū* were a type of sovereign *ʻili* within an *ahupuaʻa* that were not made to pay tribute to the chief (Thrum 1890:106). Within the *paukū* are dry land patches, referred to as *kōʻele*, *hakuone*, and *kuakua* (cultivated specifically for the chief; listed from smallest to largest). In general, high elevations or mountains are called *mauna,* but mountains or mountain summits located centrally on the island are termed *kuahiwi*, while the peaks or ridges on top of the *kuahiwi* are called *kualono.* In 1868, Lyons continues to describe the geography of the typical *ahupuaʻa* as well as the Hawaiian names for these geological features, stating:

> The place where trees are small below the fern belt is termed kuahea (hillock section); below it is the wao (wild place), also called waonahele (wilderness) and wao eiwa (ninth wilderness). The place where trees grew taller below the wao eiwa is the wao maukele, and a little below it again is the waoakua (spirit region) ; next below that is where voices increase and, hence, called wao kanaka (people's sphere), because there the people cultivate food. Below that is apaa,

> and next is ilima (where this plant of the Sida genus is found), and below it is pahu (stake or land mark). Below pahu is kula (open country) adjoining habitations, and seaward of the village is the shore, where it joins the sea. Such was the island divisions by the ancient people of Hawaii.
>
> …Places that stand high up in this and that locality are called puu (mounds or peaks) ; if they stand in a row they are a lalani puu, or pae puu (a line or range of peaks or hills)…High places of the earth lying narrow is a lapa (ridge), or kua lapa (shoulder ridge). If the ridges are many they are called olapalapa (rough protuberances). Deep places lying lengthwise are called kahawai, awawa, or owawa (streams, valleys or ditches). Lengthy, solitary places are called alanui (roads), and kuamoo (paths), and if it continues circuiting the island it is a highway. In places where the path is steep it is called piina or hoopiina (ascending path), kooku (hill slope), and auku (up hill road). Descending paths are termed ihona, alu, kalua, and hooihona, and the place where men would rest is oioina (a resting place). Places where water flows continually are streams (kahawai). Inland places are kumu (source) and seaward places are called nuku (point or outlet). Where water is led to places of cultivation, that is called an auwai (watercourse); where the water joins the sea is a muliwai (river) ; waters borne within the land are lokos (lakes or ponds) (C.J. Lyons 1868 as cited in Thrum 1921:67-68).

Perhaps the ancient Hawaiians created names for an array of topographical features and slight variations within the *ahupuaʻa* as a way to help keep the dynamic *mauka-makai* economic structure organized.

The names of the three *ahupuaʻa,* Kahuku, Keana, and Mālaekahana, in which the project area are located within each have traditional meanings. According to Pukui et al. (1974:67) Kahuku literally translates as "the projection" and is the name of a village, land division, northernmost point, golf course, ranch, schools, forest reserve, as well as surfing beach on Oʻahu. Keana literally translates into English as "the cave," according to Clark (2002:177), perhaps due to the fact that one of its most prominent sites is an ancient rock shelter (Site No. -270) known as Keana Cave (McAllister 1933:233; Sterling and Summers 1978:154). Mālaekahana Ahupuaʻa, which is named after the mother of legendary figure, Lāʻie-i-ka-wai, is also the name of the large bay and stream found within the land division (Pukui et al. 1974:143).

3.1.4 Traditional Names of Topographical Features

The Nā Pua Makani Wind Project lands are within Kahuku, Keana, and Mālaekahana Ahupuaʻa. The great majority of the project area is within the *kula* (plains/fields) and *wao* (upland) areas of Keana and Mālaekahana Ahupuaʻa. Several culturally significant landmarks and noted topographical are located in and around the Nā Pua Makani Wind Project lands. These landmarks possessed Hawaiian names in the pre-Contact era, which were based on distinguishing characteristics, *moʻolelo*, or traditional use of the area. These traditional names are seldom used to refer to these landmarks in the modern era.

Kahuku Ahupuaʻa covers the largest area and has a relatively large amount of noteworthy topographical features as well as an extensive mythological background. Due to the fact that only the northwest extreme of the project area is located in Kahuku Ahupuaʻa, noteworthy

Kahuku traditional landmarks within the southern half of the *ahupuaʻa* will be mentioned in this study. Only two landmarks within the southern half of Kahuku Ahupuaʻa were found to have traditional names. Punamanō, which translates as "shark spring," is a spring-fed wetland located a little more than one kilometer north of the project area (Clark 2002:310). Also within the southern portion of Kahuku Ahupuaʻa is Kaauhelemoa Fishpond (Site No. -268), which was an ancient fishpond named after its *moʻo* (guardian), named Kaauhelemoa. This fishpond was once located only several hundred meters west of Kahuku Village. According to legend, "Kaauhelemoa was half man and half chicken, a being of supernatural power who could change himself at will into a man or a chicken" (McAllister 1933 as cited in Sterling and Summers 1978:152). Before being destroyed for sugarcane cultivation, the pond was said to have been fed by a spring (ibid). McAllister (1933) holds that Kiʻi Wetlands, also referred to by some as Kahuku Fishponds, was always simply a swamp and never used as a fishpond (ibid.). Kiʻi Wetlands, now a National Wildlife Refuge, is located just under two kilometers north of the project area.

In Keana Ahupuaʻa, northwest of Makahoa Point is a noted fishing ground, referred to as Kaluahole, which translates as the "pit, or cavern of the ahole fish" (Clark 2002:155; Pukui et al. 1974:78). The *āhole* (Hawaiian Flagtail; *Kuhlia sandwicensis*), is described by Titcomb as "a common shore fish" that inhabits the coral and lava caverns of the reef when mature (1972:59). North of Kaluahole is Kaʻohana, or "the family," which is a calcareous sand beach near the Japanese Cemetery (Clark 2002:161). The coastline fronting the Kahuku Golf Course was traditionally referred to as Keoneʻōʻ io, or "the ʻoʻio sands," where *ʻōʻio* is the Hawaiian word for *Albula vulpes,* commonly known as bonefish (Clark 2002:137). This is also the traditional name for the channel that is most suitable for swimming in the area. Pōlou is the name of a pool of water that once existed *makai* of the Kahuku Mill, recorded by McAllister (1933) as Site No. -271 (as cited by Sterling and Summers 1978:154). This pool was said to have been the anchoring spot where the fabled "floating island" of Kahuku attaches to the rest of the island of Oʻahu (ibid.).

Mālaekahana has also been referred to in local mythology. Less than 800 meters *makai* (seaward) of the project area is Makahoa Point, which is located on the north coast of Mālaekahana Ahupuaʻa. The beach ends at the south end at Makahoa Point in Mālaekahana Ahupuaʻa. Makahoa translates to English as "friendly" or "a companion" according to Pukui et al. (1974:140) and Clark (2002:228). Where the mouth of Keaʻaulu Stream pours into Mālaekahana Bay marks the boundary Keana and Mālaekahana Ahupuaʻa. The name Keaʻaulu means "the growing root," (Pukui et al. 1974:100), which may indicate that traditional Hawaiian agricultural practices likely occurred along Keaʻaulu stream and gulch. Also in Mālaekahana Ahupuaʻa is Site No -275, referred to as Waiʻāpuka, which is a pool mentioned in the legendary story of Lāʻie-i-ka-wai and was said to be the opening of a subterranean cavern with fresh spring that a person could swim underwater for a great distance prior to it being filled in with sediment in the historic era (Sterling and Summers 1978:155). This site is located approximately 1.5 kilometers to the south of the project area.

3.1.5 Traditional Names of the Winds of Koʻolau Loa

Traditional Hawaiian stories and legends (*moʻolelo*) have been told and retold; shortened and changed; published in turn-of-the-century Hawaiian language newspapers; and collected for

books. In 1902, Moses Kuaea Nakuina published *Moolelo Hawaii o Pakaa a me Ku-a-Pakaa, na Kahu Iwikuamoo o Keawenuiauni, ke Alii o Hawaii, a o na Moopuna hoi a Laamaomao* wherein he retold a "traditional legend collected from various sources, edited, and expanded" (Nakuina 1992:vii) upon in order to preserve its knowledge. In 1992, an English version of Nakuina's *moʻolelo* was published as *The Wind Gourd of Laʻamaomao: The Hawaiian Story of Pākaʻa and Kūapākaʻa, Personal Attendants of Keawenuiaʻumi, Ruling Chief of Hawaiʻi and Descendants of Laʻamaomao*, with the translation done by Esther T. Mookini and Sarah Nākoa.

This moʻolelo retells the story of Pākaʻa and Kūapākaʻa, who were personal attendants to the ruling chief of Hawaiʻi, Keawenuiaʻumi. Pākaʻa was the son of a Hawaiʻi Island aliʻi, Kūanuʻuanu, and Laʻamaomao, a "cherished keiki, brought up with care and refinement" in a family of status on Kauaʻi (Nakuina 1992:2). Before the birth of his son, Kūanuʻuanu returned to Hawaiʻi Island and Laʻamaomao was shunned by most of her ʻohana and left to care for Pākaʻa alone in a cave by the beach. When Pākaʻa was a boy, he pestered his mother, always asking 'who is my father?' When Laʻamaomao finally answered she told him, "as for your real father, you must look for him. I'll tell you this: to find him, you must look to the east, where the sun rises and a certain local wind blows. Your father lives there." Pākaʻa determined that he would search for his father when he was "old enough to travel the seas between the islands" (Nakuina 1992:2).

As he grew up, Pākaʻa worked hard to help his mother and learned the ways of a fisherman. Pākaʻa was clever and determined and when he learned that an *aliʻi* of Kauaʻi would be touring the islands, he asked his mother's permission to join the traveling company. "'ʻAe, go,' said his mother. 'But go with humility and modesty;…and when you arrive in the presence of Keawenuiaʻumi, you'll know you've arrived at the place where your father lives'" (Nakuina 1992:14). Then:

> Laʻamaomao lifted the lid of a large calabash and took out a small, long, highly polished gourd in a woven bag. The gourd was covered securely. She turned to her keiki and said, "I'm giving you this gourd which belonged to your extraordinary kupunawahine for whom I was named. Her bones are inside the gourd. While she was alive, she controlled all the winds of the islands-she had them under a supernatural power. She gathered all the winds and put them into this gourd, where they're still kept. She memorized one by one the names of all the winds from Hawaiʻi to Kaʻula. On windless days, she could remove the cover and call out the name of a wind, and the wind in this gourd would blow. This gourd, called 'the wind gourd of Laʻamaomao,' was famous.
>
> Before she died, she entrusted me to put her bones inside this gourd and care for them until I had a child. Then I was to give the gourd to the child to watch over. You're my only child, so now I'm giving the gourd to you. You must look after it according to the wishes of your extraordinary kupunawahine.
>
> You must care for this gourd because it has been handed down from the kupuna. This gourd has great value-you may not think so now, but when you sail with the aliʻi and arrive at an area where no wind blows and the canoes are becalmed, say that the winds are at your command; all you have to do is call, and the winds will blow.

> When you're laughed at, remove the lid of the gourd and call for a wind. The wind will blow and bring the canoes to shore. The aliʻi will be grateful to you, and you'll be loved and valued by him.
>
> Before Pākaʻa sailed off, Laʻamaomao taught him the names of all the winds, along with the prayers, songs and chants concerning them, and when she was done, Pākaʻa had memorized everything. Then he took the wind gourd and tied it with a cord he had made, prepared his other things for the voyage, and left home (Nakuina 1992: 14-15).

The "grand traveling company" landed first at Waikīkī and from Oʻahu, then continued on to Molokaʻi, Maui, and eventually, Hawaiʻi Island, where he found his father in the chief's court (Nakuina 1992:15). He trained under his father, Kūanuʻuanu, to become a *kahu iwikuamoʻo* (personal attendant). When his father died, Pākaʻa took on the role of *kahu* for the old *aliʻi*. There were those jealous of Pākaʻa's position and skill and eventually, he fell out of favor with the old *aliʻi* and his court. Pākaʻa left Hawaiʻi Island, taking the wind gourd his mother had given him, and sailed to Molokaʻi where he met and married Hikauhi. They had a son named Kūapākaʻa, who was dutiful and learned all his father had to teach (Nakuina 1992).

Many years after Pākaʻa left Hawaiʻi Island, the old *aliʻi* became tired of the poor service and greedy manners of his *kahu* and went in search of Pākaʻa. Word traveled that Keawenuiaʻumi was searching for him, so Pākaʻa and Kūapākaʻa "gathered their supplies for catching uhu…took along with them the wind gourd of Laʻamaomao" (Nakuina 1992:30) and paddled out in their fishing canoe to await the entourage of his *haku* (master, lord). A fleet of canoes ladened with the people of Keawenuiaʻumi's court was approaching and each time they encountered a canoe, Kūapākaʻa would ask his father, 'Is this perhaps my haku?' and Pākaʻa would reply, 'It is not your haku' (Nakuina 1992:33). Kūapākaʻa asked that same question throughout the night and finally Pākaʻa said, 'When you see the first rays of the sun, you'll see your haku' (Nakuina 1992:33). At first light, Pākaʻa ordered Kūapākaʻa to call out to his *haku*, and the *keiki* began to chant:

> The canoe is yours,
> Great Hawaiʻi of Kāne,
> Great Hawaiʻi, land of the sun,
> The sun emerges, emerges,
> The sun emerges at Haʻehaʻe,
> With a strong affectionate love for my haku,
> Not my real haku,
> But a companion of the giddy sun,
> The Kona sun without food,
> Its loved one has arrived,
> Arrived along with Hilo of Kāne,
> Hilo of Kāneakapu,
> Hilo, land of Kanilehua,
> Beloved companion of Keawenuiaʻumi mā,
> There sits Keawenuiaʻumi,
> The canoe is yours
> (Nakuina 1992:37-38).

Once greetings were exchanged, the *keiki*, Kūapāka'a, asked Kahikuokamoku, the Kuhina Nui, to bring the canoe fleet ashore, because, "'Tomorrow is a calm day for sailing; today will be stormy: there are thick cumulus clouds resting above Kawainui and the ridge of Wailau; when these clouds are blown with full force, a terrible storm will rage; when the clouds are at rest again, then good weather will follow'….There were no clouds yet-only the clouds in the wind gourd" (Nakuina 1992:38). The Kuhina Nui asked, "how is it a calm day like today can be a bad day for sailing? The sky is clear, the mountain tops are exposed, and the banks of clouds are asleep at the horizon" (Nakuina 1992:39). Kūapāka'a responded, "This will be a stormy day, a windy day. You came here from Hawai'i with the winds from there; Hawai'i is a windy land and they blow here from behind you." The Kuhina Nui challenged Kūapāka'a, a *keiki* of Moloka'i, on his knowledge of the winds of Hawai'i Island. Kūapāka'a chanted the names of the winds for the west side of the island; he chanted the names of the winds for the east side of the island. Kahikuokamoku asked his advisers if it would storm and they contradicted Kūapāka'a. Encouraged by a look from his *haku*, Kūapāka'a chanted the rest of the names of the winds of Hawai'i (Nakuina 1992). Kahikuokamoku answered:

> "The ali'i's canoes won't go ashore with you, ē ke keiki. These winds you've called out belong to Hawai'i. They blow over the sea of 'Alenuihāhā and die out there. The winds of Hawai'i won't reach here."
> Kūapāka'a said, "Since you deny the winds of Hawai'i, here in front of you is O'ahu, another windy land."
> Kahikuokamoku said, "Let's hear the names of the O'ahu winds."
> Kūapāka'a chanted the winds of O'ahu:
>
> There are our clouds, my father's and mine,
> Covering the mountains;
> The clouds rise with a sudden shower,
> The whirling winds blow,
> The source of the storm of the keiki,
> Ku a ē-ho is at sea
> From the sea, the storm comes sweeping toward shore,
> The windward Kui-lua wind churns up the sea,
> While you're fishing and sailing,…
>
> …The sea wind blows hard,
> Mālualua comes from the northeast,
> Peapueo is of Kaunala,
> Ahamanu is of Kahuku,
> Lanakilia is of Hau'ula,
> Moa'e is of Punalu'u,
> 'Āhiu is of Kahana,
> Holopali is of Ka'a'awa and Kualoa,…
>
> …The Kona winds turn, the Ko'olau winds turn,
> The winds will turn before you and find you,
> You will be overwhelmed, O deaf ali'i,
> The winds will gather,
> The na'ena'e leaves will bend,
> You'll be swept ashore at 'Awawamalu,
> Caught in the fishing net of the head fisherman,
> Your thigh bone and upper arm bone

Will be made into fishhooks,
To catch pāoʻo and ʻōpakapaka,
Your flesh will be without bones,
The black crab, the shearwater will eat your remains,
The life from the parents will be broken off,
Here I am, the ʻaumakua kanaka,
Listen to my life-giving words,
Keawenuiaʻumi, come ashore, a storm is coming,
When you sailed yesterday, it was calm.[1]
After the winds of Oʻahu had been named, the kānaka were uncertain: they didn't believe fully in the keiki's words, yet they were afraid that the words might be right and that some of them might die at sea... (Nakuina 1992:42-44).

The tale continues, Pākaʻa urging Kūapākaʻa to call out the names of the winds of Kauaʻi; chant of the destruction to be caused by the wind; call out the names of the winds of Maui and Molokaʻi; and chant of terrible storms and rough seas. Pākaʻa had a plan of revenge that required the *aliʻi*, who had blackened his name to Keawenuiaʻumi, go ashore. At that time, Pākaʻa would then be reunited with his *hānai* (provider). In the end, "Pākaʻa was victorious over his enemies who had come between him and his hānai. With the help of Kūapākaʻa, his keiki, Pākaʻa returned to enjoy the comforts and honors and carry out the responsibilities of an aliʻi of Hawaiʻi" (Nakuina 1992:106).

According to Handy and Handy (1991), the gourd is a personification (*kino lau*) of Lono, the Hawaiian god of agriculture and fertility. "Lono is the gourd; the cosmic gourd is the heavens whence some winds, clouds, and rain" (Handy and Handy 1991:220). In a rite called the "Gourd Prayer" (*Pule Ipu*), a male child was blessed in order that he grow with the vigor of the gourd vine. Lines in the *Pule Ipu* refer to the gourd Lono-kui-kui, Lono-the-punisher, and his wife, Ka-papa-ia-kea, who bore him 12 children. They "dwelt in an underground cavern (*lua*), in which grew famous gourds (his children)….One of these gourd-children…was undoubtedly the great wind-gourd named Laʻa-maʻo-maʻo. Laʻa-maʻo-maʻo (Distant-Laʻa), or Ka-ipu-makani-a-Laʻa-maʻo-maʻo (the-wind-gourd-of-the-far-away-heavens-of-Laʻa) was a name for the sky and its horizons whence come the winds and rains" (Handy and Handy 1991:219-220).

In consonance with the *moʻolelo* of the Wind Gourd of Laʻamaomao, there is only one named wind within the project area. It is the Ahumanu wind of Kahuku. "Ahu" (lit. to gather or collect) and "manu" (the general name for fowls or the feathered tribe) together literally mean bird gathering or gathering of birds (Andrews 1865; K. Cleghorn, personal communication 2015) suggesting that birds, and possibly bird hunting/gathering activities, were common in the area.

[1] One of the greatest fears of the *aliʻi* was the desecration of their bones by fishermen who used human bones to make fishhooks. The *mana* (spiritual power) of a person resided in the bones, and this *mana* could be passed on to descendants only if the bones were taken care of. (Thus Pākaʻa carries the bones of his grandmother Laʻamaomao with him in his gourd.) Fishermen preferred the thigh bone and upper-arm bone for making hooks. If they were lucky enough to find a corpse at sea or washed ashore, they baked it in an *imu* and stripped off the flesh. Sometimes the flesh was used as bait to catch *niuhi* (tiger shark); or it could be left to scavengers, such as crabs and sea birds.

3.1.6 Moʻolelo of Kahuku, Keana, and Mālaekahana Ahupuaʻa

Each *ahupuaʻa* in which the Nā Pua Makani Wind Project lands are located has a traditional background from the pre-Contact era. Ancient *moʻolelo* for each *ahupuaʻa* helps to explain their traditional names, what kinds of natural resources were found within, what stories and mythological figures are associated with them, as well as the chronicles and conflicts may have occurred there. These facets of the cultural landscape help to provide a connection for modern day cultural practitioners to the land and their ancestors who dwelt in these *ahupuaʻa*. In addition, traditional *moʻolelo* about each *ahupuaʻa* is integral to understanding the cultural, historic, and spiritual significance of these lands.

Kahuku Ahupuaʻa

The name Kahuku appears to be used not only as the name of an *ahupuaʻa* and village, but as a district or place name for the area roughly between ʻŌʻio and Keana Ahupuaʻa. Of the three *ahupuaʻa* represented in the project area, Kahuku has the most extensive traditional and mythological background.

Traditional accounts of natural resources and environmental conditions are relatively abundant for the *ahupuaʻa* of Kahuku. Traditional land use in Kahuku is also made apparent through legend. The landscape of Kahuku appears to have had several configurations, from the pre-European contact era to the present. During Hawaiian settlement prior to the arrival of Europeans, many parts of the landscape were used for traditional agriculture, habitation, and ceremony, varying from intense to moderate. In the early European Contact period, a good portion of the land lay fallow due to severe population decline and was overgrown in some areas with exotic plant species. Thus, there are several conflicting accounts of what the landscape was like and how it was used prior to European contact. Several themes are tied to Kahuku's landscape, including its abundance of *hala,* or pandanus, and its importance to ancient Kahuku's cultural identity.

Fresh water springs were mentioned in several traditional accounts of the Kahuku area. For instance, in the tale of Makanikeoe, the celebrated adventurer, Makanikeoe stopped at Punahoʻolapa, "a deep spring on the plain of Kahuku," where he found the spring that the legendary *kapa* anvil fell into and ended up in Waipahu, at ʻEwa (Maly and Maly 2003:91). Subsequently, Makanikeoe "crawled along another path" arriving at another Kahuku spring known as Punamanō (ibid.). A lone rock here, Kū's Rock Spring, was said to give forth pure spring water (Sterling and Summers 1978:153). Further, Handy (1940:88), disclosed that a spring, referred to as Kaainapele Spring, was located *mauka* of the Kahuku Ranch house.

Agricultural terraces were also said to exist in northern Kahuku in the pre-European contact era, which was made possible with the presence of natural springs (Handy 1940:88). There is some debate, however, on the origin of these terraces, where some informants claim that the terraces pre-date European contact and were used in the late 19th Century by the Chinese for rice paddies and some claim that the terraces were built by the Chinese for this purpose (ibid.). On the district of Koʻolau Loa in general, Hall (1839) states that, "…much taro land now lies waste, because the diminished population of the district does not require its cultivation," which upholds the abandonment of taro patches in various locations in Koʻolau Loa due to population decline (as cited in Sterling and Summers 1978:148).

The presence of fish and fishing practices of pre-Contact Kahuku are recalled in legends. In the legend of Kaneaukai, as told by Thrum (1976:254) from April through July, schools of mullet, or ʻ*anae-holo*, and surgeonfish, or *āa,* move from Maui to Waimea, passing by Kahuku. Further, in the tale, *Two Fish from Tahiti*, Westervelt (1915:138-140) alludes to *kapu* being placed on the catching and eating of certain species of reef fish associated with the Tahitians that fell victim to cannibalism in this story. The story of Punamanō Spring in Kahuku eludes to locals net fishing at the beach at night, which is telling of traditional fishing methods used in Kahuku (Sterling and Summers 1978:150). The story of Kūkiʻo Pond holds that the pond was once much larger and had contained a variety of fish. This story suggests that these natural ponds were utilized as brackish water fish ponds in ancient times.

Numerous proverbs, prayers, and *mele* about Kahuku in general elude to its abundance of *hala*, or pandanus trees. Pukui (1983:248) recites the proverb, *Nani i ka hala ka ʻōiwi o Kahuku*, which translates to, "the body of Kahuku is beautified by hala trees." In Fornander's translation of the prayer of Kualiʻi, Kahuku is described as a *hala* tree (Fornander 1917:28). Thrum (1919) also associates pandanus with Kahuku in his translation of Comparison of Kualiʻi, in the following lines:

> …Not like the paua [clam or abalone] which cuts the pandanus,
> To weave its blossoms at the social gatherings,
> That was the knife to cut Kahuku's pandanus.
> [He is] Not like these.
> (Thrum 1919:459)

This *mele* compares Kualiʻi with a host of euphemisms that often call upon various localities and objects often associated with them. In a section titled: "Various Heathen Prayers," Fornander (1920:46-51) translates an untitled prayer with a line that states: "He hala o Kahuku…" which Fornander interprets as, "Full of pandanus is Kahuku…" (1920: 50). Intending to win back the affections of his wife, Halemano, composed a chant that referring to the *hala* trees of Kahuku, stating:

Ku au nana I laila,	I stood and gazed, then
Haloiloi Kuu waimaka e uwe,	Tears filled my eyes causing me to weep.
Nani na hala ka oiwi o Kahuku,	How beautiful are the hala, native trees of Kahuku.
I ka lawe a ka makani he mikioi	As they are being fanned by the Mikioi wind.
	(Elbert 1965:281)

Another tearful sentiment about the *hala* of Kahuku comes from the tragic tale of Kaopulupulu, who's failed prophecy sealed his death warrant in the time of Kahahana. According to Thrum (1912:210):

> …In the morning, ascending a hill, they turned and looked back over the sea-spray of Wailua to the swimming halas of Kahuku beyond. Love for the place of his birth so overcame Kaopulupulu for a time that his tears flowed for that he should see it no more (as cited in Silva 1984:C-4).

Further, Apuakehau wrote in the Hawaiian newspaper, *Kuokoa*, in 1922 that "the first Kahuku" was covered by a *hala* grove (as cited in Sterling and Summers 1978:149). The association of *hala* with Kahuku is even repeated in the traditional Hawaiian myth of Pele and Hiʻiaka (Silva 1984). In this portion of the myth, while Hiʻiaka is in Kahuku (Kahipa), she rebukes two bad-mannered individuals, Puna-heʻe-lapa and Pahi-pahi-alua, who did not pay her the proper respects by stating:

> We enter the fragrant groves,
> Hala groves whose heads make a calm,
> Wild growths by the sea of Kahuku,
> But what, indeed are your halas?
> Shall their murmur forbid you speech?
> Make you dumb to my salutation?
> I make this kindly entreaty
> To you who sit in the grove
> (Emerson 1915:97-8 cited in Silva 1984:C-5).

Silva (1984) adds that Emerson (1915) gathered that there was some word play in the chant, where the word "*hala*" stood for the pandanus tree as well as a fault or a sin. As late as the late 1820s, Chamberlain holds that the Kahuku area was "beautified with lauhala and some other trees" in his manuscript, "Trip Around Oahu in 1826" (as cited in Sterling and Summers 1978:149).

The wearing of *hala*, in the form of plaited *lau* (leaves) *hala* or *leis* made of the *hala* fruit/seed was a way in which the people of Kahuku represented their homeland. In the tale of Kalelealuaka, the strong and brave young warrior who fought for King Kakuhihewa, went to Kahuku and fashioned wreaths of pandanus fruit and sugarcane to disguise himself. He then was able to convince the King's marshal, who was disabled, that he was from Kahuku and that he would carry the marshal to his destination. As a reward, the marshal granted Kalelealuaka the district of Koʻolau Loa for his services (Thrum 1976:100). Cummins (1913) also calls the Kahuku area as "land of the hala tree" and stated that people should not leave Kahuku for Waimea or Waialua without a wreath of Hala-fruit (as cited in Sterling and Summers 1978:149).

Kahuku was infamous for several other landmarks that stand out in Kahuku's cultural and physical landscape. Some legends explain the occurrence of these distinctive natural features, such as the tale relayed by Pukui et al. (1974:67) where, Lono-ka-ʻeho (Lono the stone), who is described as a chief with eight stone foreheads, severed Kahuku Point from the island. Emerson (1909) translates the verses of a *hula* that describes a few of these landmarks of Kahuku in a rather colorful way. He preludes the translation with the quip, "Whether there is any

connection between the name of the hula—breast-beating—and the expression in the first verse of the following mele is more than the author can say." The verses for this *hula* are translated by Emerson into English as:

> 'Tis Kahipa, with pendulous breasts;
> How they swing to and fro, see-saw!
> The teeth of Lani-wahine gape—
> A truce to upper and lower jaw!
> From Lihue we look upon Ewa;
> There swam the monster, Miko-lo-lou,
> His bowels torn out by Pa-pi'-o.
> The shark was caught in grip of the hand.
> Let each one stay himself with wild herbs,
> And for comfort, turn his hungry eyes
> To the rustling trees of Lei-walo.
> Hark! The whistling-plover—her old-time seat,
> As one climbs the hill from Echo-glen,
> And cools his brow in the breeze.
> (Emerson 1909:206)

Emerson goes on to say that, "The thread of interest that holds together the separate pictures composing this mele is slight. It will, perhaps, give to the whole a more definite meaning if we recognize that it is made up of snapshots at various objects and localities that presented themselves to one passing along the old road from Kahuku, on O'ahu, to the high land which gave the tired traveler his first distant view of Honolulu before he entered the winding canyon of Moana-lua" (ibid.). He adds that Kahipa is the name of a fabled female character, which was then applied to a locality in Kahuku where the mountains resemble two female breasts. Further, he describes Lani-wahine as, "A benignant *mo'o*, or water-nymph, sometimes taking the form of a woman, that is said to have haunted the lagoon of 'Uko'a, Waialua, O'ahu" (ibid.).

Another tale of the distinguished promontory, referred to as Kalaeokahipa is as follows:

> Nawai-o-lewa is on the northwest side of the rocky brow of Kalaeokahipa and now only one breast is left to move in the gusty winds of Kuhuku-lewa. The other was broken off by that supernatural son of Ku and Hina…Between Kalaeokahipa and Nawaiolewa, just above is a small round opening to a secret cave…The small secret cave belonged to Kaalae-huapi (Red head mud hen) and others in the first Kahuku that was covered by a hala grove (J.K. Apuakehau, Kuokoa, June 29, 1922 in Sterling and Summers 1978:152).

Sterling and Summers (1978:151-2) list numerous historic references to Kalaeokahipa, most enlisting the use of the word "breast(s)"to describe the peak(s).

Also of note are the harsh currents and surf of Kahuku's coasts, which are mentioned in *The Birth Chant of Princess Bernice Pauahi Bishop,* as translated by Ahuena Taylor, which follows:

> …Who builds the heat, the oven, until the long fires
> Become like a wild sea.
> From "Kama" to "Waialua."
> And comes close the head lands of "Kahuku,"

> And the hawk-like scratching sea of "Kahuku,"
> The night was spent at "Waialua,"
> For a voice was at the sea of "Ewa."
> Listening for the response.
> Respond! Oh Heavenly one…
> (Kanahele 2002: 223-226)

This chant lends a rather rough image to the coast of Kahuku.

Kamakau (1964) tells of a famous hiding cave, referred to as Pohukaina, thought to be a considerable distance *mauka* of the Turtle Bay Resort area. This cave, which had an entrance in Kahuku, is described by Kamakau:

> The mountain peak of Konahuanui was the highest point of the ridgepole of this burial cave "house," which sloped toward Kahuku. Within the cave are pools of water, streams, creeks, and decorations by the hand of man (*hana kinohinoh'ia*), and in some places level land (Kamakau 1964:38).

The great cave of Pohukaina is also said have been the refuge and storage place of "much wealth" for O'ahu's chiefs (ibid.).

Although Kahuku lacked physical evidence of taro terraces along Kahuku Stream, informants interviewed by Handy and Handy in 1991 claimed that there was taro cultivation in ancient times (Handy and Handy 1991).

Hawaiian legend holds that Kahuku was once a floating island blown here and there by the trade winds and is recounted by many sources in several different ways. Pukui (1983) writes of the traditional proverb, *Kahuku 'āina lewa,* which translates as "Kahuku, an unstable land…" and later writes that, "O'ahu, according to legend, was once two islands that grew together. Kahuku is the part that bridges the gap" (Pukui 1983:144). Yet, there are many variations to this legend. In one version, the people of Kahuku grew tired of the moving island bumping against O'ahu, so they fastened Kahuku to O'ahu with fishhooks. McAllister (1933:155) retells this story in great detail:

> A story is told that Kahuku was once a land afloat, wafted about by the winds, drifting over the ocean. Just how it came to Oahu is not told, but old Hawaiians point out to Polou, the place where Kahuku is fastened to Oahu. Formerly it was possible to dice into the pool and when a depth of 40 fathoms was reached, a shelf of rock was found upon which to rest. Forty fathoms deeper Punakea (white line from coral) was reached and on looking toward Malaekahana, the hook by which Kahuku was made fast could be seen. This hook was intricately fashioned of Kawila (Alphitonia excelsior). Seaward of the Waialee Industrial School, in another pool of water, known as Kalou, is the spot where Kahuku is attached to Waialee… (McAllister 1933:155).

In addition, when McAllister (1933) relays the story about Kāne and Kanaloa, one line repeats the common tale that Kahuku was not attached to O'ahu in ancient times, stating that "Kane and Kanaloa lived in the vicinity of the ridge (Kalaiokahipa ridge); but that was at the time

when the Kahuku plain was still under water, and the waves lapped about Kalaiokahipa" (as cited by Wong-Smith 1989:A-2).

Silva (1984) lists several stories of how Kahuku was reattached to Oʻahu. One colorful account holds that the floating island of Kahuku belonged to the *menehune*, stating as follows:

> Ka-hu-ku section of Oʻahu was once a separate island…It was an islet whose people were the Mene-hune, or Dwarfs as they are called today. Many stories are told about the miraculous feats performed by the Little People of ancient Hawaiʻi. It is known, that they always worked from just after sunset until just before dawn.
>
> Legend tells us that Kahuku was a floating island situated several miles out to sea. For a long time, the people of Oʻahu had planned to make the island part of their land, for they saw it come close to Oʻahu's shores. The floating island of the Menehune did not have any fresh water springs because there were no high mountains covered with verdure and trees to capture the rains. So, the Little Folk used to paddle their islet into the bays of Oʻahu at night to haul water from the springs of the large island.
>
> One day, a resident of Kahuku suggested that all the people gather together to make strong hooks of whalebone and attach them to a stout rope made of sacred olonā fibers. This was done.
>
> The Menehune came to take water as usual, then the residents of Oʻahu attached the large hooks to the floating isle while the Menehune started to paddle off again, but they could not move their islet or free it from the ivory hooks and olonā ropes.
>
> Today, many people who travel Kahuku section of Oʻahu and see the many islets seeming to float off shore, and hear the sea singing its songs, they say, 'Listen to the Menehune grumbling while they try to move their island that used to float!'
>
> The rumbling and grumbling is heard only at night, for that is the time for the Menehune to be working at Kahuku. (Paki 1972:53 as cited in Silva 1984:2-3)

Another account of Kahuku being an island was provided by Silva (1984), which also links the locality with a legendary princess, named Lāʻieikawai, and reads as follows:

> Kahuku District, according to legend, was once a floating island blown about by the winds. As it banged against Oʻahu, it made noises which disturbed the old women guarding the princess Laieikawai. The old women grappled the island with fishhooks and attached it securely to Oʻahu. Polou pool on the sea side of the Kahuku mill is one spot where the hook was fastened. The other end was fastened at Kūkiʻo pond 300 feet inland at Kahuku Point (Boswell 1958:68 as cited in Silva 1984:2).

Other versions provide a political motive for uniting the two islands. A portion of the tale of "The Hole of Kahipa and Nawaiuolewa" was told to Mary Pukui by a one-hundred and five year old woman named, Kanui, who described how two ruling chiefs united Kahuku with Oʻahu. In this tale, "the two were brother and sister. In order to make it one, the two sat down and hooked their fingers together and drew them together. The hole marks the place where

they sat (Kamakau Part II, Moolelo o Hawaii, Note 4, Chap 12, as cited by Sterling and Summers 1978:151). Kamakau (1991:38-9) holds that O‘ahu was a floating island, rather than Kahuku. However there are some consistencies with the previously mentioned versions. He writes:

> According to traditions of some people, O‘ahu was said to have once been a floating land, *he ‘āina lewa o O‘ahu*. The Kahuku side was a wide open gap (*puka hāmama*) and this was called *Ka Puka o Kahipa a me Nawaiuolewa*, "The opening of Kahipa and Nawaiuolewa." The piece of land that closed it up was called Kahuku, and the hooks that made fast the piece of land and joined it to the island were called Kilou and Polou (Kamakau 1991:38-39).

Another variation of the story told holds that there was an underground canal or tunnel where the two islands joined. In 1828, Levi Chamberlain, a missionary accountant, tells of a 5-7 mile long by 1-2 mile wide underground canal leading from the sea inland at the convergence of the two islands (Chamberlain 1957:35-36). He reiterated the following in regards to this legend:

> The natives tell a marvelous story respecting the origin of this destrict [sic], which they say floated in from the sea, and attached itself to the ancient shore of the island, that there was a subterranean communication between the sea and the ancient shore, by which a shark used to pass, and make depredations up on the land. The basis of the tract, which is from five to seven miles in length, and from one to two miles in breadth, appears to be of coral; and it was evidently redeemed from the sea, as a good deal of land, in many places along the shore around the whole circuit of the island, evidently has been (Chamberlain 1957:35-6).

McAllister (1933) relays a story about a secret underwater passage way marked by two stones off of Kahuku Point that led to another land referred to as Ulukaa or Kahuna Moku. The story is as follows:

> Two stones known as Kahoa in water about 250 ft. from the beach just opposite from Kalaehila heiau, Kahuku Point. Many years ago a woman who lived on this beach was frequently seen to swim to these stones and disappear. At times she would be gone for as much as a week. Sometimes she was seen to put her clothes in a watertight calabash and swim away. When she returned she usually wore a kou lei. It was finally discovered that this was the entrance to another land, known as Ulukaa or Kahuna Moku (as cited by Silva 1984:A-5).

The theme of an underground canal is echoed in Thrum's (1911) "Legend of the Tapa Log," which largely takes place in Punahoolapa Marsh, located in the southeast corner of the Turtle Bay Resort property and currently a wildlife preserve. Thrum's story is as follows:

> A kapa-beating log of peculiar sound, unlike any other known on the island, which was placed in its waters at the close of the kapa-making season to keep it smooth and free from cracks that would impart an impression to the cloth in its manufacture, was missed, and, believing it to have been stolen, search was made all through the Koolau, Waialua and other districts ‘til at last it was found in use at Waipahu. Recognizing it by its resonant tone, it was claimed by the searching owner, and right thereto by those in possession was vigorously maintained. To test the truth of ownership as claimed, the ‘Ewa people accompanied the

> claimant back to Kahuku to visit the scene and witness a test of the underground stream theory. A bundle of ti leaves were gathered, which was wrapped together and consigned to the waters of Punahoolapa. In the course of a few days they were lost to sight, whereupon the party set out for ʻEwa, and after careful watching, as predicted, the bundle of ti leaves came forth on the bosom of the waters of the Waipahu stream. The kapa log was thereupon recognized as the rightful property of the Kahuku claimant (Thrum 1911:130 as cited in Sterling and Summers 1978:149).

Associated with Kahuku's underground canal are several legends of man-eating sharks, where a shark once traversed to consume people (Chamberlain 1957:35-36). In Handy (1922:111), Manō-niho-kahi (shark with one tooth) is a man who had the power to shape-shift into a shark. This version of the tale presents him as normal looking, except for the shark mouth on his back that he always covered with a cloak of *tapa*. When Manō-niho-kahi found out that people, specifically women, were going to the sea to fish or collect *limu*, he would rush out to where they were and bite them with his single shark tooth, killing them. When the killings became too regular, the chief of the region and his *kahuna* gathered all of his people and ordered them all to disrobe. When Manō-niho-kahi refused to take off his *tapa* cloak, he was stripped, revealing the shark mouth on his back. At once, he was put to death, ending the streak of deaths of women in those waters. Another, albeit less gruesome, tale about man-eating sharks associated with Kahuku is told by McAllister (1933), where a shark was caught and kept as a pet in Punamanō marsh, which is located just east of Turtle Bay Resort lands. The story, as reiterated from an informant's testimony is as follows:

> One time when the people of Kahuku were fishing they caught a small shark. Putting him in a calabash of water they carried him to their houses near the beach. Here he was cared for and put in larger and larger calabashes as he grew bigger. Finally haven outgrown even the largest calabash that could be found, it was decided to place him in one of the pools of brackish water which came to be known as Punamanō. A man and woman living near the pool became guardians. They had lived in their grass huts with a breadfruit tree near the pool and taro and potato patches near the mountains for several years when the brother of the woman came to live with them. Sometime after, the man and his wife went to the mountains to gather taro and potatoes. The brother, who was staying at home, thought that he would like to have some food prepared when the sister and her husband returned. He climbed the breadfruit tree and gathered several, throwing the fruit into the water instead of on the ground, where it would have been bruised in the fall. After picking enough for a few days he descended the tree and gathered most of the fruits from the bank. Two had floated to the middle of the pond and he could not reach them. Now this man knew of the shark that lived in the pool, but he had frequently bathed in the pool and no thought of fear crossed his mind as he swam to the breadfruit. He did not know, however, that his sister and her husband had warned the shark not to allow anyone to steal breadfruit when they were gone. When the sister and her husband returned they could not find brother. Neither was the shark to be found, but they saw the breadfruit floating in the pool and the reddish color to the water. They guessed what had occurred. For nearly a mile they followed the bloody trail until they came to a spring known as Punahoolapa. Not only was the brother never seen, but the shark has never been seen to this day (as cited in Wong-Smith 1989:A-7).

In this case, it appears that the shark was simply looking out for its keeper's interests. Kuapuu (1861) wrote a very similar account of the Punamanō man-eating shark in the *Ka Hae Hawaii* newspaper (as cited in Sterling and Summers 1978:151).

Other supernatural beings and demigods associated with Kahuku are mentioned in Beckwith (1940). On a quest to find his brother, Lono-ka-ehu brought his "great dog" or the dog-man, Kū-ʻīlio-loa (Kū long dog), to Oʻahu from Kahiki. In the search, Kū-ʻīlio-loa "pierced the hill Kāne-hoa-lani at Kualoa, cleft Kahuku and Kahipa apart, and broke Ka-pali-hoʻokuʻi at Kailua" according to Beckwith (1940:321). She later describes Kū-ʻīlio-loa as "a dog with a human body and supernatural power, 'a great soldier and famous warrior,' who terrorizes Kahiki" (Beckwith 1940:321).
Kahuku is also a place where the manifestation of ancient *kapu* law had become a permanent part of the landscape in the form of two stone outcrops. According to Beckwith (1970:48), Kamakau mentioned the story of two stones in the cave of Ke-ana at Kahuku that are said to be the bodies of two boys who disobeyed their mother's injunction to keep silence during a thunderstorm. Kāne-hekili, the god of thunder, is associated with several gods whose names are also suggestive of the phenomenon experienced during thunderstorms, such as Kāne-wawahi-lani (Kāne breaking through heaven) and Ka-uila-nui-maka-kehaʻi-i-ka-lani (Lightning flashing in the heavens). The gods in their humpbacked forms can be seen flying through the air during storms with Na-kolo-i-lani, who are the humpbacked brothers of Pele. According to the ancient *kapu* laws, all containers should be turned bottom side up and people should lie face down without any outcry, for silence is the law of Kāne-hekili (Beckwith 1970:48).

Another well known *moʻolelo* is the Legend of Kamapuaʻa, a supernatural being and a deity attributed to agriculture, rain, and fertility (Elbert 1965:200-1; Maly and Maly 2003:9). While he had the ability to shape-shift into multiple bodily forms (*kino lau*), Kamapuaʻa was most noted for his pig-like appearance. In one of his many exploits, Kamapuaʻa was caught stealing chickens from Olopana, the head chief of Oʻahu at the time. To catch Kamapuaʻa, Olopana enlisted the residents of Kahuku, who capture him, bind him to a pole, and carry him towards Punaluʻu. Upon seeing this, his grandmother, Kamaunuaniho, recited a chant that gave him the power to kill the captors from Kahuku.

In *The Hawaiian Romance of Laieikawai,* the people of Waianae on Oʻahu offered their version of the story, which mentions the high chief who ruled Kahuku named, Kahoʻaliʻi. In this account, Kahoʻaliʻi instructs his son to, "Fly about Oʻahu while I chew the *ʻawa;* before I have emptied it into the cup return to me and rehearse to me all that you have seen" (Beckwith 1918:30). The tale goes on to list the places his son passed on his journey. Further, Kahuku is mentioned in the chant of Kualiʻi as one of the major landmarks of Oʻahu for those travelling to the island from Kauaʻi (Beckwith 1918:30).

In the tale, *Two Fish from Tahiti*, Westervelt (1915:142-144) recounts two great canoes filled with men from Tahiti, referred to as two "fish," journeyed to Oʻahu. The purpose of the journey was to "find the wonderful fire-land of Hawaii about which they had been taught in the stories of returned travelers…" and "…find an appropriate location for a settlement. Possibly they planned to make a permanent home or hoped to meet some good community into which they might be absorbed" (Westervelt 1915:140). Upon their arrival on the shores of Makapuʻu, the

travelers found an "unfriendly coast" and decided to separate and circle the island, with one canoe going north and one going south. Westervelt continues:

> The boat which sailed toward the north found no good resting-place until it came to the fishing-village of Hauula…Evidently there, was dissension and at last a battle. The whole story is summed up by the Hawaiian legend in the saying: "The fish from Tahiti was caught by the fishermen of Hauula. They killed it and cut it up into pieces for food." Thus the visitors found death instead of friendship, and cannibalism was thereby veiled by calling the victims "fish" and the victory a "catch…"
>
> …The second fish from Tahiti had gone on southward in its journey around the island of Oahu. It passed the rough and desolate craters of Koko Head on the eastern end of the island. It swam by Diamond Head and the beautiful Waikiki Beach. Either the number of the inhabitants was so large that they were afraid to make any stay or else they preferred to make the complete circuit of the island before locating, for they evidently made only a very short stay wherever they landed, and then hurried on their journey. By the time they reached Kaena, the northwestern cape of Oahu, they were evidently anxious concerning their missing companions. Not a boat on the miles of water between Kaena and Kahuku, the most northerly point on the island. The legend says that the fish changed itself into a man and went inland to search the coast for its friend, but the search was unsuccessful. It was now a weary journey from point to point, watching the sea and exploring all the spots on the beach where it seemed as if there was any prospect of finding a trace of their expected friends. Where a break in the coral reef permitted their boat to approach the land they forced their way to shore. Then when the thorough search failed again, the boat was pushed out over the line of white in rolling breakers to the great sea until at last the Tahitians came to Kahuku.
>
> Now they appeared no longer as "fish," but went to the village at Kahuku as men. They made themselves at home among the people and were invited to a great feast. They heard the story of a battle with a great fish at Hauula and the capture of the monster. They heard how it had been cut up and its fragments widely distributed among the villages on the northwest coast. Evidently provision had been made for several great feasts. The people of Kahuku, although several miles distant from Hauula, had received their portion. The friendly strangers must share this great gift with them. But the men from Tahiti with heavy hearts recognized the fragments as a part of their companion. They could not partake of the feast, but by kindliness and strategy they managed not only to decline the invitation, but also to secure some portions of the flesh to carry down to the sea. These were thrown into the water, and immediately came to life. They had the color of blood as a reminder of the death from which they had been reclaimed. Ever after they bore the name "Hilu-ula," or "the red Hilu."
>
> Then the "fish" from Tahiti went on around to Hauula. They went up to the tabu land back of Hauula. They pulled up the tabu flags. Then they dammed up the waters of the valley above the village until there was sufficient for a mighty flood. The storms from the heavy clouds drove the people into their homes. Then the Tahitians opened the flood-gates of their mountain reservoir and let the irresistible waters down upon the village. The houses and their inhabitants were swept into the sea and destroyed. Thus vengeance came upon the cannibals.

> The Tahitians were "fish," therefore they went back into the ocean to swim around the islands. Sometimes they came near enough to the haunts of fishermen to be taken for food. They bear the name "hilu." But there are two varieties. The red hilu is cooked and eaten, but never eaten without having felt the power of fire. The trace of the cannibal feast is always over its flesh. Therefore it has to be removed by purification of the flames over which it is prepared for food. The blue hilu, the natives say, is salted and eaten uncooked. Thus the legend says the two fish came from Tahiti, and thus they became the origin of some of the beautiful fish whose colors flash like the rainbow through the clear waters of Hawaii (ibid.:142-144).

This account calls attention to the political control of resources, *kapu* systems, variations in conduct with outsiders as well as warfare and cannibalism in pre-European contact Kahuku and Hauʻula.

Keana Ahupuaʻa

Few traditional legends mention Keana Ahupuaʻa specifically. One of which is the section of the Pele and Hiʻiaka legend, where Hiʻiaka passes through Lāʻie, Mālaekahana, and Keana to make her way to Kahuku (Emerson 1915:233). However, there are a number of traditional sites associated with legendary stories in the *ahupuaʻa.*

For example, two large stones in the Keana Cave or Rock Shelter (Site No. -270) are said to be the remains of two boys who failed to follow their mother's orders to stay silence during a thunderstorm, which was the *kapu* (law) of the god of thunder, Kane-hekili (Beckwith 1940:48). According to Beckwith (1940:48) "During such a storm all containers should be turned bottom side up; all persons should lie face down-ward and make no outcry." Emerson's (1915) rendition of this tale is as follows:

> In Kahuku, island of Oahu, at a place not far from the sugar-mill, is a cave, known as Keana. In former times this cave was the home where lived a mother and her two sons. One day, having occasion to journey to a distance, she left them with this injunction, "If during my absence you hear the sound of thunder, keep still, make no disturbance, don't utter a word. If you do it will be your death." During her absence, there sprang up a violent storm of thunder and lightning, and the young lads made an outcry of alarm. Thereupon a thunderbolt struck them dead, turning their bodies into stone. Two pillar-shaped stones standing at the mouth of the cave are to this day pointed out in confirmation of the truth of the legend (Emerson 1915:233).

Additionally, Pōlou (Site No. -271), which was described by McAllister (1933) as once being, "a pool of water, sea side of the Kahuku mill," was located in Keana Ahupuaʻa. This was said by some *kūpuna* to be the place where the "floating island" of Kahuku attached to the Island of Oʻahu. It was also said to be the location of a "stone" known as Kanaloa (ibid).

Mālaekahana Ahupuaʻa

Several legendary stories reference Mālaekahana as a locality, and the name itself is shared with a great heroin of ancient myth and the mother of Lāʻie-i-ka-wai and her twin sister,

Lāʻielohelohe. In the story of Lāʻie-i-ka-wai, Beckwith (1940:526-527) describes the nature of the twin's birth, betrothals, and trials in finding the right suitor:

> Laie-i-ka-wai and her twin sister Laie-lohelohe are born at Laie on Oahu of Kahauokapaka the father, chief of the northern lands of the island, and Malaekahana the mother. Since the father has vowed to let no daughter born to his wife live until she bears him a son, the mother conceals the birth of the twins and gives them to her own relatives to rear, Laie-lohelohe to Ka-puka-i-haoa to bring up at the heiau at Ku-kani-loko, and Laie-i-ka-wai to Waka, who first hides her in a cave near Laie which can be reached only by diving into the pool which conceals the entrance, and then takes her to the uplands of Puna. Here she builds a tapu house for her ward thatched with bird feathers, and gives her birds to wait upon her and mists to hide her from the sight of men until such time as a suitable lover shall appear to make her his wife.
>
> The first whose suit seems acceptable is Kauakahi-aliʻi, ruling chief of Kauai and husband of Ka-ili-o-ka-lau-o-ke-koa (Skin like the leaf of the koa). The reappearance of his wife whom he had mourned for dead prevents the appointed meeting, but on his return to Kauai he relates the adventure and the young chiefs of that island are stirred by the story. Aiwohikupua meets her nightly in dream and goes to woo her, but even the presence of his four sweet-scented kupua sisters, named after the four varieties of maile vine whose scent they inherit, cannot shake her refusal. Enraged by the insult, he abandons the sisters in the forest. His fifth and favorite sister, Ka-hala-o-mapuana (The fragrant hala blossom) refuses to abandon them. Through her clever management she attracts the attention of Laie-i-ka-wai and the five are adopted as sisters and made the guardians of Paliuli. They drive off their brother upon his second attempt to win the chiefess, and a guardian moʻo named Kiha-nui-lulu-moku (Great moʻo shaking the island) completes his discomfiture. Another and more favored young chief from Kauai named Hauailike is also expelled by the watchful youngest sister.
>
> Waka now arranges a match with Ke-kalukalu-o-ke-wa, younger brother of Ka-ili-o-ka-lau-o-ke-koa and successor with her to Kauakahi as ruling chief of Kauai. Just as the formal marriage (hoao) is about to be consummated, a young rascal from Puna named Hala-aniani, aided by his sorceress sister, carries her off on his surfboard in place of the legitimate lover. Waka finds them sleeping together and abandons the girl in a rage, stripping her of mist and bird guardians and of the house thatched with feathers whose protection her loose conduct has forfeited. The five sisters and the great moʻo, however, refuse to abandon their mistress. Since the Kauai chief has made her twin sister Laie-lohelohe his wife in place of their disgraced mistress, they determine to retrieve her fortunes by providing a more splendid match, and the clever youngest sister is despatched, with the great moʻo as carrier, to fetch their oldest brother who lives as a god in a tapu house in the very center of the sun in the highest heavens. While she is away on this errand the group leave Paliuli and travel about the island and, meeting an old family guardian and seer named Hulu-maniani, make their home with him as adopted daughters at Honopuwai-akua on Kauai. Throughout the course of the story this old seer (kaula) has been following around the islands after the rainbow sign which hovers over the place where Laie-i-ka-wai is hidden, determined to make this new divinity his chief and thus provide for his own old age.

> Ka-onohi-o-ka-la (Eyeball of the sun) looks favorably upon his sister's proposal and, putting off his nature as a god, he descends to earth, strips the enemies of Laie-i-ka-wai of their lands and power and, leaving Ke-kalukalu-o-ke-wa and the twin sister rulers over Kauai, gives to each of the sisters rule over one of the other islands of the group and takes Laie-i-ka-wai up on a rainbow to live with him in Ka-hakaekaea. All goes well until, on one of his visits to earth to see that all goes well there, he notices the budding beauty of his sister-in-law. He presses his attentions and succeeds in securing her. His wife in the heavens wonders what important affairs keep him so long on earth. In the temple at Kahakaekaea stands the gourd Lau-ka-palili which reveals to one who looks within what is going on below. Laie-ika-wai discovers her husband's infidelity and reports him to his parents, who live with her in the heavens. They banish him to become a wandering spirit, the first lapu (ghost) in Hawaii. Laie-i-ka-wai returns to earth and lives like a god with her sister. Today she is worshiped as Ka-wahine-o-ka-liula (Lady of the twilight, mist, or mirage) (Beckwith 1940: 526-527).

Another fable that takes place in primarily in Mālaekahana Ahupuaʻa area is that of "Manuwahi: A Legend of Oahu" in *Hawaiian Legends* (Rice 1923), which is told as follows:

> At Laie lived Manuwahi, Free Gift, with his son, Ka haku loa, The-Lord-of-a-Long-Land; his grandson, Kaiawa, Bitter Sea, and his great-grandson Kauhale-kua The-Village-on-the-Ridge. These men were the keepers of the akua at Laie.
>
> Manuwahi and his children were hairless and were possessed of supernatural powers.
>
> Manuwahi planted black and white area far up in the mountains for the use of the akua. Every awa root planted was given one of these names, Kaluaka, The-Hole-That-Gives-a-Shadow; Kumumu, Blunt-Edged; Kahiwa, Best-Awa, or Kumilipo, The-Root-of-Unconsciousness. This was done so [that] Manuwahi, when sending one of his sons for a piece of awa could designate the exact one he wished.
>
> When the awa a was given to him, Manuwahi would prepare it, and then summon the akua from the North, South, East, and West, as well as from above and below, to drink of it. They prayed in this wise, before they drank:
>
> > Gods of the Morning,
> > Gods of the Night,
> > Look at your progeny:
> > Grant them health,
> > Grant them long life;
> > Amama ua noa - it is free!
>
> It happened that during this time Kamehameha I had come to conquer Oahu. He had succeeded in subduing all the island except Malae-kahana, between Laie and Kahuku. Determined to add this place to his conquests, the king sent one of his body guard, Ka-hala-iu, In-the-Shadow-of-the-Hala-Tree, with many of his bravest soldiers to subdue Malae-kahana.
>
> Ka-hala-iu marched as far as Hanapepe the first day, where he spent the night. Early the next morning he set out and meeting Manuwahi, whom he did not recognize, asked him where the powerful kahuna of Malae kahana lived.

Manuwahi answered, "Pass over the river and you will see a spring and nearby a hut with trees about it. This is his home."

Ka-hala-iu did as he was told and had soon surrounded the hut with his soldiers. When Manuwahi's son came out Ka-hala-iu asked him, "Where is your father?"

"Did you meet a bald headed man?" asked the boy in turn.

"Yes," replied Ka-hala-iu.

"Well, that was my father. Why did you come here?"

"I came to kill your father by the orders of King Kamehameha," answered the King's man. Deciding it would profit them nothing to kill the son, the soldiers departed for Hanapepe by the makai side of the hill, and failed to meet Manuwahi, who had returned to his home by the mauka side.

The next morning the King's body-guard again surrounded with his soldiers the home of the kahuna. Manuwahi came out and asked, "What are you here for? Did you come for battle?"

"Yes," answered the fearless soldier, "We came to kill you."

Whereupon Manuwahi called to his assistance all the akua from the North, South, East and West as well as those from above and below. They came at once and gave battle to the soldiers of the king. The akua fought by biting and scratching their assailants and before long they had killed all but Ka-hala-iu.

Ka-hala-iu cried out, "Spare my life, kahuna of the gods, and I will stay with you."

"What can you do if you stay with me?" asked Manuwahi.

"I will plant awa for you. I came from Hawaii, where I lived by planting awa," answered Ka-hala-iu.

But Manuwahi said, "I do not need you. Go back and tell your king that even his bravest soldiers were not able to conquer Malae-kahana. Tell him that all but you were killed by the akua there."

When Kamehameha had heard these words he sent Ka-hala-iu back with another body of soldiers with orders that he must conquer Malae-kahana.

In the meantime, Manuwahi had moved with his sons up to the cave of Kaukana-leau, where the natives made their stone adzes. There the King's soldiers met them. As before, Manuwahi called all the akua to his aid. Again the soldiers were quickly put to death and only Ka-hala-iu was left. So Malae-kahana was not conquered.

Ka-hala-iu respected and admired Manuwahi so much that he was very anxious to remain with him, and so he asked again to be allowed to remain as an awa grower. Manuwahi consented this time and gave him one side of the valley to cultivate in awa.

One day as Ka-hala-iu was preparing the side hill for its cultivation. He noticed that on the opposite side of the valley, trees and bushes were falling in every

> direction, as if a whirlwind were uprooting them. This frightened him very much, as he could not understand the phenomenon, so he ran in great haste to Manuwahi, and asked what it meant. Manuwahi told him that his akua were helping in the clearing of the side hill, and that if he wished them to help him they would gladly do so. Ka-hala-iu was only too happy to have help so he called upon the akua, and in a short time both sides of the valley were cleared, and were growing luxuriantly with the most beautiful awa.
>
> After the battle, between Ka-hala-iu and the akua for the possession of Malae-kahana, Manu-ka, Frightener-of-Birds, one of Manuwahi's sons, moved to Kaneohe, where he died some time later. He was buried makai of the present road. The natives dug a very large grave but before they could cover the body the akua brought red dirt from Ewa, in a cloud, which filled the grave, and made a red hill above it, which can be seen to this day. There is no other red dirt in that district (Rice 1923:113-115).

In Fornander's (1920) "Legend of Halemano," the hero, Halemano, passed through the area, mentioning Kahuku and Mālaekahana. In this story, Halemano's companion, Kumukahi, arrived at Hauula after they fled Hawai'i and so admired an upright image, named Mālaekahana, that he decided to stay in the area while the rest of his party continued on (Fornander 1920:236). It is possible that the statue was created in the likeness of its heroin namesake. The site of this statue may have been McAllister's Site No. -273, which is described as the *kauahale*, or house, foundation that once belonged to the *kahuna* (priest/sorcerer), Manuwahi, who was the keeper of the god of Mālaekahana (Sterling and Summers 1978:154). This site was located just within southern boundary of Mālaekahana Ahupua'a, near the present day entrance to the Mālaekahana State Recreation Area, which is approximately 1.5 kilometers southeast of the project area.

Mālaekahana is also associated with one of the many legends of shark gods. In this tale, Manō-niho-kahi (Shark with one tooth), resides near a spring in Mālaekahana located somewhere between Lā'ie and Kahuku, perhaps Wai'āpuka (Site No. -275). When Manō-niho-kahi spies a woman going to gather fish or *limu* (seaweed) from the ocean, he tells her to be wary of sharks, before attacking and killing her himself (Beckwith 1940:142). Subsequently, the chief detected Manō-niho-kahi out of a line-up of villagers when his tapa cloak is removed, revealing the mark of the shark's mouth on his back.

Wai'āpuka (Site No. -275), located in the *kula* of Mālaekahana, is noted in 1888 by King David Kalākaua in his book, *The Legends and Myths of Hawaii,* as a significant feature of Mālaekahana's landscape as well as an important locale in "The Story of Laieikawai." He iterates the acts of Waka, Laieikawai's grandmother, who provided the infant Laieikawai sanctuary from her father's wrath for not being born male, as follows:

> In his absence she was delivered of twin girls, who were named Laieikawai and Laielohelohe. They were surpassingly beautiful children, and, desirous of saving their lives, the mother consigned the first-named to the care of Waka, the child's grandmother, and the other to Kapukaihaoa, a priest of discretion and sanctity.

> On the return of the husband he was told that the expected child came into the world without life. He knew that a birth in his house had occurred during his absence, for he had heard two distinct claps of thunder.
>
> Waka took her foster-child to the cavern which opens into the pond of Waiapuka, and which can be entered only by diving. Laielohelohe was taken by her priestly protector to the sacred enclosure of Kukaniloko, on the western side of the island, and there tenderly cared for.
>
> The moment Waka entered the cavern of Waiapuka with Laieikawai a rainbow appeared over the place, and was constantly visible so long as the child remained there. Even when the sun was obscured by clouds the rainbow could be seen.
>
> At length the rainbow was observed by the great prophet Hulumaniani on the distant island of Kauai. For twenty days in succession he saw it, and knew its significance. He secured a canoe and fifteen men from Poloula, the chief of Wailua, provided himself with a black pig, white fowl and red fish for sacrifice, and, when the star Sirius rose, set sail for Oahu.
>
> Reaching that island he landed at Waianae, and, guided by the rainbow, in due time arrived at the pool of Waiapuka.
>
> Waka had just dived into the cave, and he noticed ripples on the water. During the day Waka started to leave the cavern, but caught a glimpse of the prophet sitting on the bank, and quickly returned, again ruffling the water.
>
> The prophet remained by the pool all night, and in the morning saw a rainbow over Kukaniloko. Traveling in that direction, he ascended Mount Kaala, when he saw the rainbow over the island of Molokai. Finding a canoe bound thither, he took passage and landed at Haleolono, near the western shore.
>
> In a dream Waka had been directed by Kapukaihaoa to remove Laieikawai to some securer place, and had accordingly taken her to Malelewaa, a secluded spot on the north side of Molokai (Kalākaua 1990:457-458).

Another mythical tale attributed to Mālaekahana Ahupuaʻa concerns Laniloa, which the name given to a point of land that extends *makai* from Lāʻie. According to Rice (1923) this legend, referred to as *Laniloa, The Moʻo*, this point was said to have been a *moʻo*, or a standing lizard in this case. Rice (1923) holds that this *moʻo* was ready at any time to kill passersby. In Rice's version of the legend, he states:

> After Kana and his brother had rescued their mother from Molokai and had taken her back to Hawaii, Kana set out on a journey around the islands to kill all the mo-o. In due time he reached Laie, where the mo-o was killing many people. Kana had no difficulty in destroying this monster. Taking its head, he cut it into five pieces and threw them into the sea, where they can be seen today as the five small islands lying off Malae-kahana: Malualai, Keauakaluapaaa, Pulemoku, Mokuaaniwa and Kihewamoku.
>
> At the spot where Kana severed the head of the mo-o is a deep hole which even to this day has never been fathomed (Rice 1923:112).

One might speculate that this "deep hole" is the legendary site, Waiʻāpuka (Site No. -275).

3.2 EUROPEAN CONTACT

At European Contact and shortly thereafter, the general Kahuku area was commented on by several maritime officials, with observations that point to a drastic change in land use from initial contact in the mid-1780s to the mid-1830s.

Approximately two weeks after the death of British Captain James Cook, Charles Clerke took over the helm of the H.M.S. Resolution. As the ship rounded the northern point of Oʻahu, Captain Clerke provided the first post-Contact account of the Kahuku area. Clerke wrote on February 28, 1779:

> SUNDAY 28th. . . Winds Eterly [Easterly]. fresh breezes with open Cloudy Weather. Run round the Noern [Northern] Extreme of the Isle which terminates in a low Point rather projecting; off it lay a ledge of rocks extending a full Mile into the Sea, many of them above the surface of the Water; the Country in this neighborhood is exceedingly fine and fertile; here is a large Village, in the midst of it is run up a high Pyramid doubtlessly part of a Morai. I stood into a Bay just to the Westward of this point the Eastern Shore of which was far the most beautifull [sic] Country we have yet seen among these Isles, here was a fine expanse of Low Land bounteously cloath'd with Verdure, on which were situated many large Villages and extensive plantations; at the Water side it terminated in a fine sloping, sandy Beach. . . (Beaglehole 1967:I:572 in Silva 1984:C-10).

This description paints a pleasant picture of the Kahuku area, with a thriving community and large ceremonial structures. At about the same period, H.M.S. Resolution Lieutenant, James King, described this northern tip of Oʻahu, writing:

> WOAʻHOO. . . We saw this Island the beginning of last year, but only just as a high lump, We this Time sailed along its NE & NW sides but say nothing of its Soern [Southern] part. What we did see of this Island was by far the most beautiful country of any in the Groupe; particularly the Neck that Stretches to the No ward [Northward] and its NW side. Nothing could exceed the verdure of the hills, nor the Variety which the face of the Country displayʻd. It /s north-eastern/ parts were cliffy, & rugg'd to the Sea side, but the Valley look'd exceedingly pleasant, near the
>
> N point we were charmed with the narrow border full of Villages, & and Moderate hills that rose behind them (Beaglehole 1967:I:610 in Silva 1984:C-10-11).

This is yet another testimony to the beauty and lushness North Shore during the early Contact period. In contrast, Captain George Vancouver visited the northern tip of Oʻahu later in 1794, discovering that the Kahuku coast had significantly changed in terms of cultivation and population, writing:

> …In every other respect our examination confirmed the remark of Capt. King excepting that in point of cultivation or fertility, the country did not appear in so flourishing a state, nor to be so numerously inhabited, as he represented it to

> have been at that time, occasioned most probably by the constant hostilities that had existed since that period (Vancouver 1798, Vol.3:71).

Wong-Smith (1989) suggests that regular hostilities and the scourge of Western diseases caused the severe decline of the Hawaiian population in Kahuku. It was likely Captain Cook's 1778 expedition that brought venereal disease to Hawaiʻi and spread rapidly between the initial and secondary contact events (Kuykendall 1938; Beaglehole 1967; Lind 1968; Schmitt 1968, 1971). By the time the first missionaries conducted a census of the islands in the early 1820s, they estimated that the entire population had been reduced by nearly a third (Schmitt 1968:10 in Wong-Smith 1989:A-10). This population crash created a wasteland out of the once verdant fields and lively villages of Kahuku.

3.3 HISTORIC ERA

The focus of this section will remain on events that greatly shaped the modern character of Kahuku, Keana, and Mālaekahana Ahupuaʻa as well as any occurrences that help paint a picture of what Hawaiian cultural practices were like during this period.

3.3.1 Western Observations

Many accounts of the Kahuku, Keana, and Mālaekahana area's early historic era were provided by missionaries. According to missionary censuses from the 1830s suggests that the area had severe declines during this time (Schmitt 1968). Koʻolau Loa's population in 1831 was 2,891 with 452 living in Lāʻie. Wong-Smith (1989:A-10) notes that "a population loss of 210 for the entire district occurred between 1831 and 1835." This population decline affected the extent of traditional agriculture in the area. In the early 1830s, E.O. Hall, of the American Board of Missions, stated in regards to Koʻolau Loa, "Much taro land now lies waste, because the diminished population of the district does not require its cultivation" (as cited in McAllister 1933: 153). The greatest factor in the tragic population decline during this period was the introduction of Western diseases, followed by warfare (Kuykendal 1938; Nakamura 1981; Wong-Smith 1989).

The Superintendent of Secular Affaires for the Mission in Hawaiʻi, Levi Chamberlain, gave an 1828 account of Mālaekahana during his second circuit of Oʻahu, where he evaluated the effectiveness of the island's education system, provides insight on the fecundity of lands in this area. Chamberlain states:

> Tuesday Feb. 5th. After breakfast I examined two schools, belonging to Laie & Malaekahana, and was pleased with the appearance of the scholars. At a quarter before 11 A.M. we set out for Kahuku, and after travelling about two hours over a level sandy country, arrived at the school house, where we found · 83 scholars assembled, waiting to be examined … A good hog had been cooked for us & when the examination closed, dinner was waiting … my attendants made a heartly meal; and the remainder of the food was placed in the calabashes of our natives, and carried along to furnish food for us when we should be again in need (Chaimberlain 1957:35-6).

Another account of Koʻolau Loa and the project area vicinity from the late 1800s was provided by John Effinger, in an article titled, "A Tramp Around Oahu," for *Paradise of the Pacific* magazine, where he states:

> The sun had scarcely got its eyes open when I had pushed on several miles further along the grassy plain and shore through Kualoa ranch, past the ruins of the old Wilder mill, looking like an antiquated English castle, and past the Punaluu rice patches. The chimney of Kahuku mill was my guiding star this morning, and the miles seem to fly along so green is the verdure around us and so fresh the strong salt air. Sentinel cliffs, sheltering pleasant valleys where are many of the summer residences of Honolulu's "400" shoot into the sky on the left. Chief Justice Judd Hon. P.C. Jones, and Cecil Brown, Esq. have country places along here, and when the Oahu Railway is completed, there will be an exodus from Honolulu every Saturday afternoon for a Sunday's vacation to this favored spot. The air is cool and bracing. Mosquitoes are hardly a nuisance. From Kualoa to Laie is the prettiest, healthiest part of the island of Oahu. About noon I reached Laie, a Mormon settlement, with a small cane plantation and mill. The plantation railway runs down into Laie from Kahuku plantation and all the cane is ground at the big Kahuku mill. Laie Point shoots out into the blue ocean here and the surf banging up against it throws spray high in the air. It was a few hours after noon when Kahuku mill was reached, and I took a few moments rest before pushing out for Waialua. The Kahuku stock ranch takes up all the land of this district not occupied by cane (Effinger 1895:88).

One account, which was recorded by King Kalākaua in the late 1800s, provides a very detailed description of a significant landmark of Mālaekahana, Waiʻāpuka (Site No. -275). He reiterated the experiences of a group of travelers touring the area in 1885, as follows:

> Entering the district of Koolouloa, and approaching the coast over a broad stretch of grassy meadow but slightly above the level of the ocean, our party was suddenly brought to a halt beside a pool of clear water, nearly round, and perhaps a hundred feet in diameter. The surface of the pool was ten or twelve feet below the level of the surrounding plain, and its even banks of solid rock dropped almost perpendicularly into water of unknown depth. The volume of the pool is affected neither by rain nor drought, and the native belief is that it is fed by springs at the bottom, and has a subterranean drainage to the ocean, some two or three miles distant.
>
> This, we learned, was the celebrated pond of Waiapuka, around which so many strange legends have been woven. All of them speak of a cavern somewhere beyond the walls of the pool, and to be reached only by diving into the water and finding the narrow passage leading up into it.
>
> While listening to fragments of the story of Laieikawai and of other legends connected with the mysterious cavern, and seriously doubting the existence of the secret chamber so prominently referred to in early folk-lore of Oahu, an old native, who had joined the party at Kaneohe, quietly and without a word, dismounted, divested himself of his upper garments and plunged into the pool. Swimming to the northern wall, he clung for a moment to a slight projection, and then disappeared. It was suggested for the first time that he was in search of the

> cavern of Laieikawai, and all eyes were turned toward the point where he was last seen above the water.
>
> Three or four minutes elapsed, and fears for his safety began to be exchanged, when the salutation of "*aloha*!" greeted us from the opposite wall, and the next moment a pair of black eyes were seen glistening through a small opening into the cavern, not before observed, about four feet above the surface of the water.
>
> The swimmer then returned to the pool by the passage through which he had left it, and we were compelled to admit that the cavern of Laieikawai was a reality, however wild and visionary may have been the stories connected with it. Not a single person present, including the governor, had ever before seen the passage to the cavern attempted, and the natives were overjoyed at what they had witnessed.
>
> To the many questions with which he was asked the old man returned but brief answers on his return, and when importuned to explain the method of his entrance to the cavern, that the secret might not be lost, he pointed significantly to the sea, and declared that there would be found thee bodies of those who sought to solve the mystery of the passage and failed (Kalākaua 1990:455-456).

This description suggests that Waiʻāpuka was not only massive, being approximately 100-feet in diameter, but also a classic sinkhole in an area known to be *karstic*, which is a geological term for limestone terrain that has been subjected to complex acidic weathering. Typically, *karstic* topography is prone to exhibiting a variety of subterranean and surficial features, including caves, tunnels, caverns, underground rivers and bodies of water, as well as sinkholes and cenotes. Unfortunately, by the time of McAllister's (1933) island-wide survey, the site of this culturally and topographically significant feature was destroyed by being filled with sediment. Whether man or natural forces are responsible for this act has not been ascertained.

Just after the turn-of-the-Century, Andrew Adams of the Territory's Forestry Division, reported on the agricultural and horticultural developments of Koʻolau Loa, stating:

> Mr. Andrew Adams, District Forester for the Koolauloa District, desired that no formal report for him be published but in correspondence he stated that "The Plantation is constantly planting Ironwood trees, which are thriving, but no systematic effort has been made toward forest planting, in fact the little planting that has been done could scarcely be dignified by the term 'forestation.' There are no forest nurseries, except several boxes on the premises of the head luna and my own where Iron wood trees are started from seeds.
>
> The native forest in the mountains is in good condition, and the Koa, of which there is a good belt between Malaekahana and Kaipapau valleys, is vigorous and thriving. The insect usually preying upon the Koa is not so much in evidence in this forest, it appears to me, as formerly, and there are many young Koas springing up; some of this is sizeable timber, but I doubt if it could ever be lumbered without great destruction to the surrounding forest, and especially the undergrowth, because of the almost inaccessible ridges on which the Koa stands (Adams 1905:90-91).

3.3.2 Cultural Practices

Although the spread of Western ideals and lifestyles was rampant at this time, there are several instances of Hawaiian traditional practices taking place in Kahuku. *Hula* and *mele* performances held in Kahuku in 1844 and 1849 were described by Emerson (1998). The first performance, a *hula*, called the Hula O-Niu, which took place in 1844 was described by Emerson (1998) as such:

> The so-called hula *o-niu* is not to be classed with the regular dances of the halau. It was rather a popular sport, in which men and women capered about in an informal dance while the players engaged in a competitive game of top-spinning. The instrument of sport was made from the lower pointed half of an oval coconut shell, or from the corresponding part of a small gourd. The sport was conducted in the presence of a mixed gathering of people amid the enthusiasm and boisterous effervescence which betting always greatly stimulated in Hawaii.
>
> The players were divided into two sides of equal number, and each player had before him a plank, slightly hollowed in the center—like the board on which the Hawaiians pounded their poi—to be used as the bed for spinning his top. The naked hand, unaided by whip or string, was used to impart to the rude top a spinning motion and at the same time the necessary projectile force—a balancing of forces that called for nice adjustment, lest the whirling thing reel too far to one side or run wild and fly its smooth bed. Victory was declared and the wager given to the player whose top spun the longest.
>
> The feature that most interests us is the singing, or cantillation, of the oli. In a dance and game of this sort, which the author's informant witnessed at Kahuku, Oahu, in 1844, one contestant on each side, in turn, cantillated an oli during the performance of the game and the dance (Emerson 1998:248).

The later performance, a *mele* about Kāne, recorded by Emerson (1998) took place in 1849 was viewed by King Kamehameha III's during his circuit around the island of O'ahu. Emerson (1998) wrote:

> The author has already hinted at the form and character of the entertainments with which hula-folk sometimes beguiled their professional interludes. Fortunately the author is able to illustrate by means of song the very form of entertainment they provided for themselves on such an occasion. The following mele, cantillated with an accompaniment of expressive gesture, is one that was actually given at an awa-drinking bout indulged in by hula-folk. The author has an account of its recital at Kahuku, island of Oahu, so late as the year 1849, during a circuit of that island made by King Kamehameha III. This mele is reckoned as belonging to the ordinary repertory of the hula; but to which particular form of the dance it was devoted has not been learned…(Emerson 1998:129-130).

The fact that this performance was part of King Kamehameha III's circuit and recorded with such detail and contemplation by Emerson (1998), suggests that this unnamed *hula hālau* was no ordinary one. It is possible that this Kahuku *halau* has a long, but unrecorded history.

In terms of traditional agricultural practices, Handy (1940; as cited by Barrera 1981) maintain that Kahuku had a few areas that traditional Hawaiian farming methods may have taken place.

They state the following about agriculture in Kahuku Ahupuaʻa:

> Inland from the Kahuku ranch house is Kaainapele Spring. Terrace symbols are shown south of the ranch house (U.S.G.S. topographic map, 1917), but Judge Rathburn says that these flats were built by Chinese before 1890 for rice paddies. They were irrigated with artesian water, but the water turned brackish and the paddies were abandoned. They were never used for taro. The 1917 map shows extensive terrace areas in the swampland seaward of the Oahu Railway, stretching l 5 miles south of Kukio Pond. These were originally terraces, were later planted to rice, and are now under sugar cane. According to John Kaleo, there is a small group of terraces, south of this swampland, named Kaukana. North of Kukio Pond was also a small area. It is reported that there were no terraces up Kahuku Stream or Kaohiaae, its upland branch. Kaleo names 11 localities where terraces were formerly cultivated (as cited in Barrera 1981:13-14).

However, Handy and Handy (1940) stated that there were no terraces in Keana's stream or on the lowland plains. They also hold that, Kaleo, their informant for the area, knew of agricultural terraces in Kaukanalaau Stream.

3.3.3 Land Court Awards

Private land ownership was established in Hawaiʻi with the Māhele ʻĀina, also known as the Great Māhele of 1848. Crown and *aliʻi* lands were awarded in 1848 and *kuleana* titles were awarded to the general populace in 1850 (Chinen 1958). Awarded lands in this process are referred to as Land Commission Awards (LCAs). Over time, government lands were sold off to pay government expenses. The purchasers of these lands were awarded Grants or Royal Patent Grants (Chinen 1958). LCAs offer the native and foreign testimonies recorded during the claiming process, which shed light on what the land use of the area was in the early historic period. This information can be used to predict the types of resources may still be present in the project area.

There are no LCAs within the Nā Pua Makani Project APE. For the purposes of gaining as much early historic information on land use in the area, the LCA information presented in this section are a sample of LCAs located outside of the project area, some as far away as 2 kilometer from the boundaries of the APE.

Numerous LCAs were identified within an approximate 2 kilometer radius around the Nā Pua Makani Project APE. A partial list of these properties by *ahupuaʻa* is provided in Table 1. Figure 4 and Figure 5 show the project area on TMK maps. The LCAs are described in Native Register (NR) comments and Foreign Testimonies (FT) submitted during the Māhele ʻĀina and provide a narrative on traditional use of land within each *ahupuaʻa*. A few of these testimonies are presented below.

<u>LCA Awards in Kahuku Ahupuaʻa</u>

While King Kamehameha III, under the name of Victoria Kamāmalu, retained the entire *ahupuaʻa* of Kahuku as part of Crown Lands, the land rights of its tenants amounted to 4,752 acres (Indices 1929:27-8 as cited by Wong-Smith 1989:A-11). According to Rechtman (2009:15), "…eighty-five claims for Land Commission Award (LCAw.) parcels were made within the *ahupuaʻa* of Kahuku, but only 72 *kuleana* lots were awarded to native tenants. Nearly all of

Table 1. Land Court Awards (LCA) in the Vicinity of the Nā Pua Makani Wind Project Area

LCA	Ahupuaʻa	Claimant	Testimony	Book	TMK Map
2691:1 & 2	Kahuku	Laumea	8 *loʻi*, 2 watercourses (*ʻauwai*?), *kula* lands and shore area, *wauke* gardens, banana plantation (a mountain land), 3 *koa* trees, 2 *hala* trees, 1 *kukui* tree, houselot	NR v. 3, 592 FT v. 10, 169	5-6-004
2702:1	Kahuku	Waiaulaa	*Kula* lands planted with melons, spring, houselot with wooden fence	NR v.3, 598 FT v.10, 188	5-6-002
2723:3	Kahuku	Puu	6 *loʻi*, *kula* land, houselot	NR v. 3, 607 FT v. 10, 166	5-6-002
2872:1 & 2	Kahuku	Kaihikapu	18 *loʻi kalo*, *kula* lands, salt land, shore land, mountain land, *mala* of *wauke*, *mala* of sweet potato, houselot	NR v. 3, 672 FT v. 10, 154	5-6-004
2887:1 & 2	Kahuku	Keawe	3 *loʻi*, *kula* land, a *mala* of *ʻawa*, houselot	NR v. 3, 678 FT v. 10, 171	5-6-002 5-6-004
2916:1 & 2	Kahuku	Kaluau	5 *loʻi kalo*, watercourse (*ʻauwai*?), *mala* of *wauke*, *mala* of *ʻolena*, a *kuahiwi*, *kula* lands, houselot	NR v. 3, 692 FT v. 10, 168	5-6-004
2918:1 & 2	Kahuku	Kawaa	1 *loʻi*, houselot	NR v. 3, 692 FT v.10, 182	5-6-002 5-6-004
3723:1	Kahuku	Male	9 *loʻi*, *kula* lands, houselot	NR v. 4, 156 FT v. 10, 171 NT v. 4, 368	5-6-002
4391:1 & 2	Kahuku and Keana	Kalawaiamanu	3 *ʻili weuweu,* 1 *ʻili* of sweet potato, 1 *ʻili* of *wauke*, 1 *kula*, sugarcane and *wauke*, breadfruit, *noni*, *ʻawa* and banana, tobacco, houselot	NR v. 4, 292 FT v. 10, 184	5-6-006
4422:2	Kahuku	Kaumualii	10 *loʻi*, *kula* land with *wauke*, sweet potato, *hala*, salt land, a *mala* of *noni*, banana, watermelon, houselot	NR v. 4, 296 FT v. 10, 164	5-6-005
4458:1	Kahuku	Kaihupailani	5 *loʻi kalo*, *kula* lands, *kula* of *wauke*, wooded upland, *koa* tree, *kukui* tree, houselot	NR v. 4, 303 FT v. 10, 203	5-6-004
238-E:1	Lāʻiewai	Pakolu	-	No testimony.	5-5-008
3696:1 & 2	Lāʻiewai	Mahunalii	1 *loʻi*, *ʻili* of *wauke*, 8 *ʻili* of gourd, a *mala* of *wauke*, 2 *ʻili* of *weuweu*, houselot	NR v. 4, 145 FT v.11, 281	5-5-005 5-5-008
3697:1, 2 & 3	Lāʻiewai	Mahoe	3 *loʻi* and 1 *kula* land, houselot	NR v. 4, 146 FT v. 11, 281	5-5-008
3699:1, 2 & 3	Lāʻiewai	Kahakea	3 *loʻi*, 1 steep patch sweet potato (*pali ʻuala*),1 *kula*, 1 *ʻili* of sweet potato, 2 *mala* of gourd, *ʻili* of *wauke*, 2 *loʻi* and a houselot	NR v. 4, 146 FT v.11, 253	5-5-008
3699-B:1	Lāʻiewai	Kainoahou	2 *loʻi kalo*, *kula* land and a houselot	FT v. 3, 531	5-5-008
3708:1	Lāʻiewai	Moanauli	3 *loʻi* and 1 *kula* land	NR v. 14, 150 FT v. 11, 251	5-5-008

LCA	Ahupuaʻa	Claimant	Testimony	Book	TMK Map
3714:2	Lāʻiewai	Maii	7 *loʻi*, 3 *kula*, houselot, 2 *koa* trees	NR v. 4, 154 FT v. 11, 251	5-5-008
3731:1 & 3	Lāʻiewai	Ihupuu	6 *loʻi*, houselot	FT v. 11, 247	5-5-008
3743:1 & 2	Lāʻiewai	Wi	5.5 *loʻi*, 9 *kula*, 3 mountain *kula*, 2 *hala* clumps, 1 gourd *kula*, 4 fallen *koʻa* trees, 1 *kula* houselot	- FT v. 11, 305	5-5-005 5-5-008
3773:1, 2 & 3	Lāʻiewai	Amaka	8 *loʻi* and 16 *kula*	NR v. 4, 165 FT v. 11, 213	5-5-008
3789:2 & 3	Lāʻiewai	Opala & Kaiimakuhi	1 *moʻo*, 3 *loʻi kalo*, 1 *loʻi*, *ʻili* of *wauke*, 2 *ʻili* of *weuweu*, houselot	- FT v. 11, 287	5-5-005
3807:1	Lāʻiewai	Laielohelohe	6 *loʻi*, 13 *kula* (1 planted in tobacco) and a houselot	NR v. 4, 173 FT v. 11, 249	5-5-008
3859:1	Lāʻiewai	Pahumoa	8 *loʻi*, 1 *kula*, 2 *ʻili* of sweet potato, 1 *mala* of *ʻawa*, houselot	NR v. 4, 179 FT v. 11, 261	5-5-008
3861:1, 2 & 3	Lāʻiewai	Pulehu	1 *moʻo*, 7 *loʻi*, 1 *ʻili* of *weuweu*, 1 *ʻili* of sweet potato, houselot	NR v. 4, 179 FT v. 11, 263	5-5-005 5-5-008
3864:1	Lāʻiewai	Paiakea	4 *loʻi*, 2 houselots, 3 *kula*	NR v. 4, 180 FT v. 11, 261	5-5-008
3873:1, 2 & 3	Lāʻiewai	Paakahi	9 *loʻi*, 7 *kula*, 1 fishery, 1 *koa* tree, houselot	NR v.4, 183 FT v. 11, 275	5-5-008
3936:1, 2, 3 & 4	Lāʻiewai	Nakahili	5 *loʻi*, 3 *kula*, houselot	FT v. 11, 299	5-5-008
3945: 1 & 2	Lāʻiewai	Napahu	3 *loʻi*, 5 *kula*, houselot	NR v. 4, 196 FT v. 11, 285	5-5-008
4003:1, 2 & 3	Lāʻiewai	Hano	3 *loʻi*, 1 *kula*, 1 *kai* [fishery], 1 mtn. area; scattered claims: 6 *loʻi*, 10 *kula*, 1 houselot; in Kapuna: 1 *loʻi*, 2 *kula*	NR v. 4, 208 FT v. 44, 277	5-5-005 5-5-008
4039:1 & 2	Lāʻiewai	Kalawaiaholona	1 *loʻi*, 1 *kula* (planted in *wauke*)	NR v.4, 214 FT v.11, 306	5-5-008
4269:1	Lāʻiewai	Kala (testimony says "Kula")	1 *moʻo*, 3 *loʻi kalo*, 1 *ʻili* (Kakaiahui), 1 steep sweet potato planting, 2 sweet potato *loʻi* (dried out *loʻi*?), 2 *koa* canoe trees, houselot	NR v. 4, 235 FT v. 11, 311	5-5-008
4270:2	Lāʻiewai	Keao	5 *loʻi kalo*, 45 *moku weuweu*, 1 *moku moʻo*, 5 *koa* trees, houselot	NR v. 4, 235 FT v. 11, 308	5-5-008
4271:1, 2 & 3	Lāʻiewai	Kaleo	44 *loʻi*, 1 *kula*, 2 *ʻili* of *wauke*, houselot	NR v. 4, 235 FT v. 11, 265	5-5-008
4272:1	Lāʻiewai	Koi	7 *loʻi*, 3 *kula*, 1 *mala* of *ʻawa*, 2 *koa* trees, houselot	NR v. 4, 236 FT v.11, 269	5-5-008

LCA	Ahupuaʻa	Claimant	Testimony	Book	TMK Map
4280:1	Lāʻiewai	Kauhane	1 *loʻi*, 1 *kula*	NR v. 4, 237 FT v. 11, 307	5-5-008
4283:1	Lāʻiewai	Koula	6 *loʻi*, 2 *kula*, 1 *moku* of *weuweu*, 1 *ʻili* planted in gourd, houselot	NR v. 4, 238 FT v. 11, 298	5-5-008
4288:1	Lāʻiewai	Kaonohi	7 *loʻi*, 2 dry *loʻi*, 1 clump of *hau*, 11 *moku* of *weuweu*, 1 *koa* tree	NR v. 4, 239 FT v. 11, 294	5-5-008
4290:1	Lāʻiewai	Kaiolohia	6 *loʻi*, 1 *ʻili* of *wauke*, 1 grass *kula*, 2 mala of *ʻawa*, 1 *mala* of *noni*, 3 *mala* of sweet potato, houselot	NR v. 4, 239 FT v. 11, 293	5-5-008
4291:1	Lāʻiewai	Kapule	4 *loʻi*, 1 *kula*, 1 *mala* of *ʻawa*, houselot, *kula wauke*, partly in Mālaekahana	NR v. 4, 240 FT v. 11, 296	5-5-008
4293:1	Lāʻiewai	Keawe	14 *loʻi*, 1 *kula*, 1 *ʻili* of sweet potato, 1 *ʻili* of *noni*, 1 *mala* of *wauke*, houselot	NR v. 4, 290 FT v. 11, 298	5-5-008
4297:1	Lāʻiewai	Kapuaokahala	4 *loʻi*, 3 *kula*, houselot	NR v. 4, 240 FT v. 11, 269	5-5-008
4298:1 & 2	Lāʻiewai	Kaualewa	2 *loʻi*, 1 *kula*, 3 *ʻili* of sweet potato, 2 *ʻili* of *wauke*, 1 *ʻili* of *noni*, 1 *mala* of sweet potato, 1 *mala* of *ʻawa*	NR v. 4, 241 FT v. 11, 297	5-5-005
4300:1	Lāʻiewai	Kapule for Waikupulani	7 *ʻili* of sweet potato, 3 *loʻi kalo*, houselot	NR v. 4, 241 FT v. 11, 297	5-5-008
4301:1	Lāʻiewai	Kanakanui	7 *loʻi*, 1 *kula*, 1 *kula* of *wauke*, 4 *mala* of *noni*, 2 steep sweet potato plantings, 2 houselots	NR v. 4, 242 FT v. 11, 373	5-5-008
4325:1	Lāʻiewai	Kahoale	2 *loʻi*, 2 *kula*, houselot	NR v. 4, 259	5-5-008
4326:1, 2, 3 & 4	Lāʻiewai	Koalaukanu	8 *loʻi*, 5 *kula*, houselot	NR v. 4, 259 FT v. 11, 309	5-5-005 5-5-007 5-5-008
4329:1 & 2 (4329B)	Lāʻiewai	Kalua	5 *loʻi*, 7 *kula*, houselot	NR v. 4, 260 FT v. 11, 306	5-5-008
4331:1 & 2	Lāʻiewai	Kamano	7 *kalo loʻi*, 6 *kula*, 1 *kula* houselot, 1 fish pond	NR v. 4, 261 FT v.11, 310	5-5-007 5-5-0088
4333:1	Lāʻiewai	Kahoukua	6 *loʻi*, 17 *kula*, houselot	NR v. 4, 262 FT v. 11, 292	5-5-008
4334:1	Lāʻiewai	Kalou	2 *loʻi*, 17 *kula* (some planted in tobacco), houselot enclosed with a wooden fence	NR v. 4, 263 FT v. 11, 292	5-5-008
4338:1 & 2	Lāʻiewai	Kahalelaau	1 *loʻi*, 1 *kula*, 3 *mala*, 1 *mala* of *wauke*, 1 shore area and a mountain land, houselot	NR v. 4, 265 FT v. 11, 293	5-5-008

LCA	Ahupuaʻa	Claimant	Testimony	Book	TMK Map
4343:1 & 2	Lāʻiewai	Not found	10 *loʻi*, 7 *kula* (scattered claims)	NR v. 4, 267 FT v. 11, 298	5-5-005 5-5-008
4345:1	Lāʻiewai	Kaumiumi	1 *loʻi*, 3 *kula*, 3 fallen (shattered) *koa* trees, houselot	NR v. 4, 286 FT v. 11, 297	5-5-008
4361:1, 2 & 3	Lāʻiewai	-	no specifics on land use	NR v. 4, 271 FT v. 11, 300	5-5-005 5-5-008
4451:1, 2 & 3	Lāʻiewai	Kuapuu	16 *loʻi*, 5 *kula*, 3 *koa* trees, 4 *lua hānai* (holes where fish feed), houselot	NR v. 4, 301 FT v. 11, 301	5-5-008
4514:1, 4 & 5	Lāʻiewai	Pupuka	5 *kalo loʻi*, 5 *kula*, 1 houselot	NR v.4, 313 FT v. 11, 302	5-5-008
6989:2	Lāʻiewai	Kahuailua	5 *loʻi*, 11 *kula*, houselot	NR v. 5, 411 FT v. 11, 291	5-5-008
8355:3	Lāʻiewai	Kakau	2 *loʻi*, 1 *kula*, houselot	NR v. 5, 545 FT v. 10, 150	5-5-008
8440:1	Lāʻiewai	Kamamae	1 *loʻi*, 2 *wauke* patches, 2 sweet potato patches, one *mala* of *noni*, 2 *hala* trees, houselot	NR v. 5, 565 FT v. 11, 307	5-5-008
8443:1, 2 & 3	Lāʻiewai	Kauhalekua	5 *loʻi*, 2 *wauke* patches, 2 *kula*, 4 *weuweu* patchs, houselot	NR v. 5, 565 FT v. 11, 307	5-5-005
8580:1, 2, 3 & 6	Lāʻiewai	Kealiiwaiwaiole	5 *loʻi*, 3 *ʻili* of *kula*, 1 *mala* of *maiapia*, houselot	NR v. 4, 355 FT v. 11, 321	5-5-005 5-5-008
8580-B:1, 2 & 3	Lāʻiewai	Palii	5 *loʻi*, 1 *mala*	FT v. 11, 322	5-5-008
10748:2 & 3	Lāʻiewai	Puhibaka	3 *loʻi*, 1 watercourse (*ʻauwai*?), 1 *kula,* 1 *mala* of *noni*, 2 *koa* trees, 1 *mala* of sweet potato, 2 pools for fish	NR v. 4, 584 FT v. 11, 302	5-5-008
10763:1	Lāʻiewai	Puni	5 *loʻi*, 4 *kula*, houselot	NR v. 4, 584 FT v. 11, 304	5-5-008
10822:1, 2, 3 & 4	Lāʻiewai	Peka	4 *loʻi*, 1 kula patch, coconut tree and sweet potato patches, 10 *moʻo*, 1 *mala* of *ʻawa*, the *pali* of Kaukauulua, the beach of Laiemaloo, 1 *kula* of mountain area	NR v. 4, 602 FT v. 11, 324	5-5-008
10928:1	Lāʻiewai	Ulukou	4 *kalo loʻi*, 1 sweet potato patch, houselot	NR v. 4, 614 FT v. 11, 304	5-5-008

awards were located makai of the present day highway…." The following are claims for lands either within or partially within Kahuku Ahupuaʻa. These claims provide a narrative on traditional use of *kula* and *wao* lands.

> No. 2887: Keawe (claimant), Kahuku, Oahu
> January 5, 1848
>
> > To the Land Commissioners, Respectful Greetings: I, Keawe, hereby state my claim for land at Kahuku. The name of the *moʻo* is Luahime. There are three *loʻi*, bounded on the north by Kawaa's [land] on the east by Kaluau's [land], on the south by *loʻi kō ʻele*, on the west by Paukoa's [land]. A *mala* of sweet potato is at Ahamau, and at Keana I have a *mala* of *ʻawa*. My houselot is Kahuku, and is surrounded by *kula*. My right of occupancy is from the time of Kamehameha I. KEAWE x his mark

LCA Awards in Keana Ahupuaʻa

The *ahupuaʻa konohiki* (overseer), Kinimaka was closely affiliated with Kamehameha III, which may have helped secure his claim to the entire *ahupuaʻa*. According to O'Hare et al. 2008, "He was a *makua hanai* (adopted parent) to David Kalākaua, sixth king of Hawaiʻi. Kinimaka retained one-half of the *ahupuaʻa*, giving back the other half to pay his commutation fees for the properties that he retained. This second half became part of the government lands" (O'Hare et al. 2008:19).

Environmental conditions would partly explain for the dearth of claims for this *ahupuaʻa*, as these lands were not suited for most traditional methods of farming. While the coastal areas of Keana appeared to be largely brackish water swamp and/or sand with outcrops of limestone, the uplands were relatively dry and rocky - not suitable for terrace farming. This was expressed by the sentiments of Kaleo, E. C. Handy's trusted informant, as they recorded traditional land use on Oʻahu in the 1940s. He maintained that he knew of no agricultural terraces up the stream, nor of any on the plains of Keana (Handy 1940). This was later upheld in Handy and Handy (1991:462), who stated the following about Mālaekahana and Keana:

> These two small ahupuaʻa intervening between Laʻie and Kahuku (the northernmost tip of Oahu) show much the same pattern, in miniature, of dune coasts, elevated coral, and broken level land seaward from the hills. Each has a small stream. There were formerly some irrigated terraces in Malaekahana (Wayclear-for-work), but not in Keana (The-cave) (as cited by O'Hare et al. 2008:19).

The following is a claim for lands partially within Keana Ahupuaʻa. This claim provides a narrative on traditional use of Keana's *kula* and *wao* lands.

> No. 4391: Kalawaiamanu (claimant), Keana, Oahu
> January 3, 1848
>
> > To the Land Commissioners, Greetings: I, Kalawaiamanu, am a claimant in the *ʻili* in Louana. There are three *ʻili weuweu*, one *ʻili* of sweet potato, one *ʻili* of *wauke*, bounded on the north by the *kula*, on the east and west by sugarcane, on the south by the *pali*. Here are the jump lands: At Halulu is sugarcane, *wauke*. At Kahalau is breadfruit and *noni*. At Keaaulu is a breadfruit, and *noni*. At Kapuou

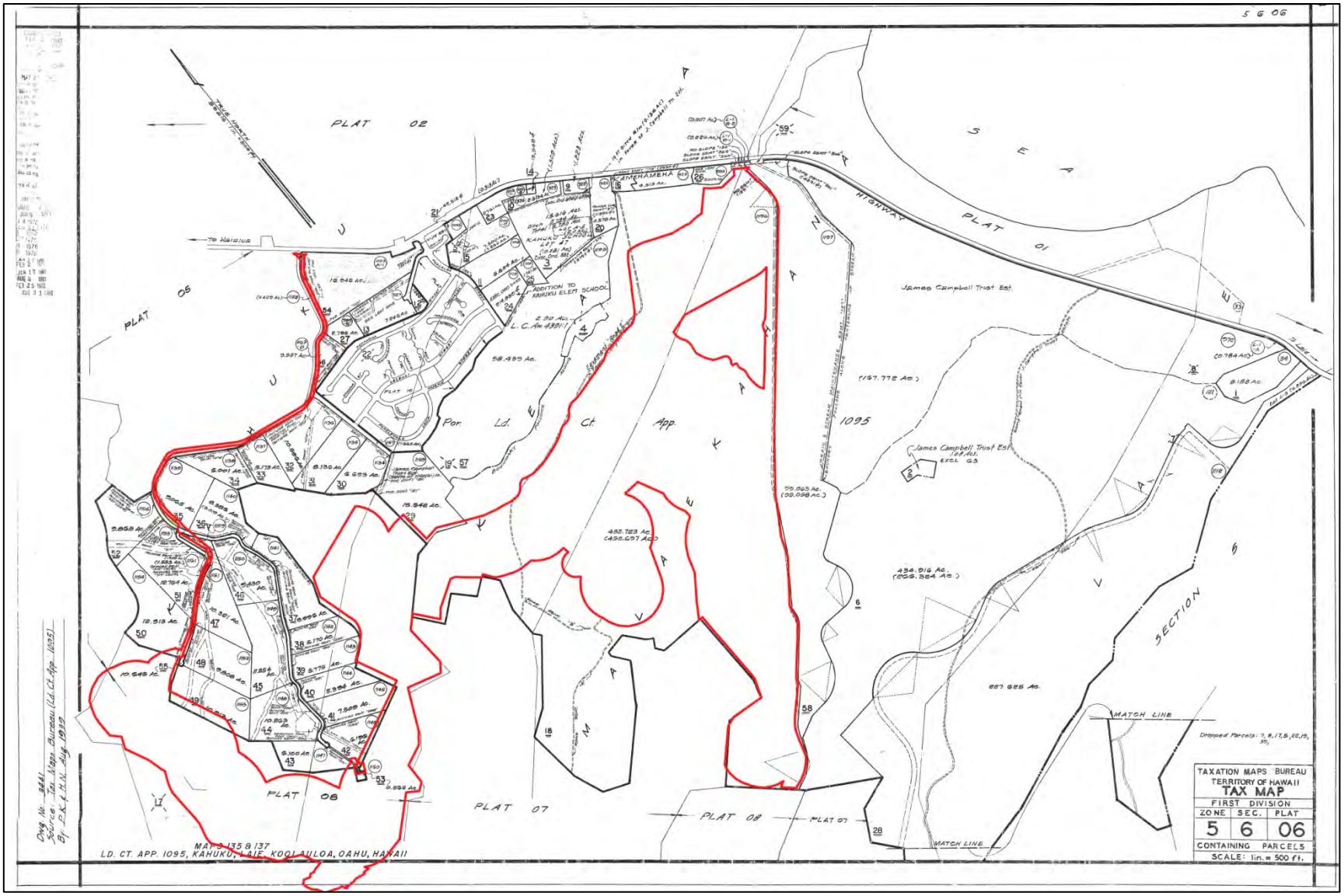

Figure 4. Project area depicted on TMK Map

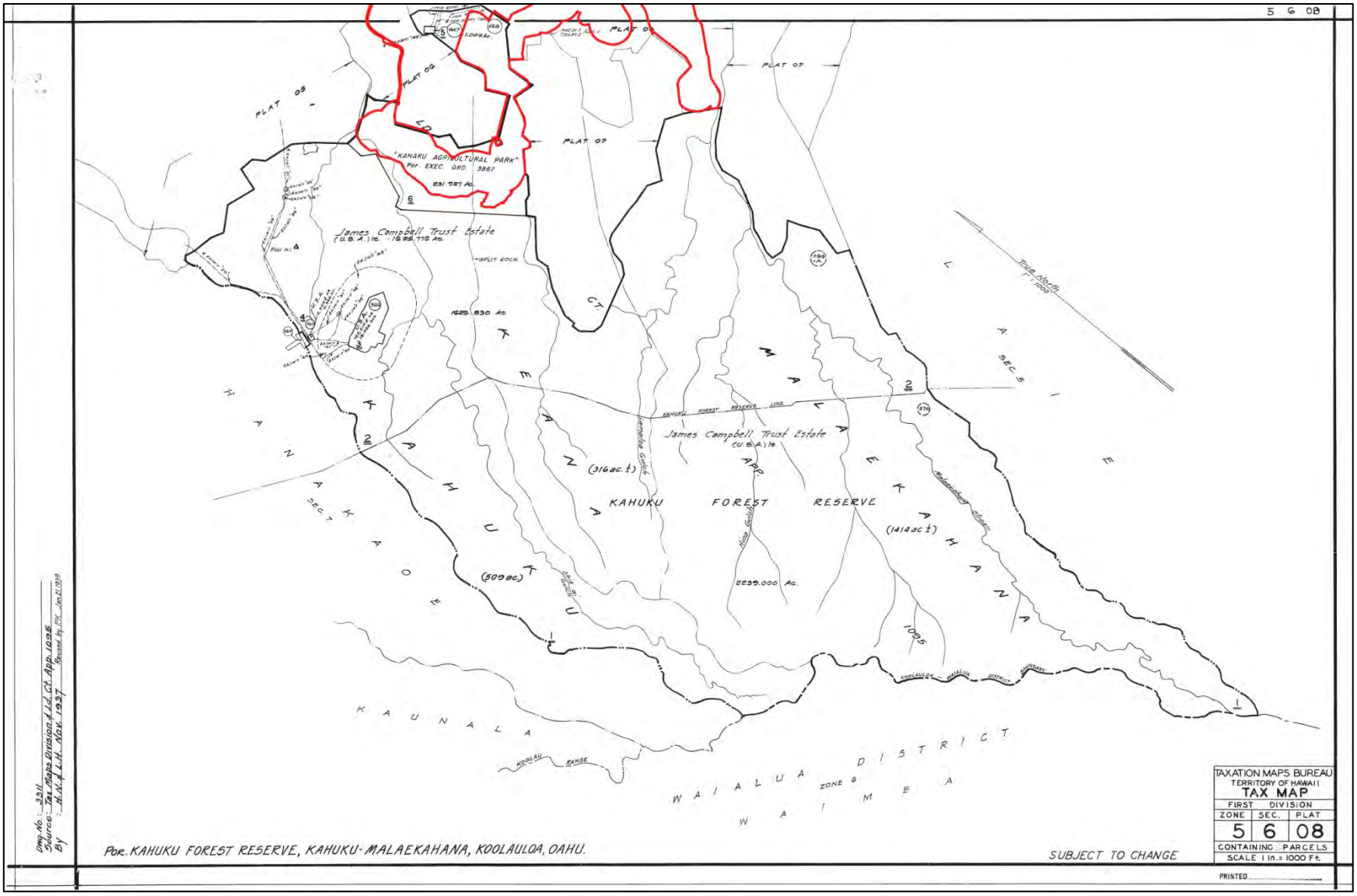

Figure 5. Project area depicted on TMK map.

is *noni*. At Kealahaka is *'awa*, sugar cane, and banana. At Paos is *'awa*. At Uumhalu is a *kula* planted in sweet potato and watermelon. My house is at Nonoula. My right of occupancy is from the time of Kameharneha II. KALAWAIMANU

LCA Awards in Mālaekahana Ahupua'a (in the Vicinity of Nā Pua Makani Project Area)

The Mālaekahana *ahupua'a* LCA claims suggest that traditional agricultural practices occurred in Mālaekahana, but was limited to dryland cultivation as well as gathering of plant resources, while wetland agricultures was practicing in adjacent Lā'ie (Hammatt 1996). Land use as indicated in Mālaekahana LCA claims is described by Hammatt (1996) as follows:

> In 1850 the *ahupua'a* of Mālaekahana (3280 Acres) is claimed by A. Keohokalole, mother of King Kalākaua, Queen Liliu'okalani, Miriam Likelike Cleghorn and Wm. Pitt Leleiohoku (II) and is awarded to her in 1854. Of 21 claims for land parcels (*apana*) in Mālaekahana only four *kuleana* claims are awarded. There are no claims for *lo'i* in Mālaekahana. The claims often state that the area jumps around and goes from sea to mountain and therefore boundaries can't be given. The claims for Mālaekahana mention 15 *kula*, 6 *mala* ,and 1 *mo'o* with no crop given, 12 *wauke* patches, 7 house sites, 6 banana patches, 3 potato patches, 5 koa trees for canoe making, and 1 *mala* each for *hala*, *noni*, *ti*, *hau,* breadfruit and tobacco. Two mountain areas are also claimed. Two house sites, 1 banana and potato land, and 1 *wauke* land are awarded. However, no present maps show where these awards were located. The old Mālaekahana maps at the State Survey office are missing (as reported by the survey office to Dr. V. Creed on 2/2/96). Tax maps do not show the location of these few awards (Hammatt 1996:4-5).

After exhausting all available historic maps for Mālaekahana during this documentary research, no maps were found depicting the Mālaekahana LCA locations. The entire *ahupua'a* was awarded to Ane Keohokālole.

LCA Awards in Lā'iewai Ahupua'a (in the Vicinity of Nā Pua Makani Project Area)

The succeeding sample of Lā'iewai LCA claims provide insights on the area's traditional land use.

> No. 3861: 2&3: Pulehu (claimant), Lā'ie, Oahu
> January 5, 1848
>
> To the Land Commissioners, Greetings: I hereby state the claim for my land. Kahikiea is the *mo'o*. There are five taro *lo'i* at Kahikiea. One *lo'i* is at Kaholo, one *lo'i* is at Paakea. One *'ili weawea* [grass or herbage], one *mo'o* is at Malaekahana. One *'ili* of sweet potatoes is at Omao. The right of my *makuas* was from Liholiho.
>
> Foreign Testimony V. 11:263
> No. 386l Pulehu
>
> Kauaikaua, sworn says, he knows the land claimed by Pulehu in Laie. It consists of 6 *kalo* patches, a piece of *kula* land and a House site. The 6 patches are bounded on Hauula side by Kahalelaau's land, Mauka and Waialua side by the Konohiki, Makai by Kii's land. The *kula* land is planted with *wauke* - contains about half an acre - surrounded by the Konohiki. The house site is not enclosed, there is one house on it. Claimant has held the land for 30 years. The Konohiki''s agent consented to this claim.

No. 4003:3: Hano (claimant), Lāʻie, Oahu
January 5, 1848

Native Register V. 4:208
January 5, 1848

> To the Land Commissioners, Greetings: I, Hano am a claimant of land at Laie. In the *ʻili* of Paoo are three *loʻi*, one *kula*, one *kai* /fishery/ one mountain area. The boundaries are: on the north, *muliwai* land of Poouahi, on the east, land of Kaaipuaa, on the south, land of Kauwaiawa, on the west, land of Palii. Here are the scattered claims: In the *ʻili* or the *ahupuaʻa*, six *loʻi*, ten *kula*. Seaward of the mountain, one house lot. In the *ʻili* of Kapuna, one *loʻi*, two *kula*. Because these claims are so very scattered, therefore it is noc practical to describe their boundaries lo you, the Land Commissioners. My right of occupancy at these places is from the time of Kamehameha 1 until the reign of Kamehameha III at this time.

Foreign Testimony V. 11:277
No. 4003 Hano

> Kauaiamanu, sworn says, he knows the land-claimed by Hano in Laie. It consists of 3 *kalo* patches, a piece of *kula* land, and a House lot. The 3 patches are bounded on Hauula side by Maii's land, Mauka by Hoanauli's land,- Waialua side by Kaluaiaawa's land. - Makai by Kauaiamanu's land. The *kula* land is planted with tobacco & bananas. It is bounded on Hauula side by Kauaiamanu's land, - Mauka by Napahu's land, -Waialua and Makai by the Konohiki. The houselot is in another place. It is not enclosed. Claimant has held the land for 9 years. The konohiki's agent had no other objection to the claim ....

No. 4343:2: Kauaiomono (claimant), Lāʻie, Oahu
January 3, 1848

Native Register V. 4:267
January 3, 1848

> To the Land Commissioners, Greetings: I, Kauaiomano, am a claimant at Laie for four *loʻi* and one *kula*. The boundaries are: north, the land of Pupukea, east, Kalakee's /land/, south, the land of Napaeko, west, the land of Hano. The scattered *loʻis* and *kulas* are as follows: Kalawa, one *loʻi*, no *kula*. Kapaakea, four *loʻi*, three *kula*. Kaholi, no *loʻi*, no *kula*. Kahikiea no *loʻi*, two *kula*. Kumupali, no *loʻi*, one *kula*. My right of occupancy is from my *kupunas* until the present.

Foreign Testimony V. 11:298
No. 4343 Kauaiomano

> Kauaikaua, sworn says, he knows-the land of claimant in Laie. It consists of 12 *kalo* patches, 7 of which are planted, a piece of *kula* land and a house site. 5 of the patches have not been planted for two years. The 7 *kalo* patches which are planted are bounded on Hauula side by Kaleoʻs land, -Mauka by Elemakule's land, ·Waialua side by the Konohiki, -Makai by Kamamai's land. The *kula* land is bounded on Hauula side by Pulehu's land, - Mauka by Kaleo's land, Waialua side by the land of Malaekahana, - Makai by Kamamai's land. It is planted with *wauke*. The house site is separate- not enclosed. Claimant derived the land from his ancestors. The Konohiki's agent had no other objection to this claim ...

No. 4361:3: Kii (claimant), Lāʻie, Oahu
January 3, 1848

Native Register V. 4:271 Laie wai, Oahu
January 3, 1848

> To the Land Commissioners, Greetings: I, Kii.am 1 claimant of land in the ʻ*ili* of Kahikea. There are two taro *loʻi*, a *kula* and a wooded upland named Omao. The boundaries are: north, Napilipili, east, Kaiwikkole, west, a stream, south, Kapaakea. Here are the scattered claims: At Puhahaka is one ʻ*ili* of *wauke*. At Namahana, is one ʻ*ili* of *wauke* and a *pali uala*; [steep planting of sweet potatoes]. At Keanahale is one ʻ*ili* of *wauke* and an *apuapuʻuala*. At Noholua are two *loʻi* and a watercourse. At Paakea is one ʻ*ili* of *wauke*, two ʻ*ili* of sweet potato, and, ʻ*ili* of watermelon. At Malaekahana is one ʻ*ili* of sweet potato. Malaekahana is a separate *ahupuaʻa*. Also, my house is at Paakea. My occupancy has been from the reign of Kamehameha 3 [sic]

Foreign Testimony V. 11:300
No. 4361 Kii

> Kupehia, sworn says, he knows the land claimed by Kii in Laie. It consists of 2 *kalo* patches, a piece of *kula* land and a house site. The 3 patches are bounded on Hauula side by Kahalelaau's land, - Maauka by Pulehua's, - Waialua side by the Konohiki, - Makai by Mahoe's land. The *kula* land is bounded on Hauula side by Kauaiomano's, - Mauka and Makai by the *konohiki*, - Waialua side by Kauikaua's land. The house site is distinct from the land – not enclosed. Claimant has held his land for over ten years. The land claimed in Malaekahana is *nahelehele*. The agent of the Konohiki of Laie had no objections to this claim.

Summary of Traditional Economic Activities

Based on the information presented above, the following is a summary of the traditional economic activities that may have taken place in the area of the project.

- Houselots for habitation.
- Irrigated taro cultivation.
- Dryland farming on *kula* lands:
  - Sweet potato
  - Wauke
  - ʻŌlena
  - ʻAwa
  - Banana
  - Melons
  - Tobacco
  - Sugar cane
- Economically useful trees:
  - Hala
  - Kukui
  - Koa
  - Breadfruit
  - Noni
  - Coconut

The summary indicates that agricultural pursuits were widespread and diverse. Both irrigated and non-irrigated farming took place, and a wide range of trees appeared to have been important to the residents of the area. Most of the cultigens were Polynesian introductions, but a couple of historically introduced plants (melons, tobacco) were added after European contact. It appears that the main agricultural cultigens were taro, sweet potato, and breadfruit. Added dietary items included banana, sugar cane, and coconut. *Wauke,* used in making tapa was apparently widespread. Medicinal plants including *ʻōlena* and *noni* were also present.

3.3.4 Historic Agriculture, Religion, Developments, and Military Land Use

The Kahuku Ranch

According to Rechtman (2009), prior to Campbell's ownership, Charles Gordon Hopkins obtained the *ahupuaʻa* of Kahuku in 1851 the as part of Grant No. 550 and founded a ranch at Kahuku.

The result of these developments were not all positive, as suggested by Emerson (1928), where he writes that the tyranny of the new land owners had caused the Native population of Kahuku to suffer, on which he elaborates:

> Kahuku had passed from control of its chief to that of an Englishman. The pastures of his big ranch extended along the shore for 12 miles, reaching inland to the mountain chain, and he was so autocratic that the natives could not own a dog, or pasture a cow or horse, without his consent. The depredations of herds and flocks on their small homesteads became unbearable, but they appealed in vain for their beloved *hala* trees and patches of vegetables. . . There was no redress, however, and with the fading of the forests the people also disappeared and the once populous district of Kahuku became a lonely sheep and cattle ranch (Emerson 1928:135-136 as cited in Rechtman 2009).

The 25,000 acre property in Kahuku that would become Kahuku Ranch had passed through a series of hands before it was purchased by James Campbell for $63,500 cash in the mid-1870s. Campbell then stocked this ranch with 3,000 head of cattle as well as a number of sheep and horses he hoped would reach 30,000 (Silva 1984:C-16).

The Kahuku Plantation

By the late 1890s, Campbell had leased a large portion of his ranch lands to James B. Castle, which would become the Kahuku Plantation. The plantation proved to be innovative both socially and economically. In the early 1900s, the Hawaiian Sugar Planters' Association became a recognized organization that aimed to improve general working and living conditions of plantation workers. Kahuku Plantation became a pioneer in the movement, providing a day-care center for the working mothers beginning in 1905 (Thrum 1921:116). The plantation had also developed a new fuel-saving device that burnt waste molasses, creating an ash that was then used as a high grade fertilizer (ibid.). By the mid-1930s, the plantation was cultivating nearly 4,500 acres and had 1,137 people under its employ (O'Hare and Hammatt 2006:21). With its heyday long over, the Kahuku Plantation shut its doors in 1971, causing the greater Kahuku area to experience economic instability for years.

During the plantation's operation, water was an extremely valued resource in the Kahuku and Keana area. Prior to the plantation, traditional agricultural methods relied on seasonal rains, the area's few springs, and intermittent streams. Thus, the plantation began pumping spring water, stream water, and rain to irrigate the sugarcane, but "…these sources were found to be insufficient. Thereafter, the company resorted to artesian wells, which came to be the main source of water" (Kuykendall 1967:69).

Religion and Religious Developments in Kahuku, Keana, and Mālaekahana Ahupuaʻa

Western religions in Kahuku during the late 1800s were jostling to gain the loyalty of the community. In the 1878 *Annual Report of the Hawaiian Evangelical Association*, Kahuku Church, which eventually merged with Hauʻula Church, was one of the last Hawaiian speaking Evangelical churches on the island (Hawaiian Evangelical Association 1878:2). This church is later described in this report as "one of the feeble churches," to the point that, "its pastor has been called to Waianae, and installed over that church…It would be well for this church to unite with some stronger one…" (Hawaiian Evangelical Association 1878:10).

The Church of Jesus Christ of Latter Day Saints gained the majority of Lāʻie and Mālaekahana's faith in as early as 1850, when Mormon missionaries initially settled in the area. According to Ahlo and Hommon (1981), the Mormon Church purchased approximately 6,000 acres in the area for farming. Of these lands, approximately 1,500 acres of which were ideal for agriculture. Crops that were initially cultivated on these lands, but by the end of the 19th century pineapple and sugar cane dominated. This is upheld in Vogeler et al. (2011), who largely cite Britsch (1989), holding that Brigham Young sent the first eight Mormon missionaries to the Hawaiian Islands in 1850. This initial mission yielded a significant religious, economic, and infrastructural foothold for the Mormon Church, as is evident in Voegler et al. (2011):

> They arrived on December 12 in Honolulu, and then split up, traveling in groups of two or three to the other islands. Their original mission to convert the mainly foreign-born (*haole*) population proved to be difficult. The missionaries were discouraged and discussed returning home, but they instead decided to stay, to learn the Hawaiian language, and to preach to the native Hawaiians...The number of Hawaiian converts quickly grew, and in 1853, they decided to buy land on Lānaʻi to start a colony, where all the brethren could live and work.
>
> The Lānaʻi colony was not a success, for a wide variety of reasons, and in 1864, the mission decided to found a new gathering place. In 1864, two Latter-day Saints Mission presidents, Francis A. Hammond and George Nebecker, traveled to Hawaiʻi to purchase land for a new Mormon settlement. Land was fairly cheap at this time in Hawaiʻi as the end of the Civil War in the U.S. had led to a depression in the sugar market, leading to an eagerness to sell land by sugar planters… In 1865, Hammond purchased a six-thousand acre plantation called "Lāʻie" from Thomas T. Dougherty. By 1865, the Church had 6,000 acres, probably all the land in Lāʻiemaloʻo and a portion of the land in Lāʻiewai (minus the 298.5 acres owned by the Kahuku Ranch and Kahuku Sugar Company).
>
> On this land was 600 head of cattle, 500 sheep, 250 goats, 20 horses, a large frame house, five native houses, and five acres of cotton…The first order of business for the new owners was to establish a cash crop that would sustain the settlement. Although corn and cotton were grown for the first two years, it soon became

> evident that sugar would be the salvation of the growing community. A mill was purchased and set up in Lāʻie in 1868...The problem of insufficient water in some years was solved in the early 1880s, when a flume was built to bring water down from the Koʻolau Mountains. A new, more efficient mill was built in 1879…
>
> By 1866, about two hundred Hawaiians, mostly members of the Church, were living at the Lāʻie mission settlement…Growth of the community was slow through the 1870s, due to most Hawaiians wishing to stay near their own homes. In 1874, only about 377 members lived near the mission... However, church membership as a whole did increase during this time; in 1865, the island-wide membership of the Hawaiian mission was recorded as 500; by 1906, it was 7,212 strong… (Voegler et al. 2011:41-42).

In 1920, the Mormon Temple was erected in Lāʻie, with a price tag of $250,000, which was intended to resemble a tabernacle in Salt Lake (Elder 1922:194).

Transportation in Kahuku, Keana, and Mālaekahana Ahupuaʻa

The entire northern portion of Oʻahu was greatly isolated from the Western urban sprawl of Honolulu until paved roadways and rail were implemented. While this area remained "country," the new transportation infrastructure forever changed the landscape Kahuku, Keana, and Mālaekahana Ahupuaʻa. According to Kuykendall (1953),

> On Oahu, what came to be called the "round-the-island road" --ancestor of Kamehameha Highway--extended from Honolulu to Ewa, thence across the central plateau to Waialua; from that place it ran along the coast past Kahuku and Kualoa to Kaneohe, where it joined the road which came over the Nuuanu pali from Honolulu. In 1856, for the first time, a four-wheeled carriage drawn by a pair of horses was driven over the portion of this road between Honolulu and Kahuku. Three years later, a Captain Coffin is reported to have driven with a carriage and span of horses from Honolulu to Kahuku one day in ten hours and to have returned the following day in eight hours (Kuykendall 1953:25).

In the late 1800s, the Oʻahu Railway and Land Co. ran a line up to Kahuku from Honolulu via the Pali – with the terminus of the line running from Waiʻanae (Honolulu Star-Bulletin 1941:155). This line was lauded for opening up new economic opportunities to windward districts of Oʻahu (ibid.:158). Wong-Smith (1989) summarizes this as follows:

> For its first nine years Kahuku Plantation Co. relied on little coastal vessels which anchored offshore from Kahuku Landing to bring supplies and return raw sugar to Honolulu. Five miles of 36-inch gauge railway, some of it portable, had been laid in 1890 to haul the cane through the plantation fields to the Kahuku mill and thence to the landing. The plantation track extended south opposite Laie and the Mormon settlement, which sent its cane to be ground at Kahuku… In 1899. the Oahu Railway finally laid track to a terminal at Kahuku. It hauled sugar and the agricultural freight products back and forth across the windward part of Oahu. The Koolau Railway Co. laid tracks from Kahana to Kahuku and served as a common carrier until 1931. From then until the 1950s, its sole function was to carry cane from the northeastern field of the island (Wong-Smith 1989:A-15-16).

Military Presence in Kahuku, Keana, and Mālaekahana Ahupuaʻa

Prior to the construction of any U.S. military bases in Hawaiʻi, the American Marconi Company set up a wireless operation in Hawaiʻi in 1902, building their transpacific receiving station at Kahuku in 1915. This site is located less than 3 kilometers north of the Nā Pua Makani Wind Project area.

According to O'Hare et al. (2008), Kahuku Golf Course, which is less than one kilometer east of the project area, also played a part in World War II, stating:

> It was during the attack on Pearl Harbor on December 7, 1941 that the Kahuku Golf Course was first used as an emergency landing field. On December 6, twelve B-17s had left California on route to the Philippines, with a stopover for refueling at Oʻahu. They flew into Oʻahu completely unaware of the Japanese attack and had to quickly dodge strafing by the Japanese Zeros. Amazingly, they all managed to make emergency landings, seven at Hickam Air Field, one at Wheeler Airfield, one at Bellows Airfield, one at the tiny Haleʻiwa Airport, and one on the grass and sand surface of the Kahuku Golf Course…The Army Air Force on Oʻahu had planned to build an emergency strip at the golf course, but it had not been completed by the time of Pearl Harbor attack (O'Hare 2008:28).

In 1942, the Kahuku Airfield was constructed as an auxiliary airfield, with several runways, ancillary bunkers, and emplacements (O'Hare and Hammatt 2006:21). Pilots from Wheeler Air Force Base were trained to fly a variety of aircraft on this airfield. By the late 1940s, Kahuku Field was abandoned and the lands once leased by the military were returned to the landowner. This former airfield was located near the present day Turtle Bay Resort.

According to Nakamura (1981), the *wao/mauka* areas of Kahuku and Keana Ahupuaʻa were also leased to the U. S. Military for training purposes in the mid-1950s. These lands, referred to as the Kahuku Training Area (KTA), have continuously been utilized by various branches of the United States Department of Defense and have not been easily accessible to the general public since. KTA makes up most of the western boundary of the Nā Pua Makani project area.

4.0 PREVIOUS ARCHAEOLOGY

A total of 39 archaeological studies have been conducted in various locations within a 2.5 kilometer radius around the proposed Nā Pua Makani Wind Project lands. Presented in the following section is a summary of the findings for these reports. A list of the reports and their locations in chronological order is provided in Table 2 and map of the project area with all of the study areas and known archaeological sites is provided in Figure 6.

Table 2. Previous Archaeological Investigations in the Vicinity of the Project Area

Authors	Year	Report Title and Publisher	Project Location	Findings
McAllister	1933	*Archaeology of Oahu.* Bishop Museum: Honolulu.	Island-wide survey.	Sites 50-80-02-0268 through -0272 near Nā Pua Makani Wind Project area.
Cox and Stasack	1970	Hawaiian Petroglyphs. Bishop Museum Press, Honolulu.	Island-wide survey.	Located a petroglyph on a beach boulder in either Keana or Kahuku Ahupuaʻa.
Rosendahl	1977	*Archaeological Inventory and Evaluation Report for U.S. Army Support Command, Hawaii (USASCH). Parts I Report Text and II Tables.* Department of Anthropology, Bishop Museum, Honolulu.	Kahuku Training Area, selected portions totaling 1,044 acres.	Relocation of 3 sites and discovery of 6 new sites (No. 50-80-02-9506 through -9509); Site -9506 (historic stone faced irrigation ditch) is less than 0.5 km southwest of project area.
Barerra	1979	*Kahuku Archaeological Survey*. Chiniago Inc. Honolulu.	Described in Barrera (1981) as located "…inland of the post office at Kahuku."	Discovery of 5 sites (No. 50-80-02-1425 through -1429), largely traditional.
Clark	1979	*Preliminary Archaeological Reconnaissance Report for Koolau Loa Housing Project and Park Expansion, Kahuku, Island of Oahu.* Kualoa Archaeological Research Project, Department of Parks and Recreation, City and County of Honolulu.	57.3-acres in the proposed Koolau Loa Housing Project area and Park Expansion Area, Kahuku.	Relocation of Site -0269, A "sacred way," (described as a Hawaiian sacred area having no structural features.
Schilt	1979	*Archaeological Reconnaissance Survey of Proposed Extension, Kahuku Elementary School, Kahuku, Oʻahu*. Department of Anthropology., Bernice P. Bishop Museum, Honolulu.	4-acres in the Proposed Extension of Kahuku Elementary School.	Relocated a rock shelter and platform previously recorded by McAllister (1933). Two new sites (a mound and overhang shelter were also found.
Yent & Estioko-Griffin	1980	*Archaeological Investigations at Mālaekahana (50-80-02-2801), Windward Oʻahu.* DLNR, Honolulu.	Mālaekahana State Park, Phase I (south portion)	Site No. -2801; 3-year project; performed mapping, testing, excavation, and analysis; 3 major occupational layers found (ca. AD 1600-1780).

Authors	Year	Report Title and Publisher	Project Location	Findings
Barrera	1981	*Cultural Resources Reconnaissance of the Kahuku Agricultural Park Project Area*. Chiniago Inc. Honolulu.	Four separate parcels totaling 3,000 acres in *mauka* Kahuku, Keana, & Mālaekahana Ahupuaʻa.	Three new sites: (1) a surface scatter of historic and traditional artifacts; (2) a single cowrie shell; and (3) a surface scatter of historic artifacts. Sites 2 and 3 are located near a prominent limestone outcrop.
Davis	1981	*Archaeological Reconnaissance Survey of Hawaiian Wind Farm Project area at Kahuku Oʻahu, Hawaiʻi.* MS 060481. Department of Anthropology, Bishop Museum, Honolulu.	Kahuku Training Area, selected portions (proposed windmill sites).	Discovery of 4 additional sites, including a historic stone wall remnant, a habitation complex, agricultural terraces, and stone platform.
Sinoto	1981	*Archaeological Reconnaissance Survey of Kiʻi and Punamanō Wetland Refuge Units, Kahuku, Oʻahu, TMK 5-6-002 & 003*, Bishop Museum.	Kiʻi and Punamanō Wetland Refuge Units in Kahuku.	Relocation of 2 sites found by McAllister (1933): Puumano Spring and Kiʻi Fishpond.
Yent & Ota	1982	*Mālaekahana Phase II Initial Testing Results*. DLNR, Honolulu.	Mālaekahana State Park, Phase II (central portion).	22 cores; cultural materials encountered only in coastal cores; No new sites found.
Rogers-Jourdane	1982	*Archaeological Reconnaissance Survey of Marine Culture Enterprises Lands in Kahuku, Oʻahu Island*.	45 acres in Kahuku Golf Course area.	No sites found.
Yent & Ota	1983	*Eroding Archaeological Site at Mālaekahana Phase III, Mālaekahana Bay, Windward Oʻahu.*	Mālaekahana State Park; Dune area of Phase III.	In eroding dune face, a human burial, *imu*, and two hearths were recorded (Site No. -1038).
Yent & Estioko-Griffin	1986	*Results of Auger Coring Conducted at Mālaekahana State Recreation Area, Phase II, Koolau Loa, Oahu.*	Mālaekahana State Park, Phase II (northern portion).	11 cores excavated; no sites found.
Sinoto	1986	*Perimeter Flagging for Proposed Fencing Around Two Archaeological Site Areas, Kahuku Elementary School, Kahuku, Oʻahu.* Letter Report. Department of Anthropology, Bernice P. Bishop Museum, Honolulu.	Kahuku Elementary School, Keana Ahupuaʻa.	No new sites found; flagging of McAllister (1933) Sites -0269 and -0270.
Jensen	1989 a & b	*Archaeological Inventory Survey Punamanō and Mālaekahana Golf Courses Lands of Ulupehupehu. Punaluu. Kahuku, Mālaekahana, and Laie, Koolau Loa District, Island of Oahu.*	Non-contiguous project area, totaling 866-acres of inland Kahuku. Punamanō Golf Courses is within Ulupehupehu, Punalau and Kahuku Ahupuaʻa. Mālaekahana Golf Course is in Lāʻie and Mālaekahana Ahupuaʻa.	Twenty-six sites containing 45 component features were identified. Traditional site types: caves, overhangs, walls, terraces, platforms, enclosures, isolated midden deposits. Historic site types: WWII II emplacements, dumps, roads, and agricultural ditches.
Kennedy	1989a	*Archaeological Inventory Survey for the Proposed Mālaekahana Golf Course, A Portion of the Country Courses at Kahuku.*	200 acres inland of Mālaekahana Bay and Kalanai Point, ca. 100 meters southeast of project area. Was location of Site -0275, Waiʻāpuka, a legendary sinkhole with spring.	Thirteen new sites found (11 traditional habitation and agricultural sites and 2 historic plantation and military sites). Also, 6 sand dunes recommended for testing. Letter report lists only temporary site numbers. Site -0275 not relocated.

Authors	Year	Report Title and Publisher	Project Location	Findings
Kennedy	1989b	*Archaeological Assessment and Reevaluation Report Concerning the Recently surveyed, Proposed Punamanō Golf Course; A Portion of the Country Courses at Kahuku.*	Inland Ulupehupehu, Punalau and Kahuku Ahupuaʻa.	Two new Historic sites to the Jensen's (1989 a&b) findings with a total of 14 additional features. Also recommends preservation of Site -4070 (possible burial).
Kennedy	1989c	*Archaeological Reconnaissance Survey at TMK: 5-6-002:025, Located at Kahuku, Oʻahu.* Archaeological Consultants of Hawaiʻi, Haleʻiwa, Hawaiʻi.	Across Kamehameha Hwy. to the north of Hospital (Kahuku Medical Center).	No sites found.
Kennedy	1990	*Kahuku Sand Mining Project: Archaeological Subsurface Testing Results*. Archaeological Consultants of Hawaiʻi, Haleʻiwa, Hawaiʻi.	Immediately southwest of Kahuku Golf Course.	No burials or cultural layers were found during testing.
Pfeffer & Hammatt	1992	*Waialua to Kahuku Power Line*. Cultural Surveys Hawaiʻi, Kailua, Hawaiʻi.	Uplands of Ahupuaʻa spanning from Waialua to Kahuku.	-
Hammatt & Pfeffer	1992	*Archaeological Reconnaissance of Kahuku Agricultural Park*. Cultural Surveys Hawaiʻi, Kailua, Hawaiʻi.	Upland Keana Ahupuaʻa.	One day reconnaissance survey yielded no new sites.
Stride et al.	1993 & 2003	*Archaeological Inventory Survey of the Proposed 785-Acre Kahuku Agricultural Park.* Cultural Surveys Hawaiʻi, Haleʻiwa, Hawaiʻi.	Original 1993 project area was 1666 acres, later in 2003 reduced to 785 acres in upland Kahuku and Keana Ahupuaʻa (single report submitted in 2003).	In all, 21 sites were located in original project area. However, 7 sites were recorded (50-80-02-4510 through -4516) in the revised area. Site types: wall sections, overhang shelters, terraces, and enclosures. Most appear to function as habitation sites from pre-Contact into historic times.
Dagher	1993	*Inadvertent Discovery of a Human Burial at Makahoa Point, Mālaekahana, Koʻolau Loa, Oʻahu*. State Historic Preservation Division, Kapolei, Hawaiʻi.	Makahoa Point.	A single pre-Contact era human burial of Hawaiian ancestry was inadvertently discovered.
Jourdane	1994	*The Inadvertent Discovery of Human Remains near Kahuku Golf Course, Kahuku, O`ahu*. Historic Preservation Division, Kapolei, Hawaiʻi.	Near Kahuku Golf Course.	A single pre-Contact era juvenile human burial was inadvertently discovered.
Hammatt	1996	*Archaeological Reconnaissance for Proposed Mālaekahana Exploratory Wells, Mālaekahana, Oʻahu.*	Just mauka of the southern mauka end of the NPM APE.	Archival research and archaeological background performed. No sites recorded.
Hibbard	1997	*Inadvertent Discovery of Human Remains, Japanese Cemetery, Kahuku Golf Course, TMK 5-6-002:010*. Memo in Burial Files, State Historic Preservation Division, Kapolei, Hawaiʻi.	Japanese Cemetery near Kahuku Golf Course.	A single pre-Contact era human bone was inadvertently discovered.
Collins	1999	*Recovery of Human Remains From Kahuku Golf Course*. State Historic Preservation Division, Kapolei, Hawaiʻi.	Kahuku Golf Course (*makai*).	Pre-Contact era human remains were inadvertently discovered (site -5773).

Authors	Year	Report Title and Publisher	Project Location	Findings
Perzinski & Hammatt	2001	*Archaeological Inventory Survey Report for Hospital Ditch and Kiʻi Bridge in the Ahupuaʻa of Kahuku, District of Koʻolau Loa, Island of Oʻahu (TMK: 5-6-002, 005 & 006).* Cultural Surveys Hawaiʻi, Kailua, Hawaiʻi.	Kamehameha Hwy., Kahuku near detour roads.	No sites recorded.
Calis & Tome	2002	*An Archaeological Monitoring Report for the Force Main Sewer Replacement Project, Kahuku Ahupuaʻa, Koʻolau Loa District, Oʻahu Island, Hawaiʻi*. Scientific Consultant Services, Inc., Honolulu.	Force Main Sewer, *makai* of Kamehameha Hwy., Kahuku.	No sites recorded.
O'Hare et al.	2004	*Documentation of the Kahuku Sugar Mill, Kahuku Ahupuaʻa, Koʻolau Loa District, Island of Oʻahu*. Cultural Surveys Hawaiʻi, Inc. Submitted to Tetra Tech Inc.	Kahuku Mill Complex.	Documentation report of remaining Plantation structures.
O'Hare et al.	2008	*Archaeological Inventory Survey Plan for the Kahuku Subdivision Project, Kahuku, Keana, and Mālaekahana Ahupuaʻa, Koʻolau Loa District, Oʻahu Island. TMK: (1) 5-6-002; 003, 010, 012, 016, and 027.* Cultural Surveys Hawaiʻi, Kailua.	200 acres of *makai* Kahuku, Keana, and Mālaekahana Ahupuaʻa. Bound by the coast, Makahoa Point, Kaluahole, and Kamehameha Hwy.	No sites recorded. Extensive background research performed on area.
Morrison	2009	*Archaeological Background Report for the Proposed Nā Pua Makani Windfarm Project, Kahuku, Oʻahu (TMK 5-6-008:006).* IARII, Honolulu.	231.9 acres of Kahuku and Keana Ahupuaʻa, *mauka* of Kahuku Hospital.	No sites recorded. Background research performed on area.
Rechtman	2009	*A Comprehensive Archaeological Survey of the First Wind Kahuku Wind Power Project Area (TMKs: 1-5-6-05:007 & 014).* Rechtman Consulting, LLC, Hilo.	230 acres west of Kahuku Village and 2.5 kilometers inland of coast.	SIHP Site 4707, which was described as sugarcane field infrastructure.
Dagher & Spear	2010	*Literature Search and Field Inspection of The Kahuku Storm Damage Reduction Project Kahuku Ahupuaʻa, Koʻolau Loa District, Oʻahu Island, Hawaiʻi*. SCS, Honolulu.	Kahuku Intermediate and High School grounds and park adjacent to the west.	No sites recorded. Background research performed on area.
Dagher & Spear	2014a	*Archaeological Inventory Survey Report for the Kahuku Village Subdivision Project, Keana and Mālaekahana Ahupuaʻa, Koʻolau Loa District, Island of Oʻahu, Hawai`i [TMK (1) 5-6-002:027].* SCS, Honolulu.	Portion of 50 acres between Kahuku Golf Course and Kamehameha Hwy.	A single site was found (site No. -7508), consisting of 10 features (9 plantation era and 1 pre-Contact to early-Contact era).
Dagher & Spear	2014b	*An Archaeological Monitoring Report for the Kahuku Village Subdivision Project, Keana and Mālaekahana Ahupuaʻa, Koʻolau Loa District, Island of Oʻahu, Hawaiʻi [TMK (1) 5-6-002:013, 014]*. SCS, Honolulu.	Portion of 50 acres between Kahuku Golf Course and Kamehameha Hwy.	Five archaeological sites found: site -7398 (historic cesspools); -7399 (Burial); -7400 (-7401, and -7511); -7398
Lyman & Spear	2014	*Archaeological Inventory Survey for the Kahuku Village Subdivision Project Keana Ahupuaʻa, Koʻolau Loa District, Island of Oʻahu, Hawaiʻi [TMK: (1) 5-6-002:047 por].* SCS, Honolulu.	Kahuku Village immediately *makai* of Kamehameha Hwy. and *mauka* of Kahuku Golf Course.	Site No. -7508, 8 features (historic existing plantation era homes) relocated.

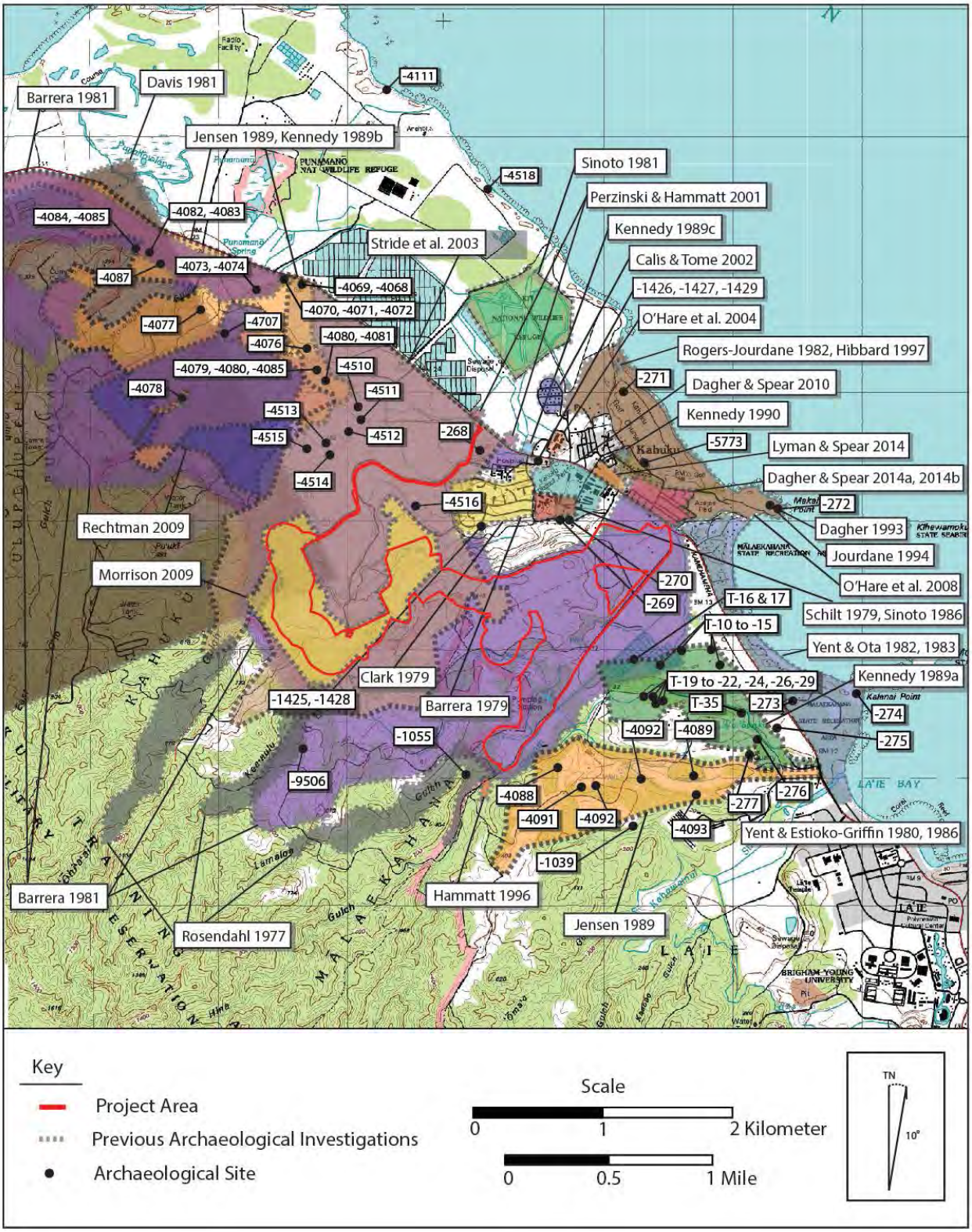

Figure 6. Previous archaeological studies and sites in vicinity of the project area (adapted from USGS Kahuku Quadrangle Map).

4.1 EARLY ARCHAEOLOGICAL STUDIES

The earliest systematic archaeological study performed in the vicinity of the Nā Pua Makani Wind Project is the 1930 island-wide survey conducted by Gilbert McAllister (1933). In *Archaeology of Oahu*, McAllister identifies several historic sites near the project area, including McAllister's Site 269 (traditional platform) and Site 270 (Keana Cave), located less than 300 meters north of the project area. In addition, Kaaulelemoa Fishpond (Site 268) is located less than a kilometer north of the project area, a traditional fishing shrine on Makahoa Point (Site 272) is less than a kilometer to the east, and Pōlou Pool (Site 271) is located just over a kilometer to the north.

Nearly 50 years later, a state-wide survey was performed by J. Halley Cox and Edward Stasack (1970), which focuses solely on petroglyphs. In this study, Cox and Stasack (1970:97) recorded a human figure petroglyph on a boulder at Kalaeuila Point, which is ca. 4 kilometers south of the Kahuku/Keana boundary.

4.2 RECENT ARCHAEOLOGICAL INVESTIGATIONS

In 1977, Paul Rosendahl, performed an archaeological inventory survey on 1,044 acres (non-contiguous) of the 9,646-acre Kahuku Training Area (KTA), the eastern sections of which abut and overlap portions of the west-southwest boundaries of the current Nā Pua Makani Wind Project lands. During this reconnaissance undertaking, Rosendahl (1977) identified nine archaeological sites, including four previously recorded sites that were destroyed (-259, -260, -1043, and -9517), one previously recorded site that was intact and on the State of Hawai'i Register of Historic Places (-2501), and four newly discovered sites (-9506 through -9509). All sites found by Rosendahl (1977) are located in the *ahupua'a* of Hanakaoe and nearly 2 kilometers to the northwest of the project area. Only site -9506, Keaaulu Ditch, which is described as a Historic stone-faced irrigation ditch, is located in close proximity to the project area (ca. 500 meters southwest).

In 1978, the Kualoa Archaeological Research Project (City and County of Honolulu) was tasked with a reconnaissance survey of the 49.9-acre Ko'olau Loa Housing Project area and the 7.4-acre Kahuku District Park Expansion area (Clark 1979). These areas are located less than 500 meters north of the project area. During the survey, local informants led the archaeologists to a locality in the housing area that they referred to as a "sacred way," which was a cleared area with no visible man-made features, but held some spiritual significance to the community. Site -269 was relocated in the school expansion area and described as a stone platform containing a large coral slab that was interpreted as a possible *kū'ula* (stone image), or grindstone (*hoana*). Also revisited was Keana Cave (Site -270) where human skeletal remains were observed on the slope of the cave entrance. In addition, Clark (1979) found a second rock shelter located along a coral outcrop that contained skeletal remains, possibly human, and wood. Clark (1979) noted several other small crevices in outcrops and rock shelters with crude walls in the project area, but did not investigate further. A single Historic grave with a marker exhibiting a date of 1945 was also found during this investigation.

William Barrera (1979) revisited the Koʻolau Loa Housing project the following year, conducting a more thorough archaeological inventory survey and subsurface testing. Barrera (1979) suggested that two limestone knolls and the base of a limestone ledge had the potential to contain archaeological sites, and that the rest of the area had been impacted by sugarcane activities. These three areas were surveyed, yielding five archaeological sites. Site No. -1425 was comprised of two walls aligned at the base of the limestone cliff. Site No. -1426 was described as a rock-lined depression and a metal pipe located at the eastern knoll. Site No. -1427 consisted of a complex of three walls, three rock mounds, and one cave located on the eastern knoll. Site No. -1428 was described as a wall situated on top of a cliff. Site No. -1429 consisted of an earthen mound within an L-shaped wall. Although several of the features were tested, no cultural remains were observed. The conclusion was that most of these features, if not all, were historic and associated with sugar cane cultivation (Barrera 1979).

In 1979, a crew from the Bishop Museum recorded Sites No. -269 and -270 (Schilt 1979), during an archaeological reconnaissance survey for the 4-acre Kahuku School Expansion project. Although some collapse and disturbance was observed on the platform (Site No. -269), Schilt (1979) noted that one component of the platform was a large coral "block," which may indicate that the feature had a ceremonial component. Sketches were made of the platform as well as photographs to record the condition of the platform. Schilt (1979) also noted that the two stones at the entrance of Keana Cave (Site No. -270) were natural formations and that the cave floor was covered by scattered limestone fragments that were likely roof fall, but that midden could possibly lie below it. A roughly rectangular stone mound (Site No. -2478) and a small overhang located within a large outcrop (Site No. -2479) were also recorded (Schilt 1979).

A reconnaissance survey was performed in 1981 by Barrera for the 2,500-acre Kahuku Agricultural Park, which was separated into four parcels. This study area nearly encompasses the current Nā Pua Makani Wind Project area. Barrera (1981) brief survey was performed in three of these parcels and a more thorough survey was performed in one 500-acre parcel. The current project area lies largely in the 500-acre parcel intensively surveyed and the eastern most parcel Barrera (1981) surveyed. In his background research, Barrera (1981:19) listed sites on file at the SHPD office at that time, stating that Site -1055, described as a "Shelter Cave," was outside of his project area and mapped it approximately 200 meters west of the southernmost projection of the project area. However, no source was cited in Barrera's 1981 report. Three archaeological "locations" were identified in the westernmost parcels, which did not include any structural features, but consisted of solely of possibly pre-Contact and Historic surficial remains. These three locations were all within Kahuku Ahupuaʻa, just under a kilometer north of the project area. Location 1 consisted of a marine shell, coral fragments, and basalt flakes. Location 2 was comprised of one cowry shell. Location 3 was a concentration of glass bottle fragments.

Subsequently, Bertel Davis (1981) performed a reconnaissance-level survey in selected areas of KTA for a proposed wind farm, which yielded four newly identified sites (Site No -2357 through -2360). Site No. -2357 consisted of a discontinuous segment of a stacked stone wall that supported a barbed-wire fence with milled wood posts. Sites No. -2358 through -2360, consisting of a house site, habitation terraces, and a terrace with ceremonial features (respectively), are suggested to be functionally and spatially related, being situated within a

swale in upland ʻŌpana Ahupuaʻa (Davis 1981). These findings are located over three kilometers to the northeast of the project area.

The same year, Aki Sinoto of the Bishop Museum performed a brief reconnaissance survey of the Kiʻi and Punamanō Wetland Refuge areas (Sinoto 1981), finding that the land had been extensively modified. He noted a single historic site, which was an old OR&L railroad track. The entire wetland site was designated 50-0a-F4-10/11. While Sinoto (1981) referred to this area as Kahuku Fishpond, one of McAllister's (1933:154) informants maintains that this area was always a swamp - not a fishpond.

Between the years 1980 and 1986, several archaeological investigations were performed in Mālaekahana State park, which had been divided into three phases. In 1980, Yent and Estioko-Griffin performed mapping, testing, excavation, and analysis at Site No. 50-80-02-2801, which was in Phase I located in the southern portion of the park. The three-year project yielded three major occupational layers dating from ca. AD 1600 to 1780. (Yent and Estioko-Griffin 1980:xxi-xxiv). Yent and Ota (1982) performed auger testing at Phase II of the park, which is the northern portion of the park. Of the 22 cores, cultural materials were encountered only in coastal areas. No new sites were found. The next year, Yent and Ota (1983) recorded a human burial, *imu*, and two hearths in an eroding dune face in Phase III, which is in the center of the bay's coast (Site No. 50-80-02-1038). In 1986, Yent and Estioko-Griffin excavated 11 cores in the southern extent of Phase I, which yielded no new sites (Yent and Estioko-Griffin 1986).

Also in 1982, Rogers-Jourdane performed a reconnaissance survey of approximately 45 acres of the Kahuku Golf Course as well as a 2,000-foot long by 100-foot wide corridor for an associated pipeline. This survey yielded no archaeological sites (Rogers-Jourdane 1982). This project area was located over 200 meters to the northeast of the current project area.

Four years later, Sinoto revisited Sites No. -269 and -270 to flag the perimeter for protective fencing to be installed prevent damage during the proposed Kahuku Elementary School extension construction activities (Sinoto 1986).

In 1989, Jensen performed an archaeological inventory survey of two separate areas for the proposed development of Punamanō and Mālaekahana Golf Courses project, totaling 866 acres. Twenty-six sites containing 45 component features were identified between the two separate project areas. These reports were initially released as a single report by Jensen (1989a). Later that year, they were released as separate reports with a change in project area for the Mālaekahana Golf Course and, thus, new survey area, released by Kennedy (1989b). A reevaluation of Jensen's (1989) Punamanō Golf Course survey was also released by Kennedy (1989a). The proposed 638-acre Punamanō Golf Course was located less than one kilometer north of the current project area. Twenty-six archaeological sites were recorded by Jensen (1989) in this portion of the project area (Sites No. -4076 through -4081, and -4085). Site No. -4076 is comprised of an overhang shelter complex of eight features (Features A-H) with visible midden and basalt flakes. Site No. -4077, also a complex (Features A-C), was described as a terrace with a wall and ʻ*auwai* (modified crevasse). Site No. -4078 is a three feature complex (A-C) comprised of an overhang shelter with two stacked walls. Site No. -4079 consists of short wall segments. Site No. -4080 is described as a historic trash dump and bottle scatter. Site No. -4085

is a complex of two features (A and B), Feature A being an enclosure and Feature B being a low wall. Kennedy (1989b) reviewed and reevaluated Jensen's (1989) findings and added two new historic sites, including an enclosure complex and an irrigation ditch, as well as 14 new features associated with sites previously identified by Jensen (1989). SIHP numbers for newly identified sites were not provided. Further, Kennedy (1989b) suggested that Jensen's (1989) Site No. -4076 be preserved, as Kennedy maintained that it could possibly be a burial. Kennedy's (1989a) survey of 200 acres at the site of the proposed Mālaekahana Golf Course, which was not the same survey area as Jensen's (1989) Mālaekahana Golf Course project area, yielded 19 surface features. These sites included overhang shelters with evidence of previous human occupation, suspected agricultural terraces, low mounds, midden scatter areas, large, sandy dune formations with suspected cultural components, prehistoric surface artifacts, a historic gun emplacement, and an historic railroad bed. Kennedy (1989a) found thirteen new sites, consisting of 11 traditional habitation and agricultural sites and two historic plantation and military sites. Also, six sand dunes were recommended for testing. Sites in this report did not receive SIHP numbers, but were designated temporary site numbers. This portion of the project area is located less than 100 meters south of the current Nā Pua Makani Wind Project's southern boundary.

Later that year, Kennedy (1989c) performed a reconnaissance survey on a 14-acre parcel across Kamehameha Highway of Kahuku Hospital, which is roughly 1 kilometer north of the project area. While no archaeological sites were identified, Kennedy noted that Kiʻi Ditch ran through the parcel. Yet, it was not apparent if this plantation-era ditch followed an earlier *ʻauwai*, or traditional irrigation ditch.

In 1990, Kennedy performed archaeological subsurface testing in a parcel just northeast of the Kahuku Sugar Mill and approximately 500-meters north of the current project area. Although no archaeological materials were found in the 47 trenches, a single early modern trash pit and a few shallow irrigation channels associated with nearby small garden areas were observed. The stratigraphy of the trenches suggested that a sand deposit, which has been formed by gradual Aeolian processes over a lengthy time period, exists throughout the area. As such, human remains may potentially exist in the upper, penetrable sand deposit (Kennedy 1990).

Pfeffer and Hammatt (1992) of Cultural Surveys Hawaiʻi, performed an archaeological assessment of an area spanning from Waialua to Kahuku for a power line project. They noted that a multitude of archaeological sites may be present in the vicinity of the project area, with greater probability in coastal areas.

A one-day survey was performed by Hammatt and Pfeffer in 1992 on four parcels (lA, lB, 2, and 3) in *mauka* Keana Ahupuaʻa for the Kahuku Agricultural Park, limiting the survey to areas not under cultivation. No sites were recorded during the brief survey.

The grand majority of the 1666-acre Kahuku Agricultural Park (Parcels 1A, 1B, 2, and 3) was surveyed and tested in 1992 by Cultural Surveys Hawaiʻi, which covers the entire western side of the current project area (Stride et al. 2003). However, the 1666-acre project area was reduced to 785 acres (Parcels 2 and 3). Prior to the project area reduction, a total of 21 archaeological sites were recorded in the 1666 acres. Seven of the 21 sites found were within Parcels 2 and 3.

Only these sites are described in detail in the 1993 CSH report, consisting of: six temporary habitation overhang shelters (Site No. -4510, 4511, and 4515); a temporary habitation enclosure (Site No. -4512); a permanent habitation complex with walls, terraces, an enclosure, and an overhang (Site No. -4513); a temporary habitation terrace (site 4514); and a temporary habitation complex with an overhang and a wall (Site No. -4516). Three of the sites were tested, each sampled with a single test unit (Trenches 1, 2, and 3). A human burial was encountered in Test Trench 2 in Site No. -4515, Feature B (overhang shelter). This burial and others found in Keana and eastern Kahuku *ahupuaʻa* were reinterred at Site No. -4516 Feature C, which is a low wall adjacent to a limestone outcrop.

In 1993, a single pre-Contact era human burial of Hawaiian ancestry was inadvertently discovered at Makahoa Point (Dagher 1993), which is approximately 800 meters east of the current project area. The following year, Jourdane (1994) wrote a letter report for a single pre-Contact era juvenile human burial that was inadvertently discovered near the Kahuku Golf Course, ca. 800 meters east of the project area. In 1997, a single human bone, assumed to be pre-Contact era, was inadvertently discovered near the Kahuku Golf Course, approximately one kilometer north of the current project area (Hibbard 1997). Several years later, another set of pre-Contact era human remains were inadvertently discovered at the golf course (Site No. -5773), less than 500 meters north of the project area (Collins 1999).

An archaeological inventory survey was performed in 2001 for the Hospital Ditch and Kiʻi Bridge/Drainage (Perzinski and Hammatt 2001), which is located just over 1 kilometer north of the project area. No archaeological sites were noted.

Archaeological monitoring was performed in 2002 during excavations related to the 670-meter long force main sewer replacement *makai* of Kamehameha Hwy, which is a little over one kilometer north of the current project area (Calis and Tome 2002). Although no archaeological sites were encountered during ground disturbing activities, Calis and Tome (2002) recorded the stratigraphy of this area that appeared to be largely imported construction fills related to sugar cane cultivation and irrigation.

In 2004, O'Hare et al. conducted documentary research for the Kahuku Sugar Mill complex, in which HAER format recordation of the existing Kahuku Mill structure was performed. History of the mill as well as recordation of mill equipment (O'Hare et al. 2004) was undertaken. The mill is roughly 900 meters north of the current project area.

O'Hare et al. (2008) performed extensive background research for the Kahuku Subdivision Project area, which is comprised of 200 acres that are located less than 300 meters northeast of the current project area. No sites recorded.

In 2009, Morrison prepared an archaeological background report for the proposed 231.9-acre Nā Pua Makani Wind Project for West Wind Works LLC, Oregon, which covers a little less than the western half of the current project area (Morrison 2009). This study focused mostly on creating predictive models by using a series of historical USGS maps and aerial photographs of the project area, ranging from 1906 to 1968, that were geo-referenced and overlain.

Rechtman (2009) conducted an archaeological inventory survey of the 230-acre First Wind Kahuku Wind Power project area located less than 300 meters northwest of the Nā Pua Makani Wind Project. A single archaeological site was recorded within the project area (Site No. -4707), which is an existing site recorded by Kennedy (1989) with related plantation infrastructure features located just outside of the project area.

Another background research report was prepared in 2010 by Dagher and Spear for the Kahuku Storm Damage Reduction Project which is located approximately 500 meters north of the project area (Dagher and Spear 2010). No archaeological sites were recorded.

In 2014, Dagher and Spear performed an inventory survey on 50 acres between the Kahuku Golf Course and Kamehameha Highway for the Kahuku Village Subdivision Project, which is directly across Kamehameha Highway of the current project area (Dagher and Spear 2014a). During this survey, a single site was found (Site No. -7508), consisting of ten features (nine plantation era and one pre-Contact to early-Contact era). Subsequently, Dagher and Spear conducted archaeological monitoring for the same project, where five additional archaeological sites were found, including Site No. -7398 through -7401, and -7511. Site types include human burials and historic cesspools (Dagher and Spear 2014b). Later the same year, Lyman and Spear (2014) conducted an inventory survey for the same project, but the area immediately northwest of Dagher and Spear's (2014a and 2014b) project area. No new archaeological sites were found.

5.0 PREVIOUS ETHNOGRAPHIC INTERVIEWS

A total of four Cultural Impact Assessments (CIA) were found for the Nā Pua Makani Project vicinity (Hammatt 2008; McGerty and Spear 2009; Voegler et al. 2011; Mooney and Cleghorn 2012).

In 2008, Hallatt H. Hammatt conducted a provisional CIA for the Kahuku Village Subdivision Project, which spanned the coastal areas of Kahuku, Keana and Mālaekahana Ahupuaʻa. This project area is located a little less than one kilometer to the northeast of the Nā Pua Makani Wind Project. Hammatt (2008) consulted numerous organizations for informants, including the State Historic Preservation Division (SHPD), Office of Hawaiian Affairs (OHA), Oʻahu Island Burial Council (OIBC), Koʻolau Loa Hawaiian Civic Club, and Koʻolau Loa Neighborhood Board. A total of three organizations and three individuals participated in this assessment, which yielded information on cultural practices and resources in the area as well as shed light on community concerns. These findings are as follows:

- the area has long been used by *kanaka maoli* and Plantation *kamaʻāina,* particularly along the shoreline;
- a variety of cultural activities including plant-gathering, salt and *limu* collection, and fishing;
- concerns of disturbing subsurface cultural and human remains are held by the community (Hammatt's 2009 archival evidence upholds this sentiment); and
- concerns of restricted beach access to cultural practitioners are also held.

McGerty and Spear (2009) conducted a CIA for the Kahuku Storm Drainage Reduction Project, which was located under Kahuku High School's football field, which is less than half of a kilometer north of the Nā Pua Makani Wind Project. According to McGerty and Spear (2009), letters were sent to various organizations, including SHPD, the Koʻolau Hawaiian Civic Club, and the Oʻahu Island Burial Committee, as well as knowledgeable individuals in the area. Additionally, three CIA Notices requesting community participation were published in *The Honolulu Advertiser* between 30 August and 3 September 2009 and also in *Ka Wai Ola,* OHA's official newspaper in the August and September issues. Despite McGerty and Spear's attempts, they hold that, "No responses were received from any of the above listed organizations or news periodical announcements" (McGerty and Spear 2009:16). Due to the lack of community interest in the matter, McGerty and Spear's assessment was that, "…pursuant to Act 50, the exercise of native Hawaiian rights, or any ethnic group, related to gathering, access or other customary activities will not be affected by development activities. Because there were no cultural activities identified within the project area, there are no adverse effects" (2009:16).

In 2011, Vogeler et al. conducted a CIA for the Hawaiʻi Department of Transportation's (HDOT) Lāʻieloa Bridge Replacement Project in Lāʻie Ahupuaʻa, approximately 2.5 kilometers to the southeast of Nā Pua Makani Wind Project lands. Vogeler et al. (2011) contacted 14 individuals, out of which, four participants responded in writing. Of these four responses, one email interview and two interviews were achieved. Findings of these efforts shed light on the cultural significance and of Lāʻieloa Stream, including its cultural resources, colorful history, and

affiliation with the *ali'i*, or royalty. Cultural resources of the project area and its vicinity were found by Vogeler et al. (2011) as follows:

- various riparian faunal food sources, such as *'ōpae* (var. shrimp), *'o'opu*, (var. goby) in Lā'ieloa Stream;
- *limu 'ele'ele (Entermorpha prolifera)* at the mouth of Lā'ieloa Stream;
- *he'e* (squid or octopus), *līpe'epe'e* (red seaweed), and variety of reef fish in near shore waters; and
- *moi* or thread-fish (*Polydactylus sexfilis),* and *'ama'ama* or mullet (*Mugil cephalus*) were bountiful in deeper waters.

While a primary concern was flooding of lands surrounding the river, concerns were raised about the potential to encounter *iwi* (human remains) during project related ground disturbances.

Mooney and Cleghorn (2012) performed a CIA as part of the Supplemental Environmental Impact Statement (SEIS) for the proposed expansion of Turtle Bay Resort (TBR). The 767-acre project area spanned the *makai* portions of 'Ōpana, Kawela, Hanaka'oe, 'Ō'io, Ulupehupehu, Punalau, and Kahuku Ahupua'a, the eastern end of which is less than 2 kilometers north of the Nā Pua Makani Wind Project. According to Mooney and Cleghorn (2012), the aim of the CIA was to be as inclusive as possible, to fully capture the area's cultural significance to the entire community. This effort is summarized as follows:

> In recognition of the area's rich *mo'olelo* and traditional land uses, great lengths were taken to contact and invite as many local *kūpuna* (elders) and cultural informants as possible from varied backgrounds and interests on the subject of traditional, customary, and contemporary use of TBR SEIS Lands and surrounding areas. Concerted attempts were made to identify and locate persons knowledgeable about traditional practices that took place in the past or that are currently taking place on or near SEIS Lands, as recommended by the Office of Environmental Quality Control (OEQC) Guidelines. Earlier CIA reports written about the Kahuku area, OEQC list of Cultural Assessment Providers, Office of Hawaiian Affairs (OHA), Neighborhood Boards No. 27 & 28, numerous North Shore civic clubs, and other North Shore community associations were consulted for a listing of *kūpuna*, cultural practitioners, and cultural informants willing to share their *mana'o* (knowledge and opinion).
>
> A total of 16 interviews were conducted between 4 May and 11 April 2012. All interviewees had a personal association with TBR SEIS Lands and/or surrounding areas, many of whom were highly recommended by various sources in the community. Most informants are active in the local community and well respected for their leadership, expertise in Hawaiian cultural practices, and knowledge of the project area and its history. The results of all interviews, with the exception of one interview, are submitted in this CIA.
>
> As a result of archival research and community consultations, it was found that TBR SEIS Lands and surrounding areas contain an array of cultural resources that are currently being used for traditional cultural practices, including marine food sources, medicinal plants, plants used in crafts, wood for woodcarving, and salt for various uses. Further, the land and sea are currently used for a variety of

> traditional and non-traditional sports and recreational activities. The presence of *iwi kūpuna*, or human burials, as well as archaeological sites on the property has also been established, which continues to be a point of concern in the community in terms of past and/or potential disturbances related to the resort. Furthermore, supernatural and/or divine phenomenon in the project area experienced by a few informants and acknowledged by others, suggests that there is still cultural significance and spiritual connection for those with ancestral ties to the land (Mooney and Cleghorn 2012:i-ii).

The archival research revealed that, in general, the TBR vicinity has long and interesting history. From the archaeological record, traditional stories and myths, and historic documents attributed to this vast area, it was evident that these lands had been the stage of many significant acts in the long drama of Oʻahu's pre- and post-Contact history. Further, these lands have been the subject of numerous archaeological investigations between 1977 and 2006, resulting in 21 individual reports. These archaeological investigations have documented 19 archaeological sites providing data from 291 auger tests excavations, 121 controlled excavations, 78 radiocarbon dates, 50 pollen samples, and substantial midden and artifact collections.

Mooney and Cleghorn (2012) also maintained that ethnographical evidence obtained through community consultations upheld the archival research findings that TBR property was abundant in cultural resources and lore, though much has changed throughout time. These community consultations also verified the existence of cultural practices, such as the gathering of various traditional marine and terrestrial resources. Out of the sixteen interviews performed, information from 15 interviews was represented the CIA. A variety of cultural resources gathered by an array of Hawaiian cultural practitioners for a variety of traditional activities, including *lāʻau lapaʻau* (herbal healing), *kālai kiʻi* (wood carving), *lei* making, cordage making, and consumption, were identified, including a total of 40 species of flora and fauna as well as *paʻakai* (sea salt). Cultural resources in the TBR vicinity are as follows:

- TBR's coastline and coastal waters provide 32 marine species, including 17 species of fish, six crustacean, one mollusk, two gastropod, two sea urchin, and four sea weed species for cultural practitioners;
- six plant species and two tree species were said to be collected from inland areas of TBR;
- concerns of disturbing subsurface cultural and human remains are held by the community (the archival evidence upholds this sentiment); and
- concerns of restricted beach access to cultural practitioners are also held.

While none of the informants claimed that any of these cultural resources were the last of their kind or this was the only place to collect them, the majority of those interviewed shared that these resources had drastically declined in their lifetimes and are now found in diminutive numbers. Further, the locations of many resources are guarded secrets according to many informants who fear over-harvesting to the point of extinction.

In conclusion, several traditional resources and sentiments were found to be common between these CIA, including a wide spectrum of flora and fauna from the lowlands, streams, coasts, and seas, which are used for traditional subsistence, crafts, and medicine. Also shared were concerns over disturbing subsurface archaeological sites and *iwi kūpuna* during construction.

6.0 ETHNOGRAPHIC INTERVIEWS

The purpose of ethnographic interviews is to acquire information from *kūpuna* and local knowledgeable individuals about the background cultural use, if any, of the subject property that could be adversely affected by the proposed Nā Pua Makani Wind Project.

Concerted attempts were made to identify and locate persons knowledgeable about traditional practices that took place in the past, or are currently taking place in the project area, that could be potentially impacted by the expansion project. In addition to prior CIA reports written about the area spanning from Kahuku to Lāʻie Ahupuaʻa (Hammatt 2008; McGerty and Spear 2009; Voegler et al. 2011; Mooney and Cleghorn 2012), the State Office of Environmental Quality Control (OEQC) and Office of Hawaiian Affairs (OHA) were consulted for a listing of Cultural Assessment Providers. Various Neighborhood Boards, and civic clubs were also contacted to obtain cultural informants. Appendix B provides a listing of potential cultural informants and their detailed contact history. Contact information was found for 24 individuals, all of which were solicited for participation. While no response was received from 14 of those asked to participate, eight individuals responded and interviews were secured with four individuals. Two of the interviewees are *kūpuna* of the area and two are recognized cultural practicioners of the area. Many of those who responded to interview requests did not wish to be interviewed, but recommended other, more knowledgeable individuals or community groups to interview.

A total of four interviews with five informants were conducted between 31 March and 12 August 2015. However, only the information from three informants is included in this CIA. All interviewees had a personal association with the Nā Pua Makani Wind Project area and were recommended by various sources in the community. Most informants are active in the local community and well respected for their leadership and knowledge of the project area and its history. Table 3 provides a list of the consulted parties, their association with the Nā Pua Makani Wind Project area.

During the typical interview, a basic questionnaire (Appendix D) was used as a guide to solicit interviewees' knowledge of the area and biographical information. Maps of the Nā Pua Makani project area were used to further assist the interview process and gain specific information about locations of resources and/or cultural practices. After the interview, an interview summary was created. The interview summary was then shared with the interviewee for review, which allowed them the opportunity to correct, add, and/or delete information in their testimony. These interviews were occasionally supplemented with subsequent personal and telephone conversations with informants for clarification and additional information. When the interview summary met their approval, the interviewee was asked to sign an Oral History Release Form. Copies of release forms are provided in Appendix E. Summaries of the resulting interviews follow.

Table 3. List of Participating Cultural Informants

Name(s)/Title	Association	Form of Interview
Junior Primacio, Kupuna	Fourth Generation Kahuku Village resident; Former plantation worker; Koʻolau Loa Neighborhood Board, Chair on Agriculture and Parks and Recreation Committees	Person-to-person; interviewer: Elizabeth L. Kahahane
Raymond "Buddy" Ako, Kupuna	Former resident of Kahuku; educated in Kahuku; Former Community Liaison for Turtle Bay Resort Development	Person-to-person: interviewer: Kimberly M. Mooney
Kenneth M. Hee, Kahu & cultural practitioner	Native Hawaiian, area descendent; born and raised in Kahuku; trusted Kahu of Kahuku; traditional agriculturalist	Person-to-person; interviewer: Elizabeth L. Kahahane; joint with Germaine K. Halualani-Hee; withdrawn
Germaine K. Halualani-Hee, cultural practitioner	Native Hawaiian; long-time resident of Kahuku; traditional agriculturalist	Person-to-person; interviewer: Elizabeth L. Kahahane; joint with Kenneth M. Hee; withdrawn
Tēvita O. Kaʻili, Ph.D.	Brinham Young University	Person-to-person: interviewer: Kimberly M. Mooney

6.1 KŪPUNA TESTIMONY

For the Nā Pua Makani Wind Project Cultural Impact Assessment, four *kūpuna* and one cultural practitioner were interviewed. In this assessment, *kūpuna* refers to individuals who are respected as elders of the community.

6.1.1 Mr. John Primacio Jr.

John "Junior" Primacio is a life-long resident of Kahuku Village. Mr. Primacio worked at the Kahuku Plantation for nearly two decades, served in the U.S. Military in wartime Vietnam, and later took the position of General Manager with the Kahuku Housing Corporation. Mr. Primacio has given over 40 years of public service in the Koʻolau Loa District, dealing with land and resource management, community affairs, workers' rights, and planning. He has served on the Koʻolau Loa Neighborhood Board as a board member and as the Chair of the Committee on Agriculture. He was also a Unit Chairman for the International Longshore & Warehouse Union. Due to the many positions and long tenure he held at Kahuku Plantation as well as being born and raised in Kahuku, Mr. Primacio has a wealth of knowledge pertaining to the past and present land use as well as history of the Kahuku area. Mr. Primacio was interviewed by Elizabeth L. Kahahane of Pacific Legacy, Inc. on 25 June 2014.

Mr. John Primacio Jr. was born to John Primacio Sr. and Alice M. Moniz on January 23, 1932. His father was born in the Philippines and immigrated to Hawaiʻi as a young boy. His mother was the daughter of a sugar plantation worker in Waipahu. John Primacio Jr. was born and raised in Kahuku and graduated from Kahuku High School in 1952.

As an adult, Mr. Primacio joined the National Guard. He subsequently applied for work in the plantation. Mr. Primacio progressed rapidly through the ranks due to his openness to change and innovation. Later in 1960, the National Guard and Army Reserves were called into active

duty in Vietnam. He, like many others, stopped work at the plantation to report to Schofield before heading to Vietnam. Mr. Primacio later returned from Vietnam to become the General Manager for Kahuku Housing Corporation in 1971. He went from working in the laboratory to the mill, to operating heavy machinery, and on to being union boss. According to Mr. Primacio, it wasn't only his openness to new job opportunities that helped Mr. Primacio see the many aspects of the plantation, it was his eagerness to ask questions and listen to the advice of his elders. It didn't matter if they were Filipino, Japanese, Hawaiian, or Portuguese, he communicated with these *kūpuna* in pidgin or otherwise to learn.

Mr. Primacio described the plantation's "good days," as being in the mid-1900s, when the union had just formed and sugar workers had contracts, medical care, inexpensive housing, even kerosene for their stoves. People became more than their "bongo," or number, but individuals with responsibilities and job titles. He also described life on the plantation as being very unique because of its sustainability. For example, many of those living on the plantation thrived with the aid of supplemental activities such as fishing, gardening, hunting, raising bees, and by specializing in a trade. It was this interdependency on each other and the dependency on the land that helped many of these families with little money send their children to college. And it wasn't uncommon for families to combine funds to buy a cow. It was through bartering and the common hardships that plantation families shared that helped them coexist, despite cultural differences and language barriers.

However, as Mr. Primacio holds, eventually the sustainability of Kahuku Plantation declined with the increase of government imposed environmental regulations. According to Mr. Primacio, gradually more plantation activities were being regulated by the government, such as mill water discharge into the ocean. As these changes affected the plantation economically, Mr. Primacio believed that it was just too costly for plantation to keep up with the proper environmental techniques and that closure was inevitable. After nearly 75 years, the Kahuku Plantation closed its doors in 1970. The next year, Mr. Primacio became the General Manager for the Kahuku Housing Corporation, with 255 plantation homes to oversee. Mr. Primacio believes this position taught him to be a good leader. His responsibility within the plantation community grew substantially as the plantation's economy, political structure, and infrastructure dissolved. Mr. Primacio then decided to serve on neighborhood, city, and state boards. As a result, he became well connected and a pillar of the community, but he maintains that his goal to help Kahuku rebound after the plantation's closure kept him grounded. He believed that his most important responsibility was to bring the focus back to sustainability. Mr. Primacio likens this focus on sustainability to today's need to transition from fossil fuels to renewable energy.

In regards to the current Nā Pua Makani Wind Project area, Mr. Primacio refers to it as "Mālaekahana West" and describes it as mostly farm operation land historically used for sugar cane production. He also knew the land to be used for diversified agriculture, cattle, chicken, and pig farming. Mr. Primacio maintains that plantation infrastructure is still present in the project area, with as many as four water pumps and wells used for irrigation and to fill the plantation's reservoirs. According to Mr. Primacio, these hydrologic control features were necessary, as low lying areas tend to flood due to the close proximity of Mālaekahana Stream. He holds that lava tubes, some containing springs, were also located in the project area, but was

unsure if they are caved in or still in existence. In addition, Mr. Primacio states that a train route ran through this property from Hauʻula to the Kahuku Sugar Mill during the plantation era. Other historic infrastructure includes a road going through the property to get back to the military training area, first installed during the World War II. He added that the training area was not extensively used in those days.

In regards to traditional and non-traditional cultural resources available in the project area, Mr. Primacio recalls pigs occasionally being hunted in and around the property, but added that pigs tend to stay in higher elevations. He acknowledged that various bird species, pheasants, mongoose, and rats are present as well and potentially still hunted. Fruit trees, such as guava, are still present and may also be exploited by locals. Mr. Primacio stated that these lands are rich in coral, or limestone, that was mined for repairing the plantation roads.

As a member of the Kahuku Community Association and past chair of the Community Association's Renewable Energy Commitee, Mr. Primacio is positive that development, in the right way, can be beneficial to the community. From agriculture to animal husbandry, the land has supported families of Kahuku. He views the land, water, and wind as valuable resources to the community that need to be managed for the long run. But ultimately, the main focus of today has to be Kahuku's ability to become as sustainable as it was in the early plantation era.

6.1.2 Mr. Raymond "Buddy" A.H. Ako

Mr. Ako has spent most of his years living, receiving an education, and working in Kahuku and Hauʻula. Mr. Ako participated in an interview on 19 November 2014 with Kimberly Mooney of Pacific Legacy.

Raymond "Buddy" A.H. Ako was born 7 July 1938 to James and Lei Ako in Honolulu. Until the age of eight years old, he was raised by his Chinese grandfather, Lau Ako, in Kāneʻohe, after which a young Buddy Ako moved from Kāneʻohe to Hauʻula to be raised by his mother and step-father. As Hauʻula was a relatively close community, Mr. Ako recalls learning about the natural world and Hawaiian traditions from several Hawaiian "uncles", including ʻAina Kamakeeʻaina, Joe Aʻalona, and Joseph Kalili. Although he lived in Hauʻula, Buddy attended Kahuku Elementary and High School from grades three to twelve.

Between school and play, Mr. Ako spent most of his time in Kahuku, as the majority of his friends resided in Kahuku and he maintains that in those days there was much more for a kid to do in Kahuku than in Hauʻula. He fondly looks back on his many adventures in the mountains above Kahuku, including parts of the proposed Nā Pua Makani Wind Project area. During the weekends and holidays, Mr. Ako remembers hiking, picking wild pineapple from abandoned fields, swimming in reservoirs, as well as hunting doves and pheasant. Whatever they were able to catch, they would share with farmer friends and classmates. These tenant farmers, mostly of Japanese descent, grew "truck crops," such as cabbage, lettuce, and tomatoes in and around the project area. The produce of these farms were largely sold to local consumers.

According to Mr. Ako, the proposed project area was largely feral pineapple fields where sugar was not grown and that sugar was still grown up until the late 1960s. He also recalls that during his childhood, Mālaekahana Stream was mostly dry, due to the usage of water by the

plantation. After the plantation closed its doors, the local streams and drainages were able to maintain some degree of flowing water intermittently.

While he has no knowledge of cultural practitioners gathering traditional Hawaiian plants or other resources in the proposed project area, he does recall that many people of Kahuku gathered flowers from a large area overgrown with bougainvillea (*Bougainvillea* sp.) near a limestone outcrop or cliff located just off of the main access road of the project area. He holds that it was common for folks to gather large amounts of these flowers for special occasions, decorating, and *lei* making. Mr. Ako is also aware of some degree of pig hunting that has taken place in the upland areas near to or within the project area and that hunting pig may still be occurring.

Mr. Ako has a positive view of the proposed Nā Pua Makani Wind Project. He feels as though this proposed project represents a needed transition to renewable energy from fossil fuels.

6.1.3 Tēvita O. Kaʻili, Ph.D.

Brigham Young University, Hawaiʻi (BYUH), Associate Professor of Cultural Anthropology and Chair of the International Cultural Studies Department Tēvita O. Kaʻili, is also a resident of Kahuku, a cultural practitioner of Polynesian traditions, and Cultural Advisor of the Kahuku Community Association. He is well versed in pan-Polynesian belief systems, including the Hawaiian creation chant, Kumulipo, and other Hawaiian mythologies, and the pantheon of pan-Polynesian gods and deities. Further, Dr. Kaʻili has a strong spiritual connection and ancestral ties to several of the pan-Polynesian gods and *ʻaumākua* that are associated with the lands of Kahuku, which he learned through his familial and Traditional Polynesian oral histories. Professor Kaʻili was interviewed on 12 August 2015 at his BYUH office by Kimberly M. Mooney of Pacific Legacy, Inc.

Tēvita ʻOsoni Kaʻili was born in March of 1970 in Tonga to parents, Tēvita and Lakalaka Kaʻili. His ancestry and the foundation of his Traditional practices and beliefs are Tongan. Much of this cultural knowledge was received during his formative years from his maternal grandfather in Tonga and the United States. Dr. Kaʻili attended schools in both Tonga and the United States. After graduating from BYUH, he obtained his M.A. in 2003 and five years later he obtained his Ph.D. in Anthropology at the University of Washington, Seattle. Subsequently, Dr. Kaʻili returned to Hawaiʻi to teach Cultural Anthropology at his *alma mater*, BYUH in Lāʻie. During his thirteen-year residence in Hawaiʻi, he has had several Hawaiian cultural practitioners and *kūpuna* as mentors who have shared oral histories and their *manaʻo* of Hawaiian culture. He has also performed documentary research on recorded traditions, such as the Hawaiian creation chant, Kumulipo, which has deepened his understanding of Hawaiian Traditional culture.

As a professor of Cultural Anthropology, Dr. Kaʻili, has extensive knowledge of Polynesian belief systems and how most Polynesian cultures have very similar world views, divine beings, ceremonies, and edicts due to common cultural and ancestral origins. The shared origins of Polynesians as well as the voyaging of Polynesians throughout the Pacific in the pre-European contact era, has led many to believe that the majority of the Polynesian pantheon to be based on the very same individuals throughout the region. In fact, many of these divine beings share the

same or very similar sounding names as well as personalities, feats, physical traits, and story lines. These deities are also held to be the ancestors of Polynesians and, for some, their spiritual guardians.

Dr. Kaʻili maintains a spiritual and ancestral connection to Hawaiʻi and the land of Kahuku by way of his ancestral deity's association with these lands. Through matrilineal descent, Dr. Kaʻili is a descendant of Maui, the Polynesian ancestral deity known for many his amazing feats throughout the Pacific. Maui legends in Hawaiʻi are profuse. Specifically in Kahuku, he is known to have anchored Kahuku, which was held in the legend to be small detached island, to the greater Island of Oʻahu with a mystical fish hook and line. Through patrilineal descent, he is related to the ancestral deity, Tangaloa/Kanaloa, who also has legendary connections to the Kahuku area. In ancient times, Kanaloa and his brother, Kāne, are said to have once lived in the vicinity of Kalaiokahipa Ridge, which is approximately two miles north of the Na Pua Makani project area. Also, an ancient Hawaiian site, referred to as Pōlou (Site No. -271), described by McAllister (1933) as once being, "a pool of water, sea side of the Kahuku mill" was believed by some *kūpuna* to be the place where the "floating island" of Kahuku attached to the Island of Oʻahu as well as the location of a "stone" known as Kanaloa (ibid). Pōlou is also the site where the deity, Maui, used his magical fish hook to anchor Kahuku to Oʻahu.

A widely held belief in Polynesia is the spiritual connection to or physical embodiment of deities as animals, plants, elements, or objects. Dr. Kaʻili maintains, his ancestral deities have the ability to take on the form of several native species of birds as well as bats (collectively *manu*) that have been documented in and around the project area. Kanaloa, according to this belief, can take the bodily form (*kinolau*) of the *ʻōpeʻapeʻa* or Hawaiian hoary bat (*Lasiurus cinereus semotus*). Further, some bird species noted in the project area are recognized in the Kumulipo, or Hawaiian Creation Chant, as ancestors, protectors, creators, and/or elders of the Hawaiian people. According to Dr. Kaʻili in his testimony during the 4 June 2015 DLNR Public Hearing on the Draft Habitat Conservation Plan for Nā Pua Makani Wind Energy Project, "Some are *ʻaumākua* (ancestral guardians), *makua* (parental birds), *keiki* (children of parent birds), *kiaʻi* (guardian/caretaker birds), and others are *kinolau* (body forms) of principal ancestors in Oceania" (Kaʻili 2015). He lists *manu* of concern and their significance in his testimony as the following:

ʻAumākua – Ancestral Guardians:

1. *ʻAlae ʻula* or Hawaiian moorhen (*Gallinula chloropus sandvicensis*) - *ʻAumakua. Makua* /parent bird of the *apapane* bird (Kumulipo line #303). *ʻAlae ʻula* taught Maui the secret of firemaking.
2. *Pueo* or Hawaiian short-eared owl (*Asio flammeus sandwicensis*) - *ʻAumakua. Kiaʻi* /guardian bird of *noio* bird (Kumulipo line #361).
3. *Nēnē* or Hawaiian goose (*Branta sandvicensis*) *ʻAumakua. Kiaʻi* /guardian bird of the *Hehe* bird (Kumulipo line #349) [.]

Mākua – Parental/Caretaker Birds:

1. *ʻAʻo* or Newell's shearwater (*Puffinus auricularis newelli*) – Makua /parent bird of the *aʻu* bird (Kumulipo line #299) [.]

2. ʻ*Alae* ʻ*ula* or Hawaiian moorhen (*Gallinula chloropus sandvicensis*) - ʻ*Aumakua. Makua* /parent bird of the *apapane* bird (Kumulipo line #303). ʻ*Alae* ʻ*ula* taught Maui the secret of firemaking.
3. ʻ*Alae keʻokeʻo* or Hawaiian coot (*Fulica alai*) – *Makua* /parent bird of the *apapane* bird (Kumulipo line #303).

Kiaʻi – Guardian/Protector Birds:

1. *Pueo* or Hawaiian short-eared owl (*Asio flammeus sandwicensis*) - ʻ*Aumakua. Kiaʻa* /guardian bird of the *noio* bird (Kumulipo line #361).
2. *Nēnē* or Hawaiian goose (*Branta sandvicensis*) ʻ*Aumakua. Kiaʻi* /guardian bird of the *hehe* bird (Kumulipo line #349) [.]
3. *Koloa maoli* or Hawaiian Duck (*Anas wyvilliana*) – "*Koloa* birds protected a legendary blind giant, *Ima-i-ka-lani*, and quacked to warn him from which side he might expect an attack (FS 169). (PPN toloa.)" (Hawaiian Dictionary). *Koloa* ducks are guardians (*kiaʻi*) for *Imaikalani*.

Keiki – Child/Offspring of Mākua Birds:

1. *Aeʻo* (*Kukuluaeʻo*) or Hawaiian stilt (*Himantopus mexicanus knudseni*) *Keiki* /child bird of the *kioea* (Kumulipo line #316).

Kinolau – Body Form/Manifestation/Vessels of Ancestors/Gods

1. ʻ*Ōpeʻapeʻa* or Hawaiian hoary bat (*Lasiurus cinereus semotus*) – *Kinolau* (body form) of Kanaloa (Kumulipo lines #589 – 592).

Thus, these *manu* hold a significant place in the Traditional cultural landscape of Kahuku for many of Hawaiian and Polynesian descent. For those who believe that these *manu* are ʻ*aumākua*, *makua*, *keiki*, *kiaʻi*, and *Kinolau,* any harm to these *manu* is tantamount to harming one's revered ancestors. In addition, Dr. Kaʻili holds that the name of Kahuku's dominant wind (*makani*) is traditionally named, Ahamanu, which translates as "gathering of birds." This further upholds the cultural significance of these *manu* to Kahuku and its traditional cultural practitioners.

According to Dr. Kaʻili, it has been established in other assessments of the Nā Pua Makani Wind Energy Project Environmental Impact Statement (EIS) that not only do these *manu* occur within and/or cross through the proposed project area, they are acknowledged to be adversely affected by industrial turbines such as those proposed for the project. To the projected impacts on these *manu*, Dr. Kaʻili feels as though the current mitigation plan is unacceptable.

In summary, Dr. Kaʻili is mainly concerned about the spiritual and cultural impacts that the project will have through the possible injuring or killing of these significant birds and bats. Though he is in support of renewable energy, Dr. Kaʻili is not for the development of renewable energy systems that compromise these already endangered *manu*. Furthermore, Dr. Kaʻili, as a resident of Kahuku, is concerned about added visual and noise impacts of additional wind turbines in the area.

6.2 WITHDRAWN TESTIMONIES

While five interviews were performed, two of these interviews is not included in this draft report. Mr. and Mrs. Hee both participated in an interview, but they subsequently withdrew their testimony from the public document.

7.0 FINDINGS

Interviews with two noted *kūpuna* and one cultural practitioner familiar with the Nā Pua Makani Wind Project area provided some additional insights into the area's history and cultural significance.

7.1 SUMMARY OF KŪPUNA TESTIMONY

Mr. Junior Primacio shared valuable information about the history of Kahuku Plantation, its transportation and irrigation infrastructure, as well as its use of lands in and around the Nā Pua Makani Wind Project area. His input regarding Kahuku's community, past and present, paints a picture of a colorful plantation culture shared by people of many different backgrounds and ethnicities. The area in question, he referred to as "Mālaekahana West," was largely used for Plantation agriculture - predominantly sugar cane. Since the closure of the plantation, these lands remained agricultural, but were used commercially for various food crops and small scale animal husbandry. Fruit trees, such as guava, are still present and may also be exploited by locals. Currently, Mr. Primacio holds that pigs are occasionally hunted in and around the project area, but added that pigs tend to stay in higher elevations. He added that various bird species, pheasants, mongoose, and rats are present as well and potentially still hunted. Another resource exploited in this area is coral, or limestone, that was mined for repairing the plantation roads. He also mentioned the presence of plantation-era structural features throughout the property and topographical features, such as "lava tubes," some of which had contained springs that may have been filled in.

Mr. Buddy Ako's testimony was similar to Mr. Primacio, regarding the project area. He agrees that these lands remained agricultural after the Kahuku Plantation closed. These tenant farmers, mostly of Japanese descent, grew "truck crops," such as cabbage, lettuce, and tomatoes in and around the project area. The produce of these farms were largely sold to local consumers. He recalls hunting doves and pheasant in the area when he was young, but this practice was not significant for anyone's subsistence. Mr. Ako added that some degree of pig hunting has taken place in the upland areas near to or within the project area and that this may still be occurring. While he has no knowledge of cultural practitioners gathering traditional Hawaiian plants or other resources in the proposed project area, he did recall that people of Kahuku gathered flowers from a large area overgrown with bougainvillea (*Bougainvillea* sp.) near a limestone outcrop or cliff located just off of the main access road of the project area. These flowers were used for special occasions, decorating, and *lei* making. He was not sure if this practice was still occurring.

Dr. Kaʻili is a Brigham Young University, Hawaiʻi (BYUH), Associate Professor of Cultural Anthropology and Chair of the International Cultural Studies Department, and cultural practitioner of Polynesian traditions. Dr. Kaʻili is mainly concerned about the spiritual and cultural impacts that the project will have through the possible injuring or killing of significant birds and bats (*manu*) that are recognized in the Kumulipo, or Hawaiian Creation Chant, as

ancestors, protectors, creators, and/or elders of the Hawaiian people. Though he is in support of renewable energy, Dr. Kaʻili is not for the development of renewable energy systems that compromise these already endangered *manu*. Furthermore, Dr. Kaʻili, as a resident of Kahuku, is concerned about added visual and noise impacts of additional wind turbines in the area.

8.0 CONCLUSIONS AND RECOMMENDATIONS

The results of archival research indicate that the vicinity of Kahuku, Keana, and Mālaekahana Ahupuaʻa has a long and rich cultural and legendary past. However, little is mentioned of the specific property in which the Nā Pua Makani Wind Project is to be built. The archaeological background suggests that this area was heavily disturbed during the plantation era for sugar cane and pineapple cultivation, which significantly decreases the likelihood of cultural resources such as intact archaeological subsurface deposits and *iwi kūpuna* to exist.

Based upon two of the ethnographic interviews (a total of five interviews were conducted, but two were retracted), some traditional Hawaiian practices were found to be practiced in and around the project area, including pig hunting and plant gathering. Yet, neither informant expressed that the areas in which the cultural practices were occurring were exceptional, legal, or even ideal, as the lands are private and/or reserved for military use. Further, it is not certain that the locations in which these activities occur are within the APE. Hence, the proposed development of the Nā Pua Makani Wind Project is not forecasted to significantly impact any ongoing cultural practices. However, as espoused by various *moʻolelo*, the area in general has a mystical past and retains some supernatural qualities, which is reportedly a common belief in the area. To respect the spiritual connections that people have with the *ʻāina*, as the general area is known as a *wahi pana* (legendary place), it is recommended that any major event or construction related activity be preceded with a traditional Hawaiian blessing ceremony performed by a *kahuna* (priest or priestess) or *kahu pule* (minister/preacher).

The third ethnographic interview with Dr. Tēvita O. Kaʻili revealed the possible cultural importance of many of the "winged creatures" or *manu* that exist in the area. Many of these *manu* have been documented as ancestors, protectors, creators, and/or elders of the Hawaiian people. These include the *ʻalae ʻula* or Hawaiian moorhen, *pueo* or Hawaiian short-eared owl *nēnē* or Hawaiian *ʻaʻo* or Newell's shearwater, *ʻalae keʻokeʻo* or Hawaiian coot, *koloa maoli* or Hawaiian Duck, *aeʻo* (*kukuluaeʻo*) or Hawaiian stilt, *ʻōpeʻapeʻa* or Hawaiian hoary bat.

The results of the interviews conducted as part of this CIA indicate that there does not appear to be a need for traditional access to the project area for the collection of natural resources or performing traditional cultural practices. No traditional activities associated with gathering natural resources or conducting traditional cultural practices were identified within the APE. It appears that community access to this area was probably stopped during the plantation era and was not re-established. Nā Pua Makani Power Partners does not plan to change the current status of *mauka/makai* access in this area.

The cultural importance of certain species of "winged creatures" should be considered in the development and operation of the wind farm. It appears that the project has the potential to impact birds and bats, some of which are culturally important. The project proponent must strive to avoid, minimize, or mitigate any impacts to these culturally important species. Specific plans to achieve the goals of avoidance, minimization, and mitigation must be thoroughly developed in development and permit plans for this project.

9.0 REFERENCES

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APPENDIX A

Guidelines For Assessing Cultural Impacts
Obtained From
Office of Environmental Quality Control Website

Guidelines for Assessing Cultural Impacts

Adopted by the Environmental Council, State of Hawaii
November 19, 1997

1. INTRODUCTION

It is the policy of the State of Hawaii under Chapter 343, HRS, to alert decision makers, through the environmental assessment process, about significant environmental effects which may result from the implementation of certain actions. An environmental assessment of cultural impacts gathers information about cultural practices and cultural features that may be affected by actions subject to Chapter 343, and promotes responsible decision making.

Articles IX and XII of the State Constitution, other state laws, and the courts of the state require government agencies to promote and preserve cultural beliefs, practices, and resources of Native Hawaiians and other ethnic groups. Chapter 343 also requires environmental assessment of cultural resources, in determining the significance of a proposed project.

The Environmental Council encourages preparers of environmental assessments and environmental impact statements to analyze the impact of a proposed action on cultural practices and features associated with the project area. The Council provides the following methodology and content protocol as guidance for any assessment of a project that may significantly affect cultural resources.

Background

Prior to the arrival of westerners and the ideas of private land ownership, Hawaiians freely accessed and gathered resources of the land and seas to fulfill their community responsibilities. During the Mahele of 1848, large tracts of land were divided and control was given to private individuals. When King Kamehameha the III was forced to set up this new system of land ownership, he reserved the right of access to privately owned lands for Native Hawaiian ahupua'a tenants. However, with the later emergence of the western concept of land ownership, many Hawaiians were denied access to previously available traditional resources.

In 1978, the Hawaii constitution was amended to protect and preserve traditional and customary rights of Native Hawaiians. Then in 1995 the Hawaii Supreme Court confirmed that Native Hawaiians have rights to access undeveloped and under-developed private lands. Recently, state lawmakers clarified that government agencies and private developers must assess the impacts of their development on the traditional practices of Native Hawaiians as well as the cultural resources of all people of Hawaii. These Hawaii laws, and the National Historic Preservation Act, clearly mandate federal agencies in Hawaii, including the military, to evaluate the impacts of their actions on traditional practices and cultural resources.

If you own or control undeveloped or under-developed lands in Hawaii, here are some hints as to whether traditional practices are occurring or may have occurred on your lands. If there is a trail on your property, that may be an indication of traditional practices or customary usage. Other clues include streams, caves and native plants. Another important point to remember is that, although traditional practices may have been interrupted for many years, these customary practices cannot be denied in the future.

These traditional practices of Native Hawaiians were primarily for subsistence, medicinal, religious, and cultural purposes. Examples of traditional subsistence practices include fishing, picking opihi and collecting limu or seaweed. The collection of herbs to cure the sick is an example of a traditional medicinal practice. The underlying purpose for conducting these traditional practices is to fulfill one's community responsibilities, such as feeding people or healing the sick.

As it is the responsibility of Native Hawaiians to conduct these traditional practices, government agencies and private developers also have a responsibility to follow the law and assess the impacts of their actions on traditional and cultural resources.

The State Environmental Council has prepared guidelines for assessing cultural resources and has compiled a directory of cultural consultants who can conduct such studies. The State Historic Preservation Division has drafted guidelines on how to conduct ethnographic inventory surveys. And the Office of Planning has recently completed a case study on traditional gathering rights on Kaua'i.

The most important element of preparing Cultural Impact Assessments is consulting with community groups, especially with expert and responsible cultural records and review of transcripts of previous ethnographic interviews. Once all the information has been collected, and verified by the community experts, the assessment can then be used to protect and preserve these valuable traditional practices.

Native Hawaiians performed these traditional and customary practices out of a sense of responsibility: to feed their families, cure the sick, nurture the land, and honor their ancestors. As stewards of this sacred land, we too have a responsibility to preserve, protect and restore these cultural resources for future generations.

TEXT OF ACT 50, SLH 2000

A BILL FOR AN ACT RELATING TO ENVIRONMENTAL IMPACT STATEMENTS

UNOFFICIAL VERSION

HOUSE OF REPRESENTATIVES H.B. NO, 2895 H.D.1
TWENTIETH LEGISLATURE, 2000
STATE OF HAWAII

A BILL FOR AN ACT

RELATING TO ENVIRONMENTAL IMPACT STATEMENTS.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF HAWAII:

SECTION 1. The legislature finds that there is a need to clarify that the preparation of environmental assessments or environmental impact statements should identify and address effects on Hawaiʻi's culture, and traditional and customary rights.

The legislature also finds that native Hawaiian culture plays a vital role in preserving and advancing the unique quality of life and the "aloha spirit' in Hawaii. Articles IX and XII of the state constitution, other state laws, and the courts of the State impose on government agencies a duty to promote and protect cultural beliefs, practices, and resources of native Hawaiians as well as other ethnic groups.

Moreover, the past failure to require native Hawaiian cultural impact assessments has resulted in the loss and destruction of many important cultural resources and has interfered with the exercise of native Hawaiian culture. The legislature further finds that due consideration of the effects of human activities on native Hawaiian culture and the exercise thereof is necessary to ensure the continued existence, development, and exercise of native Hawaiian culture.

The purpose of this Act is to: (1) Require that environmental impact statements include the disclosure of the effects of a proposed action on the cultural practices of the community and State; and (2) Amend the definition of "significant effect" to include adverse effects on cultural practices.

SECTION 2. Section 343-2, Hawaiʻi Revised Statutes, is amended by amending the definitions of "environmental impact statement' or "statement" and "significant effect", to read as follows:

"'Environmental impact statement" or "statement" means an informational document prepared in compliance with the rules adopted under section 343-6 and which discloses the environmental effects of a proposed action, effects of a proposed action on the economic [and] <u>welfare</u>, social welfare, <u>and cultural practices</u> of the community and State, effects of the economic activities arising out of the proposed action, measures proposed to minimize adverse effects, and alternatives to the action and their environmental effects.

The initial statement filed for public review shall be referred to as the draft statement and shall be distinguished from the final statement which is the document that has incorporated the public's comments and the responses to those comments. The final statement is the document that shall be evaluated for acceptability by the respective accepting authority.

"Significant effect" means the sum of effects on the quality of the environment, including actions that irrevocably commit a natural resource, curtail the range of beneficial uses of the environment, are contrary to the State's environmental policies or long-term environmental goals as established by law, or adversely affect the economic [or] welfare, social welfare[.], or cultural practices of the community and State."

SECTION 3. Statutory material to be repealed is bracketed. New statutory material is underscored.

SECTION 4. This Act shall take effect upon its approval.

Approved by the Governor as Act 50 on April 26, 2000

2. CULTURAL IMPACT ASSESSMENT METHODOLOGY

Cultural impacts differ from other types of impacts assessed in environmental assessments or environmental impact statements. A cultural impact assessment includes information relating to the practices and beliefs of a particular cultural or ethnic group or groups.

Such information may be obtained through scoping, community meetings, ethnographic interviews and oral histories. Information provided by knowledgeable informants, including traditional cultural practitioners, can be applied to the analysis of cultural impacts in conjunction with information concerning cultural practices and features obtained through consultation and from documentary research.

In scoping the cultural portion of an environmental assessment, the geographical extent of the inquiry should, in most instances, be greater than the area over which the proposed action will take place. This is to ensure that cultural practices which may not occur within the boundaries of the project area, but which may nonetheless be affected, are included in the assessment. Thus, for example, a proposed action that may not physically alter gathering practices, but may affect access to gathering areas would be included in the assessment. An ahupuaʻa is usually the appropriate geographical unit to begin an assessment of cultural impacts of a proposed action, particularly if it includes all of the types of cultural practices associated with the project area. In some cases, cultural practices are likely to extend beyond the ahupua'a and the geographical extent of the study area should take into account those cultural practices.

The historical period studied in a cultural impact assessment should commence with the initial presence in the area of the particular group whose cultural practices and features are being assessed. The types of cultural practices and beliefs subject to assessment may include subsistence, commercial, residential, agricultural, access-related, recreational, and religious and spiritual customs.

The types of cultural resources subject to assessment may include traditional cultural properties or other types of historic sites, both man-made and natural, including submerged cultural resources, which support such cultural practices and beliefs.

The Environmental Council recommends that preparers of assessments analyzing cultural impacts adopt the following protocol:

1. identify and consult with individuals and organizations with expertise concerning the types of cultural resources, practices and beliefs found within the broad geographical area, e.g., district or ahupuaʻa;
2. identify and consult with individuals and organizations with knowledge of the area potentially affected by the proposed action;
3. receive information from or conduct ethnographic interviews and oral histories with persons having knowledge of the potentially affected area;
4. conduct ethnographic, historical, anthropological, sociological, and other culturally related documentary research;
5. identify and describe the cultural resources, practices and beliefs located within the potentially affected area; and
6. assess the impact of the proposed action, alternatives to the proposed action, and mitigation measures, on the cultural resources, practices and beliefs identified.

Interviews and oral histories with knowledgeable individuals may be recorded, if consent is given, and field visits by preparers accompanied by informants are encouraged. Persons interviewed should be afforded an opportunity to review the record of the interview, and consent to publish the record should be obtained whenever possible. For example, the Primary source materials reviewed and analyzed may include, as appropriate: Mahele, land court, census and tax records, including testimonies; vital statistics records; family histories and genealogies; previously published or recorded ethnographic interviews and oral histories; community studies, old maps and photographs; and other archival documents, including correspondence, newspaper or almanac articles, and visitor journals. Secondary source materials such as historical, sociological, and anthropological texts, manuscripts, and similar materials, published and unpublished, should also be consulted. Other materials which should be examined include prior land use proposals, decisions, and rulings which pertain to the study area.

3. CULTURAL IMPACT ASSESSMENT CONTENTS

In addition to the content requirements for environmental assessments and environmental impact statements, which are set out in HAR §§ 11-200-10 and 16 through 18, the portion of the assessment concerning cultural impacts should address, but not necessarily be limited to, the following matters:

1. A discussion of the methods applied and results of consultation with individuals and organizations identified by the preparer as being familiar with cultural practices and features associated with the project area, including any constraints or limitations which might have affected the quality of the information obtained.
2. A description of methods adopted by the preparer to identify, locate, and select the persons interviewed, including a discussion of the level of effort undertaken.
3. Ethnographic and oral history interview procedures, including the institutions and repositories searched, and the level of effort undertaken. This discussion should include, if appropriate, the particular perspective of the authors, any opposing views, and any other relevant constraints, limitations or biases.
4. A discussion concerning the cultural resources, practices and beliefs identified, and, for resources and practices, their location within the broad geographical area in which the proposed action is located, as well as their direct or indirect significance or connection to the project site.

5. A discussion concerning the nature of the cultural practices and beliefs, and the significance of the cultural resources within the project area, affected directly or indirectly by the proposed project.
6. An explanation of confidential information that has been withheld from public disclosure in the assessment.
7. A discussion concerning any conflicting information in regard to identified cultural resources, practices and beliefs.
8. An analysis of the potential effect of any proposed physical alteration on cultural resources, practices or beliefs; the potential of the proposed action to isolate cultural resources, practices or beliefs from their setting; and the potential of the proposed action to introduce elements which may alter the setting in which cultural practices take place.
9. A bibliography of references, and attached records of interviews which were allowed to be disclosed.

The inclusion of this information will help make environmental assessments and environmental impact statements complete and meet the requirements of Chapter 343, HRS. If you have any questions, please call 586-4185.

APPENDIX B

Pacific Legacy Communication Log
- Organizations and Individuals Contacted

PACIFIC LEGACY –NĀ PUA MAKANI WIND PROJECT CIA - CULTURAL INFORMANTS		
Name	**Affiliation/Association**	**Contact Log**
Ahuna, Gladys Pualoa "Auntie Gladys"	Lāʻie Community Association; Koʻolau Loa Neighborhood Board; Hawaiian Civic Clubs; Lanihuli Hawaiian Civic Club, co-founder; family has lived in Lāʻie for seven generations	• letters sent: 6/10/14; 3/31/2014 • no response
Ako, Buddy	Former resident of Kahuku; educated in Kahuku; Former Community Liaison for Turtle Bay Resort Development	• letters sent: 6/10/14; 3/31/2014 • phone conversation: 11/13/14 • interview 11/19/14 (K. Mooney) • interview summary sent: 10/17/14 • phone conversation: 12/15/14 • oral history consent: 12/22/14
Anamizu, Carol	Cultural practitioner who lived and farmed ti in adjacent lands to east (Anamizu Farms); also knowledgeable on Japanese Cemetery;	• letters sent: 6/10/14; 3/31/2014 • no response • phone message left: 11/13/14 • no response
Awai-Lennox, Gladys "Honey"	Lifelong Kahuku resident; family goes back many generations in Waialua District; Waiʻalua Hawaiian Civic Club .	• letters sent: 6/10/14; 3/31/2014 • no response
Beirne-Keawe, Danielle Ululani	Koʻolau Loa Hawaiian Civic Club, President	• letters sent: 6/10/14; 4/14/2014 • no response
Benham, Roy	Kupuna, cultural practitioner; Raised in Kahuku	• letters sent: 6/10/14; 3/31/2014 • no response
Colburn, Pua	Kupuna; Kahuku Burial Committee	• letters sent: 6/10/14; 3/31/2014 • no response • phone conversation: 11/13/14 (not knowledgeable on area; refers Dawn Wasson & family)
Hee, Kenneth Makaʻio and Germaine K. Halualani-Hee	Mr. Hee: Kahuku North Shore Health Center, kahu & healer Mrs. Hulualani-Hee: cultural practitioner and longtime resident of Kahuku	• letters sent: 6/10/14; 5/3/2014 (to Mr. Hee) • interview: 6/25/14 (E.L. Kahahane) • interview summary sent: 1/7/15 • no response
Kaluhiokalani, Norman A.	Koʻolau Loa Neighborhood Board, member	• letters sent: 6/10/14; 3/31/2014 • no response
Lenchanko, Tom	Cultural practitioner and historian	• letters sent: 6/16/14 Resent letter; 6/16/14 letter returned with forwarding address; 6/10/14; 3/31/2014 • email: 11/13/14 • email response: 11/13/14 (states CIA & Ethnographic Inventory Survey are not sufficient, recommends a Traditional Cultural Property Analysis)
Logan, Roland Maiola "Ahi"	Lifelong Koʻolau Loa resident; Fisherman	• letters sent: 6/10/14; 3/31/2014 • no response
Lunasco, Ollie	Pig hunter's Association, president	• email: 11/13/14 • phone conversation: 11/13/14 • email response: 11/17/14 • letter sent: 11/18/14
Makaiau, Ralph	Lifelong Kahuku resident; Kahuku Community Association; Turtle Bay Resort, Sr. Proj. Manager	• letters sent: 6/10/14; 3/31/2014 • no response
Matsuda, Kylie	Kahuku Farms, 4th generation farmer in Kahuku	• letters sent: 6/10/14; 3/31/2014 • no response
McKenzie, Nova-Jean	Kupuna with long ancestral ties to Kahuku; Kumu of Hawaiian Studies; cultural practitioner	• letters sent: 6/10/14; 3/31/2014 • no response • found informant to be recently deceased
Napela, Jonathan	Referred by OHA	• letter sent: 6/10/14 • no response
Paglinawan, Richard	Cultural Advisor to the Kahuku Burial Committee	• letters sent: 4/1/14; 6/10/14; 3/31/2014 • no response

PACIFIC LEGACY –NĀ PUA MAKANI WIND PROJECT CIA - CULTURAL INFORMANTS		
Name	**Affiliation/Association**	**Contact Log**
Primacio, John Junior and Primacio, Margaret	Mr. Primacio: 5th Generation Kahuku Resident; former Kahuku Plantation worker; various community associations; Mrs. Primacio: Kahuku Villages Association fmr. Vice President; seven generations in Kahuku	• letters sent: 6/10/14; 3/31/2014 • interview: 6/25/14 (Mr. Primacio **only** with E.L. Kahahane) • interview summary letter sent: 10/17/14 • oral history consent: 1/1/15
Shirai, Thomas	Kawaihapai ʻOhana, Oʻahu Island Burial Council	• letter sent: 6/10/14 • email: 11/13/14 • email response: 12/5/14 (has health issues) • email 12/8/14 • no response
Wasson, Dawn Kahala Taotafa	Hauʻula Elementary - Kupuna; Koʻolau Loa Hawaiian Civic Club, Member; Koʻolau Loa Health & Wellness Center, Kupuna Council; Koʻolau Loa Neighborhood Board No. 28, Culture Committee, chair	• letters sent: 6/10/14; 3/31/2014 • phone conversations (with E.L. Kahahane): July-August 2014 • email: 11/13/14 • phone message: 11/13/14 • no response

APPENDIX C

Correspondence From OHA

From: Jerome K. Yasuhara [jeromey@oha.org]
Sent: Thursday, April 10, 2014 1:41 PM
To: mooney@pacificlegacy.com
Cc: Jerome K. Yasuhara
Subject: Pre-Consultation for the CIA and Ethnographic Inventory Survey for the proposed Nā Pua Makani Wind Farm [OHA ref: HRD14-7014]

Aloha e Kimberly M. Mooney/Pacific Legacy, Inc.:

This is commentary responding to your March 19, 2014 letter to Dr. Kamanaʻopono M. Crabbe of the Office of Hawaiian Affairs [OHA ref: HRD14-7014]. OHA appreciates this early pre-consultation in developing the Cultural Impact Assessment (CIA) and Ethnographic Inventory Survey pursuant to Act 50, Session Laws of Hawaii (2000), and Chapters 343 & 6E, HRS, the Environmental Impact Statement (EIS) and Historic Preservation review process.

OHA understands the importance of participating in the review process to foster better-informed decision-making and to bring balance to the various interests. As with any CIA, OHA values the views of the local communities being impacted in conjunction with the planning needs of developers, all of which must be weighed in view of the legally protected traditional and cultural rights of native practitioners and the historic/cultural/religious/subsistence resources.

OHA also points out the emphasis on integrity entrusted to all consulting firms, such as Pacific Legacy, Inc., in executing and presenting that which is pono. Even if one were to arrive at certain conclusions about Kahuku based on preliminary discussions and literary research, it is nearly always safe to anticipate the abundant layers of nuances upon nuances to one's analysis if only reasonable amounts of curiosity, diligence and inspection were fully employed.

Kahuku is multifaceted, dynamic, passionate, rustic and special. It is one of those rare places where linkages to the past are still vibrant even with the passage of time and introduced Western influences. We are aware of kūpuna who continue practicing and teaching lāʻau lapaʻau, we are aware of the resilience shown when concerning iwi kūpuna burials, we are aware of the interests of subsistence hunters, and so forth. Access, gathering, mālama and subsistence rights must be adequately understood if community support is sought.

Because of the many still engaged in such practices, but whose identities are not readily available, OHA encourages a broad grassroots approach in outreaching the Kahuku community. Therefore, the following is a preliminary list of referrals for this CIA (in no particular order) and from whom we hope other knowledgeable informants can be gained:

- Koʻolau Loa Hawaiian Civic Club
- Oʻahu Island Burial Council
- Kahuku Burial Committee
- Various Kūpuna Lāʻau Lapaʻau Practitioners
- D. Ululani Beirne
- Roy Benham

- Dawn Wasson
- Kahu Cy Bridges
- Margaret Primacio
- Thomas Shirai
- Ollie Lunasco
- Tom Lenchanko

Finally, please be informed of our new office location and mailing address: **Office of Hawaiian Affairs, 560 N. Nimitz Hwy., Suite 200, Honolulu, HI 96817**. All future formal requests for comment should be mailed attention: **Dr. Kamanaʻopono Crabbe, Ka Pouhana, CEO**.

Please feel free to contact me directly with any questions or concerns at (808) 594-0129 or jeromey@oha.org.

Mahalo,

Jerome

Effective January 17, 2014, OHA's formal MAILING ADDRESS will be
560 N. Nimitz Hwy., Suite 200, Honolulu HI 96817, *(phone/fax numbers will remain the same)*

Jerome Yasuhara
Ka ʻAho Pueo, Kiaʻi Kānāwai
Compliance Specialist
Office of Hawaiian Affairs

OHA
OFFICE OF HAWAIIAN AFFAIRS

560 N. Nimitz Hwy., Suite 200, Honolulu HI 96817
Ph: 808-594-0129
Fax: 808-594-1825
email: jeromey@oha.org

APPENDIX D

Ethnographic Interview Questionnaire

Pacific Legacy, Inc.
Cultural Impact Assessment (CIA)
Ethnographic Interview Form

Job Name/#:_____ Interviewer Name:_____

Location:_____ Date/Time:_____

Permission to Record Audio (Y/N):_____

Interviewee Full Name:	Birth Name:
Birth Date:	Occupation/Title:
Current Residence:	Birth Place & Place of formative years:
Years spent in or near subject area:	Affiliation with subject area:
Parents:	Informants/Mentors:

1) How familiar are you with the subject area?

2) What is this area traditionally called? Can you recall any other names of the area?

3) What stories or mythologies have you heard of this area?

4) How would you describe the physical characteristics of the area from your earliest memory?

5) Are there any significant or special features (i.e. landmarks or unique topography) in this area as it relates to land use and/or its history?

6) How was the area used by people in the past?

Land Use Details:

Activity	Types (specific names)	When	Intensity and Frequency	By Who
7) Hunting/ Fishing				
8) Gathering				
9) Agriculture/ Aquaculture				
10) Habitation				
11) Ceremonial				
12) Burial				
13) Other				

14) Have you observed changes to the land or its resources? Please Explain.

15) What are your thoughts about the project proposal?

16) Additional Comments by the Interviewee:

17) Additional Comments:

Would you like to view the synopsis of the interview prior to CIA report submittal(Y/N)?_____

Time Interview Concludes :_____

Interviewee Signature: _____ Date: _____

APPENDIX E

Signed Oral History Release Forms

PACIFIC LEGACY, INC.

ORAL HISTORY STUDY
PERSONAL RELEASE OF INTERVIEW RECORDS

Project: NA PUA MAKANI WIND FARM

Date of Interview: 25 JUNE 2014

I, JUNIOR PRIMACIO, have been previously interviewed by ELIZABETH KAHAHAHANE of Pacific Legacy, Inc. for the above referenced project. I have reviewed the typed summary of the interview and agree that this documentation is complete and accurate, except for the clarifications and corrections noted below. I further agree that the interview information may be used in a report that may be made public, subject to my specific objections and restrictions set forth below.

CLARIFICATIONS AND CORRECTIONS:

SPECIFIC OBJECTIONS AND RESTRICTIONS:

Junior Primacio
Interviewee Signature

1/1/15
Date

PACIFIC LEGACY, INC.

ORAL HISTORY STUDY
PERSONAL RELEASE OF INTERVIEW RECORDS

Project: NA PUA MAKANI WIND FARM

Date of Interview: NOVEMBER 19, 2014

I, RAYMOND "BUDDY" A.H. AKO, have been previously interviewed by KIMBERLY M. MOONEY of Pacific Legacy, Inc. for the above referenced project. I have reviewed the typed summary of the interview and agree that this documentation is complete and accurate, except for the clarifications and corrections noted below. I further agree that the interview information may be used in a report that may be made public, subject to my specific objections and restrictions set forth below.

CLARIFICATIONS AND CORRECTIONS:

NONE

SPECIFIC OBJECTIONS AND RESTRICTIONS:

NONE

Raymond A.H. Ako
Interviewee Signature

DECEMBER 22, 2014
Date

ORAL HISTORY STUDY
PERSONAL RELEASE OF INTERVIEW RECORDS

Project: Nā Pua Makani Wind farm

Date of Interview: 6/25/14

I, KENNETH HEE, have been interviewed by E.L. KAHAHANUI of Pacific Legacy, Inc. for the above referenced project. I agree that the interview information may be used in a report that may be made public.

Kenneth M. Hee
Interviewee Signature

6-25-14
Date

ORAL HISTORY STUDY
PERSONAL RELEASE OF INTERVIEW RECORDS

Project: Nā Pua Makani Wind farm

Date of Interview: 6/25/14 10:30

I, Germaine K Helumalani-Hee have been interviewed by E.L. KAHAHANE of Pacific Legacy, Inc. for the above referenced project. I agree that the interview information may be used in a report that may be made public.

Germaine K Helumalani-Hee
Interviewee Signature

06-25-14
Date

APPENDIX H
PRELIMINARY DRAINAGE REPORT

PRELIMINARY DRAINAGE REPORT
NĀ PUA MAKANI WIND FARM

Kahuku, O‘ahu, Hawai‘i
Tax Map Keys: 5-6-006:018,047,051,055; 5-6-005:018, 5-6-008:006

February 2016

Prepared for:
Champlin O‘ahu Wind Holdings LLC
2020 Alameda Padre Serra, Suite 123
Santa Barbara, CA 93102

Prepared by:
BELT COLLINS HAWAII LLC
2153 North King Street, Suite 200
Honolulu, Hawai‘i 96819

2014.33.1001

1 PROJECT DESCRIPTION

1.1 GENERAL

The Nā Pua Makani Wind Farm project (Project) is located at the northeast coast of Oʻahu, in Kahuku and Kaʻena Town, Tax Map Key (TMK) 5-6-006:018,047,051,055; 5-6-005:018, 5-6-008:006. See Figure 1 – Location Map. The 707 acre project area is approximately 9,000 feet inland from the coast on a steep sloping ridge with elevations ranging from 13- to 400-feet above mean sea level.

Alternatives evaluated in the Project EIS are: Alternative 1 – No Action, Alternative 2 – Proposed Action Wind Project of up to 10 turbines (up to approximately 25 megawatts (MW)), Alternative 2a – Modified Proposed Action of up to 9 turbines (up to approximately 25-MW) and Alternative 3 – Larger Generation Wind Project of up to 12 turbines (up to 42-MW). Under Alternative 1, there will be no new construction of wind turbines, meteorological towers, supporting structures, and access roadways. Thus, the main focus of this report will only discuss Alternative 2, 2a and 3.

Alternative 2 and 2a entails the construction and operation of an approximately 25 MW wind generation facility, consisting of up to 9 to 10 wind turbines, meteorological tower, operations and maintenance facility, electrical collections system, transmission line, and 16-foot- wide internal access roads using compacted gravel. The 9 wind turbines for Alternative 2a would have a larger generating capacity than Alternative 2.

Alternative 3 entails the construction and operation of an approximately 42 MW wind generation facility, consisting of up to 12 wind turbines, meteorological tower, operations and maintenance facility, electrical collections system, transmission line, and 16-foot-wide access roads using compacted gravel.

1.2 EXISTING DRAINAGE

The developed portions of the project area consist mostly of agricultural and vegetated fields. Runoff generated onsite and offsite is routed through three gulches located in the project site. Farthest north of the project site is ʻŌhiʻaʻai Gulch, Keaʻaulu Gulch is located in the middle of the project site, and Lamaloa Gulch is to the south of the project site. Runoff from the three gulches discharges into Mālaekahana Stream or its tributaries just upstream of Kamehameha Highway which discharges directly to the Pacific Ocean.

2 REGULATORY REQUIREMENTS

2.1 CITY AND COUNTY OF HONOLULU (CCH) STORM DRAINAGE STANDARDS

The City and County of Honolulu Rules Relating to Storm Drainage Standards requires developments to manage storm water runoff such that there is no adverse impact to downstream properties, typically resulting from an increase in storm water runoff or a change in drainage

patterns. On-site disposal or retention of the net increase in storm water runoff is proposed to mitigate any adverse downstream impact.

2.2 FLOOD HAZARD AREA

According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM Panel 15003C0045G, effective date January 19, 2011), a portion of the project site is located within Zone AE, or areas where base flood elevations (BFEs) are determined; Zone A, or areas where no BFE is determined; Zone X, or areas determined to be outside of the 0.2% annual chance floodplain; and Zone D, or unstudied areas where flood hazards are undetermined but flooding is possible. See Figure 2 – Flood Zones. The AEF zone immediately adjacent to Kamehameha Highway is designated as a floodway.

Chapter 21-9.10-5 of the Revised Ordinances of Honolulu prohibits encroachments, including fill, new construction, substantial improvements, and other development within the adopted regulatory floodway unless it has been demonstrated through hydrological and hydraulic analyses that such encroachments would not result in any increased flood levels within the community during the occurrence of the base flood discharge.

3 ANALYSIS AND RESULTS

The approximate total area of proposed roadways, wind turbines, and structures is 10 acres, 9 acres and 11 acres for Alternative 2, 2a and 3, respectively. The net change in runoff is computed using the rational method and the 10-year, 1-hour design storm. The on-site retention volume is computed using the modified rational method and the 50-year, 1-hour design storm. The design storm durations are equal to the time of concentration.

The runoff rate from the area to be occupied by the proposed improvements is computed for the existing and developed conditions and the net increase determined. Under the 10-year, 1-hour design storm, the net increase in storm water runoff is 11.92 cfs, 10.85 cfs and 13.00 cfs for Alternative 2, 2a and 3, respectively. See Appendix A for computations.

To mitigate any adverse downstream impact, the project will need to either dispose or store the net increase in runoff on-site. The criteria for disposal is a 10-year, 1-hour design storm and is limited to the installation of seepage pits or drywells. Additional subsurface investigation is needed to characterize the disposal rate of the project area. The alternative is to retain the runoff on-site using open detention areas or subsurface storage. The required storage volume, determined using the 50-year, 1-hour design storm, is 3.3 ac-ft, 3.0 ac-ft and 3.6 ac-ft for Alternative 2, 2a and 3, respectively, which may be provided in one or several distributed locations. The design of the on-site disposal or storage facilities would be developed in conjunction with preparation of detailed construction plans.

4 CONCLUSION

No adverse impacts to neighboring properties are expected. The net increase in runoff due to the proposed improvements will be mitigated through the use of on-site disposal and/or on-site detention. Drainage drywells or seepage pits may be used to dispose of the net increase in storm water runoff. Alternatively, the net increase in storm water runoff may be stored on-site using retention basins. The use of on-site disposal and retention, individually or in combination, will address the net increase in storm water runoff.

Improvements within the floodway are limited to surface pavements and overhead power transmission lines. The conveyance capacity of the floodway is not expected to change as a result of these improvements, consequently, no rise in the BFE is expected.

5 REFERENCES

- Flood Insurance Study, Volume 1 and 2, City and County of Honolulu, Hawaiʻi, Federal Emergency Management Agency, Revised November 26, 2010.

- Flood Insurance Rate Map, Map Number 15003C0045G, Federal Emergency Management Agency, Map Revised January 19, 2011.

- Rules Relating to Storm Drainage Standards, City and County of Honolulu, Hawaiʻi, Department of Planning and Permitting, Revised October 2012.

Document Path: M:\Na Pua Makani Wind Farm\2014331001 Drainage Study\04 Graphics\GIS\Location Map_2.mxd

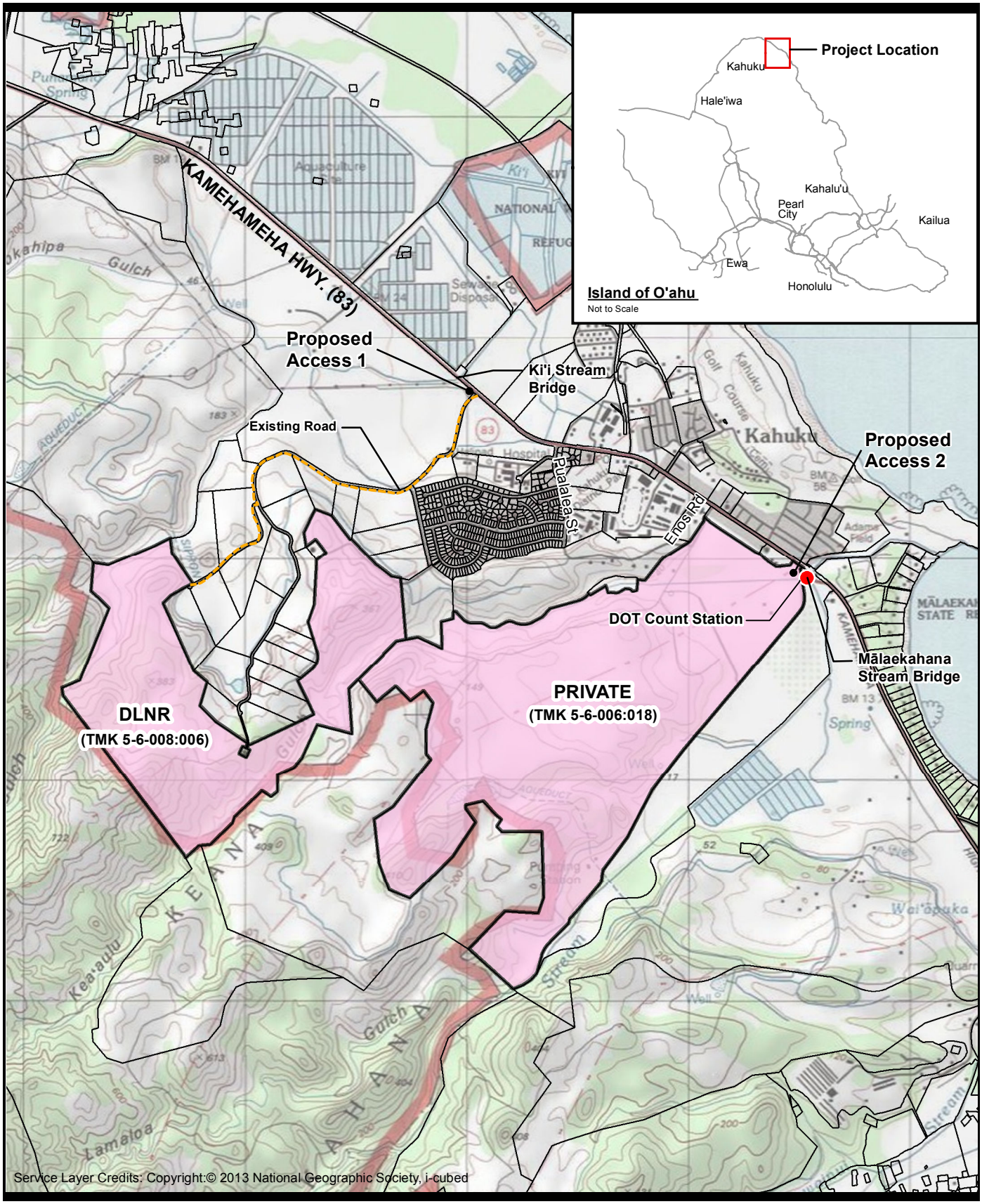


Figure 1

LOCATION MAP

Nā Pua Makani Wind Farm
Champlin Oahu Wind Holdings LLC
January 2016

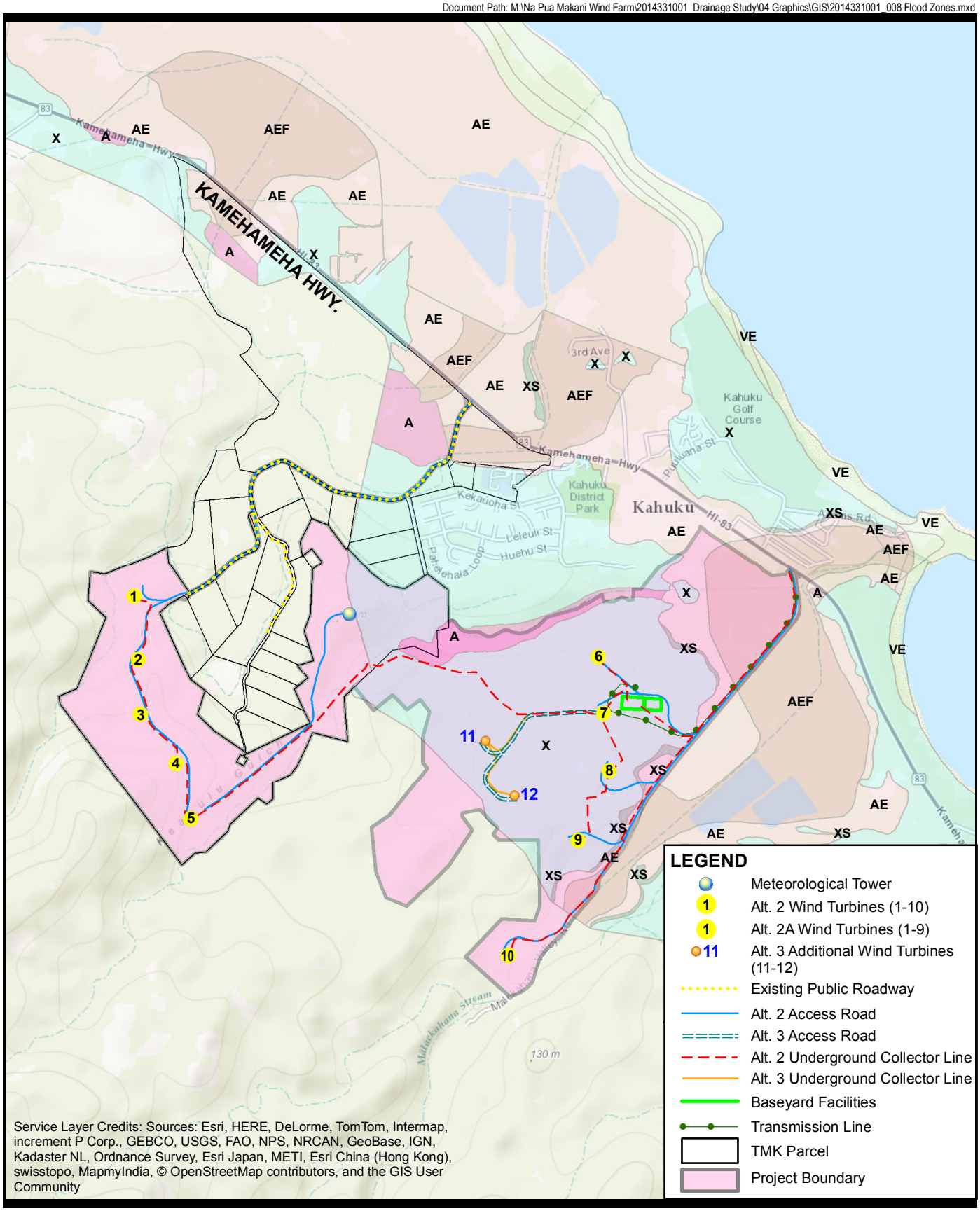
BELT COLLINS

NORTH

0 500 1,000 2,000

SCALE IN FEET

Document Path: M:\Na Pua Makani Wind Farm\2014331001 Drainage Study\04 Graphics\GIS\2014331001_008 Flood Zones.mxd



BELT COLLINS

NORTH

0 500 1,000 2,000

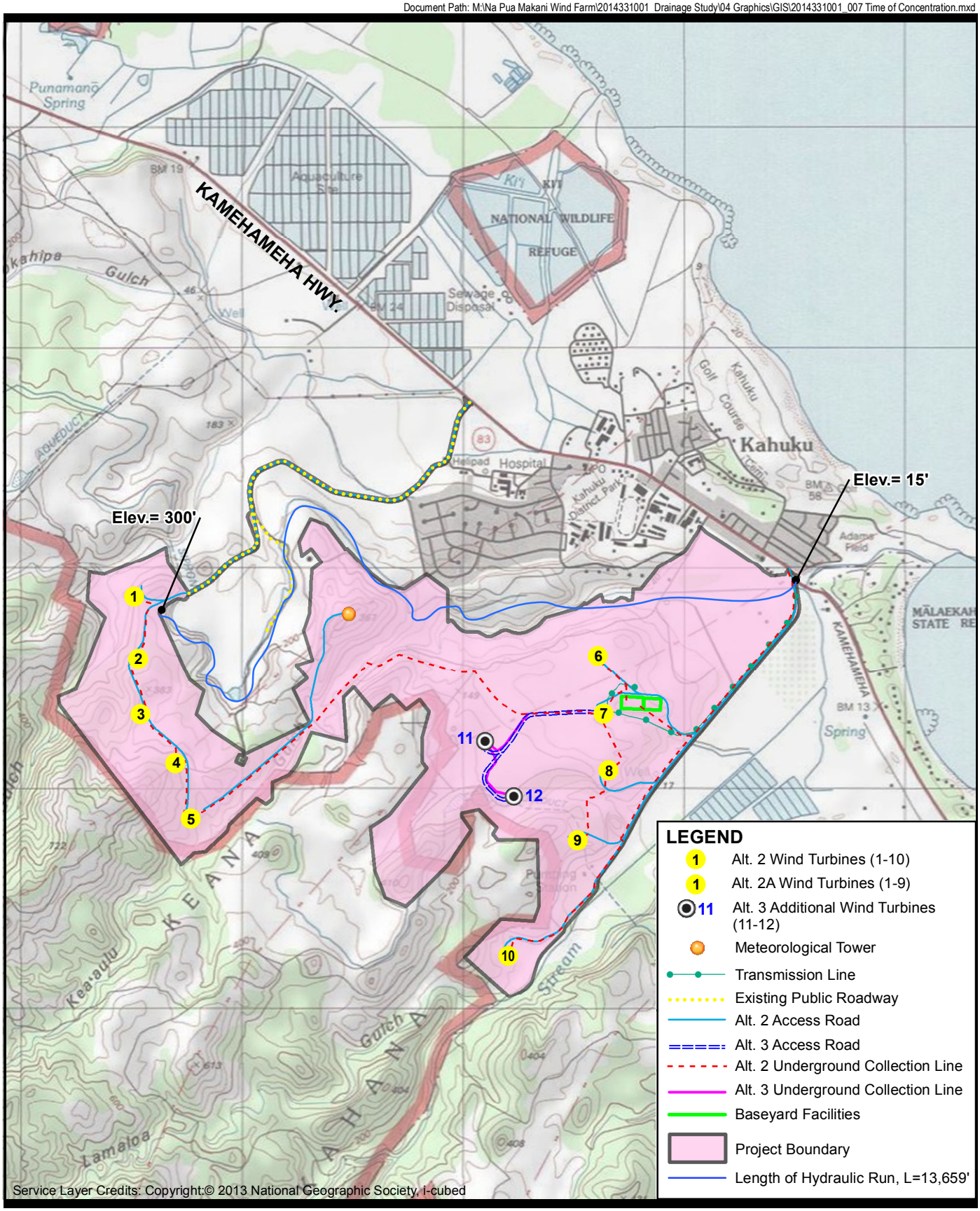
SCALE IN FEET

Figure 2

FLOOD ZONES

Nā Pua Makani Wind Farm
Champlin Oahu Wind Holdings LLC
January 2016

Document Path: M:\Na Pua Makani Wind Farm\2014331001 Drainage Study\04 Graphics\GIS\2014331001_007 Time of Concentration.mxd



NORTH

0 500 1,000 2,000
SCALE IN FEET

Figure 3

TIME OF CONCENTRATION

Nā Pua Makani Wind Farm
Champlin Oahu Wind Holdings LLC
January 2016

PROJECT:	Nā Pua Makani Wind Farm	JOB NO:	2014.33.1001
CLIENT:	Champlin O'ahu Wind Holdings LLC	DATE:	21-Jan-16
SUBJECT:	Preliminary Drainage Calculations Alternative 2	BY:	JC/CKL
FILE:	M:\Na Pua Makani Wind Farm\2014331001 Drainage Study\05 Basis of Design\Calculations\[Alternative 2 Runoff Calcs 2015_12_23.xlsx]Runoff-Storage		

Runoff Coefficient, C

	Length (ft)	Width (ft)	Area (ac)	C Value	Composite C
Existing Condition					
Agriculture Areas	n/a	n/a	10	0.3	
Developed Condition					
Buildings and Yards	n/a	n/a	2.4	0.9	2.16
New gravel roads	20,755	16	7.4	0.70	5.2
			10		**0.75**

Time of Concentration, Tc

Length Hydraulic Run (ft)	13659
Start Elevation (ft)	300
End Elevation (ft)	15
Slope	2.1%
Open Channel Velocity (fps)	1.5
Tc (min)	151.8
Tc (hrs)	2.53

Runoff Rates

	Area (ac)	I_{10Y-1H} (in.)	I_{50Y-1H} (in.)	C	Q_{10} (cfs)	Q_{50} (cfs)
Existing Condition	10	2.70	3.60	0.30	7.97	10.63
Developed Condition	10	2.70	3.60	0.75	19.89	26.52
			Total Increase in Runoff (cfs) =		**11.92**	15.90

On-site Detention

Volume to store runoff (Q_{50} x Tc)	144,764	cf
Total on-site retention requirement =	**3.3**	ac-ft

PROJECT:	Nā Pua Makani Wind Farm	JOB NO:	2014.33.1001
CLIENT:	Champlin O'ahu Wind Holdings LLC	DATE:	21-Jan-16
SUBJECT:	Preliminary Drainage Calculations Alternative 2A	BY:	JC/CKL
FILE:	M:\Na Pua Makani Wind Farm\2014331001 Drainage Study\05 Basis of Design\Calculations\[Alternative 2A Runoff Calcs 2015_12_23.xlsx]Runoff-Storage		

Runoff Coefficient, C

	Length (ft)	Width (ft)	Area (ac)	C Value	Composite C
Existing Condition					
Agriculture Areas	n/a	n/a	9	0.3	
Developed Condition					
Buildings and Yards	n/a	n/a	2.39	0.9	2.151
New gravel roads	20,755	16	6.46	0.70	4.5
			9		**0.75**

Time of Concentration, Tc

Length Hydraulic Run (ft)	13659
Start Elevation (ft)	300
End Elevation (ft)	15
Slope	2.1%
Open Channel Velocity (fps)	1.5
Tc (min)	151.8
Tc (hrs)	2.53

Runoff Rates

	Area (ac)	I_{10Y-1H} (in.)	I_{50Y-1H} (in.)	C	Q_{10} (cfs)	Q_{50} (cfs)
Existing Condition	9	2.70	3.60	0.30	7.17	9.56
Developed Condition	9	2.70	3.60	0.75	18.02	24.02
			Total Increase in Runoff (cfs) =		**10.85**	14.46

On-site Detention

Volume to store runoff (Q_{50} x Tc)	131,716	cf
Total on-site retention requirement =	**3.0**	ac-ft

PROJECT:	Nā Pua Makani Wind Farm	JOB NO:	2014.33.1001
CLIENT:	Champlin O'ahu Wind Holdings LLC	DATE:	21-Jan-16
SUBJECT:	Preliminary Drainage Calculations Alternative 3	BY:	JC/CKL
FILE:	M:\Na Pua Makani Wind Farm\2014331001 Drainage Study\05 Basis of Design\Calculations\[Alternative 3 Runoff Calcs 2015_12_23.xlsx]Runoff-Storage		

Runoff Coefficient, C

	Length (ft)	Width (ft)	Area (ac)	C Value	Composite C
Existing Condition					
Agriculture Areas	n/a	n/a	11	0.3	
Developed Condition					
Buildings and Yards	n/a	n/a	2.4	0.9	2.1800664
New gravel roads	24,057	16	8.4	0.70	5.9
			11		**0.74**

Time of Concentration, Tc

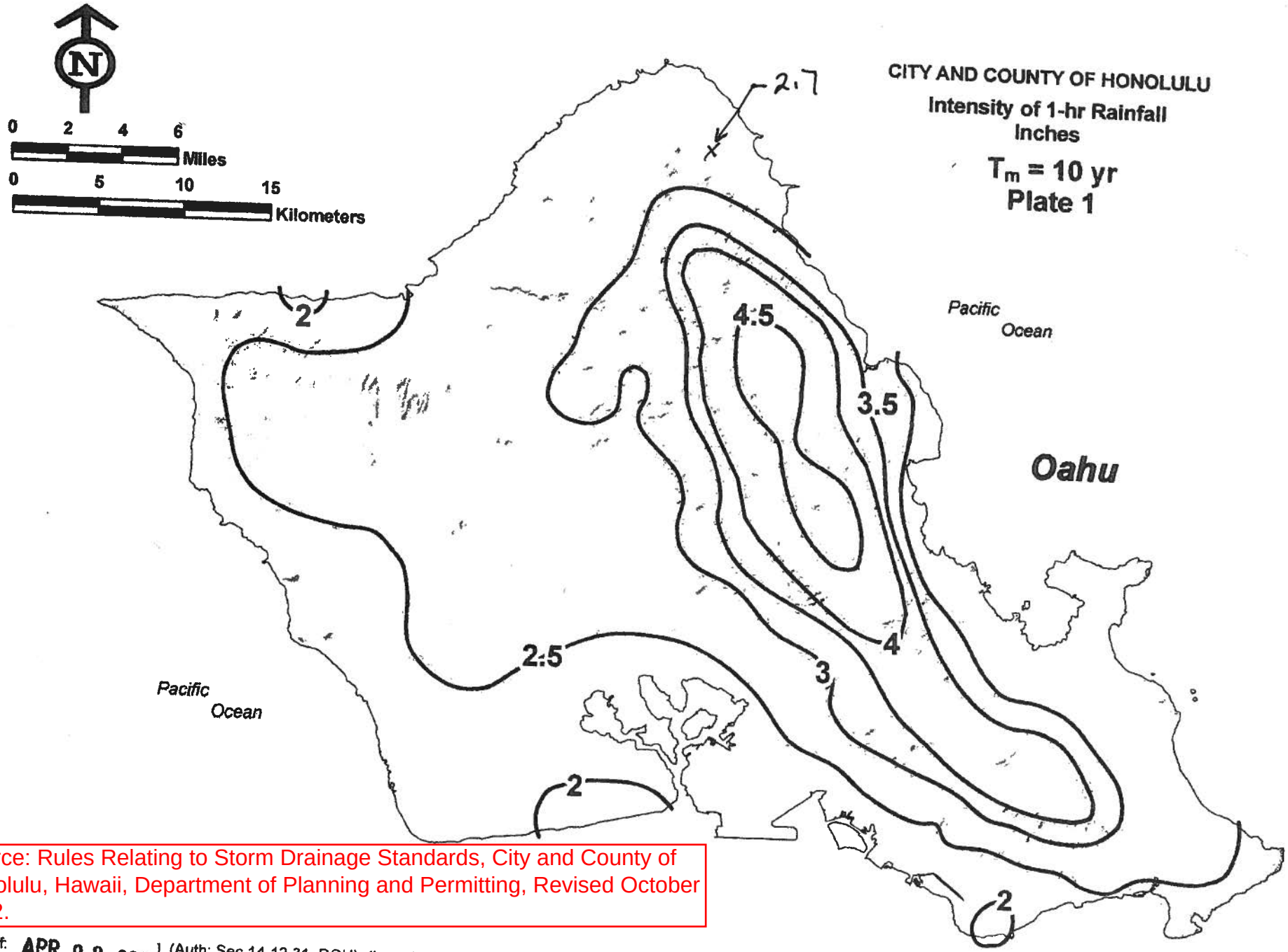
Length Hydraulic Run (ft)	13659
Start Elevation (ft)	300
End Elevation (ft)	15
Slope	2.1%
Open Channel Velocity (fps)	1.5
Tc (min)	151.8
Tc (hrs)	2.53

Runoff Rates

	Area (ac)	$I_{10Y-1H*}$ (in.)	$I_{50Y-1H**}$ (in.)	C	Q_{10} (cfs)	Q_{50} (cfs)
Existing Condition	11	2.70	3.60	0.30	8.77	11.69
Developed Condition	11	2.70	3.60	0.74	21.76	29.02
			Total Increase in Runoff (cfs) =		**13.0**	17.33

On-site Detention

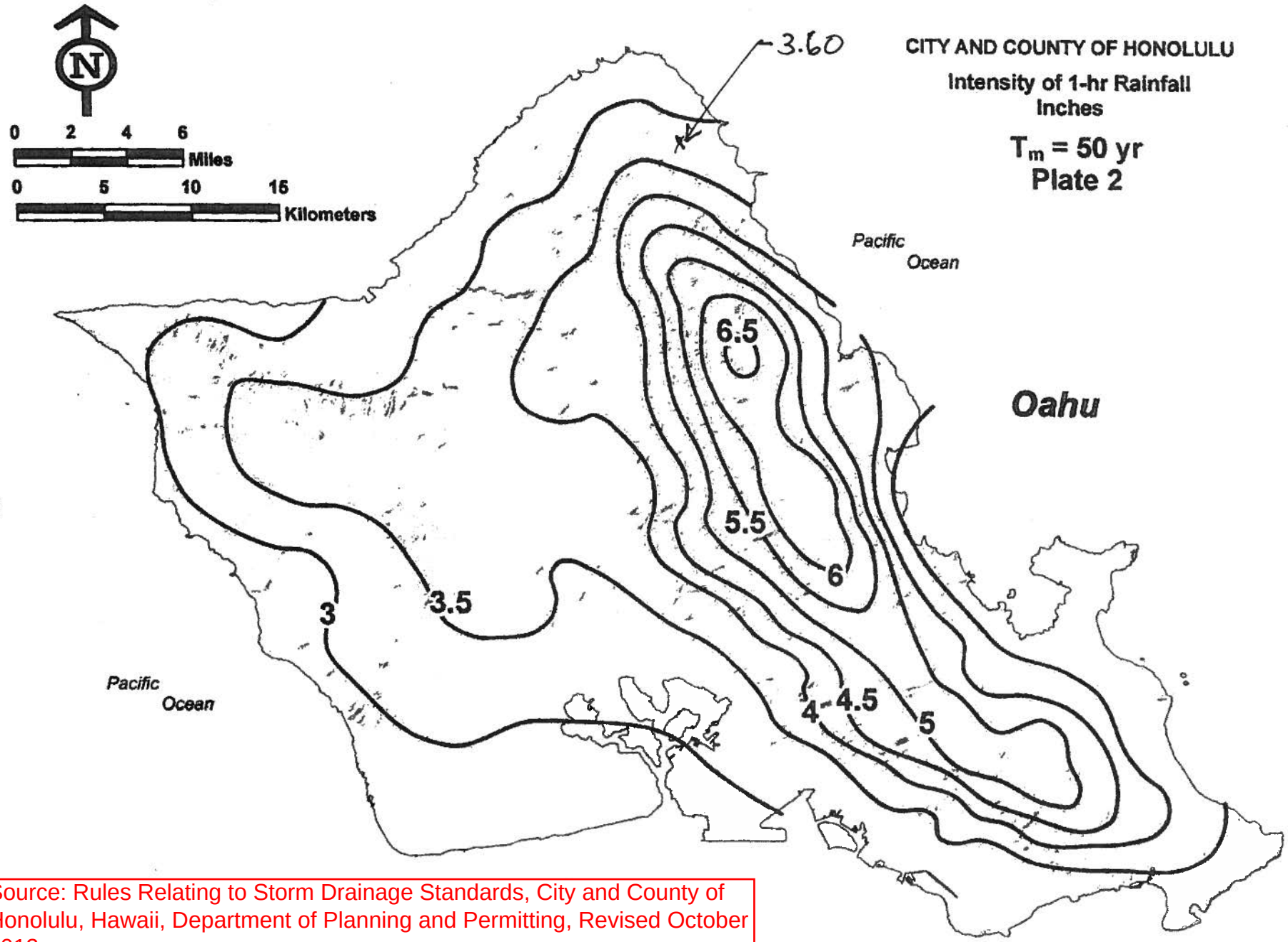
Volume to store runoff (Q_{50} x Tc)	157,790	cf
Total on-site retention requirement =	**3.6**	ac-ft



Source: Rules Relating to Storm Drainage Standards, City and County of Honolulu, Hawaii, Department of Planning and Permitting, Revised October 2012.

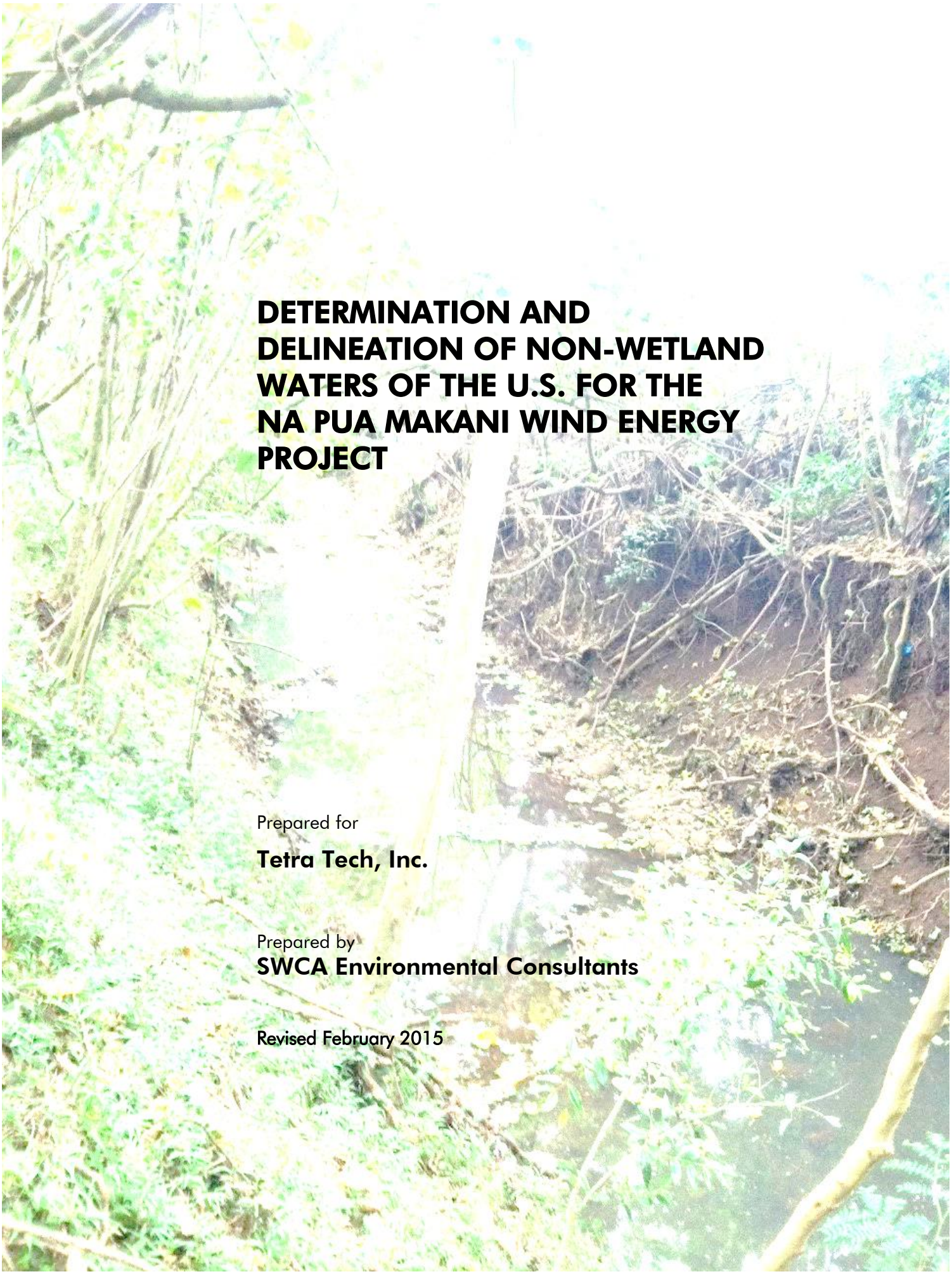
[Eff: APR 0 8 2011] (Auth: Sec 14-12.31, ROH) (Imp: Sec 14-12.31, ROH)

Source: National Oceanic and Atmospheric Administration (NOAA), National Weather Service, Silver Spring, Maryland, 2009



Source: Rules Relating to Storm Drainage Standards, City and County of Honolulu, Hawaii, Department of Planning and Permitting, Revised October 2012.

APPENDIX I
PRELIMINARY DETERMINATION AND DELINEATION OF NON-WETLAND WATER OF THE U.S.



DETERMINATION AND DELINEATION OF NON-WETLAND WATERS OF THE U.S. FOR THE NA PUA MAKANI WIND ENERGY PROJECT

Prepared for

Tetra Tech, Inc.

Prepared by

SWCA Environmental Consultants

Revised February 2015

DETERMINATION AND DELINEATION OF NON-WETLAND WATERS OF THE U.S. FOR THE NA PUA MAKANI WIND ENERGY PROJECT

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SWCA Project No. 28769

Draft Submitted July 2, 2014
Draft Revised July 24, 2014
Revised February 6, 2015

WATERS OF U.S. DETERMINATION AND DELINEATION SUMMARY

PROJECT NAME: Na Pua Makani Wind Energy Project

SITE LOCATION: Kahuku, Island of Oʻahu, Hawaiʻi
Tax Map Keys (TMKs) 5-6-006:018, 5-6-008-006, and 6-6-008:006

APPLICANT: Champlin Hawaii Wind Holdings, LLC

SURVEY DATES: April 10, 2014; June 16, 2014; June 24, 2014; and January 16, 2015

PROJECT STAFF: Tiffany Bovino Agostini, Botanist/Project Manager
Bryson Luke, Field Technician
Taya MacLean, Wetland Specialist

SWCA Environmental Consultants (SWCA) was contracted by Tetra Tech, Inc. to conduct a determination and delineation of potential waters of the U.S. (WoUS) regulated by the Clean Water Act (CWA) within 59.17 acres (23.9 hectares [ha]) in Kahuku as part of the proposed Na Pua Makani Wind Energy project. SWCA conducted fieldwork on April 10, 2014; June 16, 2014; June 24, 2014; and January 16, 2015. The delineation was performed in accordance with U.S. Army Corps of Engineers (USACE) Regulatory Guidance Letter 05-05 (USACE 2005) for identifying the ordinary high water mark (OHWM) for non-tidal, non-wetland waters.

The proposed Na Pua Makani project involves the construction and operation of a wind energy generation project near the community of Kahuku on the north shore of Oʻahu. The survey area encompasses four non-contiguous areas that have the potential to intersect with project components such as roads, overhead transmission lines, and collection lines. It is within three TMKs: 5-6-006:018, 5-6-008:006, and 6-6-008:006. Elevations range from approximately 3 feet (0.9 meters [m]) to over 200 feet (60 m) above mean sea level.

Two intermittent streams (Keaʻaulu Gulch and ʻŌhiʻaʻai Tributary) and one perennial stream (Mālaekahana Stream) as well as an aqueduct and ditch have been identified in the survey area according to geospatial data from the State of Hawaiʻi and the U.S. Geological Survey. The National Wetlands Inventory also identifies a Palustrine Forested Wetland type (PFO3C) along the length of these stream courses.

SWCA delineated portions of three potential non-wetland WoUS in the survey area. Approximately 2,980 linear feet (908 m) of Keaʻaulu Gulch and 1,873 linear feet (571 m) of Mālaekahana Stream were delineated. Approximately 562 linear feet (172 m) of the main ʻŌhiʻaʻai Tributary and 264 linear feet (80 m) of the second, ephemeral ʻŌhiʻaʻai Tributary were delineated. All these features are potential WoUS due to the presence of an OHWM and their connection to the Pacific Ocean. If dredged or fill material will be placed either temporarily or permanently below their OHWMs, a preliminary or approved jurisdictional determination can be requested and a Section 404 permit may be required from the Honolulu USACE. A State 401 Water Quality Certification permit from the Clean Water Branch may also be required, which can take several months to a year to process. If the project can avoid placement of dredged or fill material either temporarily or permanently below the delineated OHWMs, SWCA recommends that a No Permit Required determination/letter be requested from the USACE. This conclusion is subject to confirmation by the USACE Honolulu District.

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ABBREVIATIONS

CFR	Code of Federal Regulations
CWA	Clean Water Act
DAR	Division of Aquatic Resources
GPS	global positioning system
ha	hectare(s)
m	meter(s)
MW	megawatt
mm	millimeter(s)
NRCS	National Resources Conservation Service
NWI	National Wetlands Inventory
OHWM	ordinary high water mark
SWCA	SWCA Environmental Consultants
TMK	Tax Map Key
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WoUS	Water(s) of the U.S.

1. INTRODUCTION

The U.S. Army Corps of Engineers (USACE) derives its regulatory authority over wetlands and other waters of the U.S. (WoUS) from two federal laws: Section 10 of the Rivers and Harbors Act of 1899, and Section 404 of the Clean Water Act (CWA) of 1972. The Rivers and Harbors Act of 1899 prevents unauthorized obstruction or alteration of navigable WoUS. *Navigable waters* are defined as waters that are "subject to the ebb and flow of the tide and/or presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce" (33 Code of Federal Regulations [CFR] 325.5(c)(2)). A Section 10 permit is required for non-fill discharging activities proposed in, over, or under WoUS.

Under Section 404 of the CWA, dredged and fill material may not be discharged into jurisdictional WoUS (including wetlands) without a permit. According to 40 CFR 230.3, WoUS subject to agency jurisdiction under Section 404 include navigable waters and their tributaries, interstate waters and their tributaries, wetlands adjacent to these waters, and impoundments of these waters. In addition, waters are protected by the CWA if determined to have a "significant nexus" with a traditional navigable water or interstate water (U.S. Environmental Protection Agency and USACE 2011). The U.S. Supreme Court's decision in the consolidated cases *Rapanos v. United States* and *Carabell v. United States* (126 S. Ct. 2208) provides further information regarding whether a wetland or tributary is a WoUS. A Section 404 permit is required for all fill or discharge activities below (seaward or makai) the high tide line in tidal waters or below the ordinary high water mark (OHWM) for non-tidal, non-wetland waters.

Tetra Tech, Inc. (in coordination with Champlin Hawaii Wind Holdings, LLC) is reviewing the proposed Na Pua Makani Wind Energy project pursuant to Section 10 of the Rivers and Harbors Act and Section 404 of the CWA. The project involves the construction and operation of a 24-megawatt (MW) wind energy generation project near the community of Kahuku on the north shore of Oʻahu, Hawaiʻi.

SWCA Environmental Consultants (SWCA) was contracted by Tetra Tech, Inc. to delineate the potentially jurisdictional WoUS in the vicinity of several project components (hereafter *survey area*). The survey area encompasses four non-contiguous areas. Two intermittent streams and one perennial stream are identified in the survey area according to geospatial data from the State of Hawaiʻi Division of Aquatic Resources (DAR), the U.S. Geological Survey (USGS), and the National Wetlands Inventory (NWI) program. This report summarizes the findings of the WoUS survey conducted by SWCA biologists Tiffany Bovino Agostini, Bryson Luke, and Taya MacLean on the following dates: April 10, 2014; June 16, 2014; June 24, 2014; and January 16, 2015.

2. DESCRIPTION OF SURVEY AREA

2.1. Location and Vicinity

The project area is in the Kahuku area on the northeastern portion of the Island of Oʻahu in the State of Hawaiʻi. The survey area is composed of four non-contiguous areas in the project area—Lower Keaʻaulu, Upper Keaʻaulu, ʻŌhiʻaʻai, and Mālaekahana. Together, these areas encompass approximately 59.17 acres (23.9 hectares [ha]) (Figure 1). The entire project area was not surveyed because only these four areas are anticipated to have project components that may intersect with potentially jurisdictional features. The survey area is located within Tax Map Keys (TMKs) 5-6-006:018, 5-6-008:006, and 6-6-008:006. The survey area is accessed from Enos Road, Mālaekahana Valley Road, and an unnamed road near mile marker 15 off Kamehameha Highway.

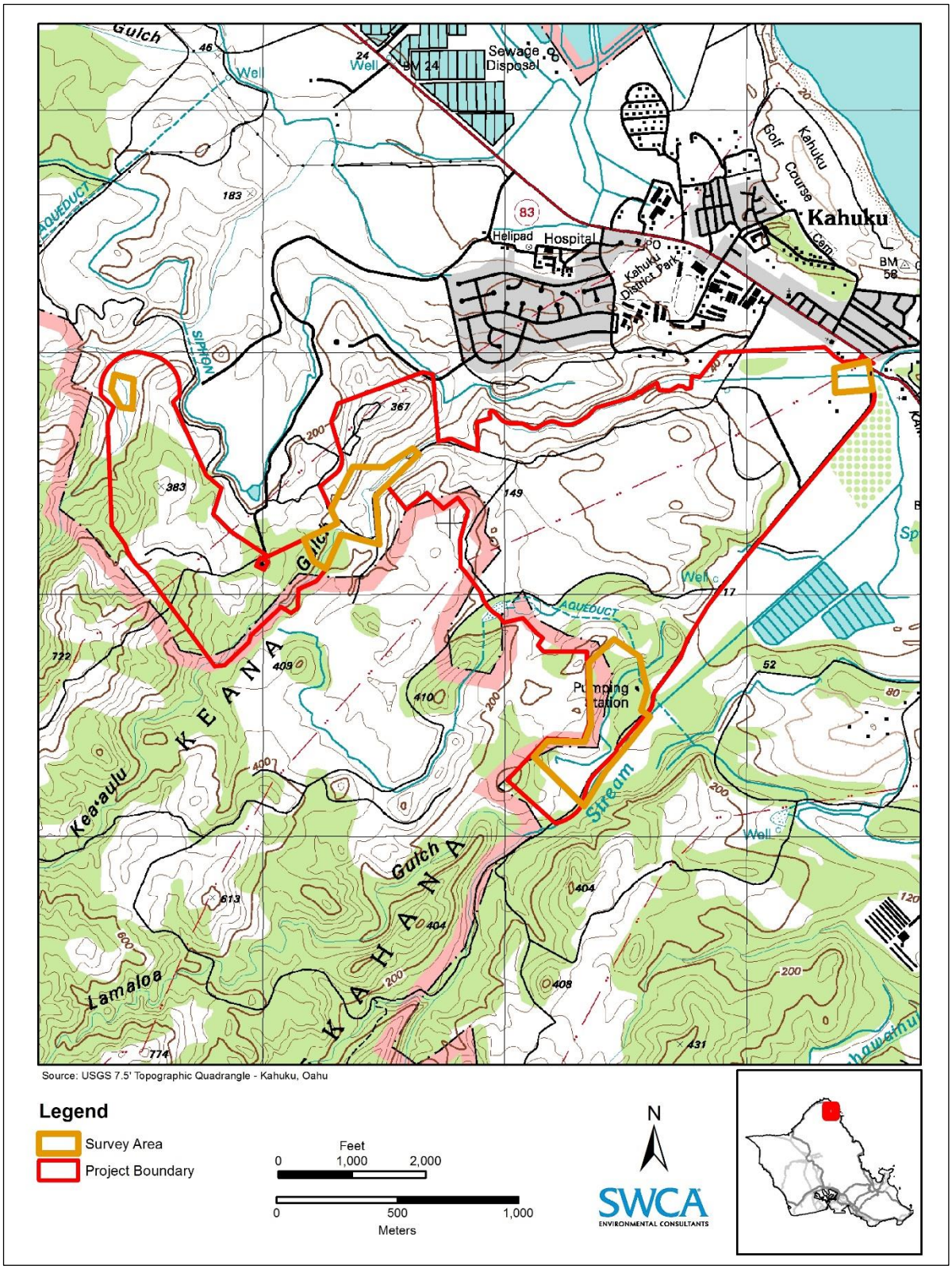

Figure 1. Location of survey area on the Island of O‘ahu.

2.2. Topography and Soils

Most of the survey area generally slopes from the southwest to the northeast. Near the ʻŌhiʻaʻai Tributary, the survey area slopes toward the northwest. Elevation at the survey area ranges from roughly 3 feet (0.9 meters [m]) near Kamehameha Highway to over 200 feet (60 m) above mean sea level in the more mauka (inland) sections.

The Natural Resources Conservation Service (NRCS) classifies eight soil types in the survey area: Mt (Mokuleia clay loam), HeB (Haleiwa silty clay, 2%–6% slopes), LaB (Lahaina silty clay, 3%–7% slopes), LaC (Lahaina silty clay, 7%–15% slopes), PeC (Paumalu silty clay, 3%–8% slopes), PeD (Paumalu silty clay, 15%–25% slopes), Pz (Paumalu-Badland complex), and KIA (Kawaihapai clay loam, 0%–2% slopes) (Foote et al. 1972; NRCS 2013). None of these soil types are considered hydric by the NRCS (NRCS 2012).

2.3. Hydrology

Most streams in the Kahuku area are considered to be naturally intermittent (Polhemus et al. 1992) and are typically short and steep, with permeable upland soils creating rapid infiltration into the Koʻolau aquifer. Numerous gulches cut into the upper portions of the Koʻolau Mountain Range and drain into the low-lying areas. Stream flow in the lowland areas have periods of high peak floods and little base flow (Hunt and De Carlo 2000).

Two intermittent streams (Keaʻaulu Gulch and ʻŌhiʻaʻai Tributary), one perennial stream (Mālaekahana Stream), one ditch/canal, and one aqueduct have been identified in the survey area according to geospatial data from the Hawaiʻi DAR and USGS. Keaʻaulu Gulch runs through dense vegetation in the central portion of the project area (Figure 2) and continues through various agricultural fields near the lower elevation survey area (Figure 3) before joining with Mālaekahana Stream just mauka (inland) of Kamehameha Highway. Mālaekahana Stream traverses the southern tip of the project area (Figure 4). It joins with Keaʻaulu Gulch before discharging to the ocean near Makahoa Point. ʻŌhiʻaʻai Tributary and Gulch run along the northwestern boundary of the project area (Figure 5). North of the survey area, ʻŌhiʻaʻai Tributary joins with a shorter tributary in the west and becomes Kiʻi Stream. This stream is referred to as Kiʻi ditch after crossing under Kamehameha Highway. It joins with Punamano ditch before entering the Kiʻi Unit of the James Campbell National Wildlife Refuge (Hunt and De Carlo 2000). Keaʻaulu Gulch, ʻŌhiʻaʻai Tributary, and Mālaekahana Stream are all listed on the *Atlas of Hawaiian Watersheds & Their Aquatic Resources* (Parham et al. 2008). A ditch/canal is identified as running roughly parallel to Mālaekahana Stream. An aqueduct is identified as intersecting with Mālaekahana Stream north of the survey area.

The NWI program identifies one wetland type in the survey area—PFO3C. This type is considered a Freshwater Forested/Shrub Wetland (Palustrine, Forested, Broad-Leaved Evergreen, Seasonally Flooded). The NWI features correspond with the locations of the three streams identified by DAR and USGS, and therefore are not displayed on the figures.

Annual average rainfall in the survey area is approximately 51.18 inches (1,300 millimeters [mm]) per year in the mauka areas and 45.47 inches (1,155 mm) near Kamehameha Highway. Rainfall is typically highest in March and lowest in June (Giambelluca et al. 2013). The nearby Kiʻi rainfall gage recorded less than average rainfall during 2014; the gage recorded 22% of the average monthly rainfall in April 2014 and 92% of average monthly rainfall during June 2014. In January 2015, the Kiʻi rainfall gage recorded roughly half the average rainfall (National Oceanic and Atmospheric Administration/National Weather Service Weather Forecast Office 2015).

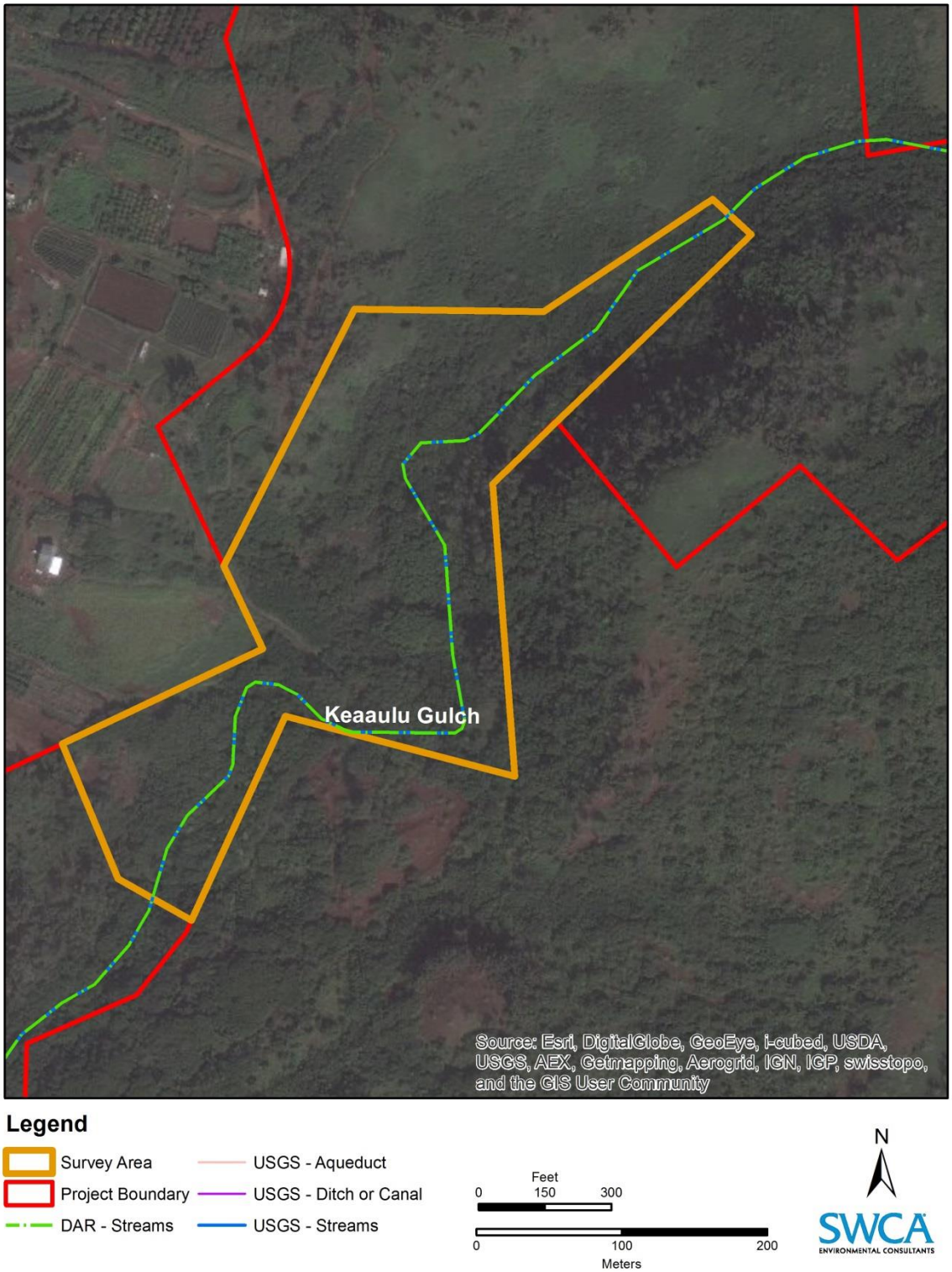

Figure 2. Upper Kea‘aulu survey area.

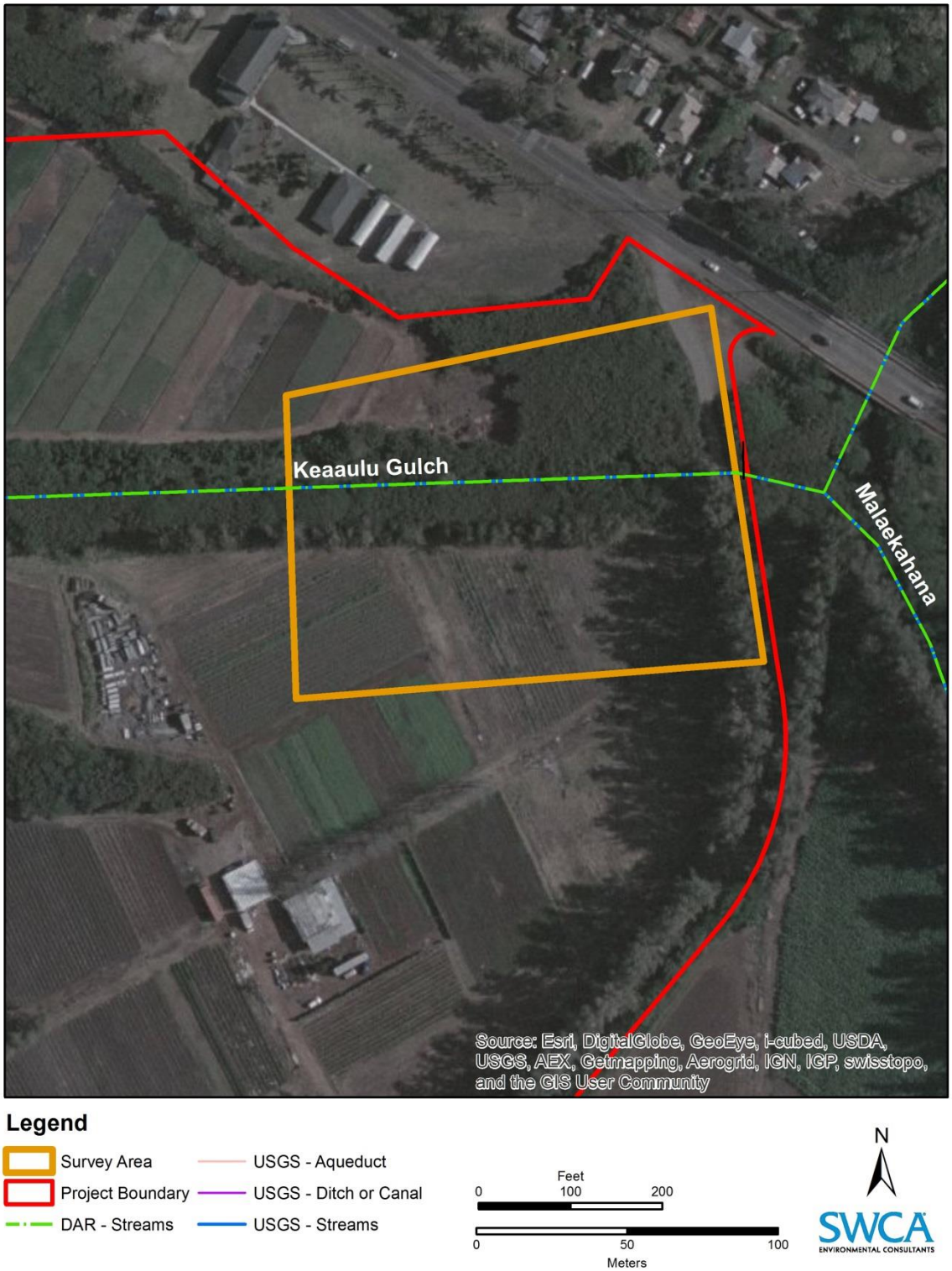

Figure 3. Lower Kea‘aulu survey area.

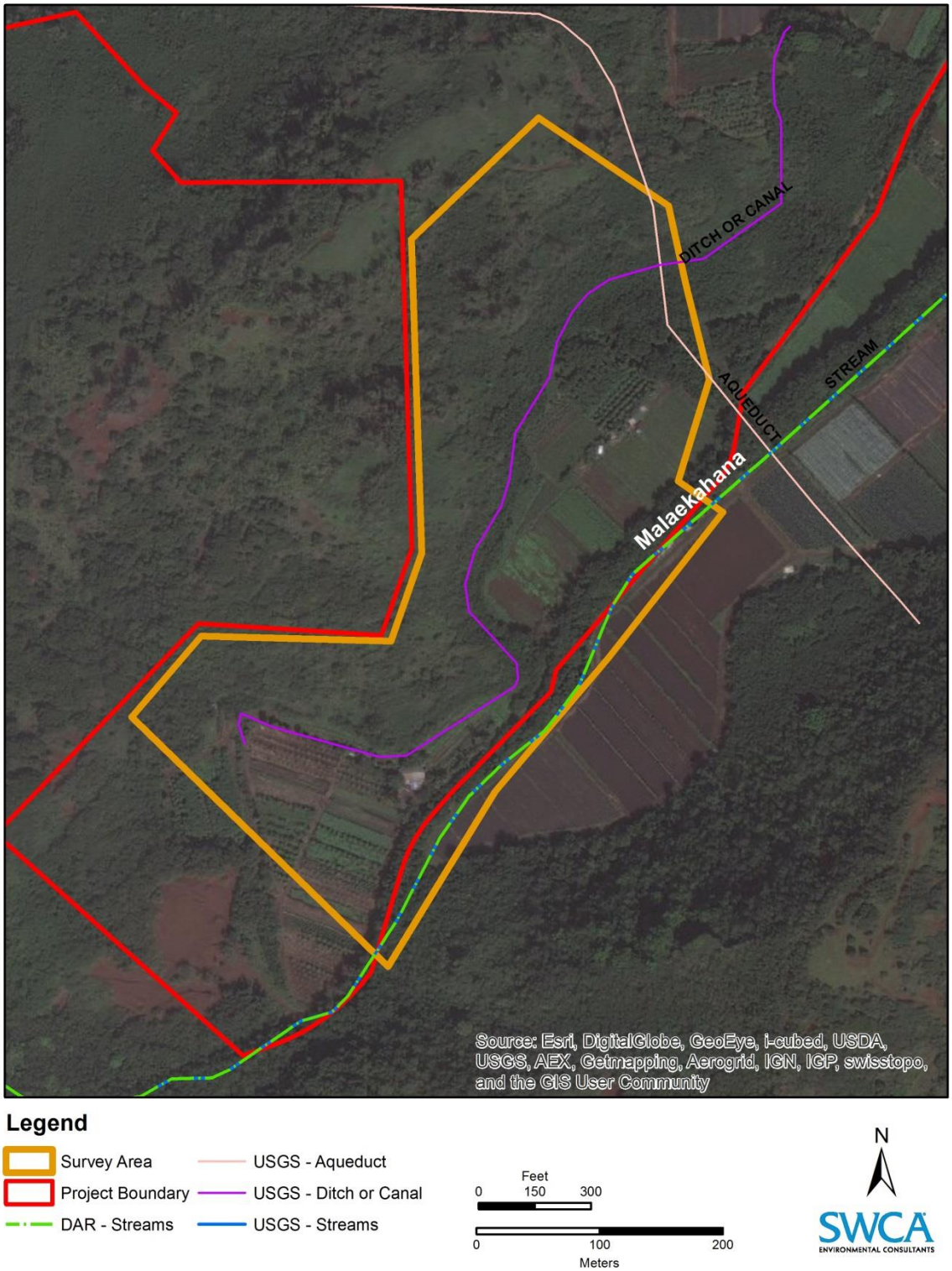

Figure 4. Mālaekahana survey area.

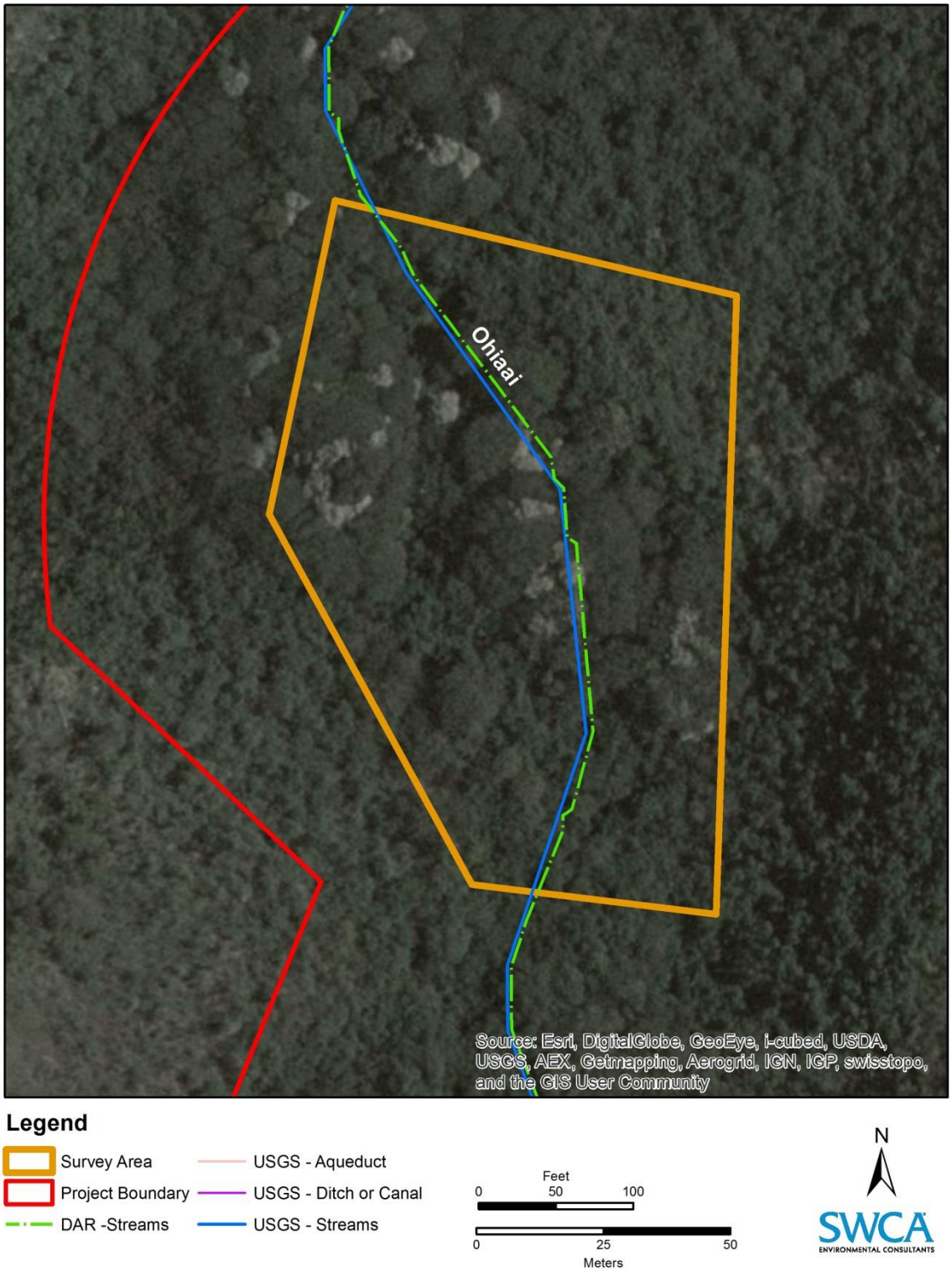

Figure 5. ʻŌhiʻaʻai survey area.

2.4. Flora and Fauna

The vegetation in the survey area is dominated by non-native species including koa haole (*Leucaena leucocephala*), Guinea grass (*Urochloa maxima*), and parasol leaf tree (*Macaranga tanarius*). Terrestrial fauna recorded in the area is predominantly non-native birds. The federally endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*) and state endangered Hawaiian short-eared owl or pueo (*Asio flammeus sandwichensis*) likely inhabit or transverse the area. Endangered waterbirds known to occur at the nearby National Wildlife Refuge may pass through the area, including Hawaiian duck (*Anas wyvilliana*), Hawaiian stilt (*Himantopus mexicanus knudseni*), Hawaiian coot (*Fulica alai*), and Hawaiian gallinule (*Gallinula chloropus sandvicensis*). Finally, seabirds, particularly the endangered Hawaiian petrel (*Pterodroma sandwichensis*) and threatened Newell's shearwater (*Puffinus auricularis newelli*), may fly over the project area at night.

3. METHODS

Before the survey, SWCA reviewed NWI, USGS, and State of Hawaiʻi data; geospatial data; aerial photographs; and topographic maps to identify potential wetlands or other WoUS in the survey area or the immediate vicinity. Information was also taken from the NRCS hydric soil data, as well as previous water resource reports and environmental assessments/environmental impact statements.

SWCA conducted field surveys on April 10, 2014; June 16, 2014; June 24, 2014; and January 16, 2015. SWCA walked the stream paths identified by USGS, NWI, and DAR, as well as low-lying areas. The boundaries of potential non-wetland WoUS were delineated by recording the location of the OHWM, as defined in the USACE Regulatory Guidance Letter 05-05 (USACE 2005). Indicators of OHWM can be physical or vegetative and include benches, shelving, drift lines, natural lines impressed on the bank, changes in the character of soil, transitions in vegetation type and density, destruction of terrestrial vegetation (matted-down vegetation), sediment deposition, presence of litter and debris, presence of wrack lines, bed and banks, multiple observed flow events, scour, sediment sorting, and water staining (USACE 2005, 2008).

SWCA documented the presence of OHWMs at various points along the streams and drainage features. For Keaʻaulu Gulch, SWCA mapped the centerline, recorded the maximum channel width, and buffered the centerline by half the width. In areas with open canopy, SWCA collected data points at the OHWM on both sides of Keaʻaulu Gulch. For Mālaekahana Stream, SWCA mapped the OHWM on the right bank and recorded the maximum channel width due to accessibility and because no project components are planned adjacent to the left bank. At ʻŌhiʻaʻai Tributary, SWCA combined methodology for mapping the centerline and left bank, depending on the density of canopy coverage and the feature width.

Data were collected using a Trimble GeoExplorer 2008 Series global positioning system (GPS) unit and Zephyr antenna, then post-processed in ArcGIS using GPS Correct to submeter accuracy. The linear lengths of the features were calculated by projecting these point/line data files in geographic information system software.

No attempt was made to determine "significant nexus" to a traditional navigable water by investigating whether the features discharge to the Pacific Ocean, or whether they may potentially affect the chemical, physical, and biological integrity of the ocean.

4. FINDINGS

In all, approximately three non-wetland WoUS were delineated in the survey area, including portions of Keaʻaulu Gulch, Mālaekahana Stream, and ʻŌhiʻaʻai Tributary. The types and acreage of the WoUS delineated by SWCA are summarized in Table 1.

Table 1. Potential Waters of the U.S. Delineated by SWCA in the Survey Area

Waters of the U.S. Identification	Type	Length (linear feet)
Keaʻaulu Gulch	Riverine – Intermittent	2,980
Mālaekahana Stream	Riverine – Perennial	1,873
ʻŌhiʻaʻai Tributary	Riverine – Intermittent	826
Non-Wetland Total		5,679

4.1. Keaʻaulu Gulch

Approximately 2,980 linear feet (908 m) of Keaʻaulu Gulch were delineated in the survey area. Of this total, 2,491 linear feet (759 m) were in the upper survey area (Figure 6) and 489 linear feet (149 m) were in the lower survey area (Figure 7).

For most of the upper Keaʻaulu Gulch survey area, physical indicators of an OHWM are weak and the drainage appears ephemeral (i.e., driven purely by heavy precipitation events and lacking a groundwater component). In many areas the channel is overgrown by tall Guinea grass. No physical characteristics to indicate an OHWM were seen within a 135-foot (41-m) stretch immediately downstream of the sharp bend in the gulch; the most likely drainage course for this area is identified in Figure 6 as a single line. However, some physical indicators of an OHWM were observed in certain areas of the upper Keaʻaulu Gulch survey area. These include changes in the character of soil; shelving; benches; exposed root hairs; and vegetation that was matted down, bent, or absent (Figures 8 and 9).

Portions of the original drainage course were likely modified by human activities for roads, trails, and agriculture. Several culverts exist near the northern portion of the survey area (see Figure 9). A few culverts are within the stream channel, and at least two culverts appear to convey water to the channel from the east.

In the lower Keaʻaulu Gulch survey area, physical indicators of the OHWM were most apparent in the immediate vicinity of the existing Mālaekahana Valley Road bridge, and included destruction of terrestrial vegetation; change in plant community (upland to facultative species); and the presence of litter and debris. Standing water was observed in the immediate vicinity of the bridge. Further upstream, the drainage is overgrown with non-hydrophytic herbaceous vegetation along the bottom and slopes (Figure 10).

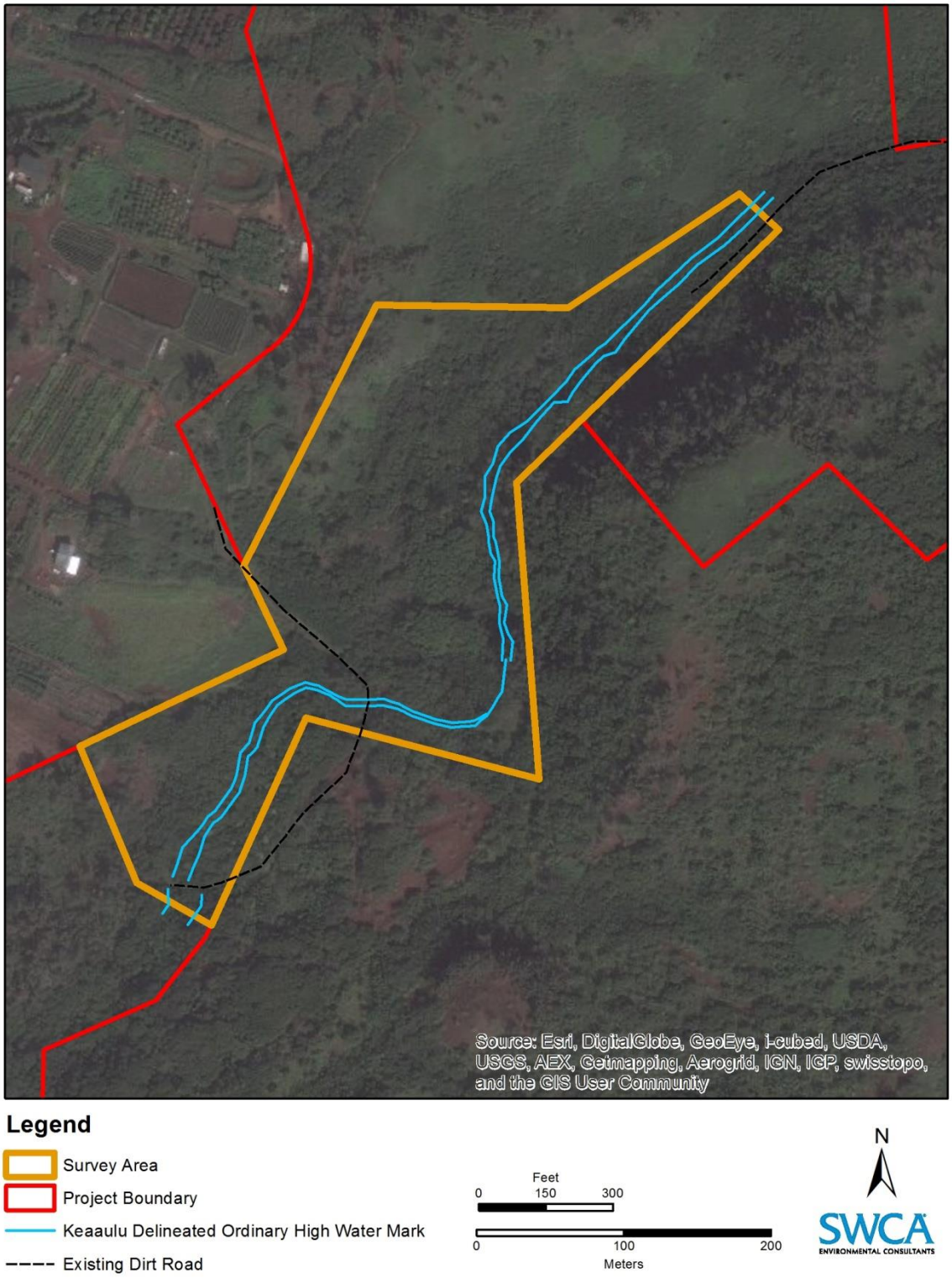

Figure 6. Delineated OHWM in the upper Kea‘aulu survey area.
Note: The break in the OHWM is a dirt road.

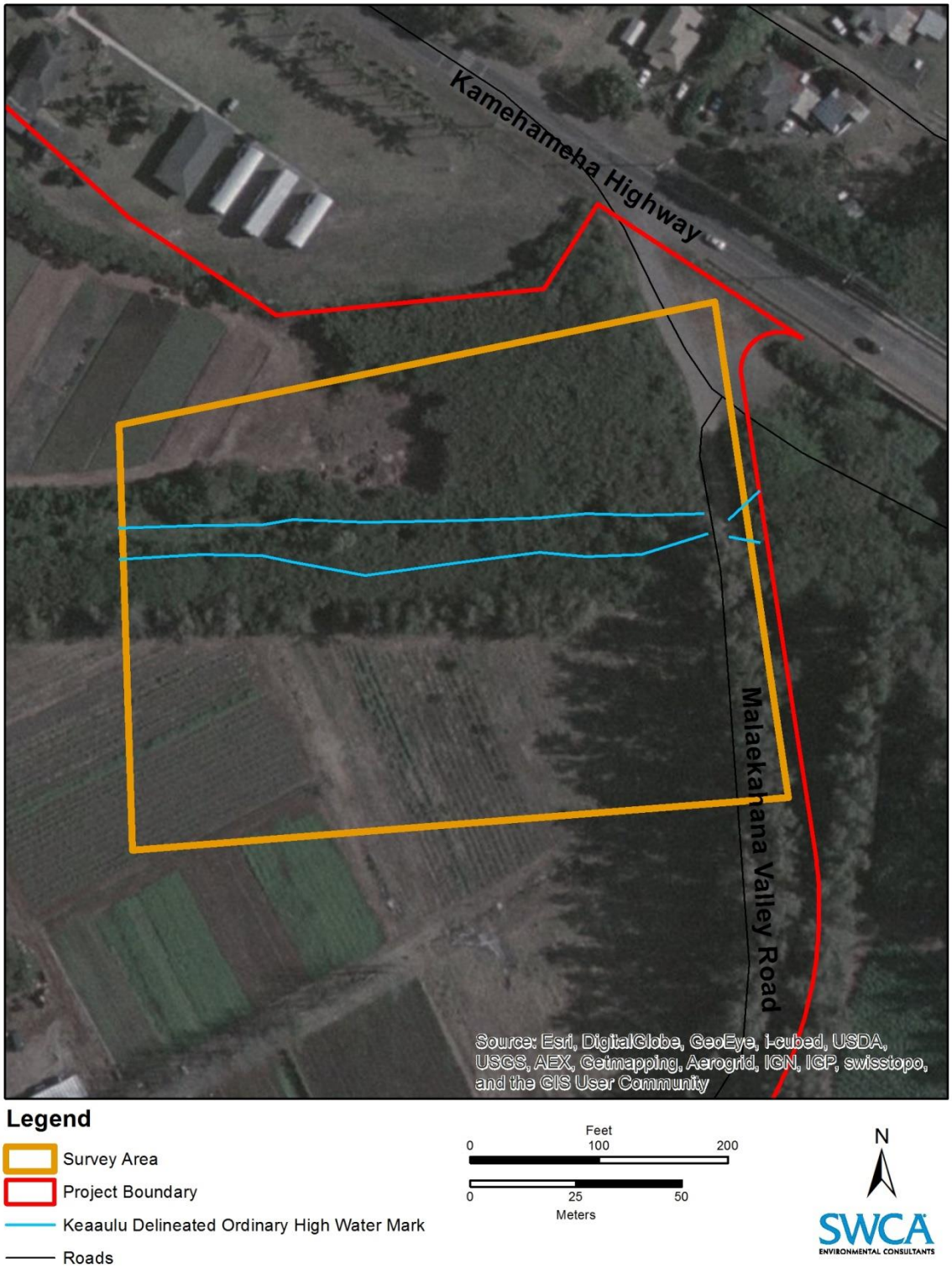

Figure 7. Delineated OHWM in the lower Kea‘aulu survey area near Kamehameha Highway. *Note:* The break in the OHWM is a bridge.

Figure 8. Looking toward the OHWM on right bank in the upper Kea‘aulu survey area.

Figure 9. Looking toward the OHWM on right bank in the upper Kea‘aulu Gulch survey area.

Figure 10. Overgrown channel in the lower Kea‘aulu survey area.

4.2. Mālaekahana Stream

Approximately 1,873 linear feet (571 m) of Mālaekahana Stream were delineated in the survey area (Figure 11). Mālaekahana Stream is perennial. It has a defined bed and bank with flow present throughout the year. Various indicators of the OHWM were seen throughout the Mālaekahana survey area, including a clear, natural line impressed on the bank; organic debris collecting behind obstructions; exposed root hairs; and benches (Figure 12).

The ditch/canal identified by the USGS in the Mālaekahana survey area (see Figure 4) appears to have been filled in and is no longer active. It was likely excavated in uplands and was not observed to contribute flow (either directly or indirectly) to another potentially jurisdictional water.

During SWCA’s survey, water was observed in the narrow, human-made channel identified as an aqueduct by USGS data (see Figures 4, 11, and 13). The edges were densely vegetated with upland species. The feature did not continue east of the road, and therefore does not appear to connect to Mālaekahana Stream.

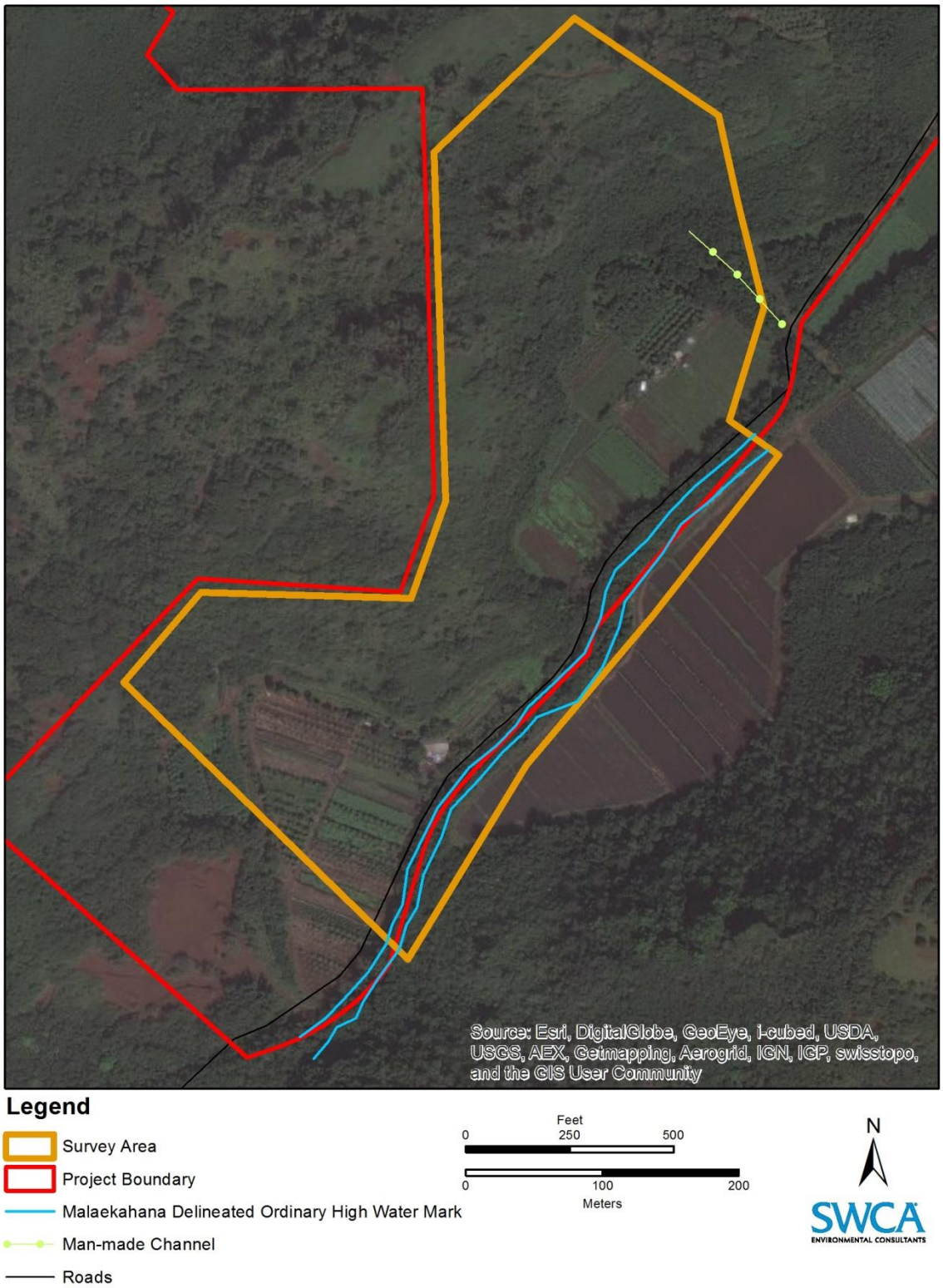

Figure 11. Delineated OHWM in the Mālaekahana survey area.

Figure 12. Mālaekahana Stream with standing water.

Figure 13. Narrow, human-made channel identified by the USGS as an aqueduct in the Mālaekahana survey area.

4.3. ‘Ōhi‘a‘ai Tributary

Two tributaries were delineated in this portion of the survey area, although only one feature is identified in the NWI, USGS, or DAR maps of the area. Approximately 562 linear feet (172 m) of the main stem of ‘Ōhi‘a‘ai Tributary were delineated in the survey area (Figure 14). The main stem of ‘Ōhi‘a‘ai Tributary is intermittent, with surface water flow during wetter months or high rainfall events, but interspersed by dry periods. The bed and bank are well defined, with the bank reaching over 5 feet (1.5 m) in some areas. Various indicators of OHWM were seen throughout the ‘Ōhi‘a‘ai survey area, including a clear, natural line impressed on the bank; undercut banks; sediment sorting and changes in soil character; organic debris collecting behind obstructions (wracking); litter removal due to flowing water; water staining on boulders; exposed roots; and standing water (Figures 15 and 16).

A smaller tributary was also identified during the survey. Approximately 264 linear feet (80 m) of this feature were delineated (see Figure 14). It flows northwest and directly connects to the main portion of ‘Ōhi‘a‘ai Tributary described above (Figure 17). It is likely to be ephemeral; flowing briefly only during rainfall events or extreme flooding. Indicators of flow were not strong throughout the entire feature, but included matted or missing vegetation, a well-defined bed and bank, and change in soil character (Figure 18).

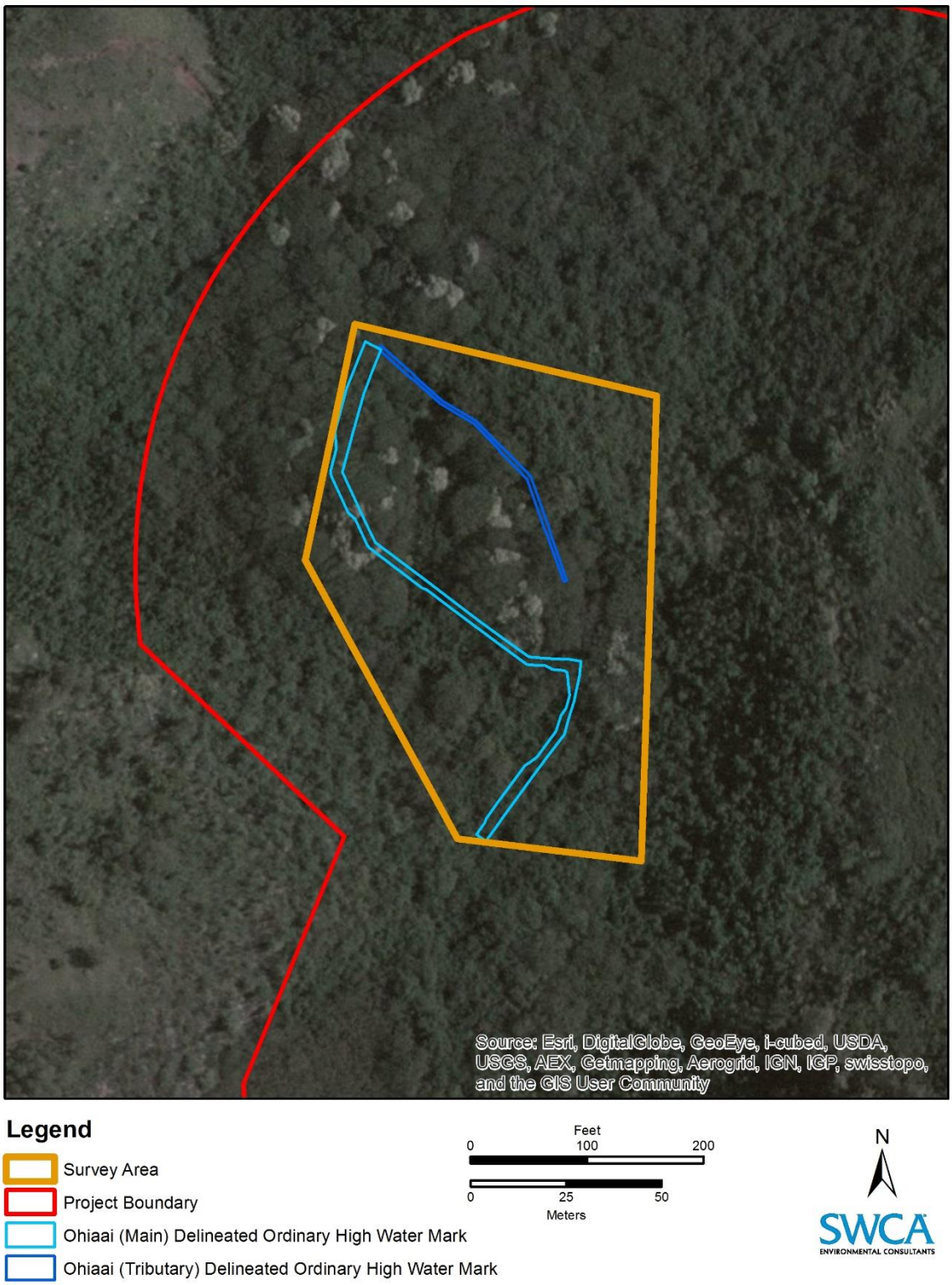

Figure 14. Delineated OHWM in the ‘Ōhi‘a‘ai survey area.

Figure 15. Main ‘Ōhi‘a‘ai Tributary indicators include cut banks, exposed roots, scour, and standing water.

Figure 16. Water-stained leaves collected on an elevated obstruction along the ‘Ōhi‘a‘ai Tributary.

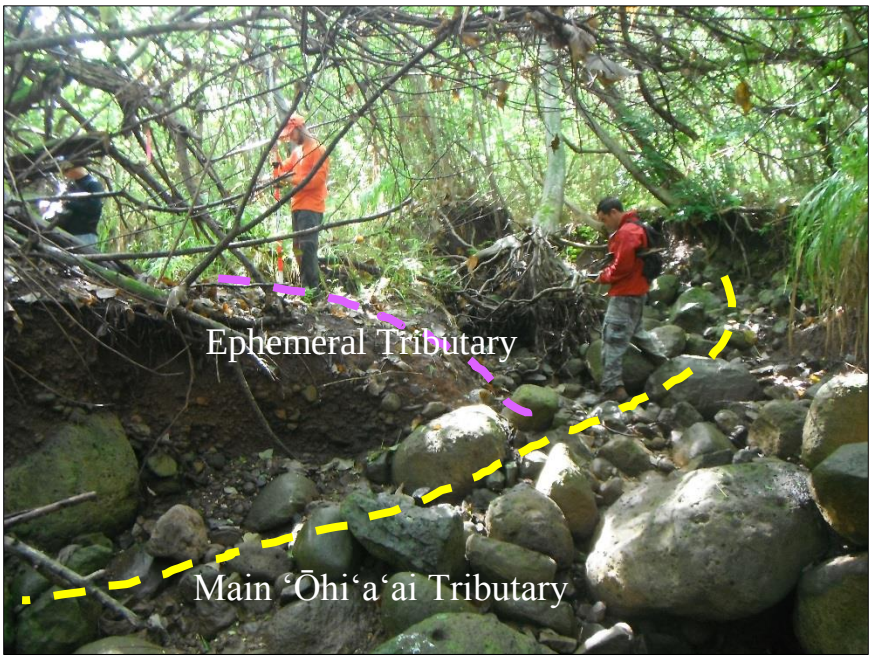

Figure 17. Junction between the ephemeral tributary (pink line) and the main ʻŌhiʻaʻai Tributary (yellow line).

Figure 18. Ephemeral ʻŌhiʻaʻai tributary showing defined bed and bank and unvegetated channel bottom.

5. CONCLUSIONS AND RECOMMENDATIONS

SWCA surveyed and delineated three potentially jurisdictional streams in the survey area. Approximately 2,980 linear feet (908 m) of the intermittent Keaʻaulu Gulch, 1,873 linear feet (571 m) of the perennial Mālaekahana Stream, and 826 linear feet (252 m) of the intermittent ʻŌhiʻaʻai Tributary were delineated in the survey area. In contrast to the Mālaekahana Stream and ʻŌhiʻaʻai Tributary, Keaʻaulu Gulch did not have strong indictors of flow or an OHWM in many areas. Portions of Keaʻaulu Gulch were likely modified by human activities for roads and agriculture. However, it may convey water and sediment from upland areas to lower reaches and subsequently the Pacific Ocean during heavy rainfall events.

It is not known whether the project will require placement of dredged or fill material either temporarily or permanently below the delineated OHWMs. If this can be avoided, SWCA recommends requesting a preliminary jurisdictional determination and a No Permit Required letter from the Honolulu USACE. If the project requires placement of dredged or fill material below the delineated OHWMs, a preliminary or approved jurisdictional determination can be requested, and a permit may be required from the USACE if the features are determined to be WoUS. A State 401 Water Quality Certification permit from the Clean Water Branch may also be required, which can take several months to a year to process. Because portions of Keaʻaulu Gulch lack strong indicators of an OHWM, the jurisdictional status of the gulch could be argued via the approved jurisdictional determination process.

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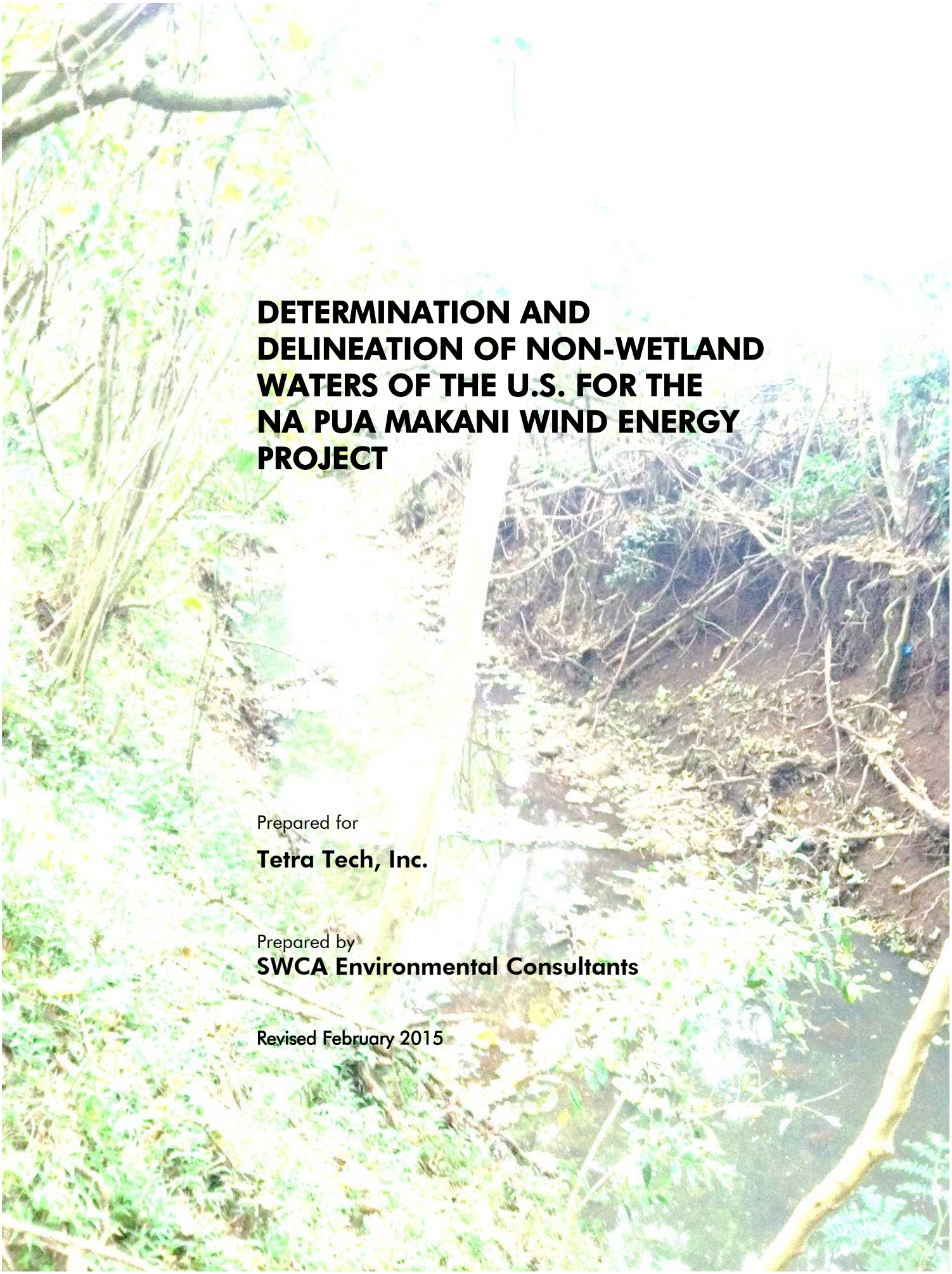
APPENDIX I
PRELIMINARY DETERMINATION AND DELINEATION OF NON-WETLAND WATER OF THE U.S.



DETERMINATION AND DELINEATION OF NON-WETLAND WATERS OF THE U.S. FOR THE NA PUA MAKANI WIND ENERGY PROJECT

Prepared for

Tetra Tech, Inc.

Prepared by

SWCA Environmental Consultants

Revised February 2015

DETERMINATION AND DELINEATION OF NON-WETLAND WATERS OF THE U.S. FOR THE NA PUA MAKANI WIND ENERGY PROJECT

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SWCA Project No. 28769

Draft Submitted July 2, 2014
Draft Revised July 24, 2014
Revised February 6, 2015

WATERS OF U.S. DETERMINATION AND DELINEATION SUMMARY

PROJECT NAME: Na Pua Makani Wind Energy Project

SITE LOCATION: Kahuku, Island of Oʻahu, Hawaiʻi
Tax Map Keys (TMKs) 5-6-006:018, 5-6-008-006, and 6-6-008:006

APPLICANT: Champlin Hawaii Wind Holdings, LLC

SURVEY DATES: April 10, 2014; June 16, 2014; June 24, 2014; and January 16, 2015

PROJECT STAFF: Tiffany Bovino Agostini, Botanist/Project Manager
Bryson Luke, Field Technician
Taya MacLean, Wetland Specialist

SWCA Environmental Consultants (SWCA) was contracted by Tetra Tech, Inc. to conduct a determination and delineation of potential waters of the U.S. (WoUS) regulated by the Clean Water Act (CWA) within 59.17 acres (23.9 hectares [ha]) in Kahuku as part of the proposed Na Pua Makani Wind Energy project. SWCA conducted fieldwork on April 10, 2014; June 16, 2014; June 24, 2014; and January 16, 2015. The delineation was performed in accordance with U.S. Army Corps of Engineers (USACE) Regulatory Guidance Letter 05-05 (USACE 2005) for identifying the ordinary high water mark (OHWM) for non-tidal, non-wetland waters.

The proposed Na Pua Makani project involves the construction and operation of a wind energy generation project near the community of Kahuku on the north shore of Oʻahu. The survey area encompasses four non-contiguous areas that have the potential to intersect with project components such as roads, overhead transmission lines, and collection lines. It is within three TMKs: 5-6-006:018, 5-6-008:006, and 6-6-008:006. Elevations range from approximately 3 feet (0.9 meters [m]) to over 200 feet (60 m) above mean sea level.

Two intermittent streams (Keaʻaulu Gulch and ʻŌhiʻaʻai Tributary) and one perennial stream (Mālaekahana Stream) as well as an aqueduct and ditch have been identified in the survey area according to geospatial data from the State of Hawaiʻi and the U.S. Geological Survey. The National Wetlands Inventory also identifies a Palustrine Forested Wetland type (PFO3C) along the length of these stream courses.

SWCA delineated portions of three potential non-wetland WoUS in the survey area. Approximately 2,980 linear feet (908 m) of Keaʻaulu Gulch and 1,873 linear feet (571 m) of Mālaekahana Stream were delineated. Approximately 562 linear feet (172 m) of the main ʻŌhiʻaʻai Tributary and 264 linear feet (80 m) of the second, ephemeral ʻŌhiʻaʻai Tributary were delineated. All these features are potential WoUS due to the presence of an OHWM and their connection to the Pacific Ocean. If dredged or fill material will be placed either temporarily or permanently below their OHWMs, a preliminary or approved jurisdictional determination can be requested and a Section 404 permit may be required from the Honolulu USACE. A State 401 Water Quality Certification permit from the Clean Water Branch may also be required, which can take several months to a year to process. If the project can avoid placement of dredged or fill material either temporarily or permanently below the delineated OHWMs, SWCA recommends that a No Permit Required determination/letter be requested from the USACE. This conclusion is subject to confirmation by the USACE Honolulu District.

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TABLES

Table 1. Potential Waters of the U.S. Delineated by SWCA in the Survey Area 9

ABBREVIATIONS

CFR	Code of Federal Regulations
CWA	Clean Water Act
DAR	Division of Aquatic Resources
GPS	global positioning system
ha	hectare(s)
m	meter(s)
MW	megawatt
mm	millimeter(s)
NRCS	National Resources Conservation Service
NWI	National Wetlands Inventory
OHWM	ordinary high water mark
SWCA	SWCA Environmental Consultants
TMK	Tax Map Key
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WoUS	Water(s) of the U.S.

1. INTRODUCTION

The U.S. Army Corps of Engineers (USACE) derives its regulatory authority over wetlands and other waters of the U.S. (WoUS) from two federal laws: Section 10 of the Rivers and Harbors Act of 1899, and Section 404 of the Clean Water Act (CWA) of 1972. The Rivers and Harbors Act of 1899 prevents unauthorized obstruction or alteration of navigable WoUS. *Navigable waters* are defined as waters that are "subject to the ebb and flow of the tide and/or presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce" (33 Code of Federal Regulations [CFR] 325.5(c)(2)). A Section 10 permit is required for non-fill discharging activities proposed in, over, or under WoUS.

Under Section 404 of the CWA, dredged and fill material may not be discharged into jurisdictional WoUS (including wetlands) without a permit. According to 40 CFR 230.3, WoUS subject to agency jurisdiction under Section 404 include navigable waters and their tributaries, interstate waters and their tributaries, wetlands adjacent to these waters, and impoundments of these waters. In addition, waters are protected by the CWA if determined to have a "significant nexus" with a traditional navigable water or interstate water (U.S. Environmental Protection Agency and USACE 2011). The U.S. Supreme Court's decision in the consolidated cases *Rapanos v. United States* and *Carabell v. United States* (126 S. Ct. 2208) provides further information regarding whether a wetland or tributary is a WoUS. A Section 404 permit is required for all fill or discharge activities below (seaward or makai) the high tide line in tidal waters or below the ordinary high water mark (OHWM) for non-tidal, non-wetland waters.

Tetra Tech, Inc. (in coordination with Champlin Hawaii Wind Holdings, LLC) is reviewing the proposed Na Pua Makani Wind Energy project pursuant to Section 10 of the Rivers and Harbors Act and Section 404 of the CWA. The project involves the construction and operation of a 24-megawatt (MW) wind energy generation project near the community of Kahuku on the north shore of Oʻahu, Hawaiʻi.

SWCA Environmental Consultants (SWCA) was contracted by Tetra Tech, Inc. to delineate the potentially jurisdictional WoUS in the vicinity of several project components (hereafter *survey area*). The survey area encompasses four non-contiguous areas. Two intermittent streams and one perennial stream are identified in the survey area according to geospatial data from the State of Hawaiʻi Division of Aquatic Resources (DAR), the U.S. Geological Survey (USGS), and the National Wetlands Inventory (NWI) program. This report summarizes the findings of the WoUS survey conducted by SWCA biologists Tiffany Bovino Agostini, Bryson Luke, and Taya MacLean on the following dates: April 10, 2014; June 16, 2014; June 24, 2014; and January 16, 2015.

2. DESCRIPTION OF SURVEY AREA

2.1. Location and Vicinity

The project area is in the Kahuku area on the northeastern portion of the Island of Oʻahu in the State of Hawaiʻi. The survey area is composed of four non-contiguous areas in the project area—Lower Keaʻaulu, Upper Keaʻaulu, ʻŌhiʻaʻai, and Mālaekahana. Together, these areas encompass approximately 59.17 acres (23.9 hectares [ha]) (Figure 1). The entire project area was not surveyed because only these four areas are anticipated to have project components that may intersect with potentially jurisdictional features. The survey area is located within Tax Map Keys (TMKs) 5-6-006:018, 5-6-008:006, and 6-6-008:006. The survey area is accessed from Enos Road, Mālaekahana Valley Road, and an unnamed road near mile marker 15 off Kamehameha Highway.

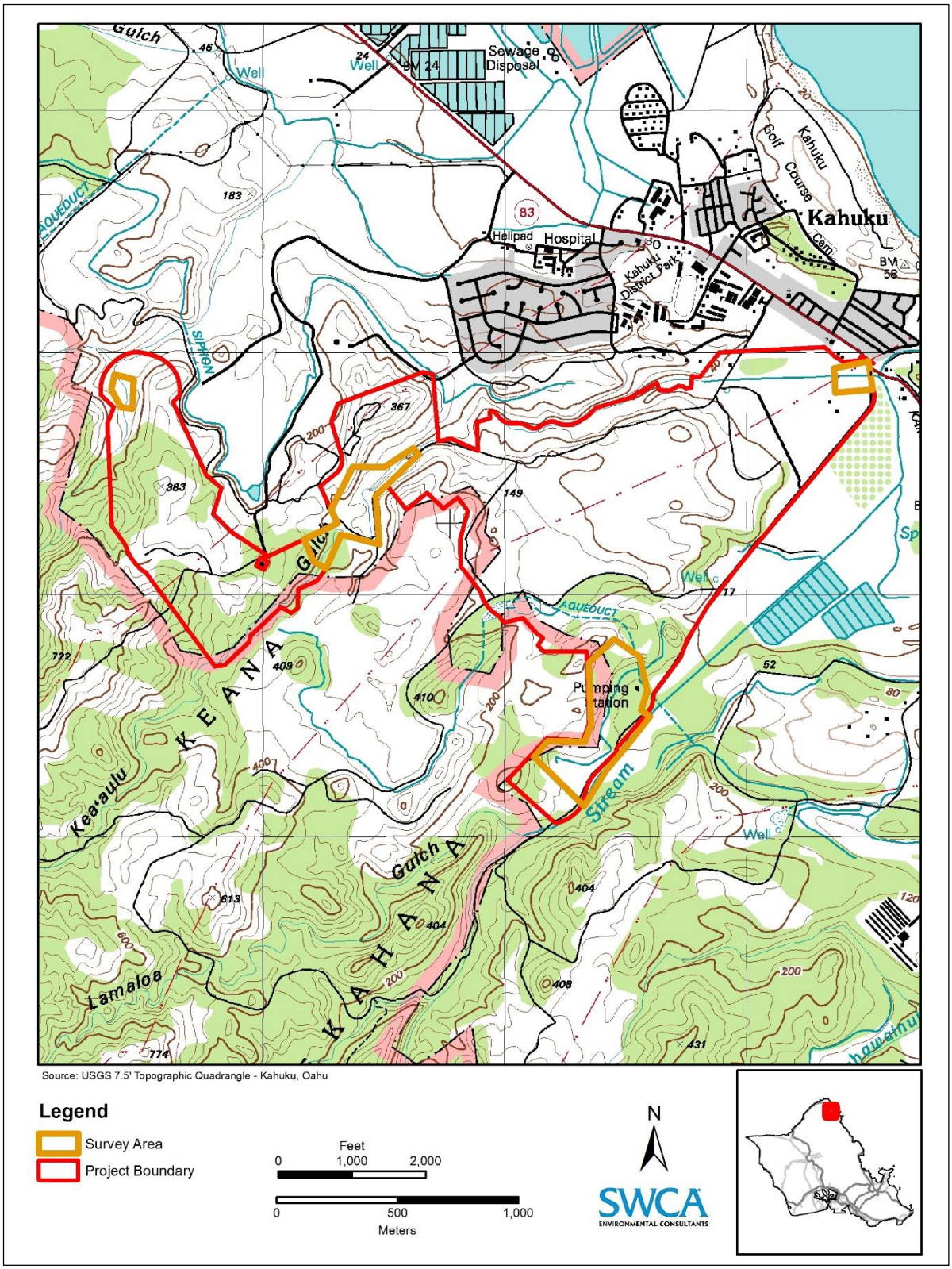


Figure 1. Location of survey area on the Island of O‘ahu.

2.2. Topography and Soils

Most of the survey area generally slopes from the southwest to the northeast. Near the ʻŌhiʻaʻai Tributary, the survey area slopes toward the northwest. Elevation at the survey area ranges from roughly 3 feet (0.9 meters [m]) near Kamehameha Highway to over 200 feet (60 m) above mean sea level in the more mauka (inland) sections.

The Natural Resources Conservation Service (NRCS) classifies eight soil types in the survey area: Mt (Mokuleia clay loam), HeB (Haleiwa silty clay, 2%–6% slopes), LaB (Lahaina silty clay, 3%–7% slopes), LaC (Lahaina silty clay, 7%–15% slopes), PeC (Paumalu silty clay, 3%–8% slopes), PeD (Paumalu silty clay, 15%–25% slopes), Pz (Paumalu-Badland complex), and KIA (Kawaihapai clay loam, 0%–2% slopes) (Foote et al. 1972; NRCS 2013). None of these soil types are considered hydric by the NRCS (NRCS 2012).

2.3. Hydrology

Most streams in the Kahuku area are considered to be naturally intermittent (Polhemus et al. 1992) and are typically short and steep, with permeable upland soils creating rapid infiltration into the Koʻolau aquifer. Numerous gulches cut into the upper portions of the Koʻolau Mountain Range and drain into the low-lying areas. Stream flow in the lowland areas have periods of high peak floods and little base flow (Hunt and De Carlo 2000).

Two intermittent streams (Keaʻaulu Gulch and ʻŌhiʻaʻai Tributary), one perennial stream (Mālaekahana Stream), one ditch/canal, and one aqueduct have been identified in the survey area according to geospatial data from the Hawaiʻi DAR and USGS. Keaʻaulu Gulch runs through dense vegetation in the central portion of the project area (Figure 2) and continues through various agricultural fields near the lower elevation survey area (Figure 3) before joining with Mālaekahana Stream just mauka (inland) of Kamehameha Highway. Mālaekahana Stream traverses the southern tip of the project area (Figure 4). It joins with Keaʻaulu Gulch before discharging to the ocean near Makahoa Point. ʻŌhiʻaʻai Tributary and Gulch run along the northwestern boundary of the project area (Figure 5). North of the survey area, ʻŌhiʻaʻai Tributary joins with a shorter tributary in the west and becomes Kiʻi Stream. This stream is referred to as Kiʻi ditch after crossing under Kamehameha Highway. It joins with Punamano ditch before entering the Kiʻi Unit of the James Campbell National Wildlife Refuge (Hunt and De Carlo 2000). Keaʻaulu Gulch, ʻŌhiʻaʻai Tributary, and Mālaekahana Stream are all listed on the *Atlas of Hawaiian Watersheds & Their Aquatic Resources* (Parham et al. 2008). A ditch/canal is identified as running roughly parallel to Mālaekahana Stream. An aqueduct is identified as intersecting with Mālaekahana Stream north of the survey area.

The NWI program identifies one wetland type in the survey area—PFO3C. This type is considered a Freshwater Forested/Shrub Wetland (Palustrine, Forested, Broad-Leaved Evergreen, Seasonally Flooded). The NWI features correspond with the locations of the three streams identified by DAR and USGS, and therefore are not displayed on the figures.

Annual average rainfall in the survey area is approximately 51.18 inches (1,300 millimeters [mm]) per year in the mauka areas and 45.47 inches (1,155 mm) near Kamehameha Highway. Rainfall is typically highest in March and lowest in June (Giambelluca et al. 2013). The nearby Kiʻi rainfall gage recorded less than average rainfall during 2014; the gage recorded 22% of the average monthly rainfall in April 2014 and 92% of average monthly rainfall during June 2014. In January 2015, the Kiʻi rainfall gage recorded roughly half the average rainfall (National Oceanic and Atmospheric Administration/National Weather Service Weather Forecast Office 2015).

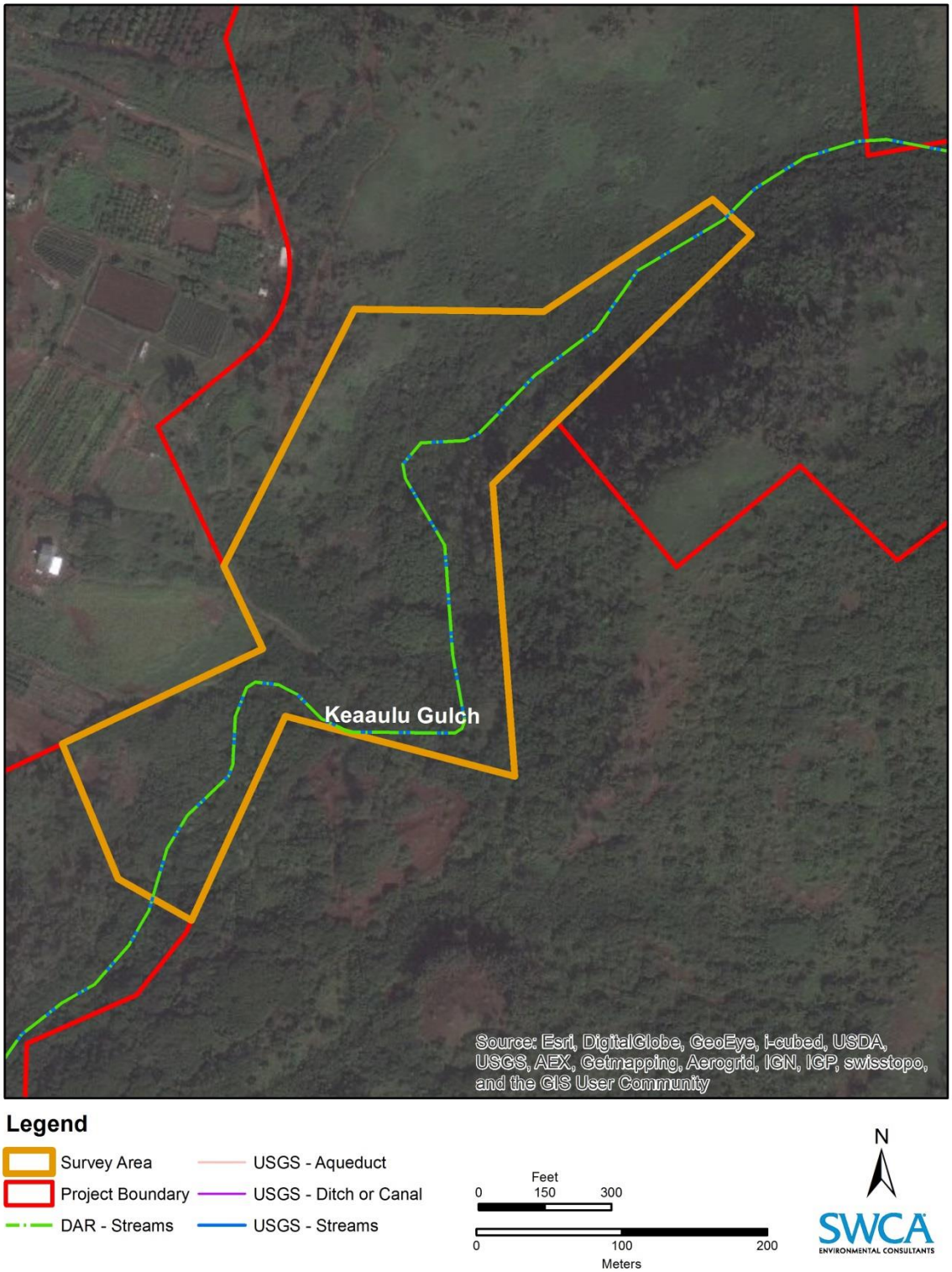
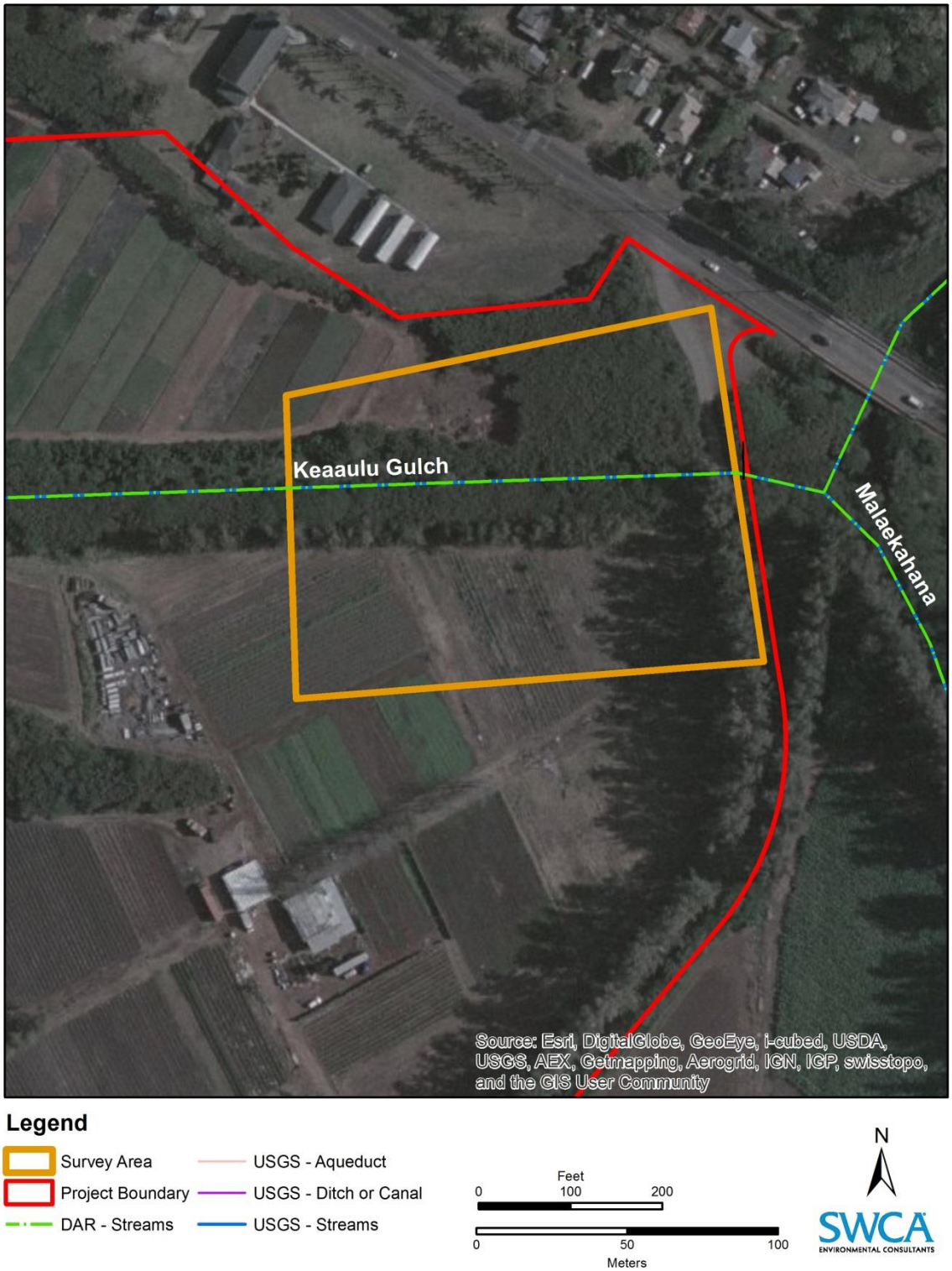


Figure 2. Upper Kea‘aulu survey area.



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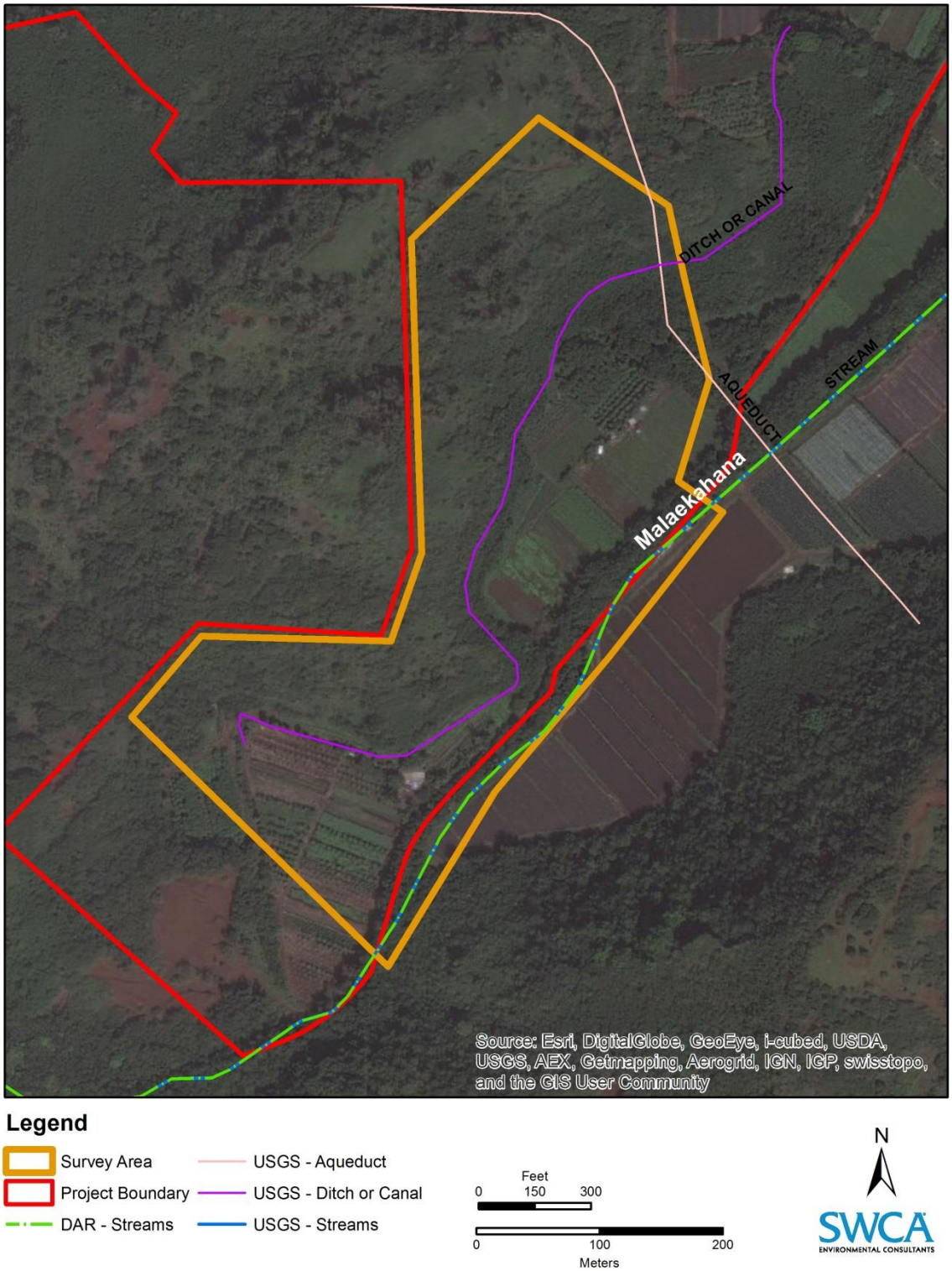

Figure 4. Mālaekahana survey area.

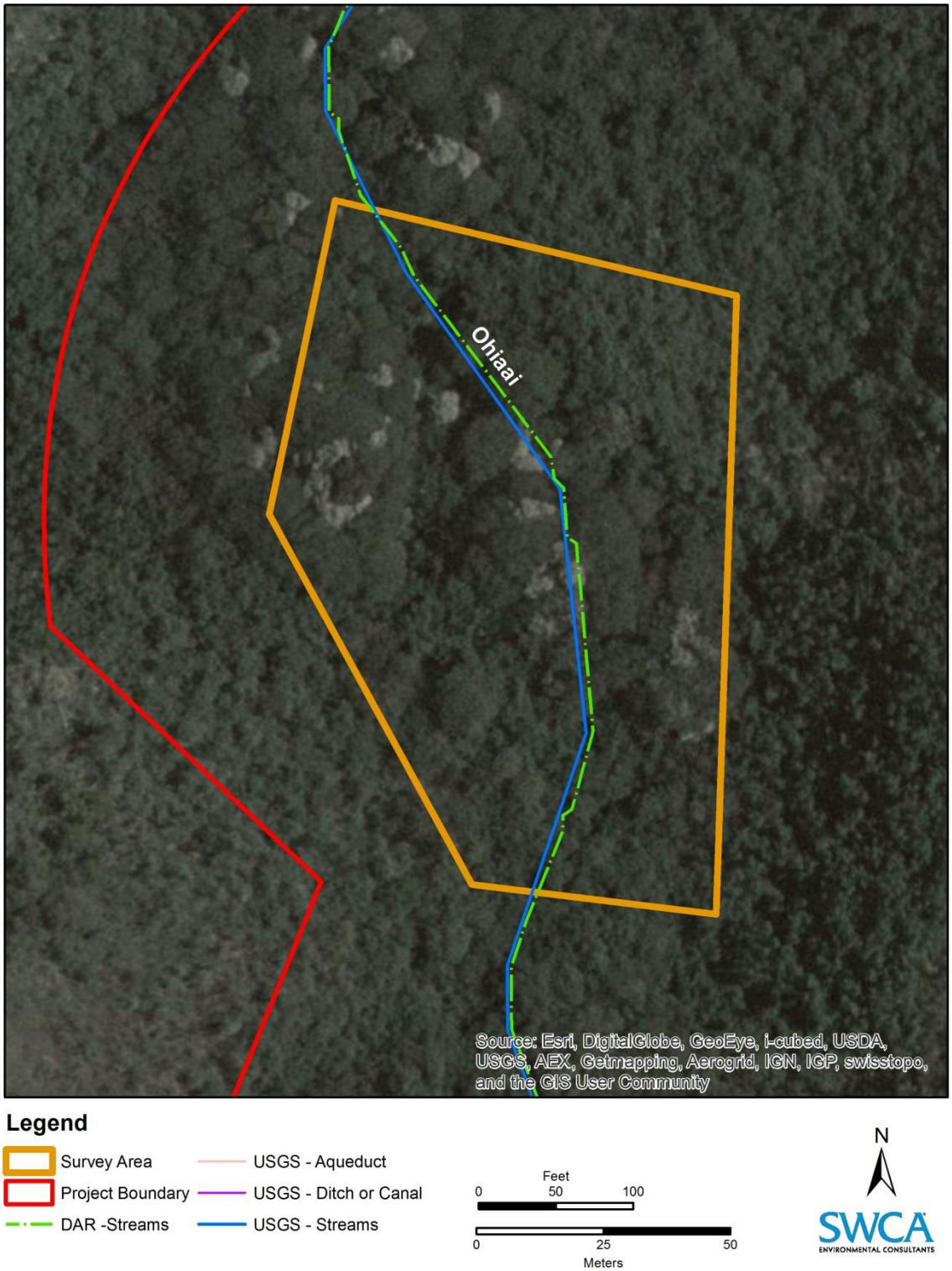

Figure 5. ʻŌhiʻaʻai survey area.

2.4. Flora and Fauna

The vegetation in the survey area is dominated by non-native species including koa haole (*Leucaena leucocephala*), Guinea grass (*Urochloa maxima*), and parasol leaf tree (*Macaranga tanarius*). Terrestrial fauna recorded in the area is predominantly non-native birds. The federally endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*) and state endangered Hawaiian short-eared owl or pueo (*Asio flammeus sandwichensis*) likely inhabit or transverse the area. Endangered waterbirds known to occur at the nearby National Wildlife Refuge may pass through the area, including Hawaiian duck (*Anas wyvilliana*), Hawaiian stilt (*Himantopus mexicanus knudseni*), Hawaiian coot (*Fulica alai*), and Hawaiian gallinule (*Gallinula chloropus sandvicensis*). Finally, seabirds, particularly the endangered Hawaiian petrel (*Pterodroma sandwichensis*) and threatened Newell's shearwater (*Puffinus auricularis newelli*), may fly over the project area at night.

3. METHODS

Before the survey, SWCA reviewed NWI, USGS, and State of Hawaiʻi data; geospatial data; aerial photographs; and topographic maps to identify potential wetlands or other WoUS in the survey area or the immediate vicinity. Information was also taken from the NRCS hydric soil data, as well as previous water resource reports and environmental assessments/environmental impact statements.

SWCA conducted field surveys on April 10, 2014; June 16, 2014; June 24, 2014; and January 16, 2015. SWCA walked the stream paths identified by USGS, NWI, and DAR, as well as low-lying areas. The boundaries of potential non-wetland WoUS were delineated by recording the location of the OHWM, as defined in the USACE Regulatory Guidance Letter 05-05 (USACE 2005). Indicators of OHWM can be physical or vegetative and include benches, shelving, drift lines, natural lines impressed on the bank, changes in the character of soil, transitions in vegetation type and density, destruction of terrestrial vegetation (matted-down vegetation), sediment deposition, presence of litter and debris, presence of wrack lines, bed and banks, multiple observed flow events, scour, sediment sorting, and water staining (USACE 2005, 2008).

SWCA documented the presence of OHWMs at various points along the streams and drainage features. For Keaʻaulu Gulch, SWCA mapped the centerline, recorded the maximum channel width, and buffered the centerline by half the width. In areas with open canopy, SWCA collected data points at the OHWM on both sides of Keaʻaulu Gulch. For Mālaekahana Stream, SWCA mapped the OHWM on the right bank and recorded the maximum channel width due to accessibility and because no project components are planned adjacent to the left bank. At ʻŌhiʻaʻai Tributary, SWCA combined methodology for mapping the centerline and left bank, depending on the density of canopy coverage and the feature width.

Data were collected using a Trimble GeoExplorer 2008 Series global positioning system (GPS) unit and Zephyr antenna, then post-processed in ArcGIS using GPS Correct to submeter accuracy. The linear lengths of the features were calculated by projecting these point/line data files in geographic information system software.

No attempt was made to determine "significant nexus" to a traditional navigable water by investigating whether the features discharge to the Pacific Ocean, or whether they may potentially affect the chemical, physical, and biological integrity of the ocean.

4. FINDINGS

In all, approximately three non-wetland WoUS were delineated in the survey area, including portions of Keaʻaulu Gulch, Mālaekahana Stream, and ʻŌhiʻaʻai Tributary. The types and acreage of the WoUS delineated by SWCA are summarized in Table 1.

Table 1. Potential Waters of the U.S. Delineated by SWCA in the Survey Area

Waters of the U.S. Identification	Type	Length (linear feet)
Keaʻaulu Gulch	Riverine – Intermittent	2,980
Mālaekahana Stream	Riverine – Perennial	1,873
ʻŌhiʻaʻai Tributary	Riverine – Intermittent	826
Non-Wetland Total		5,679

4.1. Keaʻaulu Gulch

Approximately 2,980 linear feet (908 m) of Keaʻaulu Gulch were delineated in the survey area. Of this total, 2,491 linear feet (759 m) were in the upper survey area (Figure 6) and 489 linear feet (149 m) were in the lower survey area (Figure 7).

For most of the upper Keaʻaulu Gulch survey area, physical indicators of an OHWM are weak and the drainage appears ephemeral (i.e., driven purely by heavy precipitation events and lacking a groundwater component). In many areas the channel is overgrown by tall Guinea grass. No physical characteristics to indicate an OHWM were seen within a 135-foot (41-m) stretch immediately downstream of the sharp bend in the gulch; the most likely drainage course for this area is identified in Figure 6 as a single line. However, some physical indicators of an OHWM were observed in certain areas of the upper Keaʻaulu Gulch survey area. These include changes in the character of soil; shelving; benches; exposed root hairs; and vegetation that was matted down, bent, or absent (Figures 8 and 9).

Portions of the original drainage course were likely modified by human activities for roads, trails, and agriculture. Several culverts exist near the northern portion of the survey area (see Figure 9). A few culverts are within the stream channel, and at least two culverts appear to convey water to the channel from the east.

In the lower Keaʻaulu Gulch survey area, physical indicators of the OHWM were most apparent in the immediate vicinity of the existing Mālaekahana Valley Road bridge, and included destruction of terrestrial vegetation; change in plant community (upland to facultative species); and the presence of litter and debris. Standing water was observed in the immediate vicinity of the bridge. Further upstream, the drainage is overgrown with non-hydrophytic herbaceous vegetation along the bottom and slopes (Figure 10).

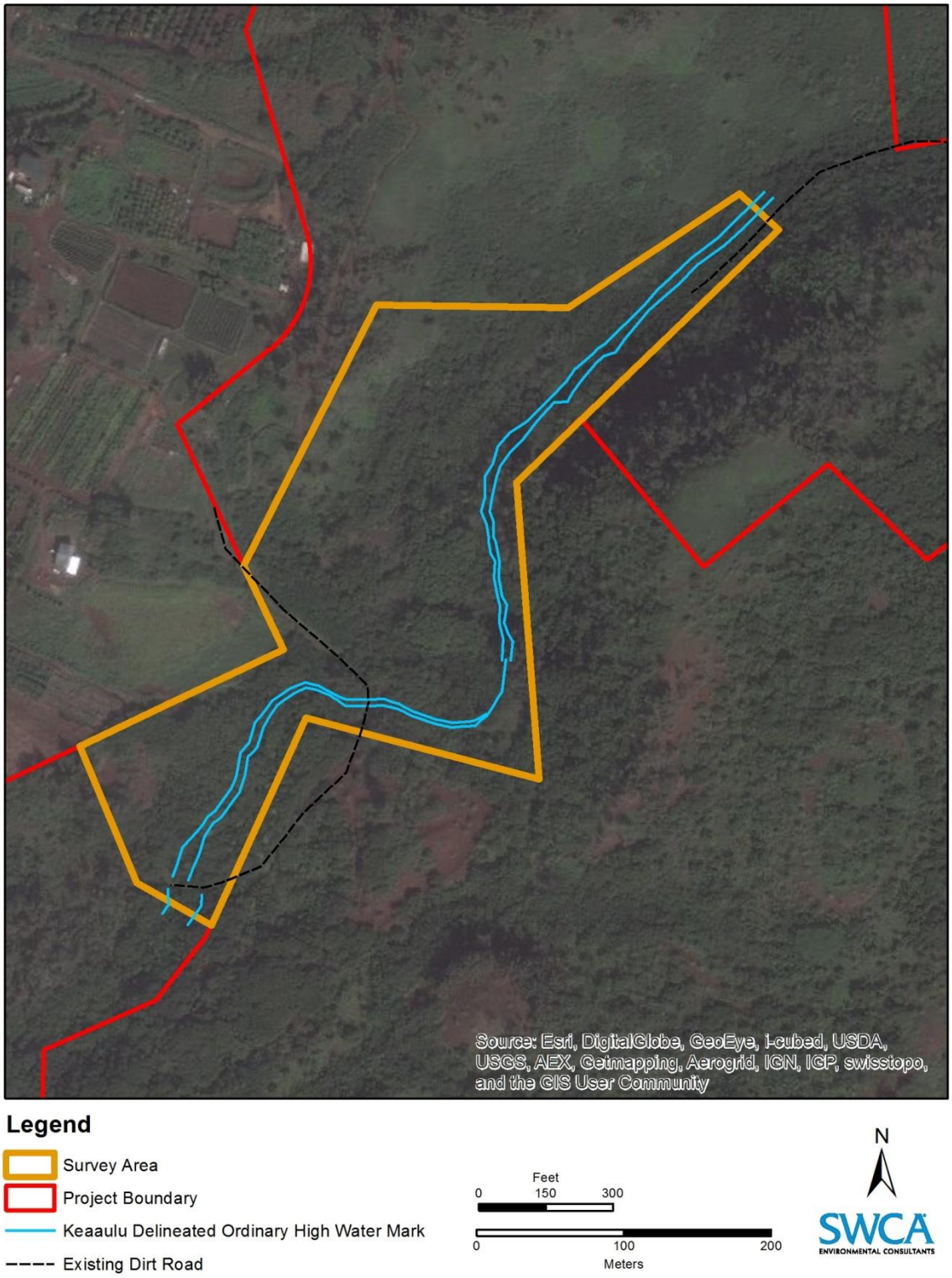

Figure 6. Delineated OHWM in the upper Kea‘aulu survey area.
Note: The break in the OHWM is a dirt road.

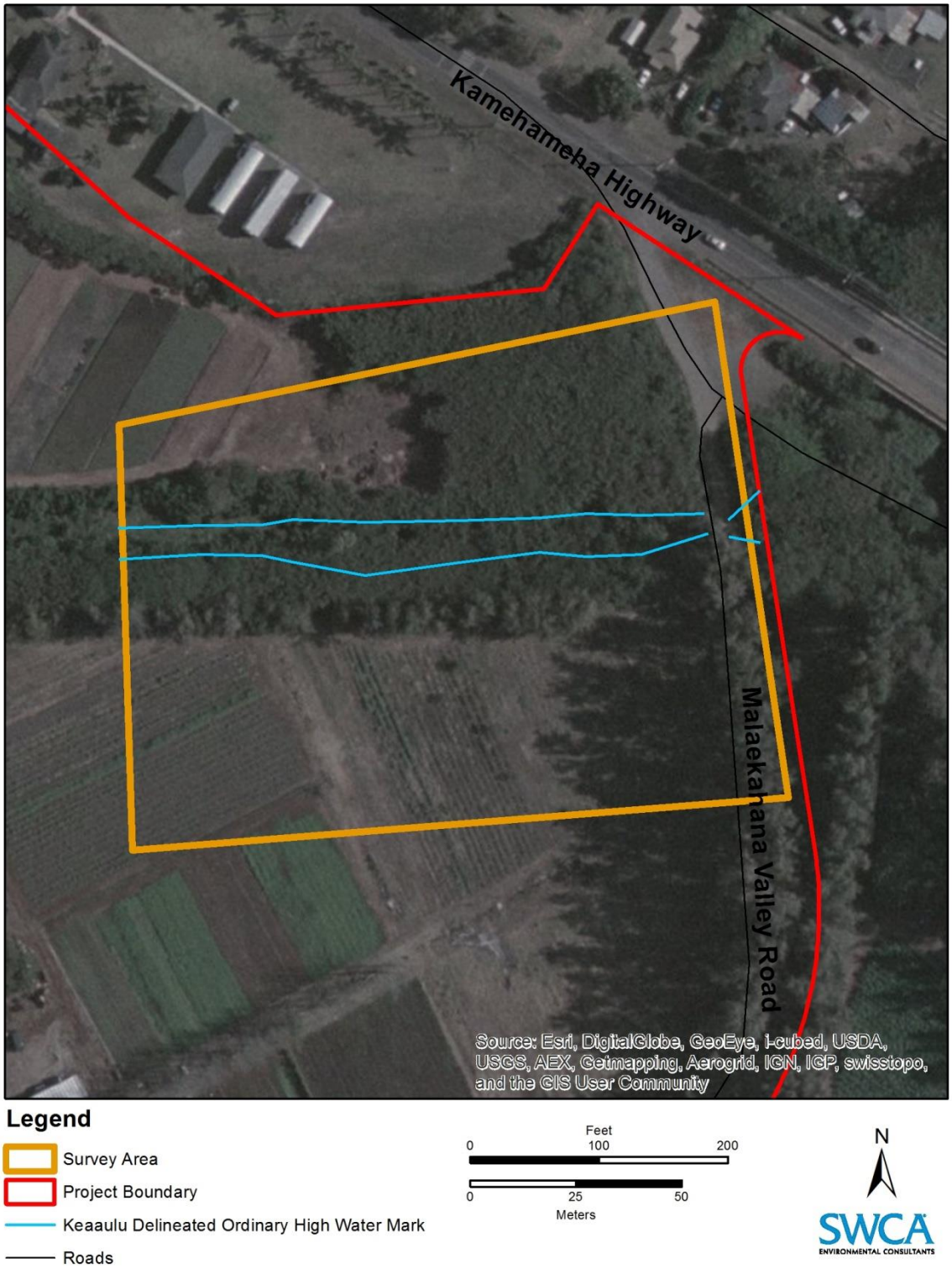

Figure 7. Delineated OHWM in the lower Kea‘aulu survey area near Kamehameha Highway. *Note:* The break in the OHWM is a bridge.

Figure 8. Looking toward the OHWM on right bank in the upper Kea‘aulu survey area.

Figure 9. Looking toward the OHWM on right bank in the upper Kea‘aulu Gulch survey area.

Figure 10. Overgrown channel in the lower Kea‘aulu survey area.

4.2. Mālaekahana Stream

Approximately 1,873 linear feet (571 m) of Mālaekahana Stream were delineated in the survey area (Figure 11). Mālaekahana Stream is perennial. It has a defined bed and bank with flow present throughout the year. Various indicators of the OHWM were seen throughout the Mālaekahana survey area, including a clear, natural line impressed on the bank; organic debris collecting behind obstructions; exposed root hairs; and benches (Figure 12).

The ditch/canal identified by the USGS in the Mālaekahana survey area (see Figure 4) appears to have been filled in and is no longer active. It was likely excavated in uplands and was not observed to contribute flow (either directly or indirectly) to another potentially jurisdictional water.

During SWCA’s survey, water was observed in the narrow, human-made channel identified as an aqueduct by USGS data (see Figures 4, 11, and 13). The edges were densely vegetated with upland species. The feature did not continue east of the road, and therefore does not appear to connect to Mālaekahana Stream.

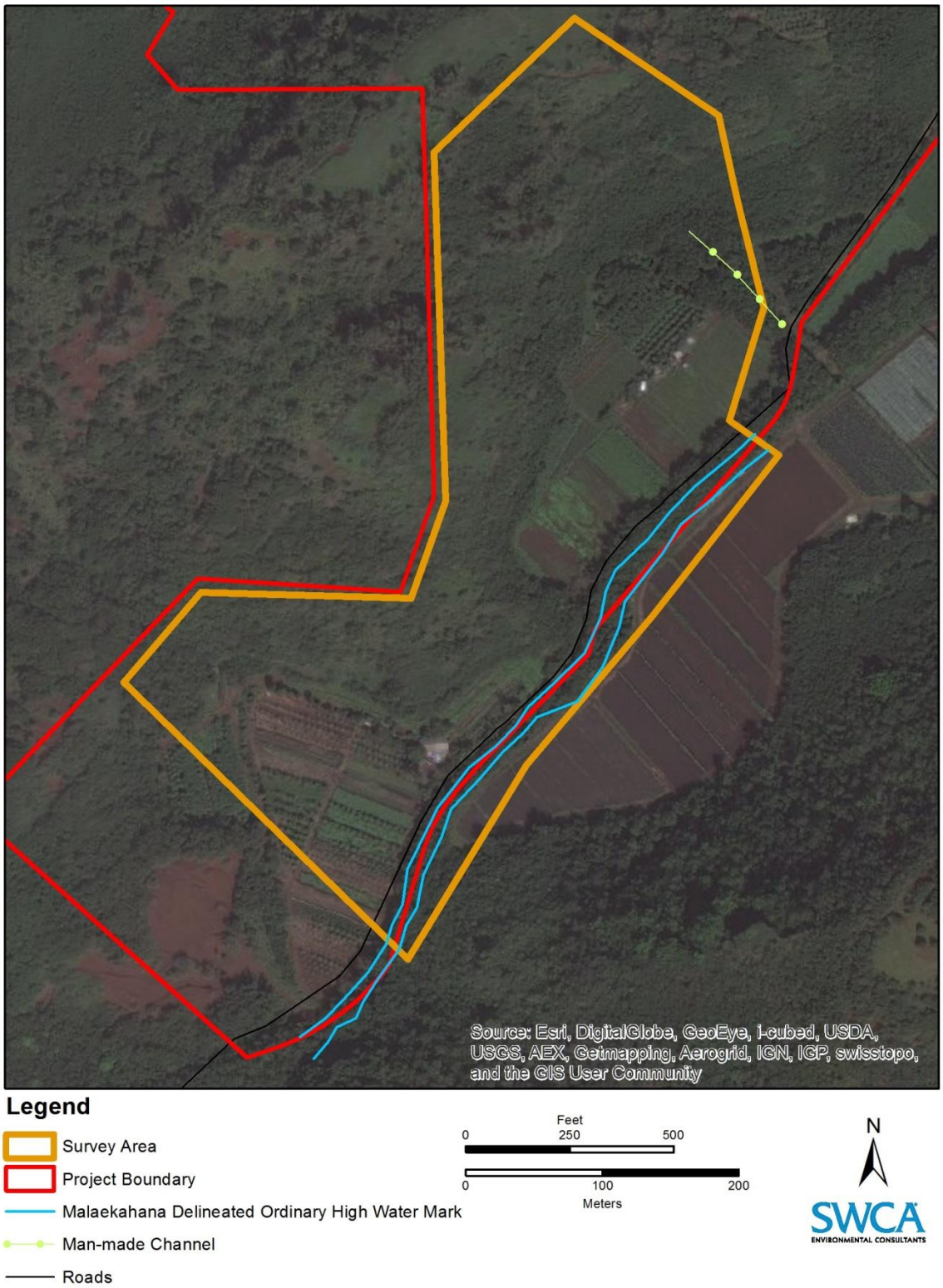

Figure 11. Delineated OHWM in the Mālaekahana survey area.

Figure 12. Mālaekahana Stream with standing water.

Figure 13. Narrow, human-made channel identified by the USGS as an aqueduct in the Mālaekahana survey area.

4.3. ‘Ōhi‘a‘ai Tributary

Two tributaries were delineated in this portion of the survey area, although only one feature is identified in the NWI, USGS, or DAR maps of the area. Approximately 562 linear feet (172 m) of the main stem of ‘Ōhi‘a‘ai Tributary were delineated in the survey area (Figure 14). The main stem of ‘Ōhi‘a‘ai Tributary is intermittent, with surface water flow during wetter months or high rainfall events, but interspersed by dry periods. The bed and bank are well defined, with the bank reaching over 5 feet (1.5 m) in some areas. Various indicators of OHWM were seen throughout the ‘Ōhi‘a‘ai survey area, including a clear, natural line impressed on the bank; undercut banks; sediment sorting and changes in soil character; organic debris collecting behind obstructions (wracking); litter removal due to flowing water; water staining on boulders; exposed roots; and standing water (Figures 15 and 16).

A smaller tributary was also identified during the survey. Approximately 264 linear feet (80 m) of this feature were delineated (see Figure 14). It flows northwest and directly connects to the main portion of ‘Ōhi‘a‘ai Tributary described above (Figure 17). It is likely to be ephemeral; flowing briefly only during rainfall events or extreme flooding. Indicators of flow were not strong throughout the entire feature, but included matted or missing vegetation, a well-defined bed and bank, and change in soil character (Figure 18).

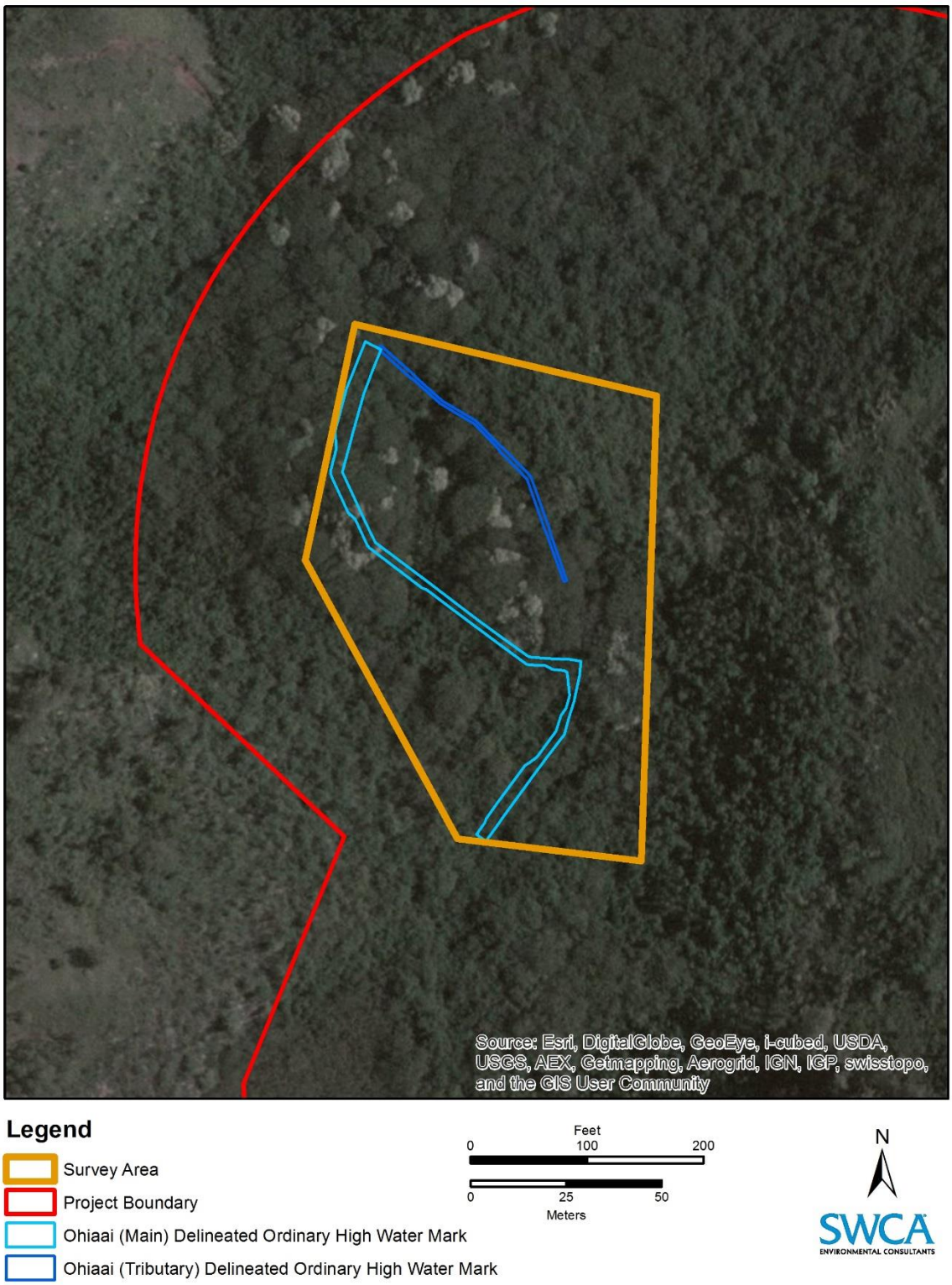

Figure 14. Delineated OHWM in the ‘Ōhi‘a‘ai survey area.

Figure 15. Main ‘Ōhi‘a‘ai Tributary indicators include cut banks, exposed roots, scour, and standing water.

Figure 16. Water-stained leaves collected on an elevated obstruction along the ‘Ōhi‘a‘ai Tributary.

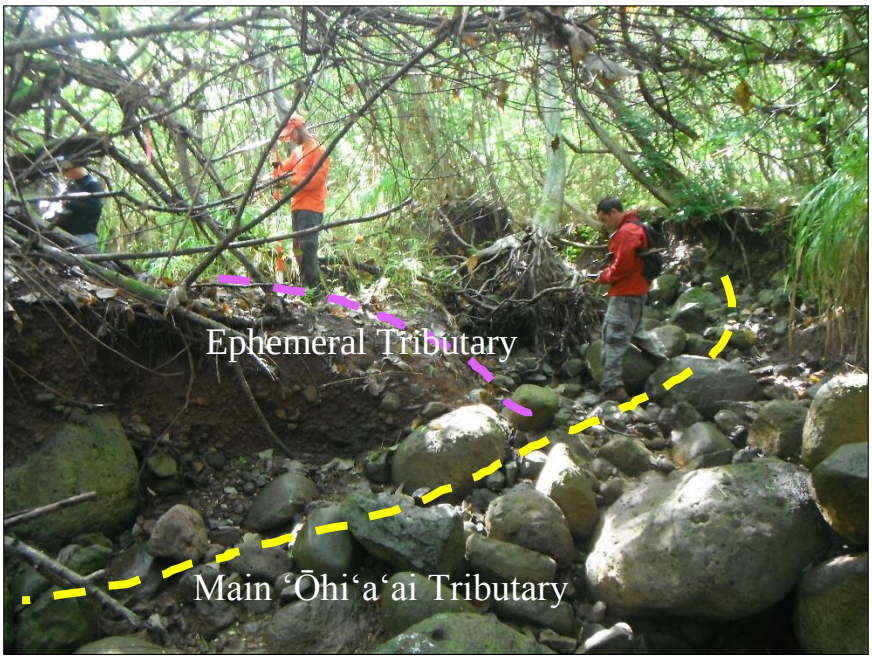

Figure 17. Junction between the ephemeral tributary (pink line) and the main ʻŌhiʻaʻai Tributary (yellow line).

Figure 18. Ephemeral ʻŌhiʻaʻai tributary showing defined bed and bank and unvegetated channel bottom.

5. CONCLUSIONS AND RECOMMENDATIONS

SWCA surveyed and delineated three potentially jurisdictional streams in the survey area. Approximately 2,980 linear feet (908 m) of the intermittent Keaʻaulu Gulch, 1,873 linear feet (571 m) of the perennial Mālaekahana Stream, and 826 linear feet (252 m) of the intermittent ʻŌhiʻaʻai Tributary were delineated in the survey area. In contrast to the Mālaekahana Stream and ʻŌhiʻaʻai Tributary, Keaʻaulu Gulch did not have strong indictors of flow or an OHWM in many areas. Portions of Keaʻaulu Gulch were likely modified by human activities for roads and agriculture. However, it may convey water and sediment from upland areas to lower reaches and subsequently the Pacific Ocean during heavy rainfall events.

It is not known whether the project will require placement of dredged or fill material either temporarily or permanently below the delineated OHWMs. If this can be avoided, SWCA recommends requesting a preliminary jurisdictional determination and a No Permit Required letter from the Honolulu USACE. If the project requires placement of dredged or fill material below the delineated OHWMs, a preliminary or approved jurisdictional determination can be requested, and a permit may be required from the USACE if the features are determined to be WoUS. A State 401 Water Quality Certification permit from the Clean Water Branch may also be required, which can take several months to a year to process. Because portions of Keaʻaulu Gulch lack strong indicators of an OHWM, the jurisdictional status of the gulch could be argued via the approved jurisdictional determination process.

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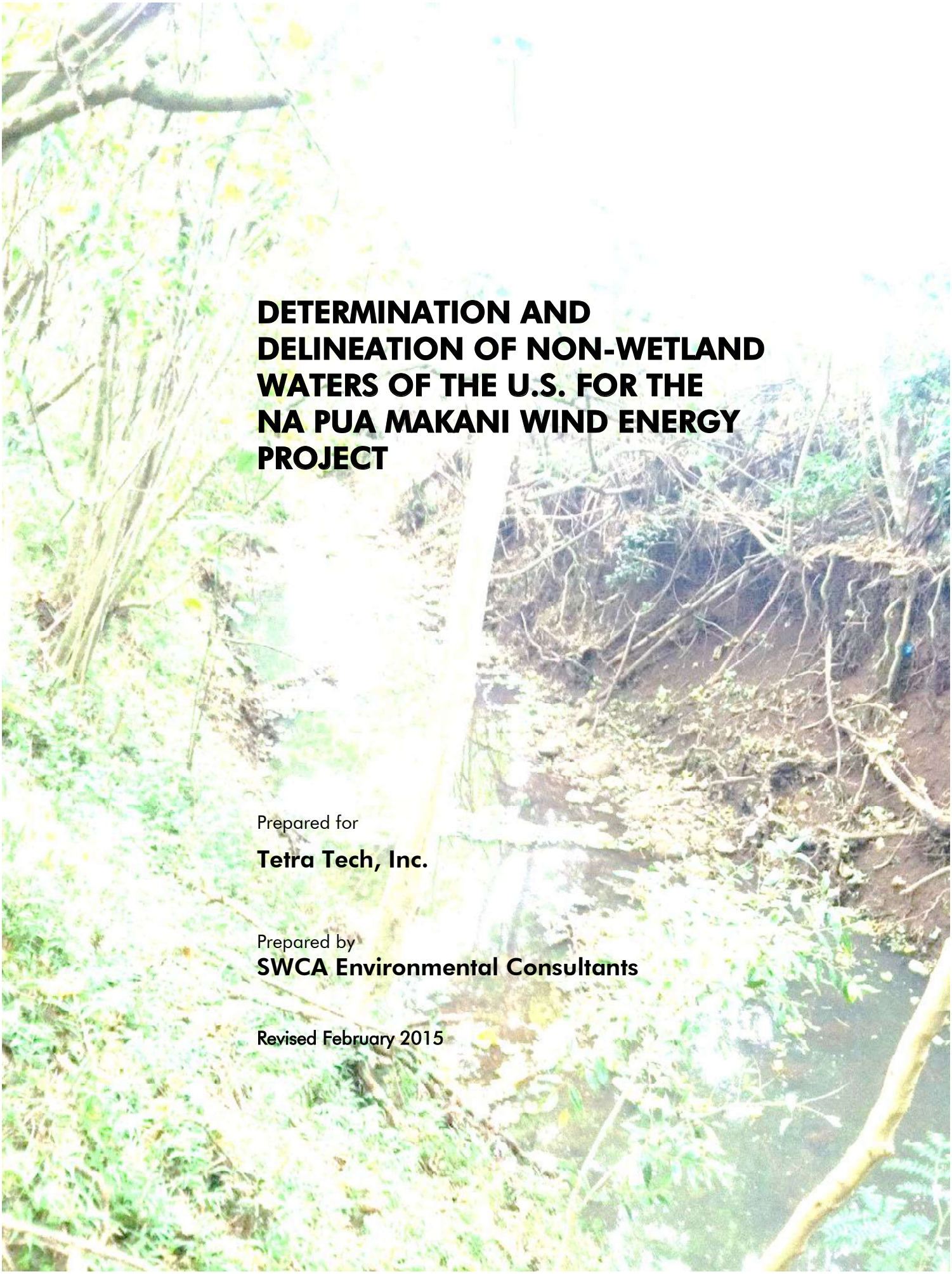
APPENDIX I
PRELIMINARY DETERMINATION AND DELINEATION OF NON-WETLAND WATER OF THE U.S.



DETERMINATION AND DELINEATION OF NON-WETLAND WATERS OF THE U.S. FOR THE NA PUA MAKANI WIND ENERGY PROJECT

Prepared for

Tetra Tech, Inc.

Prepared by

SWCA Environmental Consultants

Revised February 2015

DETERMINATION AND DELINEATION OF NON-WETLAND WATERS OF THE U.S. FOR THE NA PUA MAKANI WIND ENERGY PROJECT

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SWCA Project No. 28769

Draft Submitted July 2, 2014
Draft Revised July 24, 2014
Revised February 6, 2015

WATERS OF U.S. DETERMINATION AND DELINEATION SUMMARY

PROJECT NAME: Na Pua Makani Wind Energy Project

SITE LOCATION: Kahuku, Island of Oʻahu, Hawaiʻi
Tax Map Keys (TMKs) 5-6-006:018, 5-6-008-006, and 6-6-008:006

APPLICANT: Champlin Hawaii Wind Holdings, LLC

SURVEY DATES: April 10, 2014; June 16, 2014; June 24, 2014; and January 16, 2015

PROJECT STAFF: Tiffany Bovino Agostini, Botanist/Project Manager
Bryson Luke, Field Technician
Taya MacLean, Wetland Specialist

SWCA Environmental Consultants (SWCA) was contracted by Tetra Tech, Inc. to conduct a determination and delineation of potential waters of the U.S. (WoUS) regulated by the Clean Water Act (CWA) within 59.17 acres (23.9 hectares [ha]) in Kahuku as part of the proposed Na Pua Makani Wind Energy project. SWCA conducted fieldwork on April 10, 2014; June 16, 2014; June 24, 2014; and January 16, 2015. The delineation was performed in accordance with U.S. Army Corps of Engineers (USACE) Regulatory Guidance Letter 05-05 (USACE 2005) for identifying the ordinary high water mark (OHWM) for non-tidal, non-wetland waters.

The proposed Na Pua Makani project involves the construction and operation of a wind energy generation project near the community of Kahuku on the north shore of Oʻahu. The survey area encompasses four non-contiguous areas that have the potential to intersect with project components such as roads, overhead transmission lines, and collection lines. It is within three TMKs: 5-6-006:018, 5-6-008:006, and 6-6-008:006. Elevations range from approximately 3 feet (0.9 meters [m]) to over 200 feet (60 m) above mean sea level.

Two intermittent streams (Keaʻaulu Gulch and ʻŌhiʻaʻai Tributary) and one perennial stream (Mālaekahana Stream) as well as an aqueduct and ditch have been identified in the survey area according to geospatial data from the State of Hawaiʻi and the U.S. Geological Survey. The National Wetlands Inventory also identifies a Palustrine Forested Wetland type (PFO3C) along the length of these stream courses.

SWCA delineated portions of three potential non-wetland WoUS in the survey area. Approximately 2,980 linear feet (908 m) of Keaʻaulu Gulch and 1,873 linear feet (571 m) of Mālaekahana Stream were delineated. Approximately 562 linear feet (172 m) of the main ʻŌhiʻaʻai Tributary and 264 linear feet (80 m) of the second, ephemeral ʻŌhiʻaʻai Tributary were delineated. All these features are potential WoUS due to the presence of an OHWM and their connection to the Pacific Ocean. If dredged or fill material will be placed either temporarily or permanently below their OHWMs, a preliminary or approved jurisdictional determination can be requested and a Section 404 permit may be required from the Honolulu USACE. A State 401 Water Quality Certification permit from the Clean Water Branch may also be required, which can take several months to a year to process. If the project can avoid placement of dredged or fill material either temporarily or permanently below the delineated OHWMs, SWCA recommends that a No Permit Required determination/letter be requested from the USACE. This conclusion is subject to confirmation by the USACE Honolulu District.

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Table 1. Potential Waters of the U.S. Delineated by SWCA in the Survey Area 9

ABBREVIATIONS

CFR	Code of Federal Regulations
CWA	Clean Water Act
DAR	Division of Aquatic Resources
GPS	global positioning system
ha	hectare(s)
m	meter(s)
MW	megawatt
mm	millimeter(s)
NRCS	National Resources Conservation Service
NWI	National Wetlands Inventory
OHWM	ordinary high water mark
SWCA	SWCA Environmental Consultants
TMK	Tax Map Key
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WoUS	Water(s) of the U.S.

1. INTRODUCTION

The U.S. Army Corps of Engineers (USACE) derives its regulatory authority over wetlands and other waters of the U.S. (WoUS) from two federal laws: Section 10 of the Rivers and Harbors Act of 1899, and Section 404 of the Clean Water Act (CWA) of 1972. The Rivers and Harbors Act of 1899 prevents unauthorized obstruction or alteration of navigable WoUS. *Navigable waters* are defined as waters that are "subject to the ebb and flow of the tide and/or presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce" (33 Code of Federal Regulations [CFR] 325.5(c)(2)). A Section 10 permit is required for non-fill discharging activities proposed in, over, or under WoUS.

Under Section 404 of the CWA, dredged and fill material may not be discharged into jurisdictional WoUS (including wetlands) without a permit. According to 40 CFR 230.3, WoUS subject to agency jurisdiction under Section 404 include navigable waters and their tributaries, interstate waters and their tributaries, wetlands adjacent to these waters, and impoundments of these waters. In addition, waters are protected by the CWA if determined to have a "significant nexus" with a traditional navigable water or interstate water (U.S. Environmental Protection Agency and USACE 2011). The U.S. Supreme Court's decision in the consolidated cases *Rapanos v. United States* and *Carabell v. United States* (126 S. Ct. 2208) provides further information regarding whether a wetland or tributary is a WoUS. A Section 404 permit is required for all fill or discharge activities below (seaward or makai) the high tide line in tidal waters or below the ordinary high water mark (OHWM) for non-tidal, non-wetland waters.

Tetra Tech, Inc. (in coordination with Champlin Hawaii Wind Holdings, LLC) is reviewing the proposed Na Pua Makani Wind Energy project pursuant to Section 10 of the Rivers and Harbors Act and Section 404 of the CWA. The project involves the construction and operation of a 24-megawatt (MW) wind energy generation project near the community of Kahuku on the north shore of O‘ahu, Hawai‘i.

SWCA Environmental Consultants (SWCA) was contracted by Tetra Tech, Inc. to delineate the potentially jurisdictional WoUS in the vicinity of several project components (hereafter *survey area*). The survey area encompasses four non-contiguous areas. Two intermittent streams and one perennial stream are identified in the survey area according to geospatial data from the State of Hawai‘i Division of Aquatic Resources (DAR), the U.S. Geological Survey (USGS), and the National Wetlands Inventory (NWI) program. This report summarizes the findings of the WoUS survey conducted by SWCA biologists Tiffany Bovino Agostini, Bryson Luke, and Taya MacLean on the following dates: April 10, 2014; June 16, 2014; June 24, 2014; and January 16, 2015.

2. DESCRIPTION OF SURVEY AREA

2.1. Location and Vicinity

The project area is in the Kahuku area on the northeastern portion of the Island of O‘ahu in the State of Hawai‘i. The survey area is composed of four non-contiguous areas in the project area—Lower Kea‘aulu, Upper Kea‘aulu, ‘Ōhi‘a‘ai, and Mālaekahana. Together, these areas encompass approximately 59.17 acres (23.9 hectares [ha]) (Figure 1). The entire project area was not surveyed because only these four areas are anticipated to have project components that may intersect with potentially jurisdictional features. The survey area is located within Tax Map Keys (TMKs) 5-6-006:018, 5-6-008:006, and 6-6-008:006. The survey area is accessed from Enos Road, Mālaekahana Valley Road, and an unnamed road near mile marker 15 off Kamehameha Highway.

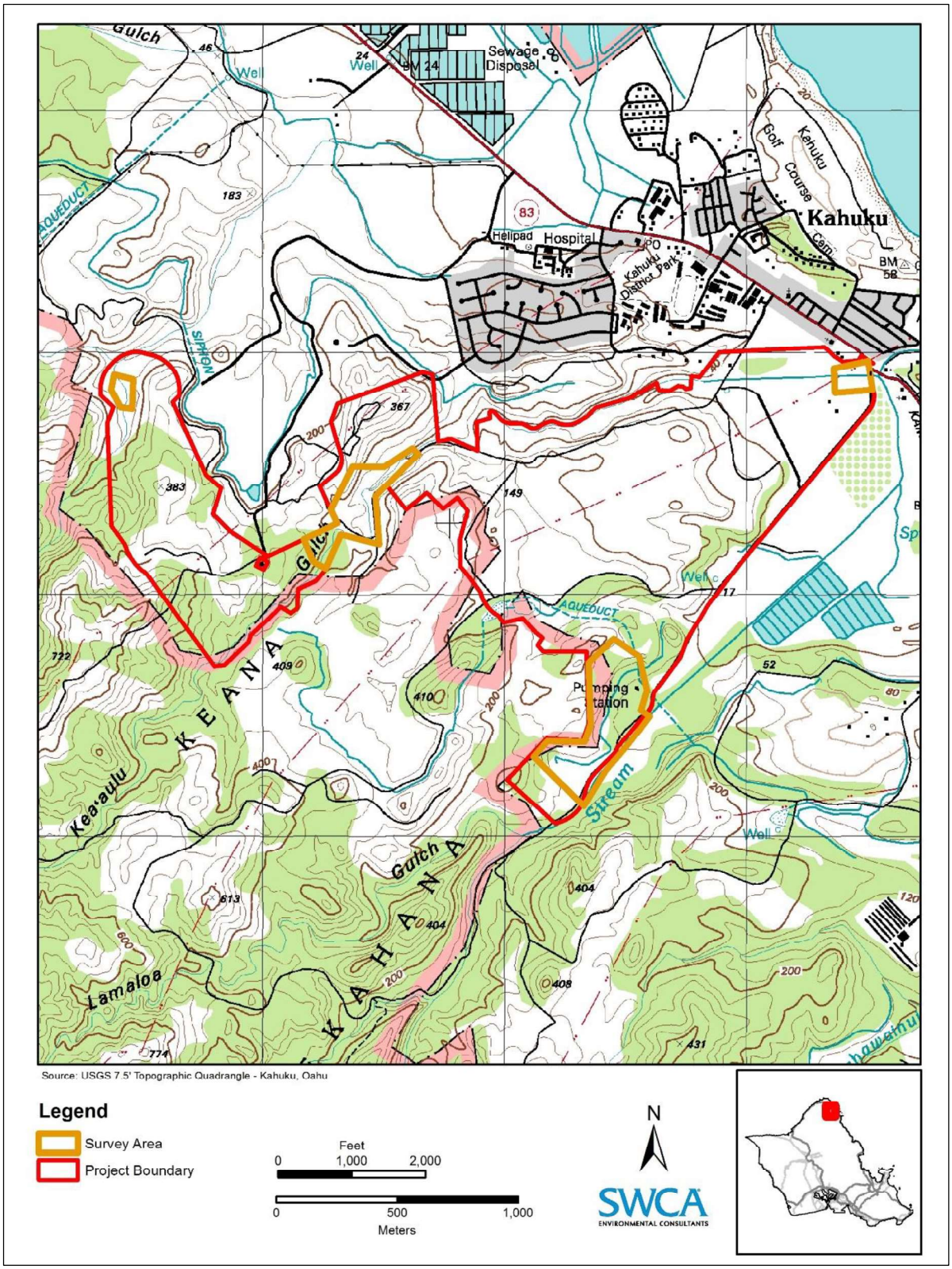

Figure 1. Location of survey area on the Island of O‘ahu.

2.2. Topography and Soils

Most of the survey area generally slopes from the southwest to the northeast. Near the ʻŌhiʻaʻai Tributary, the survey area slopes toward the northwest. Elevation at the survey area ranges from roughly 3 feet (0.9 meters [m]) near Kamehameha Highway to over 200 feet (60 m) above mean sea level in the more mauka (inland) sections.

The Natural Resources Conservation Service (NRCS) classifies eight soil types in the survey area: Mt (Mokuleia clay loam), HeB (Haleiwa silty clay, 2%–6% slopes), LaB (Lahaina silty clay, 3%–7% slopes), LaC (Lahaina silty clay, 7%–15% slopes), PeC (Paumalu silty clay, 3%–8% slopes), PeD (Paumalu silty clay, 15%–25% slopes), Pz (Paumalu-Badland complex), and KIA (Kawaihapai clay loam, 0%–2% slopes) (Foote et al. 1972; NRCS 2013). None of these soil types are considered hydric by the NRCS (NRCS 2012).

2.3. Hydrology

Most streams in the Kahuku area are considered to be naturally intermittent (Polhemus et al. 1992) and are typically short and steep, with permeable upland soils creating rapid infiltration into the Koʻolau aquifer. Numerous gulches cut into the upper portions of the Koʻolau Mountain Range and drain into the low-lying areas. Stream flow in the lowland areas have periods of high peak floods and little base flow (Hunt and De Carlo 2000).

Two intermittent streams (Keaʻaulu Gulch and ʻŌhiʻaʻai Tributary), one perennial stream (Mālaekahana Stream), one ditch/canal, and one aqueduct have been identified in the survey area according to geospatial data from the Hawaiʻi DAR and USGS. Keaʻaulu Gulch runs through dense vegetation in the central portion of the project area (Figure 2) and continues through various agricultural fields near the lower elevation survey area (Figure 3) before joining with Mālaekahana Stream just mauka (inland) of Kamehameha Highway. Mālaekahana Stream traverses the southern tip of the project area (Figure 4). It joins with Keaʻaulu Gulch before discharging to the ocean near Makahoa Point. ʻŌhiʻaʻai Tributary and Gulch run along the northwestern boundary of the project area (Figure 5). North of the survey area, ʻŌhiʻaʻai Tributary joins with a shorter tributary in the west and becomes Kiʻi Stream. This stream is referred to as Kiʻi ditch after crossing under Kamehameha Highway. It joins with Punamano ditch before entering the Kiʻi Unit of the James Campbell National Wildlife Refuge (Hunt and De Carlo 2000). Keaʻaulu Gulch, ʻŌhiʻaʻai Tributary, and Mālaekahana Stream are all listed on the *Atlas of Hawaiian Watersheds & Their Aquatic Resources* (Parham et al. 2008). A ditch/canal is identified as running roughly parallel to Mālaekahana Stream. An aqueduct is identified as intersecting with Mālaekahana Stream north of the survey area.

The NWI program identifies one wetland type in the survey area—PFO3C. This type is considered a Freshwater Forested/Shrub Wetland (Palustrine, Forested, Broad-Leaved Evergreen, Seasonally Flooded). The NWI features correspond with the locations of the three streams identified by DAR and USGS, and therefore are not displayed on the figures.

Annual average rainfall in the survey area is approximately 51.18 inches (1,300 millimeters [mm]) per year in the mauka areas and 45.47 inches (1,155 mm) near Kamehameha Highway. Rainfall is typically highest in March and lowest in June (Giambelluca et al. 2013). The nearby Kiʻi rainfall gage recorded less than average rainfall during 2014; the gage recorded 22% of the average monthly rainfall in April 2014 and 92% of average monthly rainfall during June 2014. In January 2015, the Kiʻi rainfall gage recorded roughly half the average rainfall (National Oceanic and Atmospheric Administration/National Weather Service Weather Forecast Office 2015).

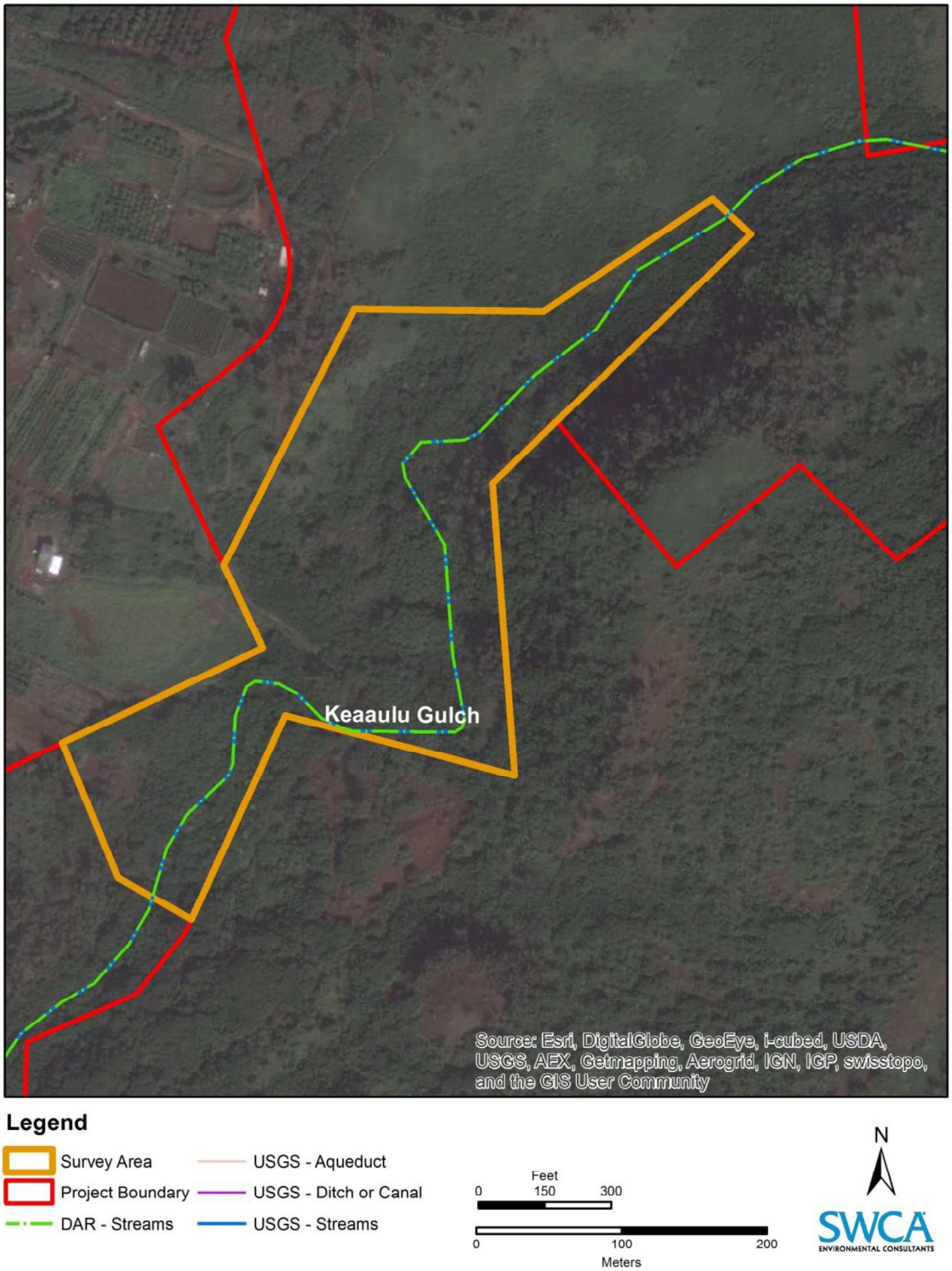

Figure 2. Upper Kea‘aulu survey area.

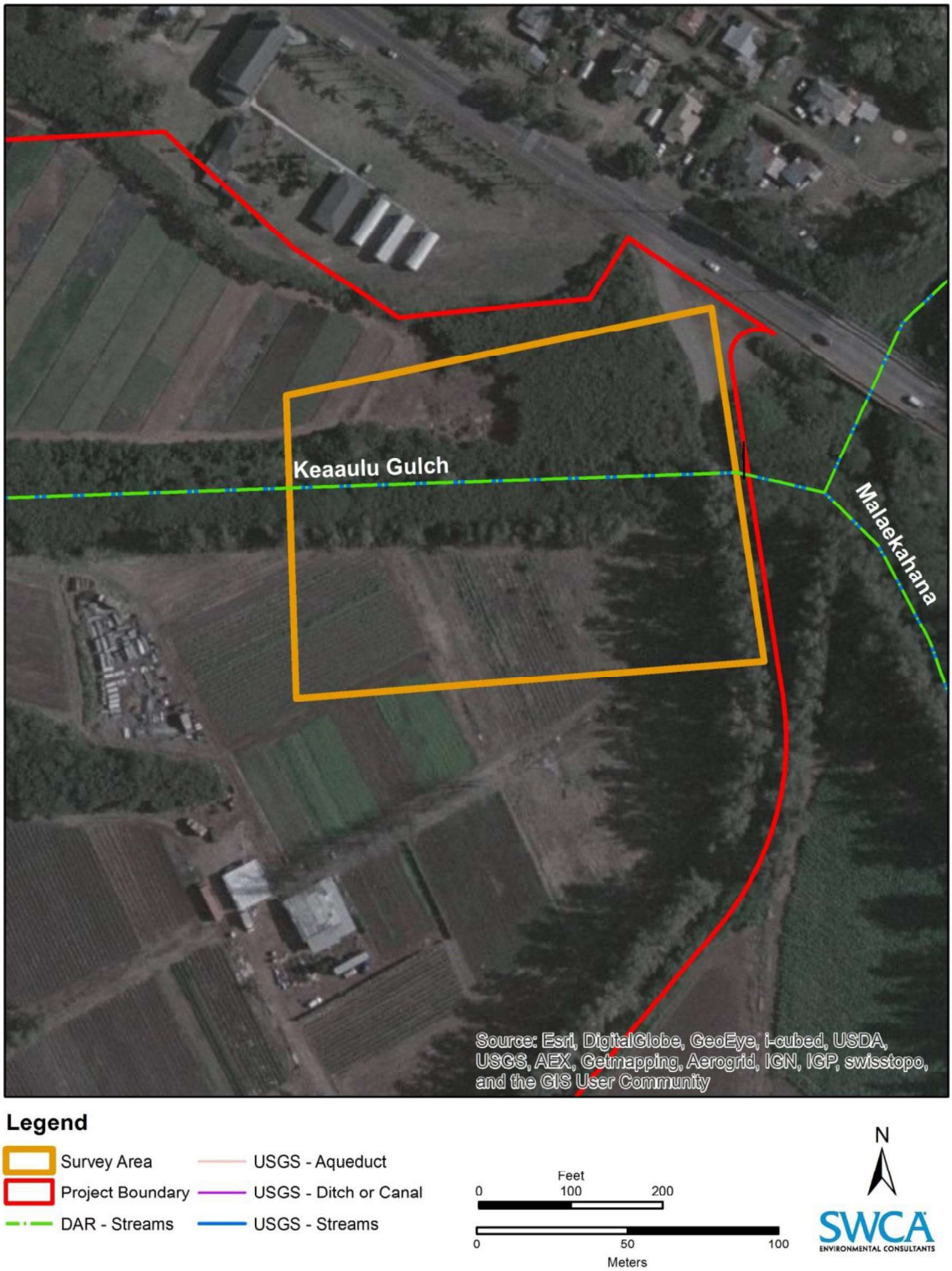

Figure 3. Lower Kea‘aulu survey area.

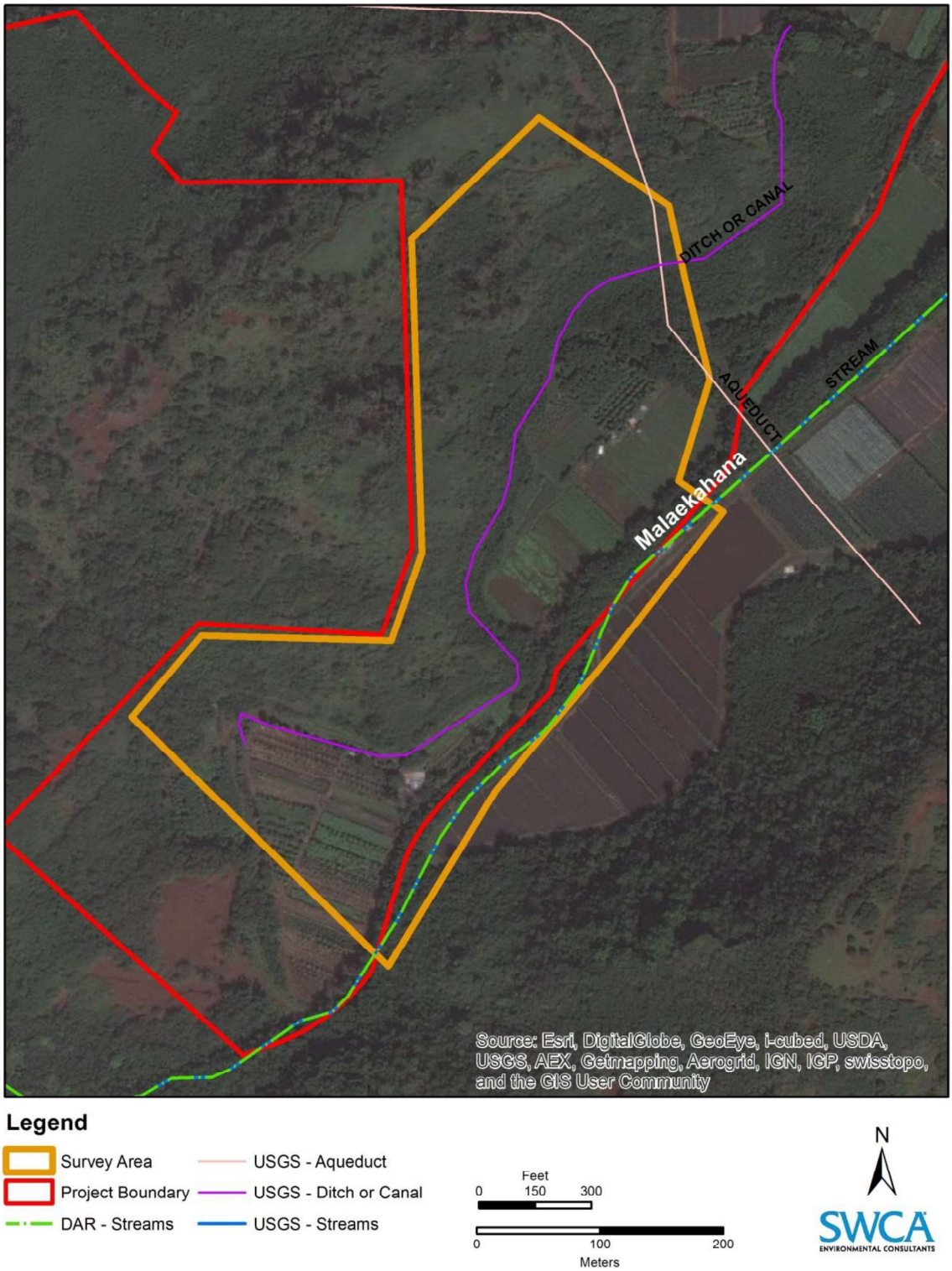

Figure 4. Mālaekahana survey area.

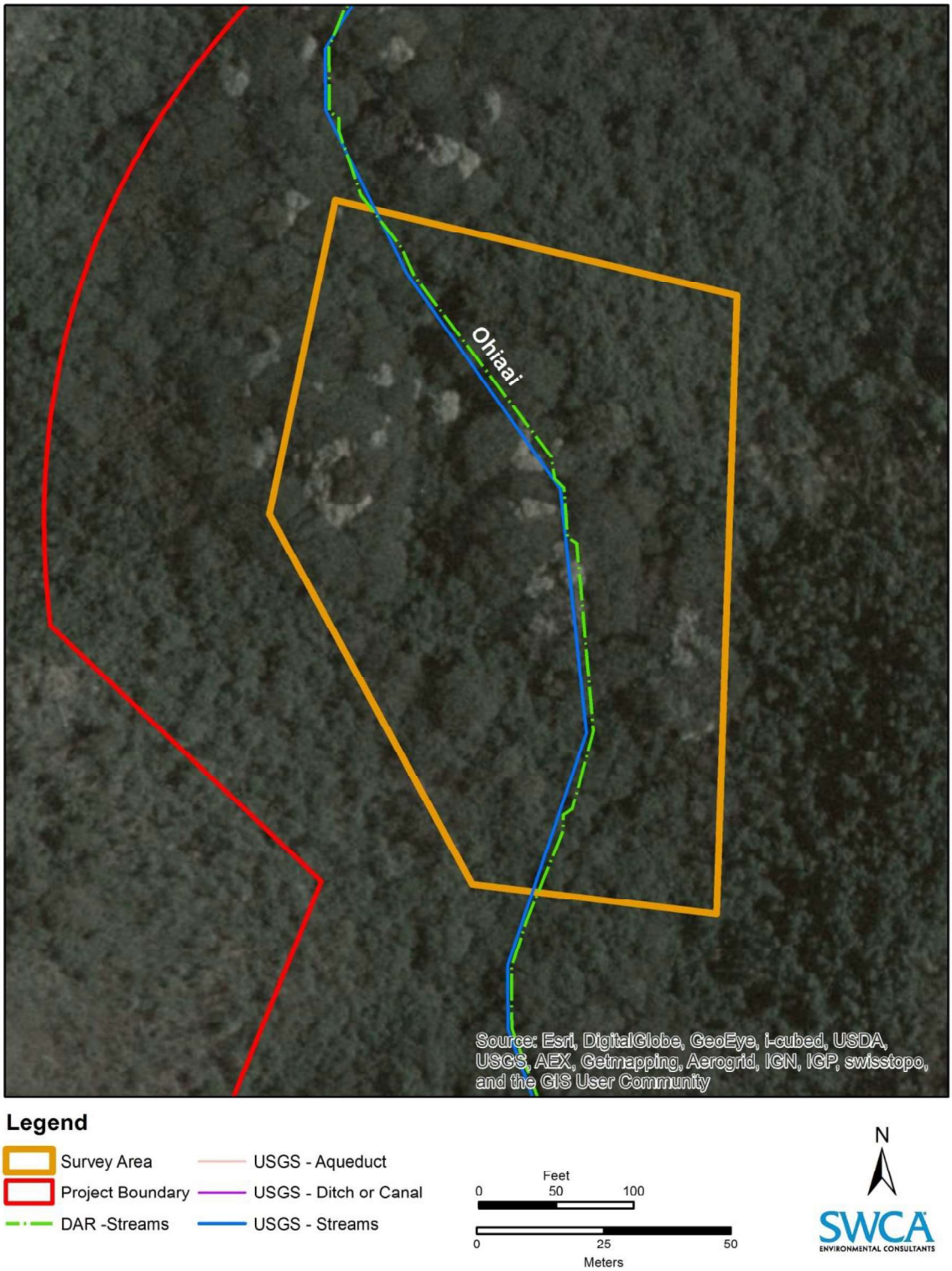

Figure 5. ʻŌhiʻaʻai survey area.

2.4. Flora and Fauna

The vegetation in the survey area is dominated by non-native species including koa haole (*Leucaena leucocephala*), Guinea grass (*Urochloa maxima*), and parasol leaf tree (*Macaranga tanarius*). Terrestrial fauna recorded in the area is predominantly non-native birds. The federally endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*) and state endangered Hawaiian short-eared owl or pueo (*Asio flammeus sandwichensis*) likely inhabit or transverse the area. Endangered waterbirds known to occur at the nearby National Wildlife Refuge may pass through the area, including Hawaiian duck (*Anas wyvilliana*), Hawaiian stilt (*Himantopus mexicanus knudseni*), Hawaiian coot (*Fulica alai*), and Hawaiian gallinule (*Gallinula chloropus sandvicensis*). Finally, seabirds, particularly the endangered Hawaiian petrel (*Pterodroma sandwichensis*) and threatened Newell's shearwater (*Puffinus auricularis newelli*), may fly over the project area at night.

3. METHODS

Before the survey, SWCA reviewed NWI, USGS, and State of Hawai‘i data; geospatial data; aerial photographs; and topographic maps to identify potential wetlands or other WoUS in the survey area or the immediate vicinity. Information was also taken from the NRCS hydric soil data, as well as previous water resource reports and environmental assessments/environmental impact statements.

SWCA conducted field surveys on April 10, 2014; June 16, 2014; June 24, 2014; and January 16, 2015. SWCA walked the stream paths identified by USGS, NWI, and DAR, as well as low-lying areas. The boundaries of potential non-wetland WoUS were delineated by recording the location of the OHWM, as defined in the USACE Regulatory Guidance Letter 05-05 (USACE 2005). Indicators of OHWM can be physical or vegetative and include benches, shelving, drift lines, natural lines impressed on the bank, changes in the character of soil, transitions in vegetation type and density, destruction of terrestrial vegetation (matted-down vegetation), sediment deposition, presence of litter and debris, presence of wrack lines, bed and banks, multiple observed flow events, scour, sediment sorting, and water staining (USACE 2005, 2008).

SWCA documented the presence of OHWMs at various points along the streams and drainage features. For Kea‘aulu Gulch, SWCA mapped the centerline, recorded the maximum channel width, and buffered the centerline by half the width. In areas with open canopy, SWCA collected data points at the OHWM on both sides of Kea‘aulu Gulch. For Mālaekahana Stream, SWCA mapped the OHWM on the right bank and recorded the maximum channel width due to accessibility and because no project components are planned adjacent to the left bank. At ‘Ōhi‘a‘ai Tributary, SWCA combined methodology for mapping the centerline and left bank, depending on the density of canopy coverage and the feature width.

Data were collected using a Trimble GeoExplorer 2008 Series global positioning system (GPS) unit and Zephyr antenna, then post-processed in ArcGIS using GPS Correct to submeter accuracy. The linear lengths of the features were calculated by projecting these point/line data files in geographic information system software.

No attempt was made to determine "significant nexus" to a traditional navigable water by investigating whether the features discharge to the Pacific Ocean, or whether they may potentially affect the chemical, physical, and biological integrity of the ocean.

4. FINDINGS

In all, approximately three non-wetland WoUS were delineated in the survey area, including portions of Keaʻaulu Gulch, Mālaekahana Stream, and ʻŌhiʻaʻai Tributary. The types and acreage of the WoUS delineated by SWCA are summarized in Table 1.

Table 1. Potential Waters of the U.S. Delineated by SWCA in the Survey Area

Waters of the U.S. Identification	Type	Length (linear feet)
Keaʻaulu Gulch	Riverine – Intermittent	2,980
Mālaekahana Stream	Riverine – Perennial	1,873
ʻŌhiʻaʻai Tributary	Riverine – Intermittent	826
Non-Wetland Total		5,679

4.1. Keaʻaulu Gulch

Approximately 2,980 linear feet (908 m) of Keaʻaulu Gulch were delineated in the survey area. Of this total, 2,491 linear feet (759 m) were in the upper survey area (Figure 6) and 489 linear feet (149 m) were in the lower survey area (Figure 7).

For most of the upper Keaʻaulu Gulch survey area, physical indicators of an OHWM are weak and the drainage appears ephemeral (i.e., driven purely by heavy precipitation events and lacking a groundwater component). In many areas the channel is overgrown by tall Guinea grass. No physical characteristics to indicate an OHWM were seen within a 135-foot (41-m) stretch immediately downstream of the sharp bend in the gulch; the most likely drainage course for this area is identified in Figure 6 as a single line. However, some physical indicators of an OHWM were observed in certain areas of the upper Keaʻaulu Gulch survey area. These include changes in the character of soil; shelving; benches; exposed root hairs; and vegetation that was matted down, bent, or absent (Figures 8 and 9).

Portions of the original drainage course were likely modified by human activities for roads, trails, and agriculture. Several culverts exist near the northern portion of the survey area (see Figure 9). A few culverts are within the stream channel, and at least two culverts appear to convey water to the channel from the east.

In the lower Keaʻaulu Gulch survey area, physical indicators of the OHWM were most apparent in the immediate vicinity of the existing Mālaekahana Valley Road bridge, and included destruction of terrestrial vegetation; change in plant community (upland to facultative species); and the presence of litter and debris. Standing water was observed in the immediate vicinity of the bridge. Further upstream, the drainage is overgrown with non-hydrophytic herbaceous vegetation along the bottom and slopes (Figure 10).

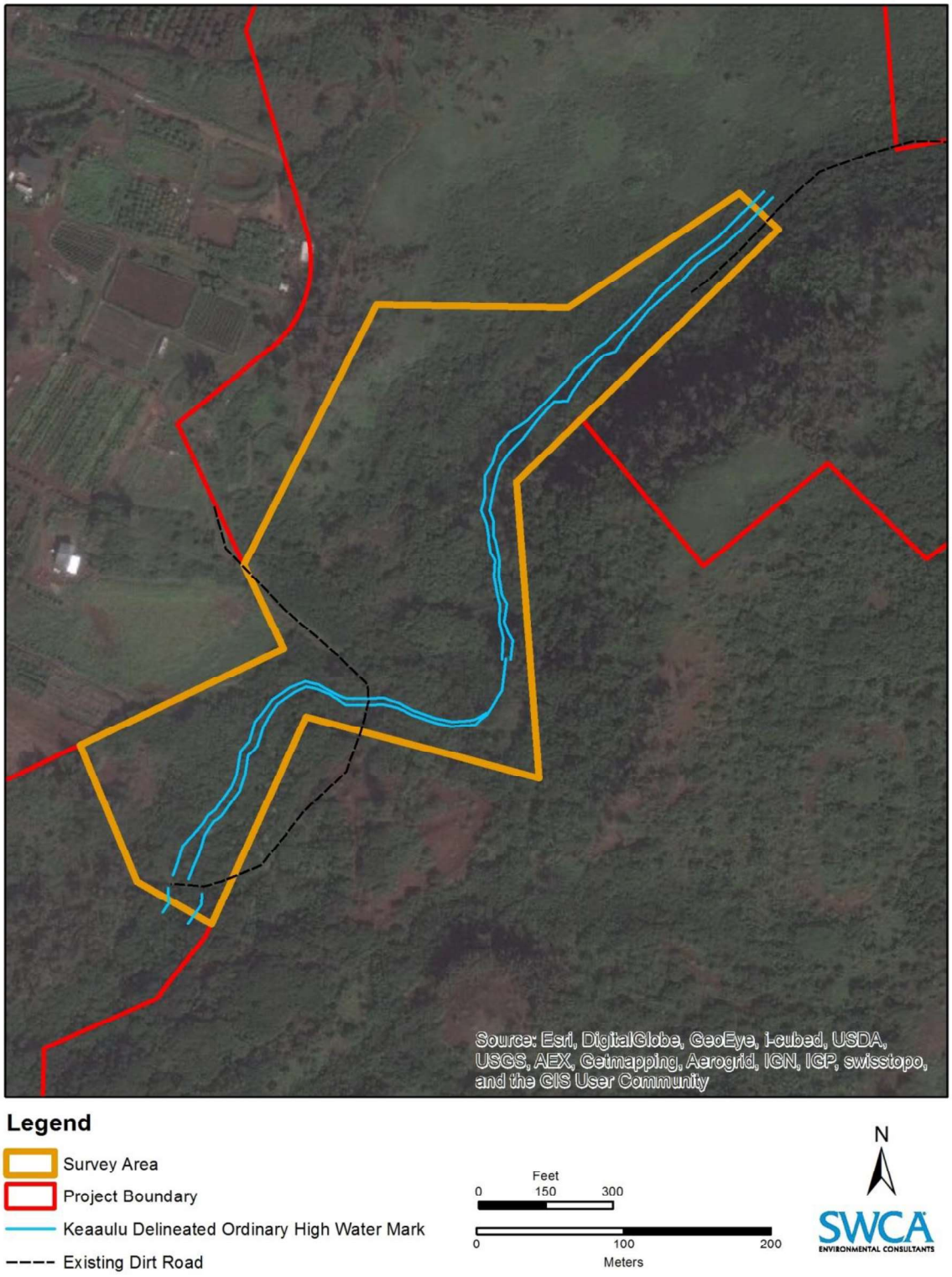

Figure 6. Delineated OHWM in the upper Kea‘aulu survey area.
Note: The break in the OHWM is a dirt road.

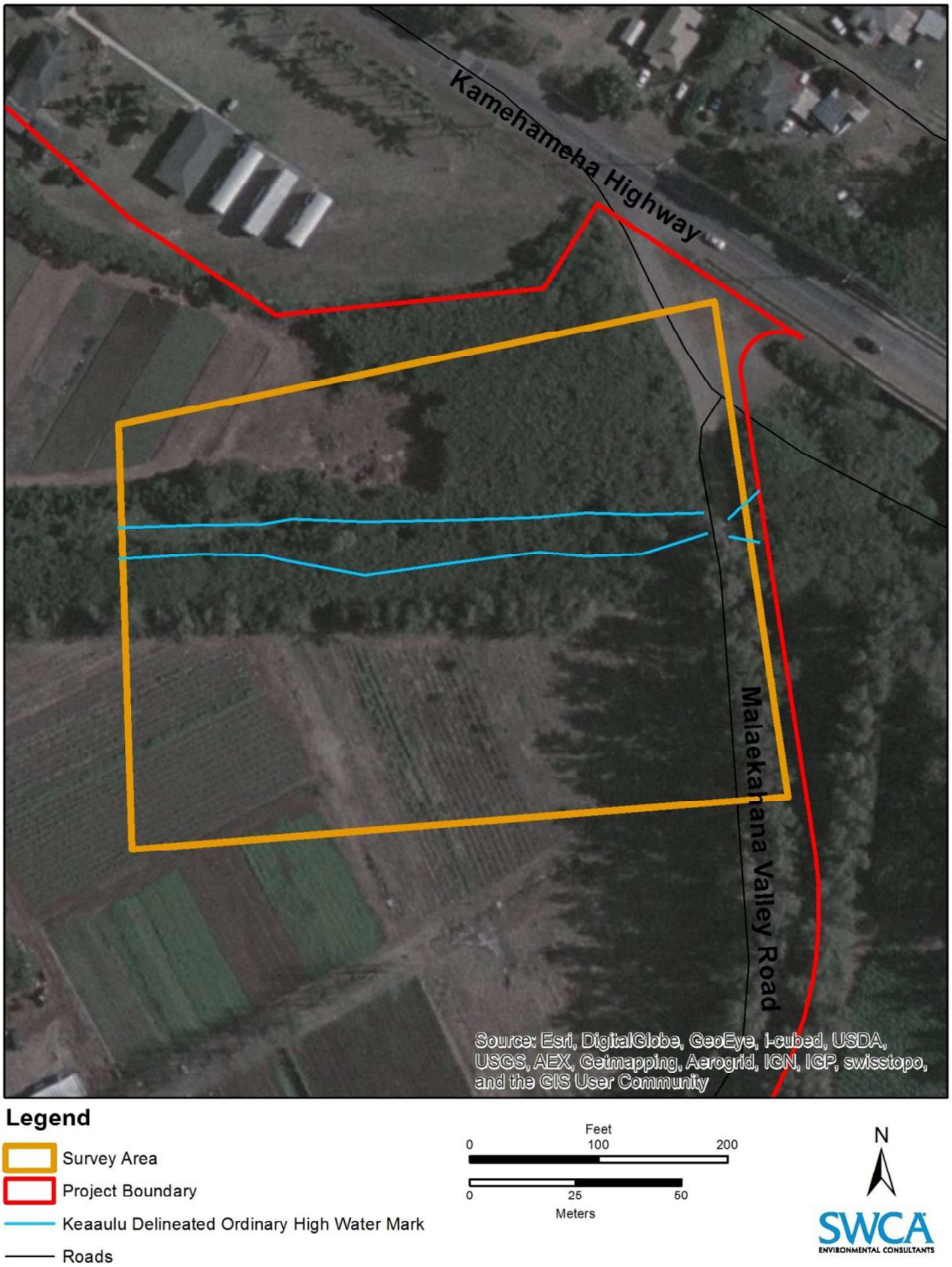

Figure 7. Delineated OHWM in the lower Kea‘aulu survey area near Kamehameha Highway. *Note:* The break in the OHWM is a bridge.

Figure 8. Looking toward the OHWM on right bank in the upper Kea‘aulu survey area.

Figure 9. Looking toward the OHWM on right bank in the upper Kea‘aulu Gulch survey area.

Figure 10. Overgrown channel in the lower Kea‘aulu survey area.

4.2. Mālaekahana Stream

Approximately 1,873 linear feet (571 m) of Mālaekahana Stream were delineated in the survey area (Figure 11). Mālaekahana Stream is perennial. It has a defined bed and bank with flow present throughout the year. Various indicators of the OHWM were seen throughout the Mālaekahana survey area, including a clear, natural line impressed on the bank; organic debris collecting behind obstructions; exposed root hairs; and benches (Figure 12).

The ditch/canal identified by the USGS in the Mālaekahana survey area (see Figure 4) appears to have been filled in and is no longer active. It was likely excavated in uplands and was not observed to contribute flow (either directly or indirectly) to another potentially jurisdictional water.

During SWCA’s survey, water was observed in the narrow, human-made channel identified as an aqueduct by USGS data (see Figures 4, 11, and 13). The edges were densely vegetated with upland species. The feature did not continue east of the road, and therefore does not appear to connect to Mālaekahana Stream.

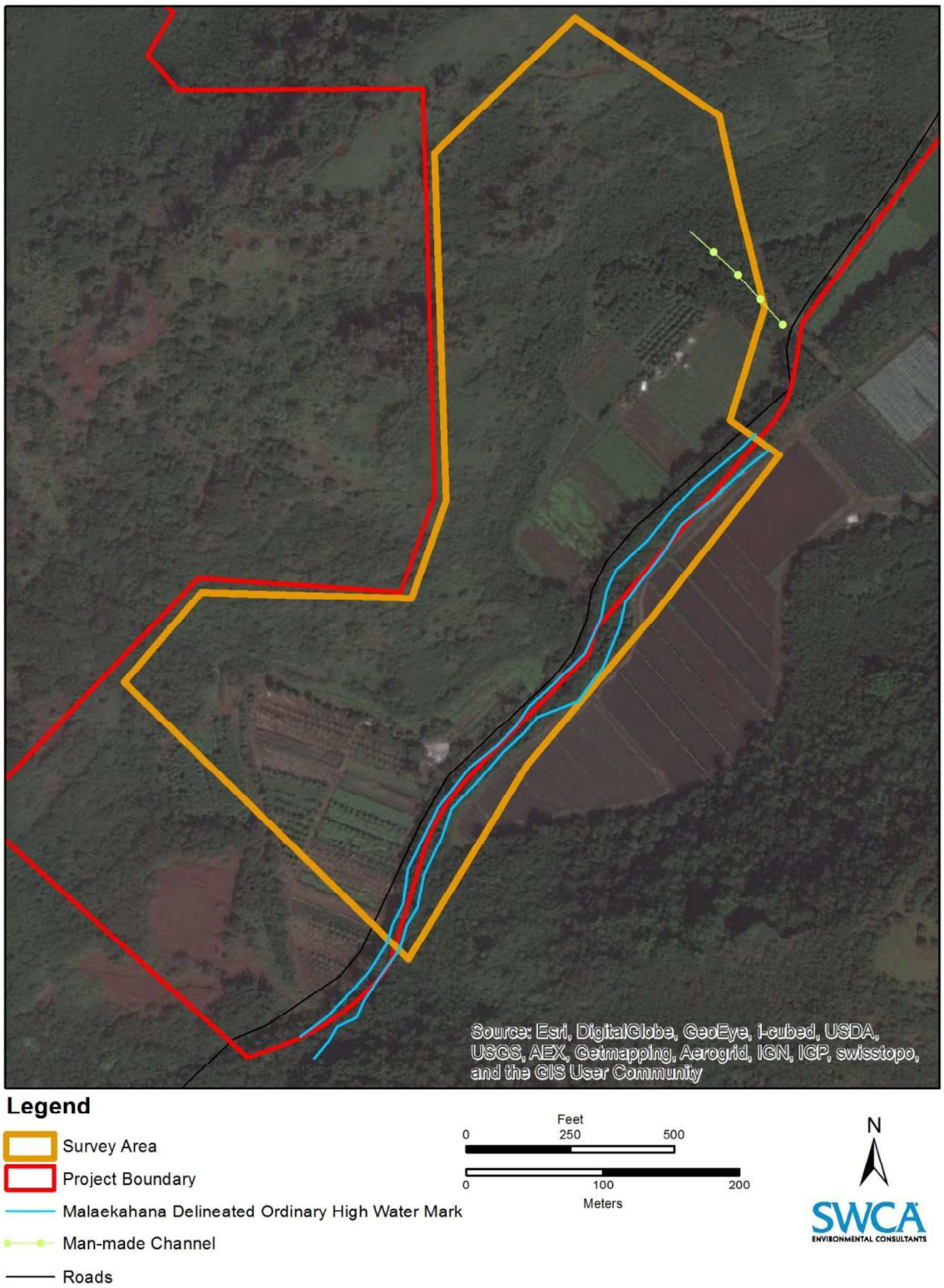

Figure 11. Delineated OHWM in the Mālaekahana survey area.

Figure 12. Mālaekahana Stream with standing water.

Figure 13. Narrow, human-made channel identified by the USGS as an aqueduct in the Mālaekahana survey area.

4.3. ʻŌhiʻaʻai Tributary

Two tributaries were delineated in this portion of the survey area, although only one feature is identified in the NWI, USGS, or DAR maps of the area. Approximately 562 linear feet (172 m) of the main stem of ʻŌhiʻaʻai Tributary were delineated in the survey area (Figure 14). The main stem of ʻŌhiʻaʻai Tributary is intermittent, with surface water flow during wetter months or high rainfall events, but interspersed by dry periods. The bed and bank are well defined, with the bank reaching over 5 feet (1.5 m) in some areas. Various indicators of OHWM were seen throughout the ʻŌhiʻaʻai survey area, including a clear, natural line impressed on the bank; undercut banks; sediment sorting and changes in soil character; organic debris collecting behind obstructions (wracking); litter removal due to flowing water; water staining on boulders; exposed roots; and standing water (Figures 15 and 16).

A smaller tributary was also identified during the survey. Approximately 264 linear feet (80 m) of this feature were delineated (see Figure 14). It flows northwest and directly connects to the main portion of ʻŌhiʻaʻai Tributary described above (Figure 17). It is likely to be ephemeral; flowing briefly only during rainfall events or extreme flooding. Indicators of flow were not strong throughout the entire feature, but included matted or missing vegetation, a well-defined bed and bank, and change in soil character (Figure 18).

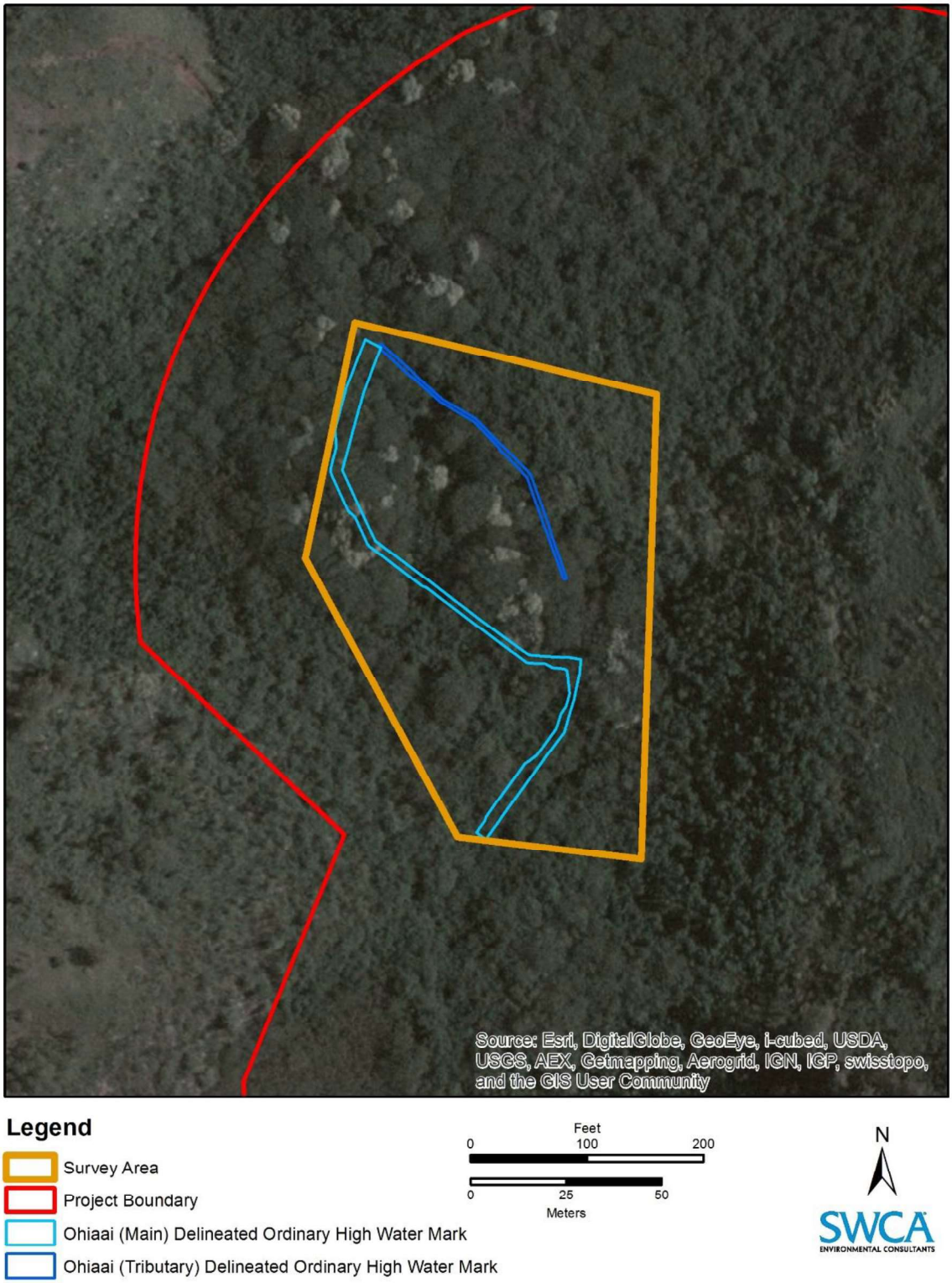

Figure 14. Delineated OHWM in the ʻŌhiʻaʻai survey area.

Figure 15. Main ʻŌhiʻaʻai Tributary indicators include cut banks, exposed roots, scour, and standing water.

Figure 16. Water-stained leaves collected on an elevated obstruction along the ʻŌhiʻaʻai Tributary.

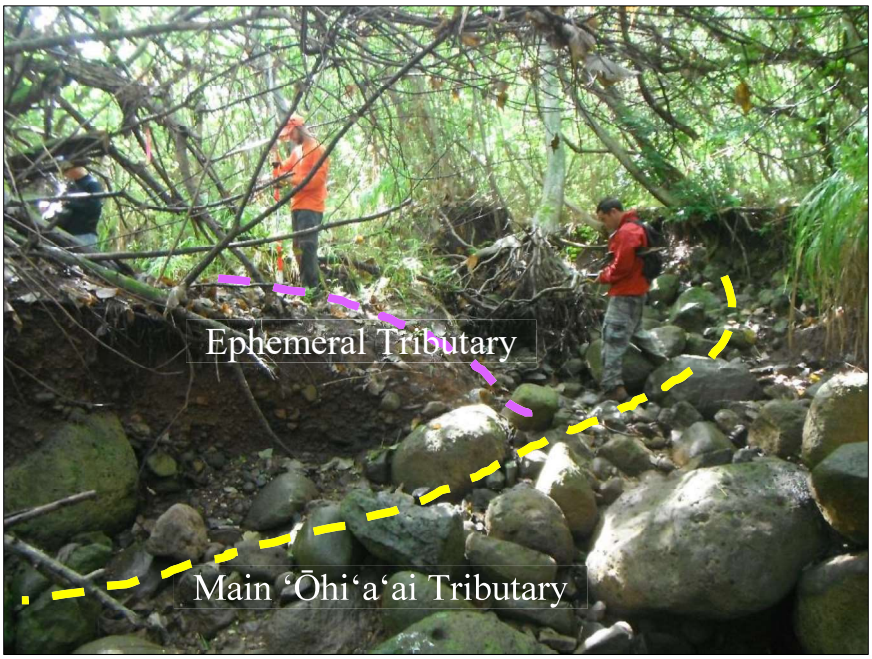

Figure 17. Junction between the ephemeral tributary (pink line) and the main ‘Ōhi‘a‘ai Tributary (yellow line).

Figure 18. Ephemeral ‘Ōhi‘a‘ai tributary showing defined bed and bank and unvegetated channel bottom.

5. CONCLUSIONS AND RECOMMENDATIONS

SWCA surveyed and delineated three potentially jurisdictional streams in the survey area. Approximately 2,980 linear feet (908 m) of the intermittent Keaʻaulu Gulch, 1,873 linear feet (571 m) of the perennial Mālaekahana Stream, and 826 linear feet (252 m) of the intermittent ʻŌhiʻaʻai Tributary were delineated in the survey area. In contrast to the Mālaekahana Stream and ʻŌhiʻaʻai Tributary, Keaʻaulu Gulch did not have strong indictors of flow or an OHWM in many areas. Portions of Keaʻaulu Gulch were likely modified by human activities for roads and agriculture. However, it may convey water and sediment from upland areas to lower reaches and subsequently the Pacific Ocean during heavy rainfall events.

It is not known whether the project will require placement of dredged or fill material either temporarily or permanently below the delineated OHWMs. If this can be avoided, SWCA recommends requesting a preliminary jurisdictional determination and a No Permit Required letter from the Honolulu USACE. If the project requires placement of dredged or fill material below the delineated OHWMs, a preliminary or approved jurisdictional determination can be requested, and a permit may be required from the USACE if the features are determined to be WoUS. A State 401 Water Quality Certification permit from the Clean Water Branch may also be required, which can take several months to a year to process. Because portions of Keaʻaulu Gulch lack strong indicators of an OHWM, the jurisdictional status of the gulch could be argued via the approved jurisdictional determination process.

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APPENDIX J
VISUAL CONTRAST RATING WORKSHEETS

TETRA TECH INC.

Visual Contrast Rating Worksheet

Section A: Project Information

Project Name	Viewpoint / Photo Point	Latitude / Longitude	Location
Na Pua Makani	01	21.6478 ,-157.9290	Laie Hawaii Temple

Section B: Characteristic Landscape Description

	Land / Water	Vegetation	Structures
Form	Clear and clean prominent water in fountain structure Flat and gently sloping landform in the foreground Rolling to rugged landform partially visible in the background	Jagged domed and flat vegetation in the foreground Rolling vegetation in the background	Bold and rectangular buildings and staircases
Line	Horizontal smooth (reflecting pool) and vertical geometric (fountain) water Horizontal landform - foreground Curving mountains - background	Flat lawn and shrubs. Regular to round shrubs and trees. Angular and irregular palm trees.	Simple vertical columns and flag pole, horizontal fountains
Color	Cool blues reflection light to dark greens	light to dark greens grays browns reds	whites, grays, tans
Texture	smooth and glossy (reflecting pool) medium directional (fountain) gradational landform	smooth to rough	smooth

Section C: Proposed Activity Description

Has Photo Simulation Been Created? ☐ Yes ☑ No If Yes, Figure Number: _____

	Land / Water	Vegetation	Structures
Form	same as above	same as above	same as above
Line	same as above	same as above	same as above
Color	same as above	same as above	same as above
Texture	same as above	same as above	same as above

Section D: Contrast Rating

Features

Degree of Contrast / Elements	Land/Water				Vegetation				Structures			
	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Form				✓				✓				✓
Line				✓				✓				✓
Color				✓				✓				✓
Texture				✓				✓				✓

Overall Level of Contrast: None

Section E: Viewer Response

Viewer Sensitivity	Duration of View	Viewer Use	Overall Response
High	Moderate	High	High

Additional Comments

The Project is 1.7 miles from the Viewpoint 01. Project would be partially to fully screened by vegetation. It is possible that portions of some turbines would be visible through the vegetation; if so, they likely would not be noticed by the casual observer.

Evaluator(s)

Jennifer D'Avanzo
Chris Lawson

Updated Jan 2016

Date

Picture Taken - May 1, 2013
Evaluated - May 2014

TETRA TECH, INC.

Visual Contrast Rating Worksheet

Section A: Project Information

Project Name	Viewpoint / Photo Point	Latitude / Longitude	Location
Na Pua Makani	02	21.63920000000, -157.92000000000	Polynesian Cultural Center

Section B: Characteristic Landscape Description

	Land / Water	Vegetation	Structures
Form	No water Flat	Rounded and irregular, columnar	Flat, blocky parking lot, regular square building`
Line	Horizontal	Angular and smooth	Horizontal parking lot and curbs and vertical light poles and fencing
Color	NA (no landform color evident)	light to dark greens browns tans	dark to light grays, tans, whites, blues
Texture	Smooth	Smooth to rough	smooth

Section C: Proposed Activity Description

Has Photo Simulation Been Created? ☐ Yes ☑ No If Yes, Figure Number: _____

	Land / Water	Vegetation	Structures
Form	same as above	same as above	same as above
Line	same as above	same as above	same as above
Color	same as above	same as above	same as above
Texture	same as above	same as above	same as above

Section D: Contrast Rating

Features

Degree of Contrast / Elements	Land/Water				Vegetation				Structures			
	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Form				✓				✓				✓
Line				✓				✓				✓
Color				✓				✓				✓
Texture				✓				✓				✓

Overall Level of Contrast: none

Section E: Viewer Response

Viewer Sensitivity	Duration of View	Use Volume	Overall Response
High	Moderate	High	Moderate

Additional Comments

Enclosed landscape. Project is 2.5 miles from Viewpoint 02. Views northwest toward Project appear to be effectively screened by trees in and adjacent to the parking lot. There is a slight possibility some turbine blades could be seen through the trees; if so, they would not likely be noticeable.

Evaluator(s)

Jennifer D'Avanzo
Chris Lawson

Updated Jan 2016

Date

Picture Taken - May 1, 2013
Evaluated - May 5 2014

TETRA TECH INC.

Visual Contrast Rating Worksheet

Section A: Project Information

Project Name	Viewpoint / Photo Point	Latitude / Longitude	Location
Na Pua Makani	03	21.6062, -157.9040	LDS Church, Hauula

Section B: Characteristic Landscape Description

	Land / Water	Vegetation	Structures
Form	Prominent flat ocean Flat beach Rugged mountains, rolling to flat land	Rounded and irregular	Flat and curving road Boxy building
Line	Horizontal ocean Flat beach Rugged sloping mountains in middle ground Rolling to flat hills in background	Bold and rugged to parallel	Horizontal and curving conductor lines Bold building Vertical utility poles, fencing
Color	Cool to medium blues Tans, browns	Light to dark greens Browns Tans Reds	Browns, blacks, grays, tans, yellow
Texture	Smooth water Stippled beach and landform - foreground Medium middle ground Striated background	Medium and gradational	smooth and directional

Section C: Proposed Activity Description

Has Photo Simulation Been Created for KOP? ☐ Yes ☑ No If Yes, Figure Number: _____

	Land / Water	Vegetation	Structures
Form	same as above	same as above	same as above
Line	same as above	same as above	same as above
Color	same as above	same as above	same as above
Texture	same as above	same as above	same as above

Section D: Contrast Rating

Features

Degree of Contrast / Elements	Land/Water				Vegetation				Structures			
	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Form				✓				✓				✓
Line				✓				✓				✓
Color				✓				✓				✓
Texture				✓				✓				✓

Overall Level of Contrast: None

Section E: Viewer Response

Viewer Sensitivity	Duration of View	Use Volume	Overall Response
Moderate	Moderate	Moderate	Moderate

Additional Comments

Project is 4.8 miles from Church. Attributes are based on view from the highway, rather than from the church itself. It is possible that the tips of turbine blades might be visible above the low ground across the bay. The existing Kahuku turbines are not evident, however, suggesting the Project turbines might also be screened.

Evaluator(s)

Jennifer D'Avanzo
Chris Lawson

Updated Jan 2016

Date

Picture Taken - May 1, 2013
Evaluated - May 2014

TETRA TECH INC.

Visual Contrast Rating Worksheet

Section A: Project Information

Project Name	Viewpoint / Photo Point	Latitude / Longitude	Location
Na Pua Makani	04	21.6757, -157.9580	Kahuku Residential Community

Section B: Characteristic Landscape Description

	Land / Water	Vegetation	Structures
Form	No water Flat in foreground to hilly in middleground	Flat and rolling Angular and rugged	Rectangular boxy homes Vertical poles and fences Diagonal and curving conductor lines. A few turbines in the Kahuku wind farm are visible among structures and trees.
Line	Horizontal to undulating	Horizontal and vertical rugged and jagged	Bold, geometric Vertical converging and diverging
Color	Browns	light greens to dark greens Yellows, grays, browns	Browns, yellows, blues, greens, pinks, tans. Grays and blacks. Whites
Texture	Smooth to medium	Smooth to rough	Smooth and medium

Section C: Proposed Activity Description

Has Photo Simulation Been Created? ☐ Yes ☑ No If Yes, Figure Number: _____

	Land / Water	Vegetation	Structures
Form	same as above	Same as above	Same as above, with additional vertical elements from new wind turbines in much of the view.
Line	same as above	Same as above	Same as above
Color	same as above	same as above	Same as above
Texture	same as above	same as above	same as above

Section D: Contrast Rating

Features

Degree of Contrast / Elements	Land/Water				Vegetation				Structures			
	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Form				✓				✓			✓	
Line				✓				✓			✓	
Color				✓				✓			✓	
Texture				✓				✓				✓

Overall Level of Contrast: Weak

Section E: Viewer Response

Viewer Sensitivity	Duration of View	User Volume	Overall Response
High	Long	High	High

Additional Comments

The Project turbines would be visible, with the closest about 0.5 mile away. The contrast would be weak because the existing view is highly modified and includes numerous vertical elements.

Evaluator(s)

Jennifer D'Avanzo
Chris Lawson

Updated Jan 2016

Date

Picture Taken - May 1, 2013
Evaluated - May 5, 2014

TETRA TECH INC.

Visual Contrast Rating Worksheet

Section A: Project Information

Project Name	Viewpoint / Photo Point	Latitude / Longitude	Location
Na Pua Makani	05	21.6756, - 157.958	Kahuku Sugar Mill Site

Section B: Characteristic Landscape Description

	Land / Water	Vegetation	Structures
Form	No water Flat in foreground to hilly in middleground	Flat and rolling Angular and rugged	Rectangular buildings, curving roads Vertical poles and signs Diagonal and curving conductor lines. Few turbines
Line	Horizontal to undulating	Horizontal and vertical and whispy rounded, rugged and jagged	Bold, geometric Vertical Curving lines
Color	Browns	light greens to dark greens Yellows, grays, browns	Browns, yellows, blues, greens, tans dark grays and blacks oranges reds Whites
Texture	Smooth to medium	Smooth to rough	Smooth and medium

Section C: Proposed Activity Description

Has Photo Simulation Been Created? ☐ Yes ☑ No If Yes, Figure Number: _____

	Land / Water	Vegetation	Structures
Form	same as above	Same as above	Same as above, with additional turbines
Line	same as above	Same as above	Additional vertical elements with Project wind turbines
Color	same as above	same as above	Same as above
Texture	same as above	same as above	same as above

Section D: Contrast Rating

Features

Degree of Contrast / Elements	Land/Water				Vegetation				Structures			
	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Form				✓							✓	
Line				✓							✓	
Color				✓				✓			✓	
Texture				✓				✓				✓

Overall Level of Contrast: Weak

Section E: Viewer Response

Viewer Sensitivity	Duration of View	User Volume	Overall Response
Low	Brief	Moderate	Low-Moderate

Additional Comments

Project is 0.6 mile from the Project nearest turbine. Weak contrast within a modified landscape. Viewers are employees and customers of commercial uses at the site.

Evaluator(s)

Jennifer D'Avanzo
Chris Lawson

Updated Jan 2016

Date

Picture Taken - May 1, 2013
Evaluated - May 5, 2014

TETRA TECH INC.

Visual Contrast Rating Worksheet

Section A: Project Information

Project Name	Viewpoint / Photo Point	Latitude / Longitude	Location
Na Pua Makani	06 (SIM)	21.6756, - 157.958	Kahuku Community Center

Section B: Characteristic Landscape Description

	Land / Water	Vegetation	Structures
Form	No water Flat in foreground to rolling in middleground and background	Flat and rolling Angular and rugged	Rectangular buildings Vertical light poles, utility poles and fencing Diagonal and curving conductor lines. Few turbines Sports field light standards create strong vertical form.
Line	Horizontal to undulating	Horizontal rounded, rugged and jagged	Bold, geometric horizontal and vertical Curving lines
Color	Browns	light greens to dark greens Yellows, grays, browns	Browns, greens, tans, beiges light grays, browns Whites
Texture	Smooth to medium	Smooth to rough	Smooth and medium

Section C: Proposed Activity Description

Has Photo Simulation Been Created? ☑ Yes ☐ No If Yes, Figure Number: 4.16-5

	Land / Water	Vegetation	Structures
Form	same as above	Same as above	Same as above, with additional wind turbines
Line	same as above	Same as above	Same as above, with additional vertical wind turbines
Color	same as above	same as above	Same as above
Texture	same as above	same as above	same as above

Section D: Contrast Rating

Features

Degree of Contrast / Elements	Land/Water				Vegetation				Structures			
	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Form				✓				✓		✓	✓	
Line				✓				✓		✓	✓	
Color				✓				✓			✓	
Texture				✓				✓				✓

Overall Level of Contrast: Weak

Section E: Viewer Response

Viewer Sensitivity	Duration of View	User Volume	Overall Response
Moderate (active recreation)	Brief/intermittent	Moderate	Moderate

Additional Comments

Closest turbine would be 0.6 mile from Viewpoint 06. Scenic quality is moderate. Moderate contrast, based on existing visual context.

Evaluator(s)

Jennifer D'Avanzo
Chris Lawson

Updated Jan 2016

Date

Picture Taken - May 1, 2013
Evaluated - May 5, 2014

TETRA TECH INC.

Visual Contrast Rating Worksheet

Section A: Project Information

Project Name	Viewpoint / Photo Point	Latitude / Longitude	Location
Na Pua Makani	07	21.6756, - 157.958	Malaekahana State Recreation Area

Section B: Characteristic Landscape Description

	Land / Water	Vegetation	Structures
Form	No water Flat in foreground to rolling in middleground and rugged background	Flat and rounded to rolling rugged	Distant geometric buildings and turbine blades Vertical poles and fences Curving conductor lines and roads
Line	Horizontal to undulating	Horizontal rounded, rugged and jagged	Bold bands and curving conductors Vertical poles
Color	Browns	light greens to dark greens Yellows, grays, browns, tans	Browns, greens, tans, beiges light grays, browns Whites
Texture	Smooth to medium	Smooth to rough	Smooth and medium

Section C: Proposed Activity Description

Has Photo Simulation Been Created? ☑ Yes ☐ No If Yes, Figure Number: 4.16-5

	Land / Water	Vegetation	Structures
Form	same as above	Same as above	Additional triangular turbine blades
Line	same as above	Same as above	Additional irregular turbine blades
Color	same as above	same as above	Same as above
Texture	same as above	same as above	same as above

Section D: Contrast Rating

Features

Degree of Contrast / Elements	Land/Water				Vegetation				Structures			
	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Form				✓				✓		✓		
Line				✓				✓		✓		
Color				✓				✓			✓	
Texture				✓				✓				✓

Overall Level of Contrast: Weak

Section E: Viewer Response

Viewer Sensitivity	Duration of View	User Volume	Overall Response
High	Short	Moderate	Moderate

Additional Comments

Views inside the park are completely screened by vegetation. Attributes for Viewpoint 07 are based on the view at the entrance of the Park so users would be driving by and not stopping.
Scenic quality is moderate.
Project is 1.0 mile from Viewpoint 07

Evaluator(s)

Jennifer D'Avanzo
Chris Lawson

Updated Jan 2016

Date

Picture Taken - May 1, 2013
Evaluated - May 5, 2014

TETRA TECH INC.

Visual Contrast Rating Worksheet

Section A: Project Information

Project Name	Viewpoint / Photo Point	Latitude / Longitude	Location
Na Pua Makani	08	21.6937, - 157.98	Kamehameha Highway near Kahuku

Section B: Characteristic Landscape Description

	Land / Water	Vegetation	Structures
Form	No water Flat to rolling in middleground. Rugged background.	Flat and rounded Rolling and rugged	Curving road, horizontal fences, rectangular building, prominent vertical poles and non directional blades from wind turbines. Curving conductors
Line	Horizontal and rounded to undulating	Horizontal and rounded Vertical, angular and wispy Rugged	Geometric, vertical. Turbines, horizontal, curving conductors.
Color	Browns, tans and light greens	light greens to dark greens Yellows, grays, browns, tans, beiges	Whites, browns, grays, blacks, tans, greens, reds, yellows
Texture	Smooth to medium	Smooth to coarse	Smooth to medium

Section C: Proposed Activity Description

Has Photo Simulation Been Created? ☐ Yes ☑ No If Yes, Figure Number: _____

	Land / Water	Vegetation	Structures
Form	same as above	Same as above	Same as above, with additional vertical turbines
Line	same as above	Same as above	Same as above, with additional turbines
Color	same as above	same as above	Same as above
Texture	same as above	same as above	same as above

Section D: Contrast Rating

Features

Degree of Contrast / Elements	Land/Water				Vegetation				Structures			
	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Form				✓				✓		✓		
Line				✓				✓		✓		
Color				✓				✓			✓	
Texture				✓				✓				✓

Overall Level of Contrast: Weak

Section E: Viewer Response

Viewer Sensitivity	Duration of View	User Volume	Overall Response
Moderate	Short	High	Moderate

Additional Comments

Existing Scenic Quality is low. Lower parts of Project turbines would be blocked from view. Highway viewpoint is 0.4 mile from closest turbine.

Evaluator(s)

Jennifer D'Avanzo
Chris Lawson

Updated Jan 2016

Date

Picture Taken - May 1, 2013
Evaluated - May 5, 2014

TETRA TECH INC.

Visual Contrast Rating Worksheet

Section A: Project Information

Project Name	Viewpoint / Photo Point	Latitude / Longitude	Location
Na Pua Makani	09	21.6763, -157.947	Kahuku High and Intermediate School

Section B: Characteristic Landscape Description

	Land / Water	Vegetation	Structures
Form	No water Flat in foreground to rugged and rolling background	Flat, vertical, and rounded Rugged background	Rectangular buildings, curving roads Vertical poles and signs Diagonal and curving conductor lines Lattice communication tower
Line	Horizontal to undulating	Horizontal and vertical and wispy Rolling	Bold, geometric, and horizontal Vertical Curving lines
Color	Browns	Light greens to dark greens Yellows, grays, browns	Browns, yellows, blues, greens, tans Dark grays and blacks, oranges, reds Whites and red
Texture	Smooth to medium	Smooth to rough	Smooth and medium

Section C: Proposed Activity Description

Has Photo Simulation Been Created? ☐ Yes ☑ No If Yes, Figure Number: _____

	Land / Water	Vegetation	Structures
Form	same as above	same as above	Upper parts of vertical and angular wind turbines added
Line	same as above	same as above	Upper parts of vertical wind turbines
Color	same as above	same as above	Same as above
Texture	same as above	same as above	same as above

Section D: Contrast Rating

Features

Degree of Contrast / Elements	Land/Water				Vegetation				Structures			
	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Form				✓				✓			✓	
Line				✓				✓			✓	
Color				✓				✓			✓	
Texture				✓				✓				✓

Overall Level of Contrast: Weak

Section E: Viewer Response

Viewer Sensitivity	Duration of View	User Volume	Overall Response
Moderate	Short and Intermittent	High	Moderate

Additional Comments

Scenic quality is low. Project is 0.5 mile from school. Upper parts of turbines would be visible but subordinate to other elements of modified landscape.

Evaluator(s)

Jennifer D'Avanzo
Chris Lawson-updated Jan 2016

Date

Picture Taken - May 2, 2013
Evaluated - May 5, 2014

TETRA TECH INC.

Visual Contrast Rating Worksheets

Section A: Project Information

Project Name	Viewpoint / Photo Point	Latitude / Longitude	Location
Na Pua Makani	10	21.7022, -157.992	Turtle Bay Resort Golf Course

Section B: Characteristic Landscape Description

	Land / Water	Vegetation	Structures
Form	Wetland/Water - curving Flat to rolling foreground to rugged background	Flat and rolling to vertical and rounded Angular and rugged	Vertical wind turbines Curving paths Rectangular buildings
Line	Undulating to rugged	Horizontal Vertical, rounded, rugged and jagged	Bold vertical and irregular Curving Geometric
Color	Browns, oranges, sienna, and greens	Light greens to dark greens Yellows, grays, browns	Whites, greys, tans
Texture	Smooth to medium	Smooth to rough	Smooth and medium

Section C: Proposed Activity Description

Has Photo Simulation Been Created? ☐ Yes ☑ No If Yes, Figure Number: _____

	Land / Water	Vegetation	Structures
Form	same as above	same as above	Potentially angular and vertical additional turbines
Line	same as above	same as above	Potentially vertical and geometric additional turbines
Color	same as above	same as above	same as above
Texture	same as above	same as above	same as above

Section D: Contrast Rating

Degree of Contrast / Features	Land/Water				Vegetation				Structures			
Elements	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Form				✓				✓			✓	
Line				✓				✓			✓	
Color				✓				✓			✓	
Texture				✓				✓				✓

Overall Level of Contrast: Weak

Section E: Viewer Response

Viewer Sensitivity	Duration of View	User Volume	Overall Response
Moderate	Short	Moderate	Low-Moderate

Additional Comments

Project is 2.6 miles. There is an existing wind farm closer to viewer. Project turbines would be partially screened.

Evaluator(s)

Jennifer D'Avanzo
Chris Lawson-updated Jan 2016

Date

Picture Taken - April 23, 2013
Evaluated - May 5, 2014

TETRA TECH INC.

Visual Contrast Rating Worksheet

Section A: Project Information

Project Name	Viewpoint / Photo Point	Latitude / Longitude	Location
Na Pua Makani	11	21.5771, -157.882	Punaluu Beach Park

Section B: Characteristic Landscape Description

	Land / Water	Vegetation	Structures
Form	Prominent flat ocean Flat beach Rugged mountains, rolling to flat land	Irregular and rugged	Rectangular buildings Vertical poles
Line	Horizontal ocean Flat beach Rugged mountains in middleground Rolling to flat hills in background	Vertical and curving	Geometric and vertical
Color	Cool to medium and dark blues with tans and whites Tans, browns	Light to dark greens, yellows Browns Tans	Tans, light grays, greens, browns
Texture	Smooth water Stippled beach and landform - foreground Medium middleground and background	Medium and gradational	Smooth

Section C: Proposed Activity Description

Has Photo Simulation Been Created ? ☐ Yes ☑ No If Yes, Figure Number: _____

	Land / Water	Vegetation	Structures
Form	same as above	same as above	Likely same as above
Line	same as above	same as above	Likely same as above
Color	same as above	same as above	same as above
Texture	same as above	same as above	same as above

Section D: Contrast Rating

Features

Degree of Contrast	Land/Water				Vegetation				Structures			
	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Elements: Form				✓				✓				✓
Elements: Line				✓				✓				✓
Elements: Color				✓				✓				✓
Elements: Texture				✓				✓				✓

Overall Level of Contrast: none

Section E: Viewer Response

Viewer Sensitivity	Duration of View	User Volume	Overall Response
High	Moderate	Moderate	Moderate

Additional Comments

Project is 7.5 miles from Beach, may be visible from the highway but likely blocked or screened. Project would not be noticeable to the casual observer. Viewer would be looking at ocean mostly likely not toward project.

Evaluator(s)

Jennifer D'Avanzo
Chris Lawson-updated Jan 2016

Date

Picture Taken - May 1, 2013
Evaluated - May 2014

TETRA TECH INC.

Visual Contrast Rating Worksheet

Section A: Project Information

Project Name	Viewpoint / Photo Point	Latitude / Longitude	Location
Na Pua Makani	12	21.5569, -157.853	Ahupua'a O'Kahana Valley State Park Beach

Section B: Characteristic Landscape Description

	Land / Water	Vegetation	Structures
Form	Flat clear water Rocky and flat to rugged landform	Rugged to vertical	Distant geometric buildings
Line	Horizontal Rugged	Undulating and vertical Horizontal edge	Geometric
Color	Cool light blues to medium and dark blues Tans, blacks, browns, beiges, and whites	Light to dark greens, tans, browns, yellows	Whites
Texture	Coarse to medium	Medium and rough	Scattered fine

Section C: Proposed Activity Description

Has Photo Simulation Been Created? ☐ Yes ☑ No If Yes, Figure Number: _____

	Land / Water	Vegetation	Structures
Form	same as above	same as above	same as above
Line	same as above	same as above	same as above
Color	same as above	same as above	same as above
Texture	same as above	same as above	same as above

Section D: Contrast Rating

Features

Degree of Contrast / Elements	Land/Water				Vegetation				Structures			
	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Form				✓				✓				✓
Line				✓				✓				✓
Color				✓				✓				✓
Texture				✓				✓				✓

Overall Level of Contrast: none

Section E: Viewer Response

Scenic Quality	Duration of View	User Volume	Overall Response
High	Moderate	Moderate	Moderate

Additional Comments

Project is 9.0 miles from beach. Project likely blocked or screened, not noticeable if partially visible.

Evaluator(s)

Jennifer D'Avanzo
Chris Lawson-updated Jan 2016

Date

Picture Taken - May 1, 2013
Evaluated - May 5, 2014

TETRA TECH INC.

Visual Contrast Rating Worksheet

Section A: Project Information

Project Name	Viewpoint / Photo Point	Latitude / Longitude	Location
Na Pua Makani	13	21.6839, -157.955	James Campbell National Wildlife Refuge

Section B: Characteristic Landscape Description

	Land / Water	Vegetation	Structures
Form	No water Flat in foreground to rolling in middleground and rugged background	Flat and rolling Angular and rugged	Rectangular sign, scattered rectangular buildings Vertical utility and fence poles, wind turbines, and horizontal fences Diagonal and curving conductor lines
Line	Horizontal to undulating	Horizontal Rounded, rugged, and jagged	Geometric and horizontal Bold vertical lines Curving lines
Color	Browns	Light greens to dark greens Yellows, grays, browns	Browns, greens, tans, beiges Light grays, browns Whites
Texture	Smooth to medium	Smooth to rough	Smooth and coarse

Section C: Proposed Activity Description

Has Photo Simulation Been Created? ☑ Yes ☐ No If Yes, Figure Number: 4.16-6

	Land / Water	Vegetation	Structures
Form	Same as above	Same as above	Same as above, with additional vertical and angular turbine blades
Line	same as above	Same as above	Additional vertical and angular wind turbines
Color	same as above	same as above	same as above
Texture	same as above	same as above	same as above

Section D: Contrast Rating

Features

Degree of Contrast / Elements	Land/Water				Vegetation				Structures			
	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Form				✓				✓		✓		
Line				✓				✓		✓		
Color				✓				✓			✓	
Texture				✓				✓				✓

Overall Level of Contrast: Moderate

Section E: Viewer Response

Viewer Sensitivity	Duration of View	User Volume	Overall Response
High	Moderate	Low	Moderate

Additional Comments

Distance from Project is 1 mile. Existing scenic quality is moderate. Project turbines would be co-dominant with the existing wind farm.

Evaluator(s)

Jennifer D'Avanzo
Chris Lawson-updated Jan 2016

Date

Picture Taken - May 2, 2013
Evaluated - May 5 2014

TETRA TECH INC.

Visual Contrast Rating Worksheet

Section A: Project Information

Project Name	Viewpoint / Photo Point	Latitude / Longitude	Location
Na Pua Makani	14	21.6027, -157-9050	North Windward Baptist Church

Section B: Characteristic Landscape Description

	Land / Water	Vegetation	Structures
Form	Flat	Flat to rounded and angular	Rectangular building Vertical utility poles Curving conductors
Line	Horizontal	Horizontal undulating and jagged	Angled rooflines, geometric, vertical, and partially curving
Color	Tans, browns	Light to dark greens and yellows Browns Tans	Browns, grays, tans, whites
Texture	Smooth to medium	Smooth to medium to coarse	Smooth

Section C: Proposed Activity Description

Has Photo Simulation Been Created? ☐ Yes ☑ No If Yes, Figure Number: _____

	Land / Water	Vegetation	Structures
Form	same as above	same as above	same as above
Line	same as above	same as above	same as above
Color	same as above	same as above	Same as above
Texture	same as above	same as above	same as above

Section D: Contrast Rating

Degree of Contrast / Elements	Features: Land/Water				Vegetation				Structures			
	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Form				✓				✓				✓
Line				✓				✓				✓
Color				✓				✓				✓
Texture				✓				✓				✓

Overall Level of Contrast: None

Section E: Viewer Response

Viewer Sensitivity	Duration of View	User Volume	Overall Response
Moderate	Moderate	Low	Moderate

Additional Comments

Project is 5 miles from Church. Grounds are enclosed by vegetation and structures. No views of Project from Church or property

Evaluator(s)

Jennifer D'Avanzo
Chris Lawson-updated Jan 2016

Date

Picture Taken - May 1, 2013
Evaluated - May 2014

TETRA TECH INC.

Visual Contrast Rating Worksheet

Section A: Project Information

Project Name	Viewpoint / Photo Point	Latitude / Longitude	Location
Na Pua Makani	15	21.6489, -157.914	Laie Point Coastal Residences

Section B: Characteristic Landscape Description

	Land / Water	Vegetation	Structures
Form	Prominent flat ocean Flat beach Rugged hills	Irregular and rugged	Rectangular buildings in foreground and middleground Angular and irregular turbine blades are faintly visible
Line	Horizontal undulating ocean Flat beach Rugged mountains in middleground Rolling to flat hills in background	Vertical and rugged	Geometric and vertical
Color	Cool to medium and dark blues with tans and whites Beiges, tans, browns	Light to dark green, yellows Browns Tans	Whites, tans, light grays, greens, browns
Texture	Smooth water Stippled beach and landform - foreground Medium middleground and background	Medium and gradational	Smooth

Section C: Proposed Activity Description

Has Photo Simulation Been Created? ☐ Yes ☑ No If Yes, Figure Number: _____

	Land / Water	Vegetation	Structures
Form	same as above	same as above	Same as above, with additional turbines
Line	same as above	same as above	Same as above, with additional vertical and irregular turbines
Color	same as above	same as above	same as above
Texture	same as above	same as above	same as above

Section D: Contrast Rating

Features

Degree of Contrast	Land/Water				Vegetation				Structures			
	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Elements: Form				✓				✓		✓		
Elements: Line				✓				✓		✓		
Elements: Color				✓				✓			✓	
Elements: Texture				✓				✓				✓

Overall Level of Contrast: Moderate

Section E: Viewer Response

Viewer Sensitivity	Duration of View	User Volume	Overall Response
High	Long	Low-Moderate	High

Additional Comments

Project is 2.5 miles from Laie Point. Scenic quality is high. Lower parts of project turbines would probably be screened, and upper parts would appear similar to existing turbines. Project turbines would be more prominent.

Evaluator(s)

Jennifer D'Avanzo
Chris Lawson-updated Jan 2016

Date

Picture Taken - May 1, 2013
Evaluated - May 2014

TETRA TECH INC.

Visual Contrast Rating Worksheet

Section A: Project Information

Project Name	Viewpoint / Photo Point	Latitude / Longitude	Location
Na Pua Makani	16	21.5569, -157.853	Swanzy Beach Park

Section B: Characteristic Landscape Description

	Land / Water	Vegetation	Structures
Form	Flat clear water Rocky and flat to rugged landform	Flat Vertical and rounded Rugged	Geometric buildings Curving path and wall
Line	Horizontal Rugged	Horizontal Vertical Undulating	Geometric and curving
Color	Cool and light blues to medium and dark blues Tans, blacks, browns, beiges, and whites	Light to dark greens, tans, browns, yellows	Grays, blues, whites, browns
Texture	Coarse and smooth to medium	Smooth, medium, and rough	Coarse to smooth

Section C: Proposed Activity Description

Has Photo Simulation Been Created? ☐ Yes ☑ No If Yes, Figure Number: _____

	Land / Water	Vegetation	Structures
Form	same as above	same as above	same as above
Line	same as above	same as above	same as above
Color	same as above	same as above	same as above
Texture	same as above	same as above	same as above

Section D: Contrast Rating

Features

Degree of Contrast / Elements	Land/Water				Vegetation				Structures			
	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Form				✓				✓				✓
Line				✓				✓				✓
Color				✓				✓				✓
Texture				✓				✓				✓

Overall Level of Contrast: None

Section E: Viewer Response

Viewer Sensitvity	Duration of View	User Volume	Overall Response
High	Moderate	Moderate	Moderate

Additional Comments

Project is 9.5 miles from park. 5-6 Kahuku Wind Farm turbines can be detected if photos from site are enlarged; they are not evident when viewed normally, so not noticeable to casual observer.

Evaluator(s)

Jennifer D'Avanzo
Chris Lawson-updated Jan 2016

Date

Picture Taken - May 1, 2013
Evaluated - May 5, 2014

TETRA TECH INC

Visual Contrast Rating Worksheet

Section A: Project Information

Project Name	Viewpoint / Photo Point	Latitude / Longitude	Location
Na Pua Makani	17	21.6759, -157.954	Kahuku Community Hospital and Medical Center

Section B: Characteristic Landscape Description

	Land / Water	Vegetation	Structures
Form	No water Flat and rolling in foreground and middleground Rugged background	Flat, irregular and rounded	Rectangular buildings and fences. Flat parking lots Vertical poles, turbines, and signs. Non-directional turbine blades Diagonal and curving conductor lines
Line	Horizontal to undulating	Horizontal and vertical and wispy	Bold, geometric, and horizontal Vertical Curving lines
Color	Browns, siennas	Light greens to dark greens Yellows, grays, browns	Browns, yellows, blues, greens, tans Dark grays and blacks, oranges, reds Whites
Texture	Smooth to medium	Smooth to rough	Smooth and medium

Section C: Proposed Activity Description

Has Photo Simulation Been Created? ☐ Yes ☑ No If Yes, Figure Number: _____

	Land / Water	Vegetation	Structures
Form	same as above	Same as above	Same as above, with additional vertical and angular turbines
Line	same as above	Same as above	Same as above, with additional vertical and angular wind turbines
Color	same as above	same as above	same as above
Texture	same as above	same as above	same as above

Section D: Contrast Rating

Features

Degree of Contrast / Elements	Land/Water				Vegetation				Structures			
	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Form				✓				✓			✓	
Line				✓				✓			✓	
Color				✓				✓				✓
Texture				✓				✓				✓

Overall Level of Contrast: Weak

Section E: Viewer Response

Viewer Sensitivity	Duration of View	User Volume	Overall Response
Moderate	Short	Moderate	Moderate

Additional Comments

Scenic quality is low due to many constructed features. Project is 0.5 mile from viewpoint. Project turbines would be partially screened or blocked. Weak contrast, based on view context.

Evaluator(s)

Jennifer D'Avanzo
Chris Lawson-updated Jan 2016

Date

Picture Taken - May 2, 2013
Evaluated - May 5, 2014

TETRA TECH INC.

Visual Contrast Rating Worksheet

Section A: Project Information

Project Name	Viewpoint / Photo Point	Latitude / Longitude	Location
Na Pua Makani	18	21.6745, -157.952	Kahuku Elementary School

Section B: Characteristic Landscape Description

	Land / Water	Vegetation	Structures
Form	No water Flat and rolling in foreground and middleground Rugged background	Flat, irregular and rounded	Rectangular buildings and fences. Curving road Vertical poles, turbines and signs. Non-directional turbine blades Diagonal and curving conductor lines
Line	Horizontal to undulating	Horizontal and vertical and wispy	Bold, geometric, and horizontal Vertical Curving lines
Color	Browns, siennas	Light greens to dark greens Yellows, grays, browns	Browns, yellows, blues, greens, tans Dark grays and blacks, oranges, reds Whites
Texture	Smooth to coarse	Smooth to rough	Smooth and medium

Section C: Proposed Activity Description

Has Photo Simulation Been Created? ☐ Yes ☑ No If Yes, Figure Number: _____

	Land / Water	Vegetation	Structures
Form	same as above	Same as above	Same as above, with additional angular and vertical turbines partially screened
Line	same as above	Same as above	Same as above, with additional vertical and angular wind turbines
Color	same as above	same as above	same as above
Texture	same as above	same as above	same as above

Section D: Contrast Rating

Features

Degree of Contrast / Elements	Land/Water				Vegetation				Structures			
	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Form				✓				✓			✓	
Line				✓				✓			✓	
Color				✓				✓				✓
Texture				✓				✓				✓

Overall Level of Contrast: Weak

Section E: Viewer Response

Viewer Sensitivity	Duration of View	User Volume	Overall Response
Moderate	Short	High	Moderate

Additional Comments

Existing scenic quality is low. Contrast is weak due to dominance of constructed features and partial screening/blocking of Project turbines.

Evaluator(s)

Jennifer D'Avanzo
Chris Lawson-updated Jan 2016

Date

Picture Taken - May 2, 2013
Evaluated - May 5, 2014

TETRA TECH INC.

Visual Contrast Rating Worksheet

Section A: Project Information

Project Name	Viewpoint / Photo Point	Latitude / Longitude	Location
Na Pua Makani	19	21.6832, -157.945	Kahuku Golf Course

Section B: Characteristic Landscape Description

	Land / Water	Vegetation	Structures
Form	No water Flat and rolling foreground to vertical in middleground and rugged background	Flat and rolling Angular and rugged	Vertical poles, turbines, non-directional blades Vertical lattice communication tower
Line	Horizontal to jagged to undulating	Horizontal and rounded Rugged and jagged	Bold vertical lines
Color	Browns, tans, and light greens	Light greens to dark greens Yellows, grays, browns	Whites, browns, grays, red
Texture	Smooth and rough to medium	Smooth to rough	Smooth

Section C: Proposed Activity Description

Has Photo Simulation Been Created? ☑ Yes ☐ No If Yes, Figure Number: 4.16-7

	Land / Water	Vegetation	Structures
Form	same as above	same as above	Same as above, with increased number of irregular turbine blades
Line	same as above	same as above	Same as above, with increased number vertical wind turbines
Color	same as above	same as above	same as above
Texture	same as above	same as above	same as above

Section D: Contrast Rating

Features

Degree of Contrast / Elements	Land/Water				Vegetation				Structures			
	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Form				✓				✓		✓		
Line				✓				✓		✓		
Color				✓				✓			✓	
Texture				✓				✓				✓

Overall Level of Contrast: Moderate

Section E: Viewer Response

Viewer Sensitivity	Duration of View	User Volume	Overall Response
Moderate	Short-Moderate	Moderate	Moderate

Additional Comments

Golf course is 1.0 mile from Project site. There is an existing wind farm in view to west, with turbines partially screened by vegetation but prominent. Project turbines would be co-dominant, moderate contrast.

Evaluator(s)

Jennifer D'Avanzo
Chris Lawson-updated Jan 2016

Date

Picture Taken - May 2, 2013
Evaluated - May 5 2014

TETRA TECH INC.

Visual Contrast Rating Worksheet

Section A: Project Information

Project Name	Viewpoint / Photo Point	Latitude / Longitude	Location
Na Pua Makani	20	21.6596, -157.933	Malaekahana Bike and Pedestrian Path

Section B: Characteristic Landscape Description

	Land / Water	Vegetation	Structures
Form	No water Flat in foreground to rolling in middleground and rugged background	Flat and rounded Rolling and rugged Columnar	Linear, flat path, horizontal fences, vertical turbines, non-directional blades, highway Rectangular scattered buildings Vertical rows of utility poles
Line	Horizontal and rounded to undulating	Horizontal and rounded Rugged	Vertical, horizontal, curving geometric
Color	Browns, tans, and light greens	Light greens to dark greens Yellows, grays, browns, tans, beiges	Whites, browns, grays, reds
Texture	Smooth to medium	Smooth to medium	Smooth paved surfaces and pastures, coarse vegetation

Section C: Proposed Activity Description

Has Photo Simulation Been Created? ☑ Yes ☐ No If Yes, Figure Number: 4.16-8

	Land / Water	Vegetation	Structures
Form	same as above	same as above	Same as above, with increased number of turbines
Line	same as above	same as above	Same as above, with increased number of vertical turbines
Color	same as above	same as above	Same as above, with more white from turbines
Texture	same as above	same as above	same as above

Section D: Contrast Rating

Features

Degree of Contrast / Elements	Land/Water				Vegetation				Structures			
	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Form				✓				✓		✓		
Line				✓				✓		✓		
Color				✓				✓			✓	
Texture				✓				✓				✓

Overall Level of Contrast: Moderate

Section E: Viewer Response

Viewer Sensitvity	Duration of View	User Volume	Overall Response
High	Short	Low-Moderate	Moderate

Additional Comments

Path viewpoint location is 1.2 miles from Project. Scenic quality in view toward Project is moderate, but low in view along highway corridor. Contrast with Project based only on simulation would be strong, but reduced to moderate in this context.

Evaluator(s)

Jennifer D'Avanzo
Chris Lawson-updated Jan 2016

Date

Picture Taken - April 22, 2014
Evaluated - May 5 2014

TETRA TECH INC.

Visual Contrast Rating Worksheet

Section A: Project Information

Project Name	Viewpoint / Photo Point	Latitude / Longitude	Location
Na Pua Makani	21	21.6937, -157.98	Kamehameha Highway near Turtle Bay

Section B: Characteristic Landscape Description

	Land / Water	Vegetation	Structures
Form	No water Flat to rolling in middleground. Rugged background	Flat and rounded Rolling and rugged	Curving road, horizontal fences, rectangular building, prominent vertical poles and non-directional blades from wind turbines. Curving conductors
Line	Horizontal and rounded to undulating	Horizontal and rounded Vertical, angular, and wispy Rugged	Geometric, vertical turbines, horizontal, curving conductros
Color	Browns, tans, and light greens	Light greens to dark greens Yellows, grays, browns, tans, beiges	Whites, browns, grays, blacks, tans, greens, reds, yellows
Texture	Smooth to medium	Smooth to coarse	Smooth to medium

Section C: Proposed Activity Description

Has Photo Simulation Been Created? ☐ Yes ☑ No If Yes, Figure Number: _____

	Land / Water	Vegetation	Structures
Form	same as above	same as above	Same as above, with additional vertical turbines partially blocked by ridge
Line	same as above	same as above	Same as above, with additional turbines
Color	same as above	same as above	same as above
Texture	same as above	same as above	same as above

Section D: Contrast Rating

Features

Degree of Contrast / Elements	Land/Water				Vegetation				Structures			
	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Form				✓				✓		✓		
Line				✓				✓		✓		
Color				✓				✓			✓	
Texture				✓				✓				✓

Overall Level of Contrast: Moderate

Section E: Viewer Response

Viewer Sensitivity	Duration of View	User Volume	Overall Response
Moderate	Short	High	Moderate

Additional Comments

From highway. 1.6 miles from the Project. Scenic quality is low due to constructed features, including an existing wind farm. Low ridge would partially block views of Project turbines.

Evaluator(s)

Jennifer D'Avanzo
Chris Lawson-updated Jan 2016

Date

Picture Taken - April 22, 2014
Evaluated - May 5 2014

APPENDIX K
SHADOW FLICKER IMPACT ANALYSIS

Shadow Flicker Impact Analysis for the Na Pua Makani Wind Energy Project

Oahu, Hawaii

Prepared for

Na Pua Makani Power Partners, LLC

Prepared by

Tetra Tech, Inc.

160 Federal Street – 3rd Floor

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June 2014

Revised November 2014

Revised December 2015

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ATTACHMENT

Attachment A. Detailed Summary of WindPro Shadow Flicker Analysis Results

1.0 OVERVIEW

Na Pua Makani Power Partners, LLC (NPMPP), is proposing to develop the Na Pua Makani Wind Energy Project (Project) on Oahu, Hawaii (see Figure 1). The Project is undergoing environmental review under both the Hawaii Environmental Policy Act (HEPA) and the National Environmental Policy Act (NEPA). As part of this review, the Project is analyzing three alternatives: Alternative 1 – no action; Alternative 2 (the Proposed Action) – construction and operation of an up to approximately 25 MW Project consisting of up to 10 wind turbines; and Alternative 3 – construction and operation of a larger generation facility of up to 42 MW and consisting of up to 12 turbines. Tetra Tech has conducted a shadow flicker analysis for Project Alternatives 2 and 3 the results of which are provided in this report.

In response to public comments on the Draft EIS related to visual impacts and consideration of turbines with larger generating capacities (to reduce the total number of turbines), NPMPP reevaluated the proposed turbine locations and turbine models considered in the Draft EIS. Through this effort, NPMPP was able to reduce the maximum number of turbines needed to meet the target generating capacity for the Project. This modification takes advantage of recent technological advancements that have resulted in the availability of uprated versions of turbine models that are larger, more efficient, have increased generating capacity, and are better suited for the moderate to low wind conditions of the wind farm site than previous models. Accordingly, the updated shadow flicker impact analysis evaluates a Modified Proposed Action Option (Alternative 2A) along with the original project alternatives and turbine design, which incorporate updated turbine locations.

2.0 PROJECT COMPONENTS

NPMPP is currently considering turbine models from leading turbine manufacturers including Siemens, Vestas, GE and others. The turbine array could include a combination of models from a single manufacturer ranging in generating capacity and dimensions. For the purposes of impact analysis, Tetra Tech analyzed a turbine array that included the turbines with the tallest maximum blade tip height with the assumption that the tallest turbine would cast the furthest shadow and therefore potentially have the greatest effect. NPMPP will select the most appropriate turbines for the site-specific conditions of the wind farm prior to construction.

Three representative wind turbine models were selected to evaluate potential shadow flicker impacts. These models which represent the general range in dimensions of turbines that could be installed on site, have the following characteristics:

- **Vestas V110-2.0** - 3-blade 110-meter diameter rotor, with a hub height of 80 meters. Assumption that the 2.0-110 WT has a normal high rotor speed of approximately 14.9 rotations per minute (rpm) which translates to a blade pass frequency of 0.75 Hertz (Hz) which is less than 1 alternation per second.

- **Siemens SWT-3.0-113** - 3-blade 113-meter diameter rotor, with a hub height of 99.5 meters. Assumption that the 3.0-113 WT has a normal high rotor speed of approximately 14.7 rpm which translates to a blade pass frequency of 0.74 Hz (less than 1 alternation per second).
- **Siemens SWT-3.0-130** - 3-blade 130-meter diameter rotor, utilizing hub heights of 85, 115, and 135 meters, depending turbine location. The SWT 3.0-113 wind turbine has a normal high rotor speed of approximately 12.2 rpm which translates to a blade pass frequency of 0.61 Hz (less than 1 alternation per second).

Smaller turbine models (Vestas V110-2.0) may be considered for turbine locations 1 and 2 , and larger turbines (Siemens SWT-3.0-113) may be considered for locations 3 to 10 (or up to turbine location 12 for Alternative 3). The combination of turbine models and specific number of turbines under each alternative will be selected to ensure consistency with HECO grid requirements, onsite wind resources, and other Project-specific factors. The Alternative 2 design is based on construction of ten (10) turbines (numbers 1-5, and 8-12), and Alternative 3 design is based on the construction of all twelve (12) turbines (numbers 1-12). If Alternative 3 were selected, the project would be built in two phases, with the first phase build out of up to 10 turbines (up to approximately 25 MW), and the second phase builds out of the remaining turbines, for total of 12 turbines (up to approximately 42 MW).

The Modified Proposed Action Option (Alternative 2A) is based on the Siemens SWT 3.3-130 turbine model for all locations with a rotor diameter of 130 meters and hub heights of varying elevation (85 m, 115 m, and 135 m) depending on turbine location. A total of 9 turbines were assumed for the Modified Proposed Action Option.

3.0 SHADOW FLICKER BACKGROUND

A wind turbine's moving blades can cast a moving shadow on locations within a certain distance of a turbine. These moving shadows are called shadow flicker, and can be a temporary phenomenon experienced at nearby residences or public gathering places. The impact area depends on the time of year and day (which determine the sun's azimuth and altitude angles) and the wind turbine's physical characteristics (height, rotor diameter, blade width, and orientation of the rotor blades). Shadow flicker impact to surrounding properties generally occurs during low angle sunlight conditions, typically during sunrise and sunset times of the day. However, when the sun angle gets very low (less than 3 degrees), sunlight passes through more atmosphere and becomes too diffused to form a coherent shadow. Shadow flicker will not occur when the sun is obscured by clouds or fog, at night, or when the source turbine(s) are not operating. In addition, shadow flicker is only an issue when at least 20% of the sun's disc is covered by the turbine blades.

Shadow flicker intensity is defined as the difference in brightness at a given location in the presence and absence of a shadow. Shadow flicker intensity diminishes with greater receptor-to-

turbine separation distance. Shadow flicker intensity for receptor-to-turbine distances beyond 2,500 meters (8,202 feet) is very low and generally considered imperceptible. In general, increasing proximity to turbines may make shadow flicker more noticeable, with the largest number of shadow flicker hours, along with greatest shadow flicker intensity, occurring nearest the wind turbines.

Shadow flicker frequency is related to the wind turbine's rotor blade speed and the number of blades on the rotor. From a health standpoint, the low flicker frequencies associated with wind turbines, are harmless, and public concerns that flickering light from wind turbines can have negative health effects, such as triggering seizures in people with epilepsy are unfounded. Epilepsy Action (working name for the British Epilepsy Foundation) states that there is no evidence that wind turbines can cause seizures (Epilepsy Action 2008). However, they recommend that wind turbine flicker frequency be limited to 3 Hz. (For comparison, strobe lights used in discotheques have frequencies which range from about 3 Hz to 10 Hz (1 Hz = 1 flash per second). Since the proposed Project's wind turbine blade pass frequency is approximately 0.74-0.8 Hz (less than 1 alternation per second), no negative health effects to individuals with photosensitive epilepsy are anticipated.

Shadow flicker impacts are not regulated in applicable state or federal law, and there is no permitting threshold with regard to hours per year of anticipated impacts to a receptor from a wind energy project. A threshold of 30 hours per year has been widely used in the industry as a target value in the absence of formal guidelines. This threshold originally came from German court case, where a judge found 30 hours of actual shadow flicker per year at a certain neighbor's property to be tolerable (WindPower 2003). The 30 hours per year threshold value has been widely used in the industry as a target value in the absence of formal guidelines. However, predicted shadow flicker greater than this threshold does not necessarily create a nuisance and is still well below concerns for impacts to health such as triggering epileptic seizers.

4.0 WINDPRO SHADOW FLICKER ANALYSIS

An analysis of potential shadow flicker impacts from the Project was conducted using the WindPro software package. The turbine array provided by NPMPP (layout dated December 4, 2015 for both the original Alternatives 2 and 3 and the Modified Proposed Action Option (Alternative 2A)), which includes up to twelve (12) turbine locations, was included in the analysis. The analysis evaluated the following three turbine scenarios:

- Alternative 2: Two (2) Vestas V110-2.0 plus eight (8) Siemens SWT-3.0-113 wind turbines
- Alternative 3: Two (2) Vestas V110-2.0 plus ten (10) Siemens SWT-3.0-113 wind turbines
- Alternative 2A: Nine (9) Siemens SWT-3.3-130 wind turbines

The WindPro analysis was conducted to determine shadow flicker impacts under realistic impact conditions (actual expected shadow). This analysis calculated the total amount of time

(hours and minutes per year) that shadow flicker are expected to occur at receptors surrounding the project. The realistic impact condition scenario is based on the following assumptions:

- The elevation and position geometries of the wind turbines and surrounding receptors (potentially occupied residences). Elevations were determined using United States Geological Survey (USGS) digital elevation model (DEM) data. Positions geometries were determined using geographic information system (GIS) and referenced to Universal Transverse Mercator (UTM) Zone 4 (NAD83).

- The position of the sun and the incident sunlight relative to the wind turbine and receptors on a minute-by-minute basis over the course of a year.

- Historical sunshine availability (percent of total hours available). Historical sunshine rates for the area (as summarized by the National Climatic Data Center (NCDC 2008) for nearby Honolulu, Hawaii) used in this analysis are as follows:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
65%	68%	72%	70%	72%	74%	76%	77%	77%	70%	65%	63%

- Estimated wind turbine operations and orientation (based on approximately 4 years of wind data (4/7/09 – 6/27/13), including the wind speed and wind direction frequency distribution, measured at on-site meteorological towers).

- Receptor viewpoints (i.e., house windows) are conservatively assumed to always be directly facing turbine to sun line of sight ("greenhouse mode").

WindPro incorporates terrain elevation contour information and the analysis accounts for terrain elevation differences. The sun's path with respect to each turbine location is calculated by the software to determine the cast shadow paths every minute over a full year. Sun angles less than 3 degrees above the horizon were excluded, for the reasons identified earlier in this section. Since shadow flicker is only an issue when at least 20% of the sun disc is covered by the blades, WindPro uses blade width dimension data to calculate the maximum distance from the turbine where shadow flicker must be calculated. Beyond this distance, the turbine will not contribute to the shadow flicker impact.

It should be noted however, that WindPro provides a conservative estimate of shadow flicker as obstacles such as trees, haze, and visual obstructions (window facing, coverings) are not fully accounted for despite the likelihood of their reducing or eliminating shadow flicker impacts to receptors. A total of 737 receptor locations were identified within 2.5 kilometers of proposed Project turbines. A receptor in the model is defined as a 1 meter squared area (approximate size of a typical window), 1 meter (3.28 feet) aboveground level. Approximate eye level is set at 1.5 meters (4.94 feet). Figure 2 shows the receptor locations and proposed Project turbines location proposed for Alternatives 2, 3, and 2A.

5.0 SHADOW FLICKER ANALYSIS RESULTS

As expected, WindPro predicts that shadow flicker impacts will be greatest at locations nearer to the wind turbines. Figures 3, 4 and 5 describe the WindPro predicted shadow flicker impact areas for turbine Alternatives 2, 3, and 2A, respectively. Note that Alternative 1 in the associated Environmental Impact Statement is the No Action alternative, under which the Project would not be constructed. Therefore, it is not discussed further here.

Tables 1, 2, and 3 present the WindPro predicted shadow flicker impacts for the receptors with predicted annual shadow flicker impact greater than 30 hours per year, for each of the turbine alternatives modelled. Under Alternative 2 (the Proposed Action), 17 of the 737 receptors had expected shadow flicker impacts of more than 30 hours per year. The predicted shadow flicker impact at any receptor ranged from 0 to 244 hours and 9 minutes (Receptor 647) which is approximately 5.5 percent of the potential available daylight hours. Under Alternative 3 (larger generation wind project), 19 of the 737 receptors had expected shadow flicker impacts of more than 30 hours per year. The predicted shadow flicker impact at any receptor ranged from 0 hours to 393 hours 10 minutes per year (Receptor 647), which is approximately 8.9 percent of the potential available daylight hours. Under Alternative 2A (the Modified Proposed Action Option), 25 of the 737 receptors had expected shadow flicker impacts of more than 30 hours per year. The predicted shadow flicker impact at any receptor ranged from 0 to 258 hours and 19 minutes (Receptor 647), which is approximately 5.8 percent of the potential available daylight hours. A detailed WindPro shadow flicker analysis summary, for the full build-out scenario (Alternative 3) for each of the modeled receptor location, is provided in Attachment A.

Table 1. WindPro Predicted Shadow Flicker Impacts for Receptors with Maximum Expected Impacts – Turbine Alternative 2

Receptor ID	Shadow Hours per Year (expected) [hh:mm / year]	Receptor Status
647	244:09:00	Malaekahana (participating property); farm structure
609	123:24:00	Malaekahana (participating property); farm structure
595	122:38:00	Kahuku Agriculture Park; residence
607	121:50:00	Malaekahana (participating property); farm structure
608	107:01:00	Malaekahana (participating property); farm structure
610	90:55:00	Malaekahana (participating property); farm structure
600	85:43:00	Kahuku Agriculture Park; residence
599	69:28:00	Kahuku Agriculture Park; residence
602	61:38:00	Kahuku Agriculture Park; residence
594	57:43:00	Kahuku Agriculture Park; residence
743	55:58:00	Malaekahana (participating property); farm structure
593	52:00:00	Kahuku Agriculture Park; residence
601	51:56:00	Kahuku Agriculture Park; residence
648	49:05:00	Malaekahana (participating property); farm structure
450	46:26:00	Malaekahana (participating property); farm structure
645	43:48:00	Malaekahana (participating property); farm structure
452	32:58:00	Malaekahana (participating property); farm structure

Table 2. WindPro Predicted Shadow Flicker Impacts for Receptors with Maximum Expected Impacts – Turbine Alternative 3

Receptor ID	Shadow Hours per Year (expected) [hh:mm / year]	Receptor Status
647	393:10:00	Malaekahana (participating property); farm structure
648	286:46:00	Malaekahana (participating property); farm structure
607	160:05:00	Malaekahana (participating property); farm structure
608	135:29:00	Malaekahana (participating property); farm structure
609	130:46:00	Malaekahana (participating property); farm structure
595	127:13:00	Non Project Participant
645	108:39:00	Malaekahana (participating property); farm structure
610	104:16:00	Malaekahana (participating property); farm structure
600	95:38:00	Non Project Participant
599	77:03:00	Non Project Participant
602	68:30:00	Non Project Participant
646	64:56:00	Malaekahana (participating property); farm structure
594	60:34:00	Malaekahana (participating property); farm structure
742	55:58:00	Malaekahana (participating property); farm structure
450	55:19:00	Malaekahana (participating property); farm structure
593	52:00:00	Non Project Participant
601	51:57:00	Non Project Participant
452	32:59:00	Malaekahana (participating property); farm structure
431	31:35:00	Malaekahana (participating property); farm structure

Table 3. WindPro Predicted Shadow Flicker Impacts for Receptors with Maximum Expected Impacts – Turbine Alternative 2a

Receptor ID	Shadow Hours per Year (expected) [hh:mm / year]	Receptor Status
647	258:19:00	Malaekahana (participating property); farm structure
595	174:46:00	Non Project Participant
607	147:47:00	Malaekahana (participating property); farm structure
609	146:26:00	Malaekahana (participating property); farm structure
608	105:37:00	Malaekahana (participating property); farm structure
610	104:51:00	Malaekahana (participating property); farm structure
600	101:30:00	Non Project Participant
599	95:00:00	Non Project Participant
594	85:08:00	Non Project Participant
593	84:35:00	Non Project Participant
602	82:04:00	Non Project Participant
601	79:24:00	Non Project Participant
648	78:06:00	Malaekahana (participating property); farm structure
743	65:53:00	Malaekahana (participating property); farm structure
450	63:49:00	Malaekahana (participating property); farm structure
452	59:12:00	Malaekahana (participating property); farm structure
606	49:14:00	Malaekahana (participating property); farm structure
645	39:58:00	Malaekahana (participating property); farm structure
592	35:29:00	Non Project Participant
431	34:41:00	Malaekahana (participating property); farm structure
530	30:55:00	Non Project Participant

Table 3. WindPro Predicted Shadow Flicker Impacts for Receptors with Maximum Expected Impacts – Turbine Alternative 2a (continued)

Receptor ID	Shadow Hours per Year (expected) [hh:mm / year]	Receptor Status
531	30:46:00	Non Project Participant
529	30:41:00	Non Project Participant
532	30:27:00	Non Project Participant
528	30:10:00	Non Project Participant

The shadow flicker impact prediction statistics are summarized in Tables 4 through 6, for each of the turbine alternatives modeled.

Table 4. Statistical Summary of WindPro Predicted Shadow Flicker Impacts at Modeled Receptor Locations – Turbine Alternative 2

Cumulative Shadow Flicker Time (expected)	Number of Receptors
Total	737
= 0 Hours	490
> 0 Hours < 10 Hours	162
≥ 10 Hours < 20 Hours	60
≥ 20 Hours < 30 Hours	8
≥ 30 Hours	17

Table 5. Statistical Summary of WindPro Predicted Shadow Flicker Impacts at Modeled Receptor Locations – Turbine Alternative 3

Cumulative Shadow Flicker Time (expected)	Number of Receptors
Total	737
= 0 Hours	489
> 0 Hours < 10 Hours	162
≥ 10 Hours < 20 Hours	60
≥ 20 Hours < 30 Hours	7
≥ 30 Hours	19

Table 6. Statistical Summary of WindPro Predicted Shadow Flicker Impacts at Modeled Receptor Locations – Turbine Alternative 2a

Cumulative Shadow Flicker Time (expected)	Number of Receptors
Total	737
= 0 Hours	537
> 0 Hours < 10 Hours	70
≥ 10 Hours < 20 Hours	75
≥ 20 Hours < 30 Hours	30
≥ 30 Hours	25

6.0 CONCLUSION

The analysis of potential shadow flicker impacts from the Project on nearby receptors shows that shadow flicker impacts for the large majority of receptors expected to be well within acceptable industry standard ranges for avoiding nuisance impacts. The analysis was deliberately conservative and actual shadow flicker is expected to occur for less than the modeled durations. The analysis assumes that the receptors all have a direct in-line view of the incoming shadow flicker sunlight and does not account for trees or other obstructions which may block sunlight. In reality, the windows of many houses will not face the sun directly for the key shadow flicker impact times.

Only 17 of the 737 receptors modeled had expected shadow flicker impacts of more than 30 hours per year under the Proposed Action. Of these 17 receptors, 10~~9~~ are located within the Project boundary on the Malaekahana Hui West, LLC parcel which is leasing land to the Project developer ~~and will work with tenant farmers to mitigate any possible shadow flicker impacts~~. No federal, state, or local regulations regulate shadow flicker; however, the 30 hours per year threshold is an industry standard that has been widely adopted in the United States as a threshold to evaluate shadow flicker impacts. There would be no shadow flicker impacts (zero hours of shadow flicker time) at the Kahuku Elementary School, Kahuku High School, or Kahuku Medical Center.

Mitigation measures such as strategic vegetative screening and/or installation of curtains and blinds on the windows facing the turbine casting the shadows are effective and economically viable mitigation options that the Project could consider on an individual basis with landowners, if necessary.

7.0 REFERENCES

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FIGURES

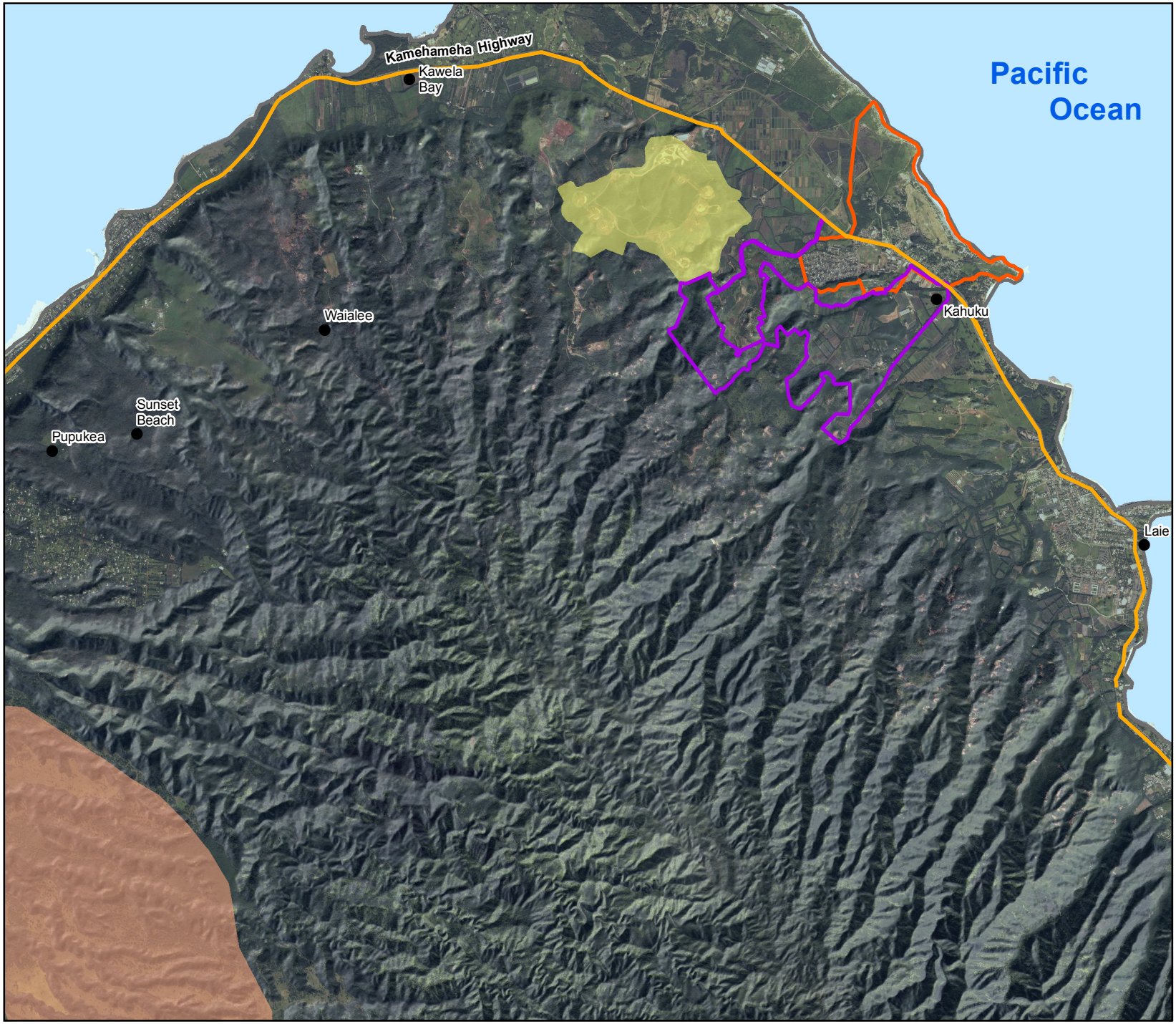


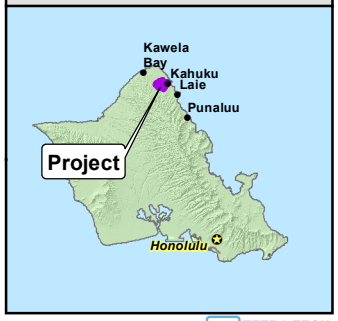
Figure 1

Na Pua Makani Wind Project

Vicinity Map

Oahu, HI
December 2015

- Wind Farm Site
- Kahuku Town
- Kahuku Wind Farm (First Wind)
- Kawailoa Wind Farm (First Wind)
- State Highway
- City/Town



1:65,000 WGS 1984 UTM 4

0 0.5 1 2 3 4 5 Miles

Data Sources Champlin: project facilities / ESRI: roads, cities / Hawaii Statewide GIS Program: city boundaries, vicinity wind projects, Kahuku training facility / USDA NAIP: aerial imagery

TETRA TECH

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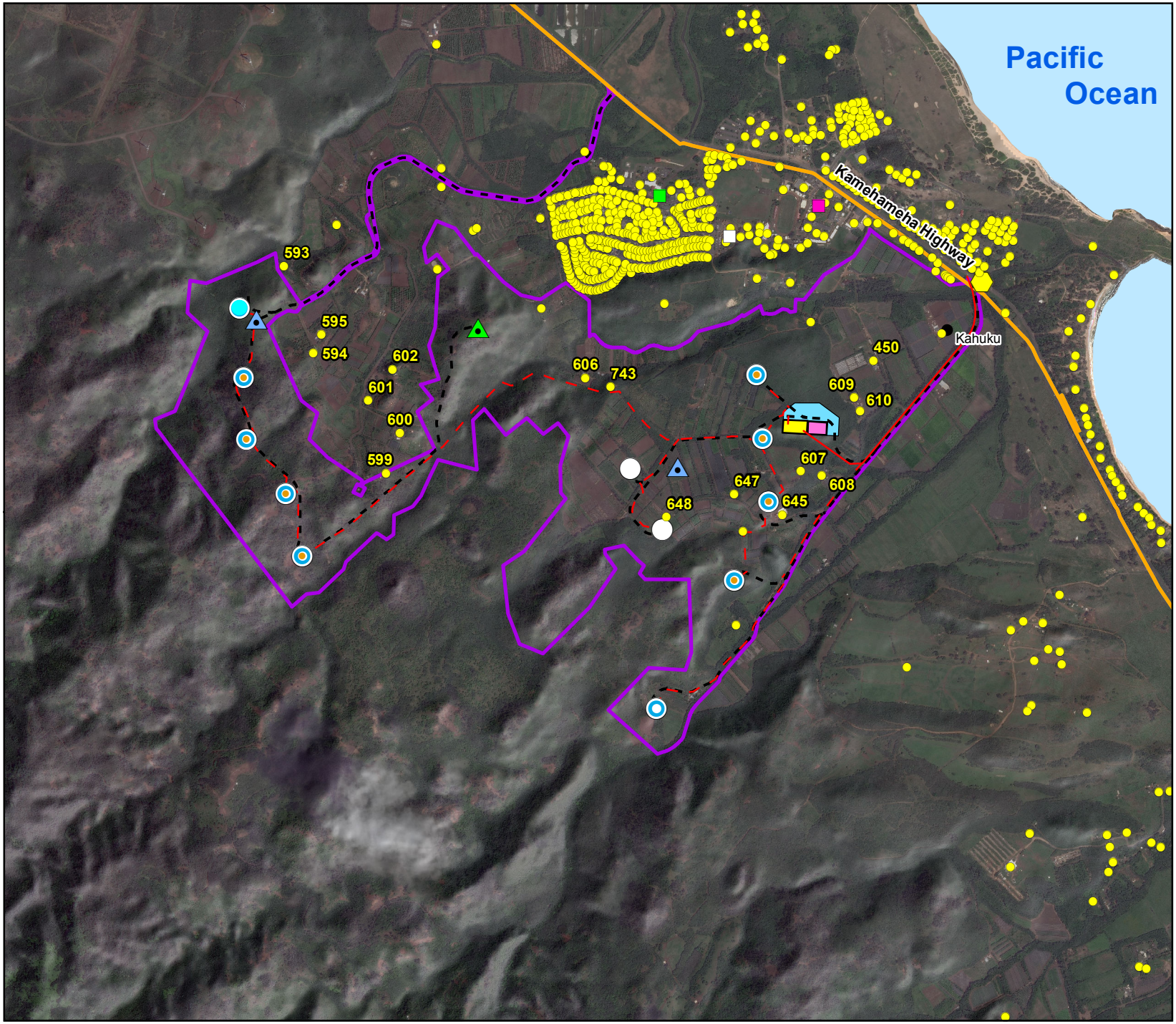


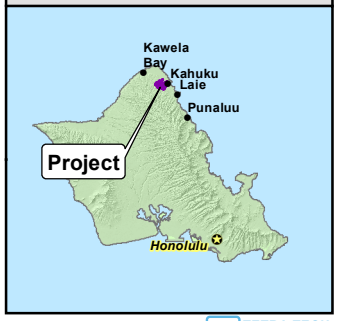
Figure 2

Na Pua Makani Wind Project

Wind Turbine and Receptor Locations

Oahu, HI
December 2015

- Wind Farm Site
- Sensitive Receptor
- Kahuku Elementary School
- Kahuku High School
- Kahuku Medical Center
- Permanent Met Tower
- Temporary Met Tower
- Alt 2a Potential Turbine Loc
- Alt 2 Potential Turbine Loc.
- Alt 3 Potential Turbine Loc.
- Line Tap Location
- Collector Substation and Point of Interconnect
- Laydown Area
- O&M Facility
- Transmission Line
- Collector Line
- Access Road
- City/Town
- State Highway



1:22,000 WGS 1984 UTM 4

0 0.25 0.5 1 Miles

Data Sources Champlin: project facilities / ESRI: roads / Tetra Tech: shadow flicker isopleths / DigitalGlobe: aerial imagery

TETRA TECH

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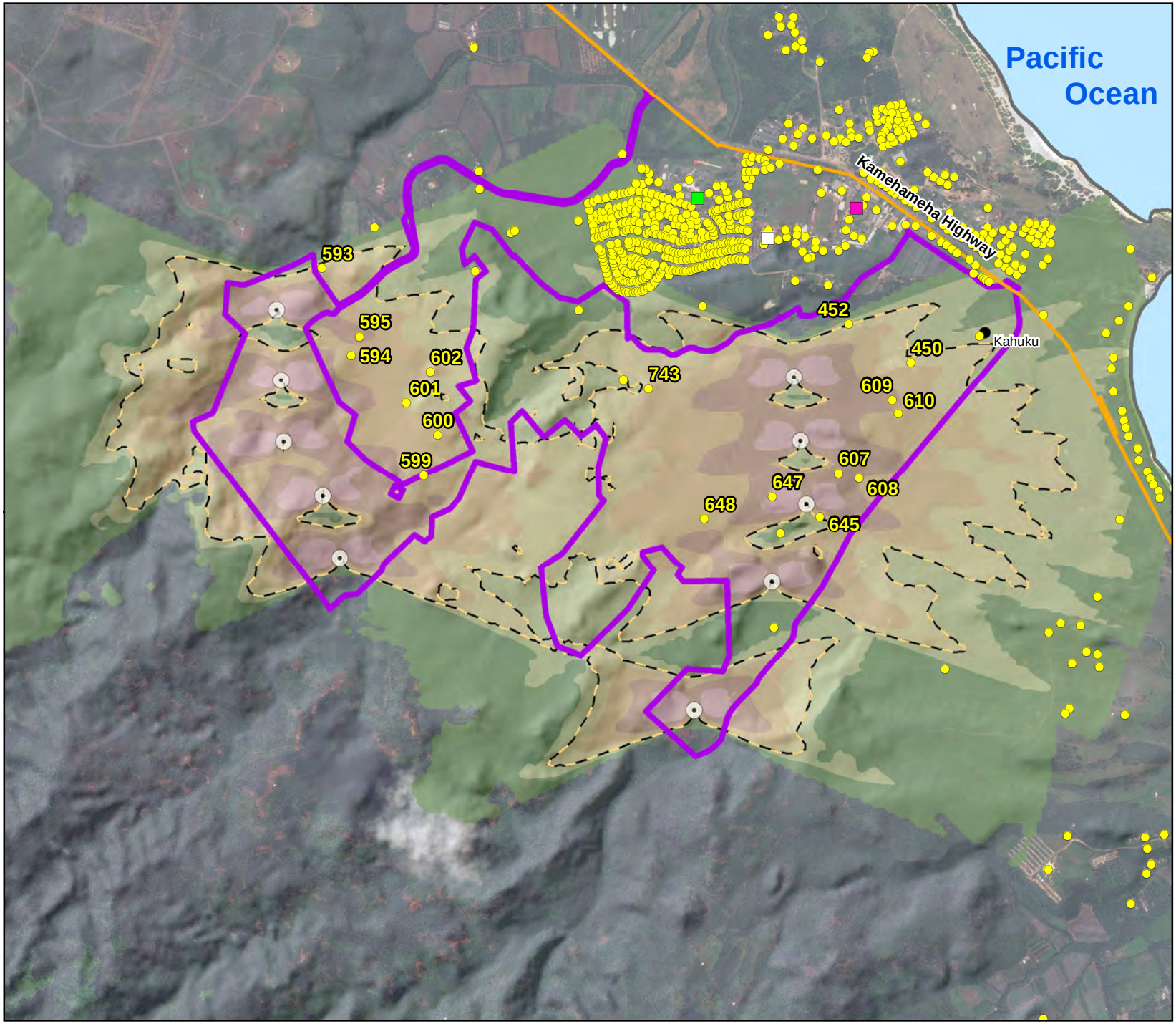


Figure 3

Na Pua Makani Wind Project

WindPro Expected Shadow Flicker Impact Areas Turbine Alternative 2

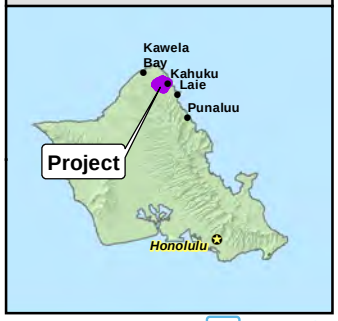
Oahu, HI
December 2015

- Sensitive Receptor *
- Kahuku Elementary School
- Kahuku High School
- Kahuku Medical Center
- Alt 2 Potential Turbine Loc.
- City/Town
- State Highway
- Wind Farm Site
- Shadow Flicker Boundary (30 hours per year)

Shadow Flicker (hours per year)

- 0 - 15
- 15 - 30
- 30 - 50
- 50 - 100
- 100 - 200
- > 200

*** Only sensitive receptors with greater than 30 hours of shadow flicker per year labeled.**



1:22,000 **WGS 1984 UTM 4**

0 0.25 0.5 1 Miles

Data Sources Champlin: project facilities / ESRI: roads / Tetra Tech: shadow flicker isopleths / DigitalGlobe: aerial imagery

TETRA TECH

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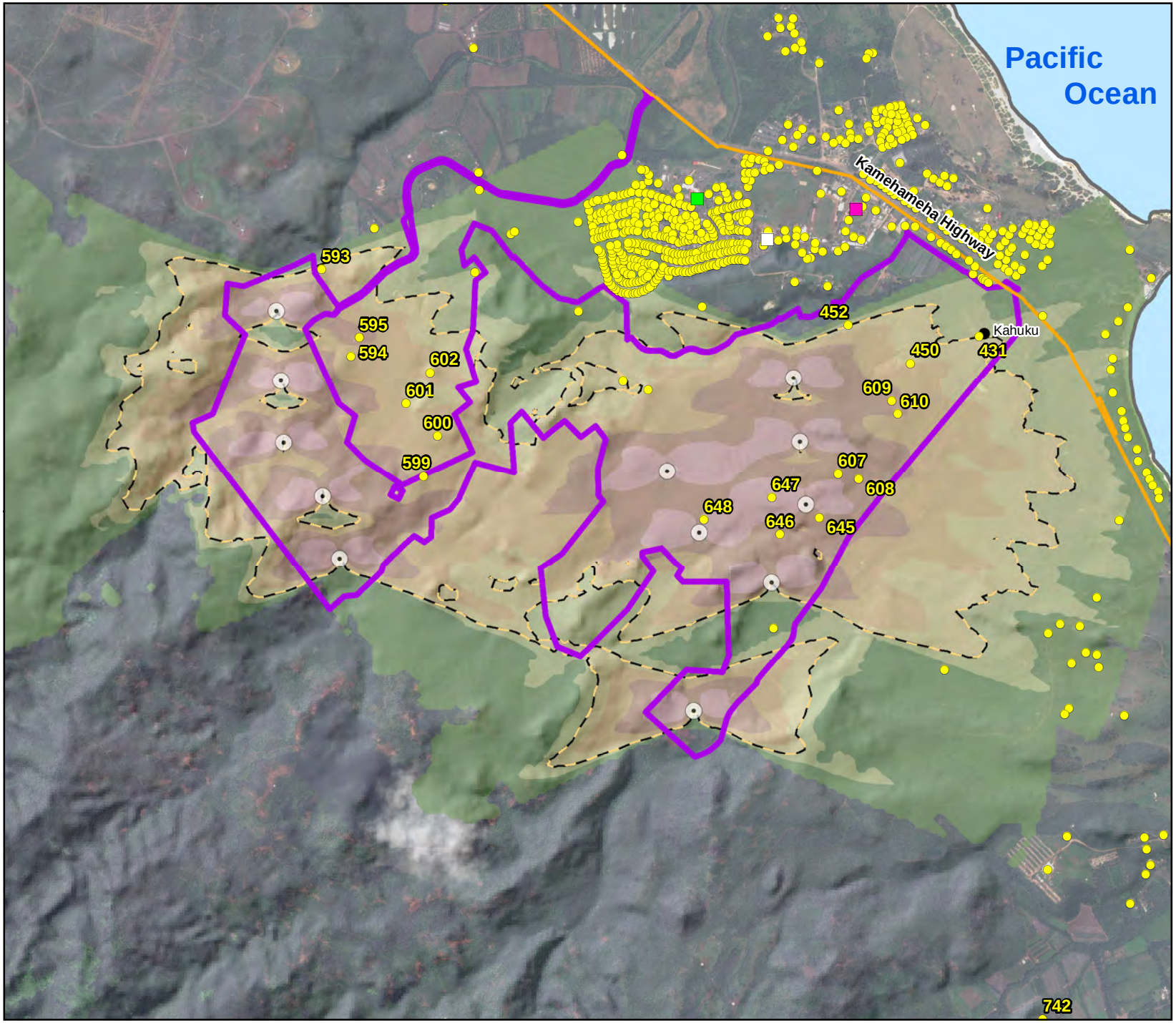


Figure 4

Na Pua Makani Wind Project

WindPro Expected Shadow Flicker Impact Areas Turbine Alternative 3

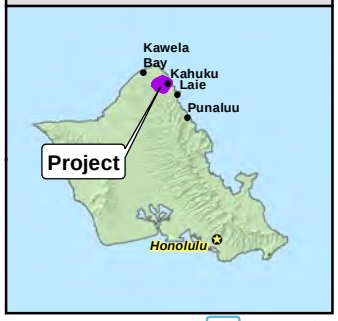
Oahu, HI
December 2015

- Sensitive Receptor *
- Kahuku Elementary School
- Kahuku High School
- Kahuku Medical Center
- Alt 3 Potential Turbine Loc.
- City/Town
- State Highway
- Wind Farm Site
- Shadow Flicker Boundary (30 hours per year)

Shadow Flicker (hours per year)

- 0 - 15
- 15 - 30
- 30 - 50
- 50 - 100
- 100 - 200
- > 200

*** Only sensitive receptors with greater than 30 hours of shadow flicker per year labeled.**



1:22,000 **WGS 1984 UTM 4**

0 0.25 0.5 1 Miles

Data Sources Champlin: project facilities / ESRI: roads / Tetra Tech: shadow flicker isopleths / DigitalGlobe: aerial imagery

TETRA TECH

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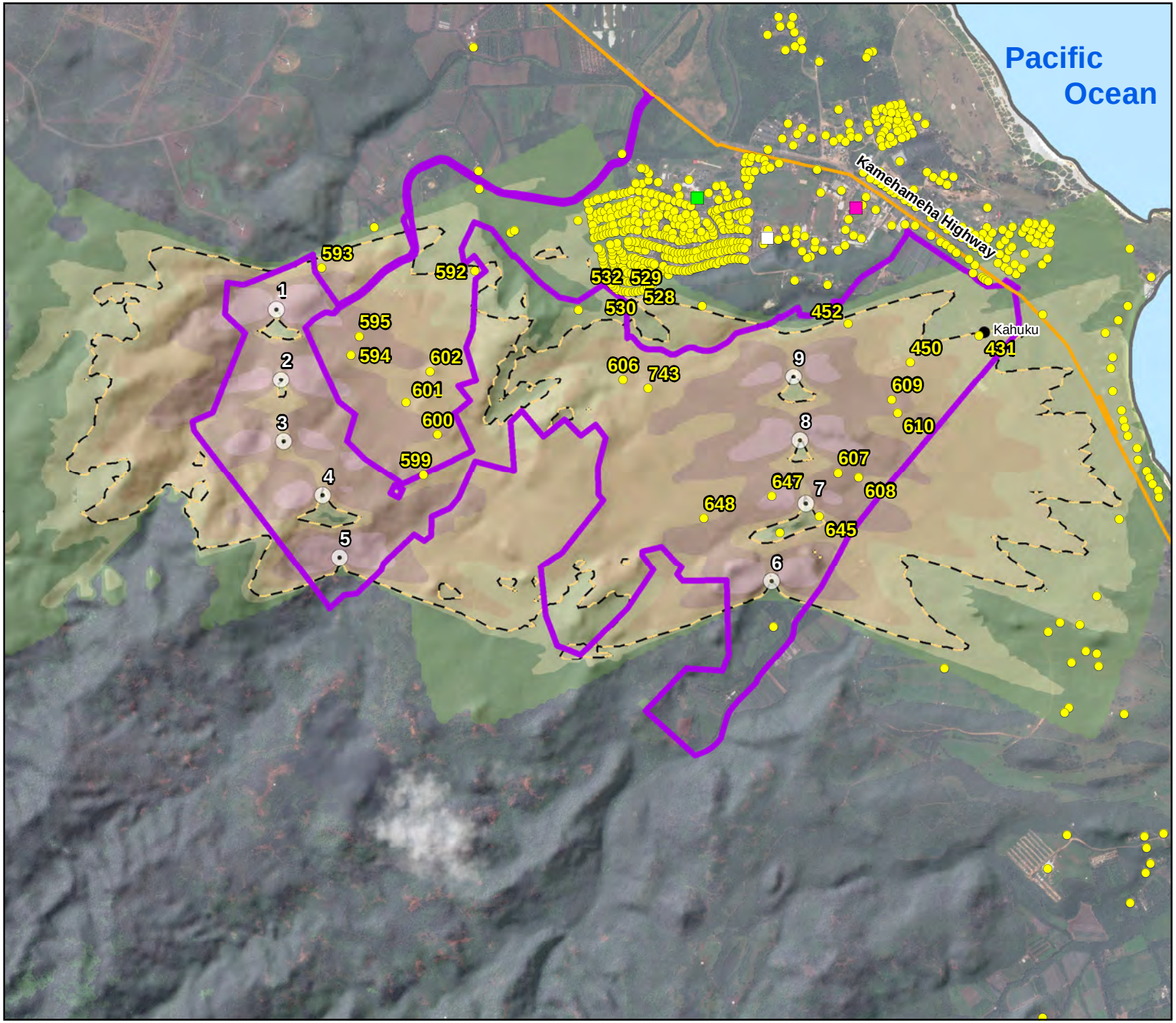


Figure 5

Na Pua Makani Wind Project

WindPro Expected Shadow Flicker Impact Areas Turbine Alternative 2a

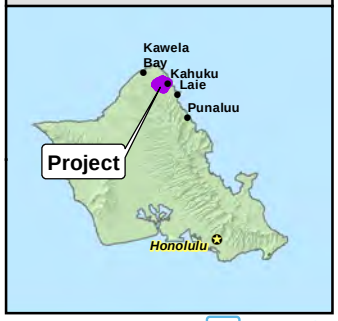
Oahu, HI
December 2015

- Sensitive Receptor *
- Kahuku Elementary School
- Kahuku High School
- Kahuku Medical Center
- Alt 2a Potential Turbine Loc.
- City/Town
- State Highway
- Wind Farm Site
- Shadow Flicker Boundary (30 hours per year)

Shadow Flicker (hours per year)

- 0 - 15
- 15 - 30
- 30 - 50
- 50 - 100
- 100 - 200
- > 200

*** Only sensitive receptors with greater than 30 hours of shadow flicker per year labeled.**



1:22,000 **WGS 1984 UTM 4**

0 0.25 0.5 1 Miles

Data Sources Champlin: project facilities / ESRI: roads / Tetra Tech: shadow flicker isopleths / DigitalGlobe: aerial imagery

TETRA TECH

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ATTACHMENT A.

Detailed Summary of WindPro Shadow Flicker Analysis Results

Na Pua Makani Energy Wind Project
WindPro Shadow Flicker Analysis Results Summary

Turbine Alternative 3

Receptor ID	UTM-E (m)	UTM-N (m)	WindPro Predicted Expected Shadow Flicker (Hours per Year)
1	607,176	2,399,049	0:00:00
2	606,746	2,398,890	0:00:00
3	606,799	2,398,858	0:00:00
4	606,842	2,398,805	0:00:00
5	606,658	2,398,901	0:00:00
6	604,655	2,398,661	0:00:00
7	604,645	2,398,491	0:00:00
8	607,253	2,398,382	0:00:00
9	607,199	2,398,126	0:00:00
10	607,636	2,398,333	0:00:00
11	607,593	2,398,333	0:00:00
12	607,512	2,398,229	0:00:00
13	608,083	2,398,265	0:00:00
14	608,168	2,398,224	0:00:00
15	608,939	2,397,915	0:00:00
16	608,922	2,397,913	0:00:00
17	608,912	2,397,893	0:00:00
18	608,841	2,397,626	0:00:00
19	608,918	2,397,620	0:00:00
20	608,957	2,397,631	0:00:00
21	608,950	2,397,656	0:00:00
22	608,952	2,397,678	0:00:00
23	608,976	2,397,685	0:00:00
24	608,995	2,397,674	0:00:00
25	608,983	2,397,640	0:00:00
26	609,005	2,397,639	0:00:00
27	608,998	2,397,612	0:00:00
28	609,035	2,397,614	0:00:00
29	609,058	2,397,622	0:00:00
30	609,077	2,397,645	0:00:00
31	609,083	2,397,622	0:00:00
32	609,093	2,397,602	0:00:00
33	609,058	2,397,596	0:00:00
34	609,038	2,397,593	0:00:00
35	608,984	2,397,593	0:00:00
36	609,039	2,397,639	0:00:00
37	609,043	2,397,666	0:00:00
38	609,069	2,397,663	0:00:00
39	609,059	2,397,685	0:00:00
40	609,053	2,397,703	0:00:00
41	609,027	2,397,699	0:00:00
42	609,007	2,397,695	0:00:00
43	609,015	2,397,668	0:00:00
44	609,150	2,397,622	0:00:00
45	609,119	2,397,651	0:00:00
46	608,720	2,397,875	0:00:00
47	608,594	2,397,624	0:00:00

Receptor ID	UTM-E (m)	UTM-N (m)	WindPro Predicted Expected Shadow Flicker (Hours per Year)
48	608,652	2,397,607	0:00:00
49	608,798	2,397,682	0:00:00
50	608,615	2,398,057	0:00:00
51	608,509	2,397,984	0:00:00
52	608,562	2,398,018	0:00:00
53	608,555	2,398,058	0:00:00
54	608,604	2,398,024	0:00:00
55	608,619	2,397,995	0:00:00
56	608,647	2,397,960	0:00:00
57	608,651	2,397,927	0:00:00
58	608,622	2,397,938	0:00:00
59	608,582	2,397,923	0:00:00
60	607,315	2,397,935	0:00:00
61	604,622	2,397,929	0:00:00
62	606,910	2,397,202	0:00:00
63	607,335	2,397,430	0:00:00
64	607,465	2,397,178	0:00:00
65	607,479	2,397,188	4:44:00
66	607,739	2,397,228	13:31:00
67	607,336	2,397,356	0:00:00
68	607,918	2,397,499	6:01:00
69	607,995	2,397,440	3:59:00
70	608,013	2,397,439	3:52:00
71	608,065	2,397,384	3:21:00
72	607,973	2,397,379	7:48:00
73	608,000	2,397,377	8:37:00
74	608,025	2,397,391	3:36:00
75	608,028	2,397,420	3:39:00
76	608,190	2,397,397	2:50:00
77	608,143	2,397,364	2:56:00
78	608,207	2,397,343	2:42:00
79	608,153	2,397,330	2:53:00
80	607,891	2,397,180	8:46:00
81	607,883	2,397,210	9:34:00
82	607,870	2,397,204	9:45:00
83	607,879	2,397,178	8:59:00
84	607,868	2,397,176	9:11:00
85	607,856	2,397,174	9:25:00
86	607,843	2,397,170	9:30:00
87	607,833	2,397,166	9:42:00
88	607,820	2,397,165	10:02:00
89	607,804	2,397,157	10:15:00
90	607,802	2,397,185	11:15:00
91	607,824	2,397,190	10:34:00
92	607,839	2,397,193	10:20:00
93	607,855	2,397,196	9:55:00
94	607,798	2,397,209	13:31:00
95	607,794	2,397,227	13:44:00
96	607,817	2,397,233	13:23:00
97	607,833	2,397,239	13:11:00
98	607,856	2,397,240	12:40:00
99	607,875	2,397,242	12:07:00
100	607,872	2,397,264	12:33:00

Receptor ID	UTM-E (m)	UTM-N (m)	WindPro Predicted Expected Shadow Flicker (Hours per Year)
101	607,862	2,397,283	11:51:00
102	607,847	2,397,266	12:33:00
103	607,832	2,397,266	12:21:00
104	607,816	2,397,257	12:45:00
105	607,793	2,397,248	12:59:00
106	607,783	2,397,274	11:02:00
107	607,778	2,397,301	8:28:00
108	607,800	2,397,309	8:29:00
109	607,817	2,397,315	8:30:00
110	607,833	2,397,317	8:51:00
111	607,850	2,397,323	8:46:00
112	607,865	2,397,326	8:59:00
113	607,880	2,397,332	8:49:00
114	607,897	2,397,332	9:26:00
115	607,910	2,397,336	9:22:00
116	607,926	2,397,342	9:16:00
117	607,942	2,397,343	9:37:00
118	607,957	2,397,349	9:33:00
119	607,987	2,397,346	10:05:00
120	608,014	2,397,343	10:25:00
121	608,036	2,397,339	10:25:00
122	608,062	2,397,329	3:15:00
123	608,082	2,397,325	3:08:00
124	608,104	2,397,317	3:06:00
125	608,133	2,397,307	2:54:00
126	608,154	2,397,303	2:50:00
127	608,176	2,397,293	2:44:00
128	608,198	2,397,289	2:39:00
129	607,923	2,397,182	8:13:00
130	607,934	2,397,190	8:11:00
131	607,946	2,397,193	7:59:00
132	607,965	2,397,192	7:43:00
133	607,981	2,397,188	7:22:00
134	607,987	2,397,219	7:43:00
135	607,968	2,397,228	8:15:00
136	607,948	2,397,221	8:32:00
137	607,930	2,397,221	8:47:00
138	607,915	2,397,217	9:06:00
139	607,972	2,397,251	8:35:00
140	607,971	2,397,270	9:25:00
141	607,903	2,397,255	11:39:00
142	607,922	2,397,262	11:18:00
143	607,932	2,397,265	10:56:00
144	607,953	2,397,273	10:27:00
145	607,956	2,397,305	11:22:00
146	607,931	2,397,293	11:33:00
147	607,909	2,397,289	11:52:00
148	607,894	2,397,282	12:03:00
149	607,981	2,397,308	11:01:00
150	607,987	2,397,293	10:30:00
151	608,016	2,397,177	6:57:00
152	608,028	2,397,181	6:47:00
153	608,040	2,397,178	6:42:00

Receptor ID	UTM-E (m)	UTM-N (m)	WindPro Predicted Expected Shadow Flicker (Hours per Year)
154	608,055	2,397,172	6:25:00
155	608,050	2,397,196	6:39:00
156	608,054	2,397,231	6:56:00
157	608,044	2,397,254	7:23:00
158	608,022	2,397,222	7:10:00
159	608,012	2,397,288	8:55:00
160	608,016	2,397,309	10:19:00
161	608,049	2,397,301	8:18:00
162	608,028	2,397,284	8:16:00
163	608,018	2,397,248	7:39:00
164	608,131	2,397,268	2:53:00
165	608,139	2,397,236	2:47:00
166	608,131	2,397,214	2:50:00
167	608,122	2,397,239	2:55:00
168	608,103	2,397,250	3:00:00
169	608,110	2,397,278	3:00:00
170	608,085	2,397,286	3:05:00
171	608,069	2,397,266	7:08:00
172	608,069	2,397,248	6:54:00
173	608,049	2,397,212	6:45:00
174	608,102	2,397,195	6:08:00
175	608,096	2,397,183	6:09:00
176	608,076	2,397,168	6:15:00
177	608,093	2,397,167	6:03:00
178	608,102	2,397,164	6:00:00
179	608,113	2,397,158	5:57:00
180	608,124	2,397,155	2:52:00
181	608,124	2,397,178	2:50:00
182	608,148	2,397,144	2:46:00
183	608,167	2,397,147	2:45:00
184	608,176	2,397,152	2:39:00
185	608,190	2,397,153	2:38:00
186	608,202	2,397,157	2:35:00
187	608,216	2,397,157	2:33:00
188	608,194	2,397,174	2:35:00
189	608,167	2,397,170	2:42:00
190	608,169	2,397,184	2:41:00
191	608,194	2,397,196	2:36:00
192	608,221	2,397,211	2:29:00
193	608,219	2,397,233	2:31:00
194	608,211	2,397,254	2:36:00
195	608,191	2,397,233	2:38:00
196	608,194	2,397,214	2:34:00
197	608,169	2,397,204	2:41:00
198	608,153	2,397,209	2:47:00
199	608,159	2,397,240	2:44:00
200	608,178	2,397,256	2:39:00
201	607,821	2,397,116	4:24:00
202	607,870	2,397,131	4:06:00
203	607,897	2,397,137	8:10:00
204	607,973	2,397,141	7:14:00
205	607,957	2,397,145	7:29:00
206	607,942	2,397,145	7:41:00

Receptor ID	UTM-E (m)	UTM-N (m)	WindPro Predicted Expected Shadow Flicker (Hours per Year)
207	607,942	2,397,131	7:32:00
208	607,952	2,397,120	7:21:00
209	607,973	2,397,116	7:09:00
210	607,985	2,397,115	6:57:00
211	607,998	2,397,108	6:46:00
212	608,012	2,397,105	6:37:00
213	608,071	2,397,116	6:05:00
214	608,057	2,397,120	6:14:00
215	608,044	2,397,125	6:25:00
216	608,032	2,397,128	6:33:00
217	608,022	2,397,131	6:36:00
218	608,009	2,397,135	6:49:00
219	607,996	2,397,135	6:54:00
220	607,985	2,397,141	7:06:00
221	608,096	2,397,111	5:58:00
222	608,108	2,397,107	5:50:00
223	608,124	2,397,102	5:42:00
224	608,239	2,397,158	2:29:00
225	608,253	2,397,162	2:26:00
226	608,267	2,397,168	0:00:00
227	608,290	2,397,166	0:00:00
228	608,289	2,397,180	0:00:00
229	608,280	2,397,196	0:00:00
230	608,272	2,397,207	0:00:00
231	608,263	2,397,219	0:00:00
232	608,239	2,397,182	2:32:00
233	608,282	2,397,262	0:00:00
234	608,294	2,397,251	0:00:00
235	608,302	2,397,242	0:00:00
236	608,309	2,397,232	0:00:00
237	608,317	2,397,221	0:00:00
238	608,325	2,397,205	0:00:00
239	608,332	2,397,190	0:00:00
240	608,354	2,397,191	0:00:00
241	608,368	2,397,194	0:00:00
242	608,381	2,397,195	0:00:00
243	608,393	2,397,193	0:00:00
244	608,408	2,397,193	0:00:00
245	608,426	2,397,187	0:00:00
246	608,357	2,397,209	0:00:00
247	608,353	2,397,228	0:00:00
248	608,350	2,397,247	0:00:00
249	608,383	2,397,248	0:00:00
250	608,397	2,397,250	0:00:00
251	608,411	2,397,255	0:00:00
252	608,423	2,397,258	0:00:00
253	608,436	2,397,260	0:00:00
254	608,408	2,397,229	0:00:00
255	608,427	2,397,233	0:00:00
256	608,300	2,397,268	0:00:00
257	608,306	2,397,273	0:00:00
258	608,330	2,397,281	0:00:00
259	608,346	2,397,284	0:00:00

Receptor ID	UTM-E (m)	UTM-N (m)	WindPro Predicted Expected Shadow Flicker (Hours per Year)
260	608,354	2,397,286	0:00:00
261	608,366	2,397,289	0:00:00
262	608,378	2,397,293	0:00:00
263	608,390	2,397,297	0:00:00
264	608,400	2,397,301	0:00:00
265	608,413	2,397,301	0:00:00
266	608,426	2,397,305	0:00:00
267	608,270	2,397,341	0:00:00
268	608,311	2,397,313	0:00:00
269	608,348	2,397,323	0:00:00
270	608,341	2,397,346	0:00:00
271	608,327	2,397,370	0:00:00
272	608,302	2,397,368	0:00:00
273	608,391	2,397,335	0:00:00
274	608,235	2,397,107	2:30:00
275	608,246	2,397,112	2:28:00
276	608,256	2,397,118	2:25:00
277	608,270	2,397,119	0:00:00
278	608,278	2,397,122	0:00:00
279	608,294	2,397,124	0:00:00
280	608,305	2,397,131	0:00:00
281	608,316	2,397,131	0:00:00
282	608,325	2,397,136	0:00:00
283	608,337	2,397,137	0:00:00
284	608,352	2,397,139	0:00:00
285	608,361	2,397,141	0:00:00
286	608,371	2,397,141	0:00:00
287	608,389	2,397,139	0:00:00
288	608,402	2,397,139	0:00:00
289	608,415	2,397,140	0:00:00
290	608,428	2,397,138	0:00:00
291	608,508	2,397,151	0:00:00
292	608,511	2,397,189	0:00:00
293	608,493	2,397,131	0:00:00
294	608,425	2,397,485	0:00:00
295	608,417	2,397,464	0:00:00
296	608,437	2,397,466	0:00:00
297	608,446	2,397,485	0:00:00
298	608,474	2,397,481	0:00:00
299	608,497	2,397,475	0:00:00
300	608,503	2,397,453	0:00:00
301	608,496	2,397,436	0:00:00
302	608,521	2,397,445	0:00:00
303	608,556	2,397,461	0:00:00
304	608,429	2,397,370	0:00:00
305	608,441	2,397,398	0:00:00
306	608,419	2,397,403	0:00:00
307	608,419	2,397,428	0:00:00
308	608,436	2,397,428	0:00:00
309	608,457	2,397,429	0:00:00
310	608,631	2,397,581	0:00:00
311	608,570	2,397,562	0:00:00
312	608,512	2,397,517	0:00:00

Receptor ID	UTM-E (m)	UTM-N (m)	WindPro Predicted Expected Shadow Flicker (Hours per Year)
313	608,614	2,397,534	0:00:00
314	608,688	2,397,564	0:00:00
315	608,552	2,397,151	0:00:00
316	608,587	2,397,161	0:00:00
317	608,581	2,397,192	0:00:00
318	608,630	2,397,192	0:00:00
319	608,628	2,397,170	0:00:00
320	608,622	2,397,137	0:00:00
321	608,661	2,397,166	0:00:00
322	608,702	2,397,118	0:00:00
323	608,704	2,397,143	0:00:00
324	608,726	2,397,343	0:00:00
325	608,711	2,397,436	0:00:00
326	608,972	2,397,575	0:00:00
327	608,969	2,397,556	0:00:00
328	608,977	2,397,531	0:00:00
329	609,004	2,397,540	0:00:00
330	609,023	2,397,549	0:00:00
331	609,009	2,397,567	0:00:00
332	609,101	2,397,582	0:00:00
333	609,075	2,397,572	0:00:00
334	609,055	2,397,564	0:00:00
335	609,048	2,397,469	0:00:00
336	609,114	2,397,284	0:00:00
337	609,091	2,397,303	0:00:00
338	609,105	2,397,353	0:00:00
339	609,069	2,397,313	0:00:00
340	609,050	2,397,332	0:00:00
341	609,026	2,397,340	0:00:00
342	609,010	2,397,352	0:00:00
343	608,990	2,397,366	0:00:00
344	608,972	2,397,378	0:00:00
345	608,952	2,397,393	0:00:00
346	608,928	2,397,399	0:00:00
347	608,968	2,397,427	0:00:00
348	608,923	2,397,596	0:00:00
349	608,846	2,397,590	0:00:00
350	608,849	2,397,569	0:00:00
351	608,805	2,397,563	0:00:00
352	608,827	2,397,548	0:00:00
353	608,778	2,397,551	0:00:00
354	608,897	2,397,480	0:00:00
355	608,878	2,397,567	0:00:00
356	608,747	2,397,575	0:00:00
357	608,899	2,397,424	0:00:00
358	608,826	2,397,191	0:00:00
359	608,840	2,397,235	0:00:00
360	608,870	2,397,274	0:00:00
361	608,896	2,397,291	0:00:00
362	608,950	2,397,274	0:00:00
363	608,810	2,397,352	0:00:00
364	608,911	2,397,326	0:00:00
365	609,014	2,397,209	0:00:00

Receptor ID	UTM-E (m)	UTM-N (m)	WindPro Predicted Expected Shadow Flicker (Hours per Year)
366	609,069	2,397,213	0:00:00
367	608,861	2,397,168	0:00:00
368	608,892	2,397,155	0:00:00
369	608,796	2,397,108	0:00:00
370	608,825	2,397,128	0:00:00
371	609,109	2,397,209	0:00:00
372	609,175	2,397,168	0:00:00
373	609,214	2,397,142	0:00:00
374	609,236	2,397,129	0:00:00
375	609,257	2,397,114	0:00:00
376	609,358	2,397,122	0:00:00
377	609,339	2,397,134	0:00:00
378	609,300	2,397,159	0:00:00
379	609,282	2,397,172	0:00:00
380	609,261	2,397,186	0:00:00
381	609,240	2,397,194	0:00:00
382	609,221	2,397,211	0:00:00
383	609,175	2,397,239	0:00:00
384	609,248	2,397,262	0:00:00
385	609,158	2,397,426	0:00:00
386	609,185	2,397,405	0:00:00
387	609,210	2,397,389	0:00:00
388	609,229	2,397,416	0:00:00
389	609,267	2,397,407	0:00:00
390	609,240	2,397,375	0:00:00
391	609,404	2,397,283	0:00:00
392	609,383	2,397,100	0:00:00
393	609,398	2,397,129	0:00:00
394	609,409	2,397,157	0:00:00
395	609,424	2,397,180	0:00:00
396	609,402	2,397,202	0:00:00
397	609,386	2,397,177	0:00:00
398	609,373	2,397,153	0:00:00
399	609,333	2,397,186	0:00:00
400	609,354	2,397,170	0:00:00
401	609,302	2,397,204	0:00:00
402	609,491	2,397,105	0:00:00
403	609,505	2,397,123	0:00:00
404	609,476	2,397,149	0:00:00
405	609,457	2,397,128	0:00:00
406	609,466	2,397,191	0:00:00
407	609,494	2,397,175	0:00:00
408	609,599	2,397,139	0:00:00
409	609,575	2,397,157	0:00:00
410	609,546	2,397,178	0:00:00
411	609,506	2,397,204	0:00:00
412	609,572	2,397,221	0:00:00
413	609,559	2,397,200	0:00:00
414	609,583	2,397,188	0:00:00
415	609,597	2,397,213	0:00:00
416	609,637	2,397,218	0:00:00
417	609,663	2,397,196	0:00:00
418	609,655	2,397,177	0:00:00

Receptor ID	UTM-E (m)	UTM-N (m)	WindPro Predicted Expected Shadow Flicker (Hours per Year)
419	609,623	2,397,196	0:00:00
420	609,609	2,397,172	0:00:00
421	609,636	2,397,156	0:00:00
422	609,660	2,397,138	0:00:00
423	609,626	2,397,131	0:00:00
424	609,984	2,397,115	9:07:00
425	610,071	2,396,998	4:48:00
426	609,976	2,396,880	13:59:00
427	609,885	2,396,770	19:36:00
428	609,937	2,396,822	16:23:00
429	609,914	2,396,671	20:20:00
430	609,629	2,396,844	10:27:00
431	609,370	2,396,760	24:31:00
432	609,330	2,397,070	0:00:00
433	609,353	2,397,048	0:00:00
434	609,346	2,397,014	0:00:00
435	609,382	2,396,998	0:00:00
436	609,388	2,396,991	0:00:00
437	609,396	2,396,987	0:00:00
438	609,407	2,396,981	0:00:00
439	609,446	2,397,055	0:00:00
440	609,474	2,397,039	0:00:00
441	609,492	2,397,024	0:00:00
442	609,522	2,397,010	5:48:00
443	609,543	2,397,033	2:35:00
444	609,516	2,397,050	0:00:00
445	609,454	2,397,092	0:00:00
446	609,480	2,397,074	0:00:00
447	609,556	2,397,093	0:00:00
448	609,648	2,397,073	4:08:00
449	609,628	2,397,049	7:03:00
450	609,092	2,396,651	69:22:00
451	609,278	2,397,098	0:00:00
452	608,838	2,396,807	0:00:00
453	608,620	2,396,984	0:00:00
454	608,753	2,396,967	0:00:00
455	608,733	2,397,108	0:00:00
456	608,685	2,397,083	0:00:00
457	608,671	2,397,078	0:00:00
458	608,649	2,397,105	0:00:00
459	608,134	2,397,097	5:33:00
460	608,147	2,397,097	2:47:00
461	608,159	2,397,096	2:44:00
462	608,172	2,397,096	2:42:00
463	608,185	2,397,096	2:37:00
464	608,196	2,397,097	2:37:00
465	608,210	2,397,102	2:35:00
466	608,220	2,397,104	2:33:00
467	608,093	2,397,084	5:57:00
468	608,104	2,397,080	5:49:00
469	608,123	2,397,075	5:40:00
470	608,142	2,397,071	5:29:00
471	608,162	2,397,068	2:43:00

Receptor ID	UTM-E (m)	UTM-N (m)	WindPro Predicted Expected Shadow Flicker (Hours per Year)
472	608,180	2,397,070	2:39:00
473	608,194	2,397,074	2:38:00
474	608,206	2,397,074	2:35:00
475	608,224	2,397,080	2:31:00
476	608,242	2,397,085	2:27:00
477	608,251	2,397,088	2:25:00
478	608,265	2,397,091	0:00:00
479	608,277	2,397,096	0:00:00
480	608,289	2,397,098	0:00:00
481	608,304	2,397,100	0:00:00
482	608,319	2,397,104	0:00:00
483	608,339	2,397,108	0:00:00
484	608,348	2,397,111	0:00:00
485	608,362	2,397,112	0:00:00
486	608,375	2,397,115	0:00:00
487	608,390	2,397,116	0:00:00
488	608,403	2,397,114	0:00:00
489	608,417	2,397,113	0:00:00
490	608,007	2,396,948	17:43:00
491	608,021	2,396,958	15:43:00
492	608,031	2,396,963	14:07:00
493	608,042	2,396,971	3:23:00
494	608,050	2,396,983	3:19:00
495	608,059	2,396,995	3:14:00
496	608,069	2,397,008	3:11:00
497	608,076	2,397,020	3:08:00
498	608,082	2,397,030	3:03:00
499	608,085	2,397,044	3:02:00
500	608,107	2,397,029	3:01:00
501	608,107	2,397,006	3:01:00
502	608,122	2,397,028	2:55:00
503	608,137	2,397,025	2:52:00
504	608,151	2,397,026	2:47:00
505	608,167	2,397,024	2:47:00
506	608,179	2,397,024	2:44:00
507	608,193	2,397,025	2:36:00
508	608,205	2,397,029	2:39:00
509	608,215	2,397,032	2:39:00
510	608,229	2,397,034	2:35:00
511	608,239	2,397,038	2:29:00
512	608,254	2,397,041	2:27:00
513	608,264	2,397,046	2:25:00
514	608,275	2,397,049	0:00:00
515	608,288	2,397,053	0:00:00
516	608,304	2,397,050	0:00:00
517	608,315	2,397,061	0:00:00
518	608,332	2,397,061	0:00:00
519	608,347	2,397,068	0:00:00
520	608,362	2,397,071	0:00:00
521	608,376	2,397,072	0:00:00
522	608,393	2,397,071	0:00:00
523	608,405	2,397,071	0:00:00
524	608,418	2,397,069	0:00:00

Receptor ID	UTM-E (m)	UTM-N (m)	WindPro Predicted Expected Shadow Flicker (Hours per Year)
525	608,243	2,396,881	12:32:00
526	607,997	2,396,944	18:22:00
527	607,983	2,396,940	18:57:00
528	607,971	2,396,938	19:00:00
529	607,962	2,396,936	18:57:00
530	607,944	2,396,936	18:44:00
531	607,933	2,396,938	18:33:00
532	607,917	2,396,940	18:06:00
533	607,902	2,396,944	17:36:00
534	607,892	2,396,952	17:25:00
535	607,881	2,396,963	17:08:00
536	607,872	2,396,971	16:52:00
537	607,862	2,396,984	16:25:00
538	607,860	2,396,998	15:52:00
539	607,852	2,397,017	14:39:00
540	607,848	2,397,035	13:17:00
541	607,844	2,397,050	11:58:00
542	607,841	2,397,064	10:18:00
543	607,838	2,397,076	8:46:00
544	607,835	2,397,095	6:05:00
545	607,832	2,397,107	4:22:00
546	607,875	2,397,115	4:04:00
547	607,878	2,397,103	4:03:00
548	607,878	2,397,088	4:03:00
549	607,880	2,397,069	10:25:00
550	607,883	2,397,057	12:00:00
551	607,887	2,397,043	9:54:00
552	607,889	2,397,029	12:08:00
553	607,895	2,397,014	13:47:00
554	607,903	2,396,999	14:59:00
555	607,913	2,396,988	15:47:00
556	607,924	2,396,982	16:05:00
557	607,939	2,396,979	16:08:00
558	607,952	2,396,979	15:47:00
559	607,963	2,396,982	14:52:00
560	607,977	2,396,983	13:57:00
561	607,989	2,396,987	12:28:00
562	608,001	2,396,992	10:33:00
563	608,012	2,397,000	7:56:00
564	608,022	2,397,007	5:29:00
565	608,030	2,397,019	3:17:00
566	608,038	2,397,028	3:15:00
567	607,897	2,397,124	3:56:00
568	607,906	2,397,108	7:56:00
569	607,917	2,397,096	7:43:00
570	607,924	2,397,084	7:32:00
571	607,909	2,397,072	7:40:00
572	607,926	2,397,069	7:32:00
573	607,913	2,397,051	6:29:00
574	607,919	2,397,038	8:20:00
575	607,927	2,397,026	9:56:00
576	607,940	2,397,016	10:43:00
577	607,956	2,397,012	10:14:00

Receptor ID	UTM-E (m)	UTM-N (m)	WindPro Predicted Expected Shadow Flicker (Hours per Year)
578	607,956	2,397,077	7:15:00
579	607,969	2,397,075	7:05:00
580	607,982	2,397,069	6:53:00
581	607,999	2,397,065	6:44:00
582	608,010	2,397,059	6:38:00
583	608,026	2,397,058	6:25:00
584	608,038	2,397,057	6:23:00
585	608,049	2,397,051	6:15:00
586	607,954	2,397,051	7:06:00
587	607,969	2,397,047	7:02:00
588	607,983	2,397,044	3:31:00
589	608,002	2,397,033	3:26:00
590	608,000	2,397,020	4:43:00
591	607,741	2,396,863	9:24:00
592	607,319	2,397,021	25:00:00
593	606,695	2,397,034	48:35:00
594	606,815	2,396,680	73:02:00
595	606,848	2,396,756	117:35:00
597	605,003	2,396,363	0:00:00
598	604,988	2,396,317	0:00:00
599	607,110	2,396,193	74:33:00
600	607,166	2,396,356	99:18:00
601	607,038	2,396,488	57:31:00
602	607,137	2,396,614	66:02:00
606	607,921	2,396,580	21:14:00
607	608,797	2,396,201	161:37:00
608	608,881	2,396,182	133:20:00
609	609,014	2,396,499	153:57:00
610	609,038	2,396,445	176:45:00
611	609,906	2,396,627	18:36:00
612	609,914	2,396,533	17:14:00
613	609,957	2,396,417	15:32:00
614	609,949	2,396,456	15:47:00
615	609,964	2,396,387	15:26:00
616	609,975	2,396,351	15:25:00
617	610,013	2,396,303	14:43:00
618	610,016	2,396,254	14:58:00
619	610,063	2,396,182	14:11:00
620	610,053	2,396,207	14:09:00
621	610,609	2,395,774	0:00:00
622	610,597	2,395,775	0:00:00
623	610,574	2,395,777	0:00:00
624	610,457	2,395,755	0:00:00
625	610,479	2,395,821	0:00:00
626	610,506	2,395,807	0:00:00
627	610,544	2,395,798	0:00:00
628	610,214	2,396,012	3:49:00
629	610,223	2,395,981	3:57:00
630	610,261	2,395,960	3:44:00
631	610,263	2,395,909	3:39:00
632	610,345	2,395,901	0:00:00
633	610,359	2,395,857	0:00:00
634	610,376	2,395,848	0:00:00

Receptor ID	UTM-E (m)	UTM-N (m)	WindPro Predicted Expected Shadow Flicker (Hours per Year)
635	610,391	2,395,840	0:00:00
636	610,167	2,396,054	4:14:00
637	610,191	2,396,030	4:02:00
638	610,077	2,396,156	14:06:00
639	610,098	2,396,130	13:39:00
640	610,103	2,396,102	14:21:00
641	609,941	2,396,013	20:10:00
642	609,849	2,395,699	11:56:00
645	608,721	2,396,023	108:01:00
646	608,561	2,395,956	64:58:00
647	608,527	2,396,107	411:55:00
648	608,251	2,396,015	307:25:00
649	608,534	2,395,574	0:00:00
650	609,229	2,395,405	6:33:00
651	609,781	2,395,584	11:26:00
652	609,804	2,395,476	5:03:00
653	609,850	2,395,467	4:34:00
654	609,857	2,395,415	4:57:00
655	609,747	2,395,430	6:11:00
656	609,701	2,395,591	8:37:00
657	609,652	2,395,554	6:09:00
658	610,560	2,395,693	0:00:00
659	610,768	2,394,779	0:00:00
660	610,746	2,394,763	0:00:00
661	610,793	2,394,760	0:00:00
662	610,584	2,395,156	0:00:00
663	610,547	2,395,134	0:00:00
664	610,573	2,395,126	0:00:00
665	610,584	2,395,101	0:00:00
666	610,676	2,394,967	0:00:00
667	610,640	2,394,959	0:00:00
668	610,617	2,394,959	0:00:00
669	610,595	2,394,986	0:00:00
670	610,298	2,394,900	0:00:00
671	610,253	2,394,896	0:00:00
672	609,961	2,395,220	0:00:00
673	609,719	2,395,226	5:02:00
674	609,735	2,395,247	7:56:00
675	609,650	2,394,592	0:00:00
676	609,728	2,394,729	0:00:00
677	610,042	2,394,722	0:00:00
678	610,122	2,394,732	0:00:00
679	610,053	2,394,675	0:00:00
680	610,067	2,394,611	0:00:00
681	609,985	2,394,452	0:00:00
682	610,048	2,394,572	0:00:00
683	610,260	2,394,673	0:00:00
684	610,223	2,394,691	0:00:00
685	610,514	2,394,718	0:00:00
686	610,548	2,394,725	0:00:00
687	610,598	2,394,739	0:00:00
688	610,815	2,394,732	0:00:00
689	610,823	2,394,712	0:00:00

Receptor ID	UTM-E (m)	UTM-N (m)	WindPro Predicted Expected Shadow Flicker (Hours per Year)
690	610,799	2,394,689	0:00:00
691	610,781	2,394,704	0:00:00
692	610,760	2,394,740	0:00:00
693	610,717	2,394,580	0:00:00
694	610,746	2,394,589	0:00:00
695	610,767	2,394,607	0:00:00
696	610,768	2,394,584	0:00:00
697	610,761	2,394,562	0:00:00
698	610,723	2,394,543	0:00:00
699	610,740	2,394,523	0:00:00
700	610,758	2,394,640	0:00:00
701	610,731	2,394,632	0:00:00
702	610,704	2,394,624	0:00:00
703	610,670	2,394,648	0:00:00
704	610,687	2,394,656	0:00:00
705	610,719	2,394,664	0:00:00
706	610,746	2,394,672	0:00:00
707	610,706	2,394,687	0:00:00
708	610,738	2,394,698	0:00:00
709	610,678	2,394,683	0:00:00
710	610,651	2,394,674	0:00:00
711	610,623	2,394,674	0:00:00
712	610,614	2,394,706	0:00:00
713	610,646	2,394,708	0:00:00
714	610,669	2,394,716	0:00:00
715	610,707	2,394,728	0:00:00
716	610,639	2,394,592	0:00:00
717	610,619	2,394,584	0:00:00
718	610,596	2,394,577	0:00:00
719	610,578	2,394,564	0:00:00
720	610,553	2,394,550	0:00:00
721	610,535	2,394,541	0:00:00
722	610,516	2,394,529	0:00:00
723	610,504	2,394,506	0:00:00
724	610,523	2,394,473	0:00:00
725	610,551	2,394,482	0:00:00
726	610,541	2,394,342	0:00:00
727	610,533	2,394,374	0:00:00
728	610,525	2,394,394	0:00:00
729	610,514	2,394,426	0:00:00
730	610,545	2,394,450	0:00:00
731	610,565	2,394,428	0:00:00
732	610,584	2,394,432	0:00:00
733	610,604	2,394,437	0:00:00
734	610,613	2,394,409	0:00:00
735	610,592	2,394,405	0:00:00
736	610,563	2,394,400	0:00:00
737	610,631	2,394,417	0:00:00
738	610,660	2,394,427	0:00:00
739	610,172	2,394,187	0:00:00
740	610,203	2,394,179	0:00:00
741	609,656	2,393,882	0:00:00
742	609,629	2,393,983	0:00:00

Receptor ID	UTM-E (m)	UTM-N (m)	WindPro Predicted Expected Shadow Flicker (Hours per Year)
743	608,022	2,396,545	38:06:00

APPENDIX L
SUPPLEMENTAL TECHNICAL ANALYSIS

(Prepared in support of the NEPA Final EIS)

Na Pua Makani Wind Project Technical Analysis of Modified Proposed Action Option

Prepared by

Tetra Tech, Inc.

February 2016

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1.0 INTRODUCTION

1.1 Introduction

Na Pua Makani Power Partners, LLC (NPMPP), a wholly owned subsidiary of Champlin Hawaii Wind Holdings, LLC, proposes to construct and operate the proposed Na Pua Makani Wind Project (Project). The Draft Environmental Impact Statement (DEIS) was published the Office of Environmental Quality and Control's (OEQC) The Environmental Notice on June 8, 2015, and a notice of availability of the DEIS was published on June 12, 2015, in the Federal Register by USFWS (80 FR 33535-33537) and on the same date by US EPA (80 FR 33519) in accordance with requirements set forth under the Hawaii Environmental Policy Act (HEPA; HRS § 343-3) and NEPA (40 CFR 1506.6) implementing regulations. Public comments on the DEIS were accepted during the 45-day and 60-day State and Federal public comment periods, respectively.

In response to public comments on the DEIS related to visual impacts, NPMPP reevaluated the proposed turbine locations and turbine models considered under the Proposed Action (up to 10 turbines) with the goal of reducing the number of turbines by considering turbines with larger generating capacities. Through this effort, NPMPP was able to reduce the maximum number of turbines needed to meet the target generating capacity for the Project from 10 turbines to 9 turbines. Depending on the selection of the final turbine model, the number of turbines may be as few as eight. This modification takes advantage of recent technological advancements that have resulted in the availability of uprated versions of turbine models that are larger, more efficient, have increased generating capacity, and are better suited for the moderate to low wind conditions of the wind farm site than previous models. These modifications are evaluated here as the Modified Proposed Action Option (Alternative 2a).

The purpose of this technical report is to compare the Proposed Action as presented in the DEIS and the Modified Proposed Action Option to determine whether or not the modification is presents significant new information relative to the DEIS. To make this determination, the technical analysis applies the methods and standards outlined in the DEIS and indicates whether the modification would result in a significant new impact or a significantly more adverse impact not disclosed in the DEIS. Should the impacts of the Modified Proposed Action Option fall into either of these categories, this would indicated the potential need to publish a supplemental NEPA document. If the Modified Proposed Action Option does not constitute new or significantly different information then this provides justification for evaluating the modification as an option to the Proposed Action in the Final EIS.

NPMPP is preparing a Habitat Conservation Plan (HCP) and pursuing and Incidental Take Permit (ITP) from the U.S. Fish and Wildlife Service (USFWS). The federal proposed action (approval of the HCP and issuance of the ITP) is the same under the Proposed Action and the Modified Proposed Action Option. Therefore, the HCP and issuance of the ITP are not discussed further here.

As set forth below, this technical report concludes that the Modified Proposed Action Option would not result in any significant new impact or a significantly more adverse impact than already identified in the DEIS. The analysis supporting the evaluation of these modifications for each environmental topic is provided in Section 2.0. See Section 3.0 for a detailed explanation of this report's conclusions and recommendations for moving forward.

1.2 Description of Modified Proposed Action Option In Comparison to Proposed Action

The Modified Proposed Action Option would include up to 9 turbines and depending on the final turbine model selected may be as few as eight turbines. To meet the minimum required generating capacity for the project of approximately 25 megawatts, these turbines would be larger and more efficient, each with a greater generating capacity than Alternative 2 under the Proposed Action. By eliminating one turbine and the associated access road and collection line, the Modified Proposed Action Option would have a smaller footprint, thereby reducing the amount of temporary and permanent disturbance associated with the Project. All other Project facilities, which include the associated foundations and transformers; an underground electrical collection system; up to three meteorological (met) towers; access roads; construction staging areas; an operations and maintenance building and associated storage yard; a transmission line; and an onsite substation would be the same as under the Proposed Action (see Chapter 2 of the EIS for details).

Table 1 provides a comparison of the turbine model dimensions and project footprint between the Proposed Action and the Modified Proposed Action Option. The Best Management Practices (BMPs) and other avoidance and minimization measures described in Chapter 2 and Chapter 4 of the EIS would also apply to Modified Proposed Action Option and are therefore not discussed further in this technical report.

1.3 Analysis Approach

The analysis presented in this technical report applies the applicable methodologies and standards outlined in Chapter 4 of the DEIS and indicates whether the Modified Proposed Action Option would result in a significant new impact or a significantly more adverse impact than the Proposed Action. The impact issues identified under each resource in the DEIS are evaluated in this analysis and a summary impact category is applied to each impact issue. The impact categories are defined in Chapter 4 of the DEIS and include: negligible, minor, moderate, or major. Cumulative Effects will be the same for both the Proposed Action and the Modified Proposed Action Option; therefore, they are not discussed in this report.

The evaluation here assumes a 9-turbine Project. If only eight turbines were constructed, all impacts that are based on turbine number would be incrementally reduced due to the removal of one turbine and resulting smaller footprint of the Project. That is, there would be less ground disturbance and comparable or reduced visual, shadow flicker, and noise impacts. Impacts to socioeconomics, air quality, natural hazards, public infrastructure and services and other resources which would not change with the removal of one turbine would be the same for an 8- or 9-turbine

Project. The decision to construct an 8- or 9-turbine Project would be ultimately driven by the turbine model selected. This decision is dependent on turbine suitability for the wind regime (based on ongoing wind data collection), consideration of other site-specific factors, the availability and cost of the turbine models, and other factors. Ultimately, the project must produce up to approximately 25 MW of energy; therefore, generating capacity of the individual turbine model would determine the need for 8 or 9 turbines.

Table 1. Comparison of Project Components and Disturbance Areas

Description	Measurement	
Wind Turbine Component	**Proposed Action**	**Modified Proposed Action Option**
Power generation	Up to 3.3 MW[1]	Up to 3.45 MW[1]
Tower height	Up to 302 feet (92 meters)	Up to 443 feet (135 meters)[2]
Rotor type	3-bladed, horizontal axis	3-bladed, horizontal axis
Rotor diameter	Up to 384 feet (117 meters)	Up to 427 feet (130 meters)
Blade length	Up to 187 feet (57 meters)	Up to 208 feet (63 meters)
Number of blades	3	3
Total height above ground	Up to 512 feet (156 meters)	Up to 656 feet (200 meters)
Rotor swept area	Up to 115,723 feet^2 (10,751 meters^2)	Up to 143,160 feet^2 (13,300 meters^2)
Rotor speed	6-16 rotations per minute	6-16 rotations per minute
Cut -in wind speed	10 ft/s (3 m/s)	10 ft/s (3 m/s)
Cut-out wind speed	Up to 82 ft/s (25 m/s)	Up to 82 ft/s (25 m/s)
Project Footprint	**Proposed Action**	**Modified Proposed Action Option**
Total Area of Permanent Site Disturbance	59.9 acres (24.2 hectares)	56.7 acres (22.9 hectares)
Total Area of Site Disturbance During Construction	89.0 acres (36.0 hectares)	84.5 acres (34.2 hectares)

ft/s = feet per second; m/s = meters per second
[1]Should the turbine manufacturers make available up-rated versions of existing turbine models prior to construction, they will be considered for use in this project.
[2]To meet City and County of Honolulu setback requirements (a distance equivalent to the maximum turbine blade tip height), if the largest turbine model under consideration were selected hub heights of individual turbines would range from approximately 85 to 135 meters (blade lengths would be the same).

2.0 RESOURCES EVALUATED IN THE DEIS

2.1 Geology and Soils

Direct effects on geology and soils from the Modified Proposed Action Option would be less than the Proposed Action due to the reduced Project footprint. The Modified Proposed Action Option would disturb up to 84.5 acres (34.2 hectares) during construction, of which 56.7 acres (22.9 hectares) would be disturbed over the long-term during Project operation. The Proposed Action would disturb up to 89.0 acres (36.0 hectares), of which 59.9 acres (24.2 hectares) would be disturbed over the long-term during Project operation. Indirect effects such as impacts to threatened or endangered plant species or sensitive ecosystems, or long term loss of productivity or vegetative growth from compaction or mixing of soils would be the same under the Proposed Action and the Modified Proposed Action Option.

No new impacts or significantly more adverse impact are anticipated from the Modified Proposed Action Option (see Table 2 for an evaluation of each geology and soils impact issue identified in the DEIS). For the impact issues of drainage, erosion, and loss of agricultural land or soil productivity,

the Modified Proposed Action Option would result in slightly reduced impacts compared to the Proposed Action due to a decrease in the total area of temporary and permanent ground disturbance.

Table 2. Evaluation of Modified Proposed Action Option Impacts to Geology and Soils

Impact Issues	Summary of Impact		Evaluation of whether Modified Proposed Action Option Impacts are New or More Adverse from Proposed Action
	Proposed Action	Modified Proposed Action Option	
Geologic resources and hazards	Negligible	Negligible	No change in impact. No significant geologic features or mineral resources with economic value are known or expected to occur in the wind farm site; earthquake or seismic activity in the wind farm site is not anticipated.
Drainage patterns and slope failure	Minor	Minor	The Modified Proposed Action Option would have less impact on drainage patterns due to the reduction of the total area of temporary and permanent ground disturbance. (See Preliminary Drainage Study in Appendix H.)
Erosion	Minor	Minor	The Modified Proposed Action Option would have less possibility for erosion due to the reduction of the total area of temporary and permanent ground disturbance.
Sensitive species or ecosystems	Negligible	Negligible	No change in impact. There would be no impact to listed plant species or sensitive ecosystems as none occur at the wind farm site.
Loss of agricultural land or soil productivity	Minor	Minor	The Modified Proposed Action Option would impact less prime agricultural lands due to the reduction of the total area of temporary and permanent ground disturbance. Under the Proposed Action, approximately 12.6 acres (5.1 hectares) of the Prime Agricultural Lands (as classified under the ALISH system by the Hawaii State Department of Agriculture 1977) would be impacted over the long-term, through the life of the Project. Under the Modified Proposed Action Option, approximately 9.4 acres (3.8 hectares) of the Prime Agricultural Lands would be impacted over the long-term, through the life of the Project.

2.2 Hydrology and Water Resources

Direct effects on hydrology and water resources from the Modified Proposed Action Option would be less than the Proposed Action due to the decreased area of disturbance and area of impervious surfaces. The Modified Proposed Action would result in up to approximately 9.1 acres (3.7 hectares) of impervious surfaces in the wind farm site, which includes 9 acres (3.6 hectares; 99 percent) of gravel surfaces which are semi-pervious. Proposed Action would result in up to approximately 10.1 acres (4.1 hectares) of impervious surfaces in the wind farm site, which includes 10 acres (4.1 hectares; 99 percent) of gravel surfaces which are semi-pervious. The net increase in stormwater would also be less under the Modified Proposed Action Option (10.9 cubic feet per second) compared to the Proposed Action (11.9 cubic feet per second).

No new impacts or significantly more adverse impact are anticipated from the Modified Proposed Action Option (see Table 3 for an evaluation of each hydrology and water resources impact issue identified in the DEIS). For the impact issues of drainage, contamination of surface waters, and alteration of surface water quality, the Modified Proposed Action Option would result in slightly less impacts than the Proposed Action due to a decrease in the total area of temporary and permanent ground disturbance and decrease in impervious or semi-pervious surfaces.

Table 3. Evaluation of Modified Proposed Action Option Impacts to Hydrology and Water Resources

Impact Issues	Summary of Impact		Evaluation of whether Modified Proposed Action Option Impacts are New or More Adverse from Proposed Action
	Proposed Action	Modified Proposed Action Option	
Impacts to wetlands and other waters of the U.S.	Minor to Moderate	Minor to Moderate	No change in impact. There are no wetlands within the wind farm site; therefore the Modified Proposed Action Option would have no direct or indirect impact on wetlands. Three jurisdictional streams run through the wind farm site; however the project footprint under both the Proposed Action and Modified Proposed Action Option is designed to avoid impacts to these streams.
Alteration of existing drainage patterns	Negligible	Negligible	The Modified Proposed Action Option would have less impact on drainage patterns due to the reduction of the total area of temporary and permanent ground disturbance. (See the Preliminary Drainage Study in Appendix H of the EIS.)
Contamination of surface water quality from increased erosion, sedimentation, stormwater runoff and/or pollutants.	Minor	Minor	The Modified Proposed Action Option would have less possibility for surface water contamination from erosion, sedimentation, stormwater runoff and/or pollutants due to the reduction of 3.2 acres (1.3 hectares) in the total area of permanent ground disturbance and a reduction of 1 acre (0.4 hectares) in semi--pervious surfaces.
Alteration of surface water quality resulting in long-term loss or use by humans or aquatic wildlife and plants.	Minor	Minor	No change in impact. The Modified Proposed Action Option's smaller Project footprint and total impermeable area would reduce the impacts to surface water quality in comparison to the Proposed Action but it would not measurably change the potential long-term loss of use by humans or aquatic wildlife or plants.
Decrease in available groundwater or groundwater recharge	Negligible	Negligible	No change in impact. The water requirements for construction and operation under the Modified Proposed Action Option would not change.
Degradation of ground water quality	Negligible	Negligible	No change in impact. The Spill Prevention, Containment, and Countermeasures (SPCC) Plan described under the Proposed Action (Section 4.4.3 of DEIS) would be prepared for the Modified Proposed Action Option to ensure adverse impacts to groundwater quality from construction are avoided.

2.3 Air Quality and Climate Change

Direct or indirect effects on air quality and climate conditions from the Modified Proposed Action Option would be the same as the Proposed Action. There may be a slightly reduced amount of air pollutant emissions and fugitive dust levels associated with construction under the Modified Proposed Action Option due to the decrease in the number of turbines; however, this reduction would be negligible.

No new impacts or significantly more adverse impacts to air quality or climate conditions are anticipated from the Modified Proposed Action Option. See Table 4 for an evaluation of each air quality and climate impact issue identified in the DEIS.

Table 4. Evaluation of Modified Proposed Action Option Impacts to Air Quality and Climate Change

Impact Issues	Summary of Impact		Evaluation of whether Modified Proposed Action Option Impacts are New or More Adverse from Proposed Action
	Proposed Action	Modified Proposed Action Option	
Violations of State or Federal air quality standards as a result of construction activity or traffic	No Impact	No Impact	No change in impact. Emissions and increased fugitive dust levels would not violate State or Federal air quality standards under either the Modified Proposed Action Option or the Proposed Action.
Greenhouse gas emissions from Project construction	Minor	Minor	No change in impact. Construction equipment and vehicle emissions are anticipated to be the same under both the Modified Proposed Action Option and the Proposed Action.
Greenhouse gas emissions from Project operation	Negligible Adverse/Moderate Beneficial	Negligible Adverse/Moderate Beneficial	No change in impact. Emission of green-house gasses is anticipated to be the same under both the Modified Proposed Action Option and the Proposed Action.

2.4 Noise

Direct and indirect effects of noise from the Modified Proposed Action Option would be similar to the Proposed Action, only varying in the location of where construction activities would take place within the wind farm site (i.e., construction only occurring at a maximum of nine turbine pad locations rather than 10). Like Alternative 2, construction noise is likely to exceed HAR 11-46 limits at some TMKs in the acoustic analysis area under Alternative 2a and; therefore, a permit from the DOH would likely be required.

Direct and indirect effects of operational noise from the Modified Proposed Action Option would be similar to those described under the Proposed Action. Impacts from Low frequency noise (LFN) and infrasound (IS) would be the same under Alternative 2a as under Alternative 2, because the nearest residence to a proposed wind turbine is the same under both alternatives. Operational broadband (dBA) sound pressure levels for the Modified Proposed Action Option; however, were calculated based on a total of nine Siemens SWT 3.3-130; whereas operational broadband (dBA) sound

pressure levels for the Proposed Action were based on two Vestas V110-2.0 and eight Siemens SWT 3.0-113 turbines. Increases at the most sensitive Zone A TMKs are predicted to be slightly less under Alternative 2a (no more than 3 dBA over existing sound levels) than under Alternative 2 (no more than 4 dBA over existing sound levels). Similar to the Proposed Action, the operational noise analysis for the Modified Proposed Action Option demonstrates compliance with HAR 11-46 (see Appendix D of the EIS for details).

No new impacts or significantly more adverse impacts related to noise are anticipated from the Modified Proposed Action Option. See Table 5 for an evaluation of each noise impact issue identified in the DEIS.

Table 5. Evaluation of Modified Proposed Action Option Impacts to Noise

Impact Issues	Summary of Impact		Evaluation of whether Modified Proposed Action Option Impacts are New or More Adverse from Proposed Action
	Proposed Action	Modified Proposed Action Option	
Audible noise	Minor	Minor	No change in impact. The Modified Proposed Action Option would result in a slight decrease in operational noise impacts.
Low frequency noise/infrasound	Negligible	Negligible	No change in impact. Low frequency noise/infrasound impacts would be the same under both the Modified Proposed Action Option and the Proposed Action (no impacts as sound levels would be below the threshold of human hearing). There would be no change in low frequency noise/infrasound levels.

2.5 Hazardous and Regulated Materials and Wastes

Direct or indirect effects from use of hazardous materials, solid waste and petroleum projects under the Modified Proposed Action Option would be the same as the Proposed Action. There may be a reduced amount of hazardous materials, solid waste, or petroleum products generated or used under the Modified Proposed Action Option due to the decrease in the number of turbines; however this reduction would be negligible.

No new impacts or significantly more adverse impacts are anticipated from the Modified Proposed Action Option as the result of the transport, storage, use and disposal of hazardous materials, solid waste and petroleum products. See Table 6 for an evaluation of each hazardous and regulated materials and waste impact issue identified in the DEIS.

Table 6. Evaluation of Modified Proposed Action Option Impacts to Hazardous and Regulated Materials and Waste

Impact Issues	Summary of Impact		Evaluation of whether Modified Proposed Action Option Impacts are New or More Adverse from Proposed Action
	Proposed Action	Modified Proposed Action Option	
Routine use, storage and transport of hazardous materials	Minor	Minor	No change in impact. The impacts as the result of the transport, storage, use, and disposal of hazardous materials during the construction and operation of the Modified Proposed Action Option would be similar to those discussed under the Proposed Action in the DEIS.
Accidental spills and releases	Minor	Minor	No change in impact. The potential for accidental releases or spills under the Modified Proposed Action Option would be the same as the Proposed Action.
Worker exposure to chemicals exceeding OSHA limits	Minor	Minor	No change in impact. The potential for accidental worker exposure to chemicals under the Modified Proposed Action Option would be the same as the Proposed Action.
Disturb existing contamination or improper disposal	Minor	Minor	No change in impact. The potential disturbance of existing contamination during construction of the Modified Proposed Action Option would be similar to the Proposed Action.
Vandalism	Minor	Minor	No change in impact. The risk of vandalism would be the same under the both the Modified Proposed Action Option and the Proposed Action.

2.6 Natural Hazards

Construction and operation of the Project could be adversely affected by a natural hazard such as a hurricane, tsunami, or earthquake. However, the occurrence rates for these natural hazards on Oahu is very low. Table 7 evaluates each impact issue identified in the DEIS under this resource. There would be no change in potential impacts of natural hazards to the Project under the Modified Proposed Action Option.

Table 7. Evaluation of Potential Natural Hazards Impacting the Modified Proposed Action Option Impacts

Impact Issues	Summary of Impact		Evaluation of whether Impacts to the Modified Proposed Action Option are New or More Adverse Compared to the Proposed Action
	Proposed Action	Modified Proposed Action Option	
Hurricanes and tropical storms	None expected/negligible	None expected/negligible	No change in impact. Impacts to construction and operation of the Project from natural hazards under the Modified Proposed Action Option are the same as those described for the Proposed Action.
Tsunamis	Negligible	Negligible	
Earthquakes and seismicity	None expected/negligible	None expected/negligible	
Flooding	Minor	Minor	
Wildfire	Negligible	Negligible	

2.7 Vegetation

Direct effects to vegetation communities from Project construction include the physical destruction or degradation of vegetation and vegetation communities. The Modified Proposed Action Option would have less direct effects on vegetation than the Proposed Action due to the decrease in Project footprint. Construction and operation of the Project under the Modified Proposed Action Option would result in approximately up to 84.5 acres (34.2 hectares) of impacted vegetation, including 56.7 acres (22.9 hectares) of long-term impacts. Construction and operation of the Project under the Proposed Action would result in approximately 89.0 acres (36.0 hectares) of impacted vegetation, including 59.9 acres (24.2 hectares) of long-term impacts.

Indirect impacts to vegetation communities from Project construction include the introduction and spread of noxious weeds and the potential increased risk of wildfire, both of which can impact and alter vegetation communities within the wind farm site. Indirect impacts are anticipated to be the same for the Modified Proposed Action Option as they are for the Proposed Action.

No new impacts or significantly more adverse impacts are anticipated from the Modified Proposed Action Option (Table 8). For the impact issues of loss of plant species populations or loss of native plant communities, the Modified Proposed Action Option would result in slightly reduced impacts compared to the Proposed Action due to a decrease in the total area of temporary and permanent ground disturbance.

Table 8. Evaluation of Modified Proposed Action Option Impacts to Vegetation

Impact Issues	Summary of Impact		Evaluation of whether Modified Proposed Action Option Impacts are New or More Adverse from Proposed Action
	Proposed Action	Modified Proposed Action Option	
Introduction or spread of noxious weeds	Minor	Minor	No change in impact. The Modified Proposed Action Option has the same potential to increase the introduction and spread of noxious weeds as the Proposed Action.
Loss to any population of plant species resulting in proposal for listing or listing	Negligible	Negligible	The Modified Proposed Action Option would have less impact on existing plant species populations due to the reduction of the total area of temporary and permanent ground disturbance.
Loss of native plant communities	Minor	Minor	The Modified Proposed Action Option would have less impact on native plant communities due to the reduction of the total area of temporary and permanent ground disturbance.
Fire	Minor	Minor	No change in impact. The Modified Proposed Action Option has the same potential to increase the risk of wildfire as the Proposed Action.

2.8 Wildlife

Direct effects to wildlife from Project construction activities include injury or mortality (e.g., collision with construction equipment), habitat removal and alteration, and noise and disturbance. Indirect effects to wildlife include the introduction and spread of non-native plant and animal species. Direct impacts would be slightly less under the Modified Proposed Action Option than under the Proposed Action due to the reduction in the total area of temporary and permanent ground disturbance (see Section 2.7). Indirect impacts would be the same for the Modified Proposed Action Option as they are for the Proposed Action. The direct and indirect effects of the Habitat Conservation Plan actions would benefit wildlife over the long term through the protection and enhancement of native habitats similarly for both the Modified Proposed Action Option and the Proposed Action.

No new impacts or significantly more adverse impacts are anticipated from the Modified Proposed Action Option (Table 9). For the impact issues of habitat removal and alteration and direct mortality, the Modified Proposed Action Option would result in slightly less impacts than the Proposed Action due to a decrease in the total area of temporary and permanent ground disturbance and decrease in the number of turbines.

Table 9. Evaluation of Modified Proposed Action Option Impacts to Wildlife

Impact Issues	Summary of Impact		Evaluation of whether Modified Proposed Action Option Impacts are New or More Adverse from Proposed Action
	Proposed Action	Modified Proposed Action Option	
Habitat removal and alteration	Minor adverse/ Moderate Beneficial	Minor adverse/ Moderate Beneficial	The Modified Proposed Action Option would require less vegetation removal due to the reduction of the total area of temporary and permanent ground disturbance (see Section 2.7).
Direct mortality	Minor	Minor	The Modified Proposed Action Option would have one less turbine which may slightly reduce collision risk associated with Project operation.
Noise and disturbance	Minor	Minor	No change in impact. The Modified Proposed Action Option would result in a slight decrease in noise and disturbance related to construction but this decrease would be negligible.

2.9 Threatened and Endangered Species

Construction and operation of the Project would result in direct and indirect effects to threatened and endangered species under both the Proposed Action and the Modified Proposed Action Option. There are eight State and Federally threatened and endangered species that are known to occur, or have the potential to occur, in the vicinity of the wind farm site (see Table 10 for a list of the eight species and see Section 3.9 of DEIS for a description of each species).

The Final HCP includes incidental take calculations based on the Modified Proposed Action Option, incorporating 9 turbines with larger dimensions. However, Project take estimates under the Proposed Action (i.e., included in the Draft HCP and evaluated in the Draft EIS) and Modified Proposed Action Option are comparable (the same or less than presented in the Draft HCP) and do not result in different levels of requested take for any of the Covered Species. Additionally, the Modified Proposed Action Option does not result in changes to the HCP avoidance, minimization, and mitigation measures. Therefore, no new impacts or significantly more adverse impacts would occur under the Modified Proposed Action Option compared to the Proposed Action (Table 10).

Table 10. Evaluation of Modified Proposed Action Option Impacts to Threatened and Endangered Species

Species	Impact Issues	Summary of Impact		Evaluation of whether Modified Proposed Action Option Impacts are New or More Adverse from Proposed Action
		Proposed Action	Modified Proposed Action Option	
Hawaiian hoary bat	Incidental Take	Negligible	Negligible	The Modified Proposed Action Option considers the operation of up to 9 turbines; thereby reducing risk of take by one turbine. However, requested authorized take levels under the HCP would be the same for the Proposed Action and Modified Proposed Action Option.
	Habitat Impacts	Negligible	Negligible	
Newell's shearwater	Incidental Take	Negligible	Negligible	
	Habitat Impacts	No Impact	No Impact	
Hawaiian goose	Incidental Take	Negligible	Negligible	
	Habitat Impacts	Negligible	Negligible	
Hawaiian duck	Incidental Take	Negligible	Negligible	
	Habitat Impacts	No Impact	No Impact	
Hawaiian stilt	Incidental Take	Negligible	Negligible	
	Habitat Impacts	No Impact	No Impact	
Hawaiian coot	Incidental Take	Negligible	Negligible	
	Habitat Impacts	No Impact	No Impact	
Hawaiian moorhen	Incidental Take	Negligible	Negligible	
	Habitat Impacts	No Impact	No Impact	
Hawaiian short-eared owl	Incidental Take	Negligible	Negligible	
	Habitat Impacts	No Impact	No Impact	

2.10 Socioeconomics

Direct or indirect effects on socioeconomic resources from the Modified Proposed Action Option would be the same as the Proposed Action. There are no data providing a clear link between turbine number and dimensions and socioeconomic factors such as property values, population, housing demand, and other factors. No new impacts or significantly more adverse impacts to socioeconomic resources are anticipated from the Modified Proposed Action Option. See Table 11 for an evaluation of each socioeconomic impact issue identified in the DEIS.

Table 11. Evaluation of Modified Proposed Action Option Impacts to Socioeconomic Resources

Impact Issues	Summary of Impact		Evaluation of whether Modified Proposed Action Option Impacts are New or More Adverse from Proposed Action
	Proposed Action	Modified Proposed Action Option	
Property values	Variable	Variable	No change in impact. Property value impacts will be similar under both the Modified Proposed Action Option and the Proposed Action.
Homeowner's insurance rates	Negligible	Negligible	No change in impact. No impact to homeowner insurance rates are anticipated under either the Modified Proposed Action Option or the Proposed Action.
Businesses	Minor	Minor	No change in impact. Project impacts on nearby recreation and tourism businesses would be negligible to minor under either the Modified Proposed Action Option or the Proposed Action.
Residential solar energy/ photovoltaic system installation	Negligible	Negligible	No change in impact. Hawaii Electric Company's limits on rooftop solar installations are not related to existing or planned wind projects.
Population	Minor	Minor	No change in impact. No change is anticipated in the assumed temporary and permanent population gain as described under the Proposed Action in the DEIS.
Demand on housing	Minor	Minor	No change in impact. No change is anticipated in the number of construction or operation workers needed or in the assumption of temporary housing needs described under the Proposed Action in the DEIS.
Employment/income	Minor	Minor	No change in impact. No change is anticipated in the number of construction or operation workers needed as described under the Proposed Action in the DEIS.

2.11 Historic, Archaeological, and Cultural Resources

Direct effects on historic, archaeological, and cultural resources from the Modified Proposed Action Option would be similar to the direct effects from the Proposed Action. Indirect effects from the construction and operation of the Project would be the same under both the Proposed Action and the Modified Proposed Action Option. Indirect impacts to historic, archaeological and cultural resources could result from noise, dust, and vibrations caused by earthmoving and heavy equipment, or from the loss of community access to cultural resources, such as traditional cultural properties. No new impacts or significantly more adverse impacts are anticipated from the Modified Proposed Action Option (Table 12).

Table 12. Evaluation of Modified Proposed Action Option Impacts to Historic, Archaeological, and Cultural Resources

Impact Issues	Summary of Impact		Evaluation of whether Modified Proposed Action Option Impacts are New or More Adverse from Proposed Action
	Proposed Action	Modified Proposed Action Option	
Archaeological sites	Minor	Minor	No change in impacts to archaeological sites are anticipated under the Modified Proposed Action Option. Two archaeological sites identified in the Archaeological Inventory Survey (AIS) are located in proximity to the turbine and access road that would not be included in the Modified Proposed Action Option (archaeological sites 7846 and 7844). These sites are recommended for preservation in the Project AIS; however, both sites are outside of the area of disturbance and would not be affected by Project construction under both the Modified Proposed Action and the Proposed Action.
Traditional cultural uses and practices	Negligible	Negligible	No change in impact. No effects to traditional cultural uses and practices would occur under either the Modified Proposed Action Option or the Proposed Action.

2.12 Land Use

Direct effects on land use from the construction of the Modified Proposed Action Option would be less than the Proposed Action due to the decrease in Project footprint and acres of disturbance to agricultural uses. Indirect effects on land use related to air quality, noise, visual, public health, and traffic considerations would be the same for the Modified Proposed Action Option as they are for the Proposed Action.

No new impacts or significantly more adverse impacts to land use are anticipated from the Modified Proposed Action Option. See Table 13 for an evaluation of each land use impact issue identified in the DEIS.

Table 13. Evaluation of Modified Proposed Action Option Impacts to Land Use

Impact Issues	Summary of Impact		Evaluation of whether Modified Proposed Action Option Impacts are New or More Adverse from Proposed Action
	Proposed Action	Modified Proposed Action Option	
Compatibility with existing and planned land uses	Minor	Minor	No change in impacts. Both the Modified Proposed Action Option and the Proposed Action would be compatible with existing and planned land use, and consistent with land use plans and policies (see Chapter 5 of the EIS for additional discussion).
Consistency with the Koolau Loa Sustainable Communities Plan and land use regulations	Consistent/No Impact	Consistent/No Impact	No change in impact.

2.13 Agriculture

Direct effects on agriculture from the construction and operation of the Project under the Modified Proposed Action Option would be less than the Proposed Action due to the decrease in the Project footprint and resulting acres of disturbance to agricultural uses. Under the Modified Proposed Action Option, approximately 2.7 acres (1.8 hectares) of actively farmed land (row crops) would be permanently affected. Under the Proposed Action approximately 4.6 acres (1.8 hectares) of actively farmed land would be permanently affected. Under both the Modified Proposed Action Option and the Proposed Action no net loss of active agriculture would occur because NPMPP would work with farmers to prepare existing non-arable land for agricultural production (e.g., grubbing, grading, soil amendments, extend irrigation, etc.). Therefore, no new impacts or significantly more adverse impacts to agriculture are anticipated from the Modified Proposed Action Option (Table 14).

Table 14. Evaluation of Modified Proposed Action Option Impacts to Agriculture

Impact Issues	Summary of Impact		Evaluation of whether Modified Proposed Action Option Impacts are New or More Adverse from Proposed Action
	Proposed Action	Modified Proposed Action Option	
Impacts to active agriculture	Minor	Minor	The Modified Proposed Action Option would have reduced impacts to active agriculture compared to the Proposed Action due to a smaller Project footprint.
Impacts to irrigation/water availability or road access for farmers	Minor	Minor	The Modified Proposed Action Option and the Proposed Action would result in temporary disruptions in access to farm plots and/or to irrigation water during construction.

2.14 Recreation and Tourism

Similar to the Proposed Action, the Modified Proposed Action Option would not result in a direct loss of opportunity to any recreation or tourism resource in the analysis area. The Modified Proposed Action would have negligible to minor impacts on recreation and tourism due to

construction traffic and noise and will have comparable overall visual impacts as the Proposed Action.

No new impacts or significantly more adverse impacts to recreation and tourism are anticipated from the Modified Proposed Action Option. Table 15 evaluates each recreation and tourism impact issue identified in the DEIS.

Table 15. Evaluation of Modified Proposed Action Option Impacts to Recreation and Tourism

Impact Issues	Summary of Impact		Evaluation of whether Modified Proposed Action Option Impacts are New or More Adverse from Proposed Action
	Proposed Action	Modified Proposed Action Option	
Direct loss of recreation or tourism opportunity	No Impact	No Impact	No change in impact.
Indirect loss of recreation or tourism opportunity due to traffic, noise, or visual impacts	Negligible	Negligible	No change in impact.
Predicted impacts to recreation and tourism use rates	Negligible	Negligible	No change in impact.

2.15 Visual Resources

Direct and indirect effects on visual resources from the Modified Proposed Action Option would be essentially the same as those for the Proposed Action using the same methodology and standards of evaluating impacts on visual resources (see Section 4.16 – Visual Resources). Table 16 summarizes the potential visual impact of the Project for each viewpoint under the Modified Proposed Action Option. At each viewpoint, the visual impact intensity is similar to the Proposed Action and ratings are the same determined for the Proposed Action (see Table 4.16-3 of the EIS).

Visual simulations of the Modified Proposed Action Option and the Proposed Action are shown in Figures 2 through 6 at the four viewpoints that was included in the DEIS. At locations from which the Project would be visible, the view with the Modified Proposed Action Option would typically include one less turbine than would have been visible with the Proposed Action. This aspect of the Modified Proposed Action Option would result in a slight reduction in the incremental visual change created by the Project. Because the Modified Proposed Action Option would employ taller turbines, however, each turbine would create slightly more visual contrast than an individual turbine under the Proposed Action. Reevaluation of the with-Project conditions for each viewpoint under the Modified Proposed Action Option indicated that the difference in visual contrast would not be sufficient to change the contrast rating or the change in visual quality rating for any of the viewpoints.

Table 17 summarizes the updated results of the viewpoint-specific impact evaluation and the overall evaluation of the change to visual resource character, which was the fundamental impact

Table 16. Modified Proposed Action Option: Visual Impact Intensity for Viewpoints

Viewpoint	Viewpoint Name	Closest Wind Turbine to Project (miles)	Viewer Group(s) Represented	Existing Scenic Quality	Contrast Rating	Change in Visual Quality	Overall Viewer Response	Impact Intensity
01	Laie Hawaii Temple	1.7	Recreational, Institutional	High	None	None	Moderate	None
02	Polynesian Cultural Center	2.5	Recreational	Medium	None	None	Moderate	None
03	The Church of Jesus Christ of Latter Day Saints	5.0	Institutional	High	None	None	Moderate	None
04	Kahuku Community	0.5	Residential	Low	Weak	Low	High	Moderate
05	Kahuku Sugar Mill Site	0.5	Commercial	Low	Weak	Low	Low-Moderate	Low
06*	Kahuku Community Center	0.5	Recreational	Moderate	Moderate	Moderate	Moderate	Moderate
07	Malaekahana State Recreation Area	1.0	Recreational	Moderate	Moderate	Moderate	Moderate	Moderate
08	Kamehameha Highway	0.6	Highway travelers	Low	Moderate	Low	Moderate	Low-Moderate
09	Kahuku High and Intermediate School	0.5	Institutional	Low	Weak	Low	Moderate	Low-Moderate
10	Turtle Bay Resort	2.5	Recreational	Moderate	Weak	Low	Moderate	Low-Moderate
11	Punaluu Beach Park	7.3	Recreational	High	None	None	Moderate	None
12	Kahama Valley State Park Beach	9.0	Recreational	High	None	None	Moderate	None
13*	James Campbell National Wildlife Refuge	1.0	Recreational	Moderate	Moderate	Moderate	Moderate	Moderate
14	North Windward Baptist Church	5.0	Institutional	Moderate	None	None	Moderate	None
15	Laie Point Coastal Residences	2.5	Residential	High	Moderate	Moderate-High	Moderate-High	Moderate-High
16	Swanzy Beach Park	9.6	Recreational	High	None	None	Moderate	None

Table 16. Modified Proposed Action Option: Visual Impact Intensity for Viewpoints (continued)

Viewpoint	Viewpoint Name	Distance from Project (miles)	Viewer Group(s) Represented	Existing Scenic Quality	Contrast Rating	Change in Visual Quality	Overall Viewer Response	Impact Intensity
17	Kahuku Hospital and Medical Center	0.5	Institutional	Low	Weak	Low	Moderate	Low-Moderate
18	Kahuku Elementary School	0.3	Institutional	Low	Weak	Low	Moderate	Low-Moderate
19*	Kahuku Golf Course	1.0	Recreational	Moderate	Moderate	Moderate	Moderate	Moderate
20*, **	Malaekahana Bike and Pedestrian Path	1.0	Recreational	Moderate	Moderate	Moderate	Moderate	Moderate
21	Kamehameha Highway	1.6	Highway Travelers	Low	Moderate	Low	Moderate	Low-Moderate

Key:
* - A visual simulation has been completed for the viewpoint.
** - A nighttime visual simulation has been complete for viewpoint

Table 17. Evaluation of Modified Proposed Action Option Impacts to Visual Resources

Impact Issues	Summary of Impact		Evaluation of whether Modified Proposed Action Option Impacts are New or More Adverse from Proposed Action
	Proposed Action	Modified Proposed Action Option	
Number of viewpoints with no visual impact	7	7	Number of viewpoints with no visibility same for Proposed Action and Modified Proposed Action Option.
Number of viewpoints with low or low-moderate visual impact intensity	7	7	No change in impact.
Number of viewpoints with moderate or moderate-high visual impact intensity	7	7	No change in impact.
Number of viewpoints with high visual impact intensity	0	0	No change in impact.
Changes to visual resource character	Moderate	Moderate	No new or substantially more adverse visual impacts with Modified Proposed Action Option.

issue identified in the DEIS under this resource. The summary of visual impact under the Modified Proposed Action Option would be the same as reported in the DEIS for the Proposed Action: visual impact intensity would be moderate or less for all of the viewpoints; the extent of the most noticeable visual impacts would be local; the Project would primarily affect common visual resources that are not rare, unique, or protected by specific legislation; and the overall visual impacts of the Project would be moderate. Therefore, the Modified Proposed Action Option would not result in a significant new impact or a significantly more adverse impact than the Proposed Action.

2.16 Transportation

Direct and indirect effects on transportation infrastructures from the Modified Proposed Action Option would be the comparable to the Proposed Action. There would be no change in the transportation route for construction. The Proposed Action and Modified Proposed Action Option would result in the same number average number of truck trips per day (144 truck trips) and maximum number of truck trips per day (154 truck trips). Therefore, no new impacts or significantly more adverse impacts to transportation would occur under the Modified Proposed Action Option. Table 18 evaluates each impact issue identified in the DEIS under this resource.

Table 18. Evaluation of Modified Proposed Action Option Impacts to Transportation

Impact Issues	Summary of Impact		Evaluation of whether Modified Proposed Action Option Impacts are New or More Adverse from Proposed Action
	Proposed Action	Modified Proposed Action Option	
Increase traffic exceeding a 100 new peak hour trips or 500 daily trips on Kamehameha Highway	Negligible	Negligible	No change in impact. Neither the Proposed Action nor Modified Proposed Action Option would trigger then need for a Traffic Impact Report by HDOT.
Long term traffic delays for a substantial number of motorist	Minor	Minor	No change in impact. Under both the Proposed Action and Modified Proposed Action Option, 90 percent of construction truck trips would occur outside of peak traffic times, and would comprise less than 3 percent of the base traffic levels along Kamehameha Highway.
Changes to traffic patterns that create hazardous situations for motorist, pedestrians, or bicyclists	Minor	Minor	No change in impact.
Changes to air or marine traffic patterns that would cause substantial safety hazards	Negligible	Negligible	No change in impact.
Increase traffic to affect traffic patterns to and from the mitigation areas	Negligible	Negligible	No change in impact.

2.17 Public Health

Impacts associated with construction and operation of the Project under the Modified Proposed Action Option related to public health and safety would be the same as under the Proposed Action with respect to turbine collapse and blade throw, fire risk and hazardous materials exposure, EMF, and stray voltage.

There is no state or national standard that exist for frequency or duration of shadow flicker from wind turbines. However, a threshold of 30 hours per year has been widely used in the industry as a target value in the absence of formal guidelines. However, predicted shadow flicker greater than this threshold does not necessarily create a nuisance and is still well below concerns for impacts to health such as triggering epileptic seizures.

Shadow flicker impacts would be slightly greater under the Modified Proposed Action Option at some sensitive receptors due to the larger size of the turbines. Twenty-five of the 737 receptors modeled in the shadow flicker analysis showed impacts of more than 30 hours per year under the Modified Proposed Action; whereas 17 receptors showed shadow flicker impacts of more than 30

hours per year under the Proposed Action. The maximum predicted shadow flicker impact at any receptor under the Modified Proposed Action is 258 hours 19 minutes per year versus a maximum predicted shadow flicker impact of 244 hours 9 minutes per year under the Proposed Action. This receptor is a farm structure located within the wind farm site used for storing and processing truck crops from the surrounding agricultural fields. Although the number of shadow flicker hours would increase for some receptors (see Appendix K of the EIS), there would be no change in risk to public health and safety.

Under both the Proposed Action and Modified Proposed Action, the potential for shadow flicker would be almost entirely contained within the wind farm site, and the amount of potential flicker extending onto adjacent areas would be relatively short in duration. No shadow flicker impacts would occur at the Kahuku High School, Kahuku Elementary School, or Kahuku Medical Center under either the Modified Proposed Action Option or the Proposed Action. To mitigate for shadow flicker impacts, NPMPP will offer home owners for which shadow flicker is predicted to be greater than 30 hours per year reimbursement for costs up to $800 for adding awnings or blinds to windows facing the wind farm and/or landscaping/trees to block shadow flicker.

Table 19 evaluates each impact issue identified in the DEIS under this resource. No new impacts or significantly more adverse impacts to public health and safety are anticipated from the Modified Proposed Action Option.

Table 19. Evaluation of Modified Proposed Action Option Impacts to Public Health

Impact Issues	Summary of Impact		Evaluation of whether Modified Proposed Action Option Impacts are New or More Adverse from Proposed Action
	Proposed Action	Modified Proposed Action Option	
Turbine collapse and blade throw	Negligible	Negligible	No change in impact. Under both the Modified Proposed Action Option and the Proposed Action there is a negligible risk of impacts to public health and safety in association with turbine collapse and blade throw.
Shadow flicker	Moderate	Moderate	No change in significance of impact; shadow flicker at individual receptors would increase under the Modified Proposed Action Option but there would be no change in effects to public health and safety.
Fire and fuels	Minor	Minor	No change in impact. The reduction of one turbine to the Project layout under the Modified Proposed Action Option will only slightly reduce the risk of fire; therefore the impact is the same as the Proposed Action.
Noise and vibration	Minor/negligible	Minor/negligible	Due to the reduced number of turbines under the Modified Proposed Action Option, there is a reduced risk of impacts to public health and safety in association with noise. No impacts would occur in association with vibration.

Table 19. Evaluation of Modified Proposed Action Option Impacts to Public Health (continued)

Impact Issues	Summary of Impact		Evaluation of whether Modified Proposed Action Option Impacts are New or More Adverse from Proposed Action
	Proposed Action	Modified Proposed Action Option	
Electromagnetic fields (EMF)	Negligible	Negligible	No change in impact. Public or farm worker exposure to EMF is negligible under both the Modified Proposed Action Option and the Proposed Action due to low frequency of the magnetic field.
Stray voltage	Negligible	Negligible	No change in impact. Due to the implementation of standard industry procedures, negligible effects to public health and safety from stray voltage are expected in association with the both the Modified Proposed Action Option and the Proposed Action.

2.18 Environmental Justice

The communities of Kahuku, Laie, and the coastal area south to Kaneohe Bay may be considered minority environmental justice populations based on the disproportionate concentration of Native Hawaiians and Other Pacific Islanders relative to Oahu as a whole (Oahu Metropolitan Planning Organization and Department of Planning and Permitting 2004, U.S. Census Bureau 2012). Neither the Modified Proposed Action Option nor the Proposed Action would result in high and adverse human health or environmental impact; and therefore, neither action alternative would have the potential to disproportionately impact these minority communities, especially Kahuku.

Table 20 provides an evaluation of each environmental justice impact issue identified in the DEIS. No new impacts or significantly more adverse impacts to the environmental justice community are anticipated from the Modified Proposed Action Option.

Table 20. Evaluation of Modified Proposed Action Option Impacts to Environmental Justice

Impact Issues	Summary of Impact		Evaluation of whether Modified Proposed Action Option Impacts are New or More Adverse from Proposed Action
	Proposed Action	Modified Proposed Action Option	
Effects to environmental justice community	Negligible	Negligible	No change in impact.

2.19 Public Infrastructure

Potential effects on public infrastructure facilities and services, including electric service, gas service, water supply, wastewater management, stormwater management, education facilities, emergency and health services, solid waste management, and telecommunications would be the same under the Modified Proposed Action Option as they would be under the Proposed Action. Table 21 provides an evaluation of each public infrastructure impact issue identified in the DEIS. No

new impacts or significantly more adverse impacts to public infrastructure are anticipated from the Modified Proposed Action Option.

Table 21. Evaluation of Modified Proposed Action Option Impacts to Public Infrastructure

Impact Issues	Summary of Impact		Evaluation of whether Modified Proposed Action Option Impacts are New or More Adverse from Proposed Action
	Proposed Action	Modified Proposed Action Option	
Electric service	Minor adverse/moderate beneficial	Minor adverse/moderate beneficial	No change in impact. The electricity service required during construction and operation will be the same under both the Modified Proposed Action Option and the Proposed Action.
Gas service	Negligible	Negligible	No change in impact. Traffic management plan prepared under both the Modified Proposed Action Option and the Proposed Action will mitigate any potential for disruption to bottled gas delivery.
Water supply	Negligible	Negligible	No change in impact. Avoidance and minimization measures described under the Proposed Action will be implemented under the Modified Proposed Action Option to avoid any impacts to existing water wells or public water system infrastructure in the vicinity of the Project.
Wastewater management	Minor	Minor	No change in impact. Wastewater generation will be the same (minimal) under the Modified Proposed Action Option as it would be under the Proposed Action.
Stormwater management	Minor	Minor	No change in impact. Construction of the Project would not impact existing stormwater drainage infrastructure, as there is none in the wind farm site that could be affected
Solid waste management	Minor	Minor	No change in impact. The amount of waste generated under the Modified Proposed Action Option would be similar to the Proposed Action and is not expected to adversely impact existing waste management services or facility capacity.

Table 21. Evaluation of Modified Proposed Action Option Impacts to Public Infrastructure (continued)

Impact Issues	Summary of Impact		Evaluation of whether Modified Proposed Action Option Impacts are New or More Adverse from Proposed Action
	Proposed Action	Modified Proposed Action Option	
Education facilities and emergency and health services	Minor	Minor	No change in impact. Direct and indirect impacts to nearby educational facilities and emergency and health services will be the same under both the Modified Proposed Action Option and the Proposed Action.
Telecommunications	Minor	Minor	No change in impact. Minor impacts to telecommunications described under the Proposed Action would be the same for the Modified Proposed Action Option.

2.20 Military Interests

Direct and indirect effects on military interests from the Modified Proposed Action Option would be the same as the Proposed Action. Table 22 provides an evaluation of each military interest impact issue identified in the DEIS. No new impacts or significantly more adverse impacts to military interests are anticipated from the Modified Proposed Action Option.

Table 22. Evaluation of Modified Proposed Action Option Impacts to Military Interests

Impact Issues	Summary of Impact		Evaluation of whether Modified Proposed Action Option Impacts are New or More Adverse from Proposed Action
	Proposed Action	Modified Proposed Action Option	
Loss of land area available to the military for training	Negligible	Negligible	No change in impact. Construction and operation of the Project under both the Modified Proposed Action Option and the Proposed Action would not occupy any land currently used by the military, and would not reduce the area of land available for training.
Change in training practices or activities with a resulting change in military readiness	Negligible	Negligible	No change in impact. Negligible impacts to military helicopter flights and other military air traffic described under the Proposed Action would be the same for the Modified Proposed Action Option.

Table 22. Evaluation of Modified Proposed Action Option Impacts to Military Interests (continued)

Impact Issues	Summary of Impact		Evaluation of whether Modified Proposed Action Option Impacts are New or More Adverse from Proposed Action
	Proposed Action	Modified Proposed Action Option	
Degradation of function of military communication systems	Negligible	Negligible	No change in impact. Negligible impacts to military communication systems described under the Proposed Action would be the same for the Modified Proposed Action Option.
Hazard to training flight operations in the A-311 TFTA[1/]	Negligible	Negligible	No change in impact. Under both the Modified Proposed Action Option and the Proposed Action, approximately 198.1 acres (80.2 hectares) of the wind farm site lies within the TFTA, representing approximately 0.32 percent of the flight training area. All turbines under the Propose Action would be below assumed approach/departure clearance planes helicopter landing zones in the Kahuku Training Area; one turbine under the Modified Proposed Action would coincide with the clearance planes of two landing zones. However, because the FAA allows heliport approach/departure paths to be curved, allowing them to avoid pre-existing or new obstructions, this turbine would not represent an obstruction for designated helicopter landing zones.

1/ The Army's A-311 Alert Area overlays the Kahuku Training Area and Kawailoa Training Area (see Figure 3.19-1 in EIS); it is commonly referred to as the Tactical Flight Training Area (TFTA).

3.0 CONCLUSION

Based on the above analysis, the Modified Proposed Action Option would not result in any new impacts or significantly more adverse impacts than the Proposed Action and already disclosed in the DEIS. Therefore, the Final EIS will carry forward the proposed modifications to the Project as described in Section 2 as the Modified Proposed Action Option evaluated as Alterative 2a.

Figures

Figure 1

Na Pua Makani Wind Project

Visual Simulation
Kahuku Community Center

January 2016 **Oahu, HI**

Looking southwest from the Kahuku Community Center

TETRA TECH

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Simulated Conditions: Modified Proposed Action Option (Alternative 2a)

Simulated Conditions: Proposed Action (Alternative 2)

Figure 2

Na Pua Makani
Wind Project

Visual Simulation
James Campbell National Wildlife Refuge

January 2016 **Oahu, HI**

Looking southwest from the James Campbell National Wildlife Refuge

TETRA TECH

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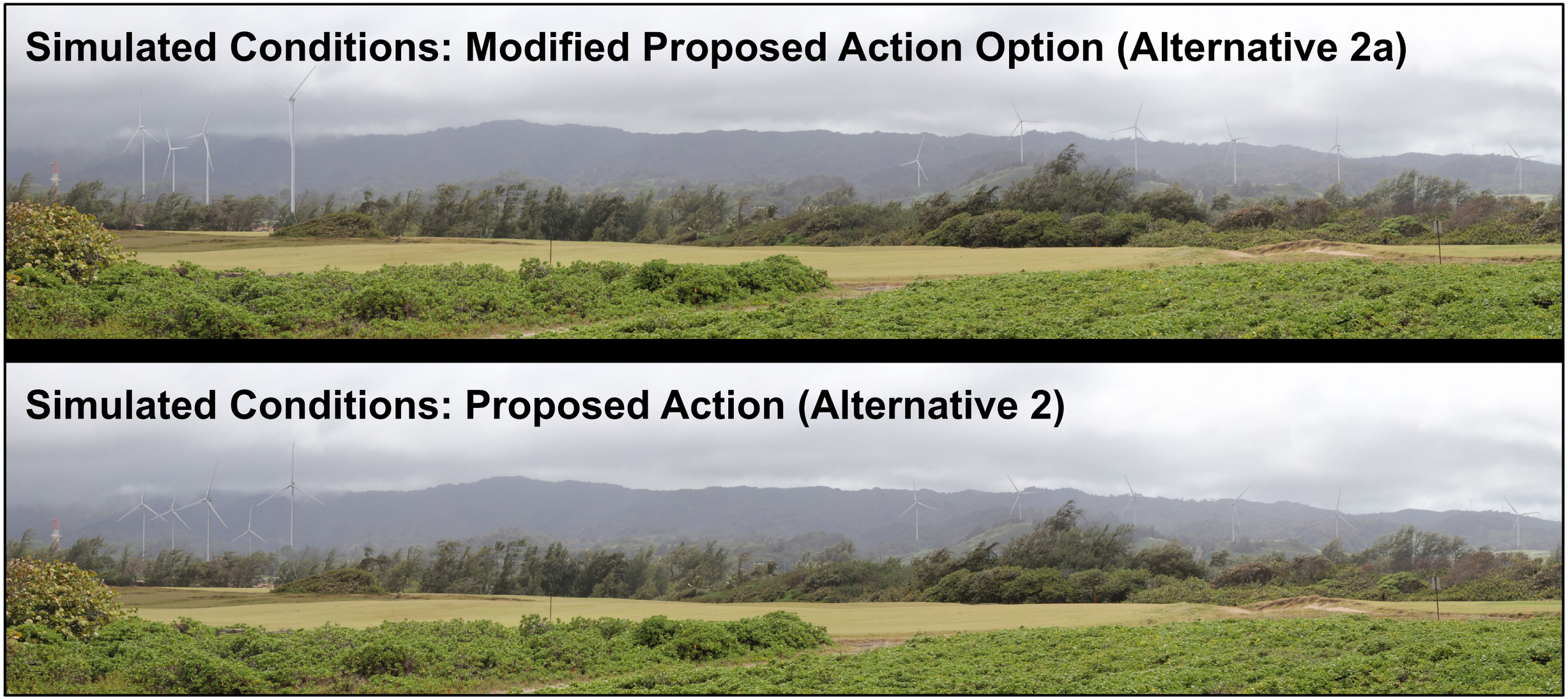

Figure 3

Na Pua Makani Wind Project

Visual Simulation
Kahuku Golf Course

January 2016 **Oahu, HI**

Looking southwest from the eastern edge of the Kahuku Golf Course

TETRA TECH

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Figure 4

Na Pua Makani Wind Project

Visual Simulation
Kahuku Walking Trail

January 2016 **Oahu, HI**

Looking northwest from the walking path on the west side of Kamehameha highway, approximately 1/2 mile south of Kahuku

TETRA TECH

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Figure 5

Na Pua Makani Wind Project

Night Time Visual Simulation
Kahuku Walking Trail

January 2016 **Oahu, HI**

Looking northwest from the walking path on the west side of Kamehameha highway, approximately 1/2 mile south of Kahuku

TETRA TECH

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APPENDIX M
PUBLIC COMMENT LETTERS AND RESPONSES TO COMMENTS ON THE DRAFT EIS, DRAFT HCP, AND SECOND DRAFT EIS

County Letters and Responses

HONOLULU FIRE DEPARTMENT

CITY AND COUNTY OF HONOLULU

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Honolulu, Hawaii 96813-5007
Phone: 808-723-7139 Fax: 808-723-7111 Internet: www.honolulu.gov/hfd

KIRK CALDWELL
MAYOR

MANUEL P. NEVES
FIRE CHIEF

LIONEL CAMARA JR.
DEPUTY FIRE CHIEF

RECEIVED
JUN 29 2015
U.S. FISH & WILDLIFE SVC
PACIFIC ISLANDS FWD
HONOLULU, HI 96850

June 23, 2015

CO-1

Ms. Kristi Young, Field Supervisor
Pacific Island Fish and Wildlife Office
U.S. Fish and Wildlife Service
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawaii 96850

Dear Ms. Young:

Subject: Draft Environmental Impact Statement
Proposed Na Pua Makani Wind Project and Draft Habitat Conservation Plan
Kahuku, Koolauloa, Hawaii
Tax Map Keys: 5-6-005: 018 (portion)
5-6-006: 018, 047, 051, and 055
5-6-008: 006 (portion)

In response to a letter from Ms. Brita Woeck of Tetra Tech, Inc., dated June 3, 2015, regarding the above-mentioned subject, the Honolulu Fire Department (HFD) reviewed the material provided and requires that the following be complied with:

1 1. Fire department access roads shall be provided such that any portion of the facility or any portion of an exterior wall of the first story of the building is located not more than 150 feet from fire department access roads as measured by an approved route around the exterior of the building or facility. (National Fire Protection Association [NFPA] 1, Uniform Fire Code [UFC]™, 2006 Edition, Section 18.2.3.2.2.)

A fire department access road shall extend to within 50 feet of at least one exterior door that can be opened from the outside and provides access to the interior of the building. (NFPA 1, UFC™, 2006 Edition, Section 18.2.3.2.1.)

2 2. A water supply approved by the county, capable of supplying the required fire flow for fire protection, shall be provided to all premises upon which facilities or buildings, or portions thereof, are hereafter

CO-1

constructed, or moved into or within the county. When any portion of the facility or building is in excess of 150 feet from a water supply on a fire apparatus access road, as measured by an approved route around the exterior of the facility or building, on-site fire hydrants and mains capable of supplying the required fire flow shall be provided when required by the AHJ [Authority Having Jurisdiction]. (NFPA 1, UFC™, 2006 Edition, Section 18.3.1, as amended.)

3 3. The unobstructed width and unobstructed vertical clearance of a fire apparatus access road shall meet county requirements. (NFPA 1, UFC™, 2006 Edition, Section 18.2.3.4.1.1, as amended.)

4 4. Submit civil drawings to the HFD for review and approval.

Should you have questions, please contact Acting Battalion Chief Terio Bumanglag Jr. of our Fire Prevention Bureau at 723-7151 or tbumanglag@honolulu.gov.

Sincerely,

Socrates D. Bratakos

SOCRATES D. BRATAKOS
Assistant Chief

SDB/SY:bh

cc: Brita Woeck
Tetra Tech, Inc.

April 1, 2016

Socrates D. Bratakos, Assistant Chief
City and County of Honolulu
Honolulu Fire Department
636 South Street
Honolulu HI 96813-5007

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Bratakos:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter dated June 23, 2015, commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Draft Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment CO-1.1*: Fire department access roads shall be provided such that any portion of the facility or any portion of an exterior wall of the first story of the building is located not more than 150 feet from fire department access roads as measured by an approved route around the exterior of the building or facility. (National Fire Protection Association [NFPA] 1, Uniform Fire Code [UFC]TM, 2006 Edition, Section 18.2.3.2.2.)*
A fire department access road shall extend to within 50 feet of at least one exterior door that can be opened from the outside and provides access to the interior of the building. (NFPA 1, UFCTM, 2006 Edition, Section 18.2.3.2.1.)

Response CO-1.1: The Project will be designed in compliance with Fire Department access road requirements. Access roads will be extended to within 50 feet of an exterior door of any proposed building or facility.

Comment CO-1.2*: A water supply approved by the county, capable of supplying the required fire flow for fire protection, shall be provided to all premises upon which facilities or buildings, or portions thereof, are hereafter constructed, or moved into or within the county. When any portion of the facility or building is in excess of 150 feet from a water supply on a fire apparatus access road, as measured by an approved route around the exterior of the facility or building, on-site fire hydrants and mains capable of supplying the required fire flow shall be provided when required by the AHJ (Authority Having Jurisdiction). (NFPA 1, UFCTM, 2006 Edition, Section 18.3.1, as amended.)*

Response CO-1.2: The Project will be designed for compliance with water supply requirements. Adequate water supply will be provided to a fire hydrant adjacent to the facilities and building, as required. If required, an approved flow rate will be determined once building plans are completed.

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

Comment CO-1.3*: The unobstructed width and unobstructed vertical clearance of a fire apparatus access road shall meet county requirements. (NFPA 1, UFCTM, 2006 Edition, Section 18.2.3.4.1.1, as amended.)*

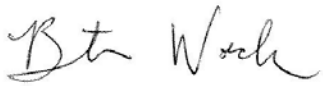
Response CO-1.3: The Project will be designed to facilitate access by fire equipment. Requirements for access road width, turn around, and vertical clearance will be met by the Project.

Comment CO-1.4*: Submit Civil drawings to the HFD for review and approval.*

Response CO-1.4: Drawings will be submitted to the HFD for approval. This will occur after publication of the Second Draft EIS.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

DEPARTMENT OF FACILITY MAINTENANCE

CITY AND COUNTY OF HONOLULU

1000 Ulu`ohia Street, Suite 215, Kapolei, Hawaii 96707
Phone: (808) 768-3343 • Fax: (808) 768-3381
Website: www.honolulu.gov

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JUN 25 2015

U.S. FISH & WILDLIFE SVC
PACIFIC ISLANDS FWD
HONOLULU, HI 96850

KIRK CALDWELL
MAYOR

ROSS S. SASAMURA, P.E.
DIRECTOR AND CHIEF ENGINEER

EDUARDO P. MANGLALLAN
DEPUTY DIRECTOR

IN REPLY REFER TO:
DRM 15-423

June 22, 2015

CO-2

Ms. Kristi Young, Field Supervisor
Pacific Island Fish and Wildlife Office
U.S. Fish and Wildlife Service
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawaii 96850

Dear Ms. Young:

SUBJECT: Draft Environmental Impact Statement for the Proposed Na Pua Makani Wind Project and Draft Habitat Conservation Plan located at Kahuku, Koolauloa, Hawaii, TMKs (1) 5-6-005:018 (portion); (1) 5-6-006:018, 047, 051, 055; and (1) 5-6-008:006 (portion)

Thank you for the opportunity to review and provide our input regarding the Draft Environmental Impact Statement on the above-subject project and the CD-ROM.

1 We have no comments at this time, as we do not have any facilities or easements on the subject property.

If you have any questions, please call Mr. Kyle Oyasato of the Division of Road Maintenance at 768-3697.

Sincerely,

Ross S. Sasamura, P.E.
Director and Chief Engineer

TETRA TECH

April 1, 2016

Ross S. Sasamura, P.E., Director and Chief Engineer
City and County of Honolulu
Department of Facility Maintenance
1000 Ulu`ohia Street, Suite 215
Kapolei HI 96707

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)
DRM 15-423

Dear Mr. Sasamura:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter dated June 22, 2015 regarding the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Draft Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We appreciate your confirmation that no City and County of Honolulu facilities or easements are on the Project property.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

POLICE DEPARTMENT
CITY AND COUNTY OF HONOLULU
801 SOUTH BERETANIA STREET · HONOLULU, HAWAII 96813
TELEPHONE: (808) 529-3111 · INTERNET: www.honolulupd.org

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JUN 19 2015
U.S. FISH & WILDLIFE SVC
PACIFIC ISLANDS FWD
HONOLULU, HI 96850

KIRK CALDWELL
MAYOR

LOUIS M. KEALOHA
CHIEF

DAVE M. KAJIHIRO
MARIE A. McCAULEY
DEPUTY CHIEFS

OUR REFERENCE MT-DK

June 16, 2015

CO-3

Ms. Kristi Young, Field Supervisor
Pacific Island Fish and Wildlife Office
U.S. Fish and Wildlife Service
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawaii 96850

Dear Ms. Young:

This is in response to a letter from Brita Woeck of Tetra Tech, Inc., (dated June 3, 2015) requesting comments on the joint Draft Environmental Impact Statement for the proposed Na Pua Makani Wind Project and Draft Habitat Conservation Plan located in Koolauloa, Kahuku.

1 Based on the information provided, this project should have no significant impact on the services or operations of the Honolulu Police Department.

If there are any questions, please call Major Ryan J. Borges of District 4 (Kailua-Kaneohe-Kahuku) at 723-8639.

Thank you for the opportunity to review this project.

Sincerely,

LOUIS M. KEALOHA
Chief of Police

By
MARK TSUYEMURA
Management Analyst VI
Office of the Chief

TETRA TECH

April 1, 2016

Louis M. Kealoha, Chief of Police
City and County of Honolulu Police Department
801 South Beretania Street
Honolulu HI 96813

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Kealoha:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter dated June 16, 2015, commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Draft Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment CO-3.1*: Based on the information provided, this project should have no significant impact on the services or operations of the Honolulu Police Department.*

Response CO-3.1: Thank you for confirming that the Project would have no significant impact on the services and operations of the Honolulu Police Department.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

2014 - F - 0091

DEPARTMENT OF DESIGN AND CONSTRUCTION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 11TH FLOOR
HONOLULU, HAWAII 96813
Phone: (808) 768-8480 • Fax: (808) 768-4567
Web site: www.honolulu.gov

KIRK CALDWELL
MAYOR

ROBERT J. KRONING, P.E.
DIRECTOR

MARK YONAMINE, P.E.
DEPUTY DIRECTOR

July 14, 2015

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JUL 17 2015
U.S. FISH & WILDLIFE SVC
PACIFIC ISLANDS FWD
HONOLULU, HI 96850

CO-4

Pacific Island Fish and Wildlife Office
U.S. Fish and Wildlife Service
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawaii 96850

Attn: Kristi Young

Dear Ms. Young:

Subject: Draft Environmental Impact Statement
for the Proposed Na Pua Makani Wind Project
and Draft Habitat Conservation Plan located at Kahuku, Koolauloa, Hawaii
TMKs (1) 5-6-005:018 (portion); (1) 5-6-006:018, 047, 051, 055;
and (1) 5-6-008:006 (portion)

1 The Department of Design and Construction does not have comments to offer on the draft environmental impact statement.

Thank you for the opportunity to review and comment. Should there be any questions, please contact me at 768-8480.

Sincerely,

Robert J. Kroning, P.E.
Director

RJK: cf (612230)

TETRA TECH

April 1, 2016

Robert J. Kroning, P.E., Director
City and County of Honolulu
Department of Design and Construction
650 South King Street, 11th Floor
Honolulu HI 96813

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Kroning:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter dated July 14, 2015 regarding the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Draft Environmental Impact Statement (EIS). We appreciate your taking the time to provide feedback about the Project. Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

DEPARTMENT OF PLANNING AND PERMITTING
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 7TH FLOOR • HONOLULU, HAWAII 96813
PHONE: (808) 768-8000 • FAX: (808) 768-6041
DEPT. WEB SITE: www.honoluludpp.org • CITY WEB SITE: www.honolulu.gov

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JUL 24 2015
U.S. FISH & WILDLIFE SVC
PACIFIC ISLANDS FWD
HONOLULU, HI 96850

KIRK CALDWELL
MAYOR

GEORGE I. ATTA, FAICP
DIRECTOR

ARTHUR D. CHALLACOMBE
DEPUTY DIRECTOR

2015/ELOG-1144(WA)

July 22, 2015

CO-5

Ms. Kristi Young
Pacific Island Fish and Wildlife Office
U.S. Fish and Wildlife Service
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawaii 96850

Dear Ms. Young:

SUBJECT: Draft Environmental Impact Statement (DEIS)
Na Pua Makani Wind Farm Project and Habitat Conservation Plan
56-452 and 668 Kamehameha Highway - Kahuku
Tax Map Key 5-6-6: 18 and 5-6-8: 6

This responds to your zoning inquiry received on June 5, 2015, requesting comments on the DEIS for the proposed Na Pua Makani Wind Farm Project and Habitat Conservation Plan (HCP). We have reviewed the subject DEIS and have the following comments from various department branches:

A. Planning Division, Community Planning Branch:

1 1. Chapter 205, Hawaii Revised Statutes: The Draft Environmental Impact Statement (DEIS) does not adequately address Section 205-4.5(a)(15) of the Hawaii Revised Statutes relating to compatibility and minimizing adverse impacts of wind energy systems on agricultural land rated Class A and B by the Land Study Bureau. This section of the statutes reads as follows:

"Wind energy facilities, including the appurtenances associated with the production and transmission of wind generated energy; provided that the wind energy facilities and appurtenances are compatible with agriculture uses and cause minimal adverse impact on agricultural land;"

The DEIS should elaborate on how the displacement of portions of high quality agricultural land, currently in crop production and rated Class "B" by the Land Study Bureau, for the construction and operation of wind turbines and accessory uses, constitute a compatible use and causes minimal adverse impact on the agricultural lands being sought for the wind farm. The DEIS states that lands lost to the project will be replaced by other areas for crop production. Replacement areas should be identified and its qualities described as to whether the

replacement lands are suitable for similar crops currently being produced on the project lands. More information on and an analysis of the impact of the project may have on existing agricultural operations should be included in the Final EIS. For example, please describe the impacts the construction of new roadways, wind turbine pads and fencing, overhead or underground electrical hardware, and other construction activities would have on crop production either temporarily or permanently and on future agricultural operations.

2 In addition, the Final EIS should state that a Special Use Permit (SUP) may be required if the County in which the project is located determines that the project is not compatible with agricultural uses. In this case, the Department of Planning and Permitting (DPP) is the agency that would determine whether the project is a compatible use and cause minimal adverse impact on agricultural land. At this time, until submission of additional information indicating that the wind energy facilities and appurtenances are compatible with existing and future agricultural uses and associated accessory uses (e.g., farm dwellings) and cause minimal adverse impact on agricultural land, the DPP determines that the wind energy project is subject to obtaining a Special Use Permit for the portions of the project located within Class "B" lands.

2. Koolau Loa Sustainable Communities Plan: With respect to the Koolau Loa Sustainable Communities Plan (the Plan), the following policies and/or guidelines of the Plan will need to be adequately addressed:

3 a. Mountain Areas:

Avoid disturbances caused by utility corridors and other uses on areas with high concentrations of native species.

The Final EIS should address this guideline. In particular, how does the project's location and layout avoid the area's native species? The Final EIS should provide and analysis of relocating the project in other areas which do not require Federal Incidental Take Permit.

4 b. Electrical Power Development:

Locate and design system elements such as renewable electrical power facilities, substations, communication sites, and transmission lines, including consideration of underground transmission lines, to mitigate any potential adverse impacts on scenic and natural resources, as well as public safety considerations.

Mitigation measures for the project's visual impacts other than increasing setbacks have not been thoroughly analyzed. In addition, the daylight simulations were done using an overcast sky background which serves to reduce the tower and blades visual impacts. The visual impact of towers

and blades may be more significant when compared to the background's natural environment, especially during hours of full sun light. When considered together with the existing Kahuku Wind Farm, the appearance. We recommend that the Final EIS include additional design and location alternatives for analysis, such as lower and more slender towers and heights with smaller blades, avoidance of prominent hilltop locations, tower and blade colors to blend with the background terrain, and further setbacks to reduce the project's visual impacts on public viewing locations.

5 We also recommend that the Final EIS address public safety of farmers and their dwellings/properties. The DEIS and recent aerial imagery shows what appears to be numerous farm structures, some of which could be farm dwelling or farm buildings located in the vicinity of the wind turbines. Occupants of affected farm dwellings could experience destruction or bodily injury in the case of a catastrophic event involving wind turbine failure. More information and ensuing analysis of the potential impact should be submitted for the Final EIS and to the DPP as part of the SUP application.

6 c. Agriculture:

Protect agricultural lands from conversion to uses that are primarily residential, industrial, or commercial in purpose.

Allow for appropriate non-agricultural uses that are compatible with open space and resource character, such as recreational or educational programs, or other uses consistent with the character of a rural agricultural area which provides supplemental income necessary to sustain the primary agricultural activity. There should be a direct connection between those activities and the maintenance of agricultural uses on the same or nearby properties.

Recognize the Contribution of Agricultural Lands to Koolau Loa's Rural Character.

Koolau Loa's rural character is in large part defined by the region's agricultural areas. Allowable uses should be appropriate to onsite or adjacent resources and open space settings. Any onsite development must be low-key, low-impact and predominantly open space in character.

Agriculture and open space help define the region's rural character. Pursuant to the Plan, conversion of agricultural lands to non-agricultural uses is strongly discouraged. When a conversion is allowed, the non-agricultural use should be compatible with the open space and which provide supplemental income to sustain the primary agricultural activity.

It's not clear that the Project will provide supplemental income to sustain the existing farming activities nor is the project low-key, low-impact, or predominantly open space in character. Therefore, the Final EIS should address the above policies and guidelines of the Plan pertaining to agriculture. Unless information is submitted to show the project is consistent with the Plan, the Department of Planning and Permitting cannot determine that the project is consistent with the vision, policies, and guidelines of the Koolau Loa Sustainable Communities Plan.

B. Site Development Division, Civil Engineering Branch:

7 1. Show the locations of the propose turbine sites on Figure 3.6.1.

8 2. Use the current Rules Relating to Storm Drainage Standards and not the NOAA precipitation data to calculate stormwater runoff for all the turbine sites.

9 3. The DEIS would be much clearer had the presentation been separated into the actual wind farm location sites and the addressing HCP requirements in a separate Appendix or Section that was identified in the Executive Summary.

C. Land Use Permits Division, Urban Design Branch:

10 1. Wind machines are a permitted use with an approved Conditional Use Permit -Minor (CUP-Minor). We concur that an approved CUP-Minor would be required for joint development of two or more adjacent lots.

11 2. Section 5.3.3 City and County of Honolulu, states that "The Project is also in compliance with setback requirements for the wind turbines heights and noise standards". The Final EIS should discuss and show how the proposed turbines will be located within the required height setbacks.

12 3. We concur that a minor modification to CUP No. 95/CUP1-106 would be required to add a new dish antenna to the existing utility installation, Type B.

4. The hardcopy of the Final EIS should be indexed and tabbed for quick reference.

If you have any questions, please contact William Ammons of our staff at 768-8025.

Very truly yours,

Anthony X. Cliney

For George I. Atta, FAICP
Director

Doc 1263432

April 1, 2016

George I. Atta, FAICP, Director
City and County of Honolulu
Department of Planning and Permitting
650 South King Street, 7th Floor
Honolulu HI 96813

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Atta:

On behalf of Na Pua Makani Power Partners, LLC, (NPMPP) and the U.S. Fish and Wildlife Service, thank you for your letter dated June 22, 2015, commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Draft Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment CO-5.1*: Chapter 205, Hawaii Revised Statutes: The Draft Environmental Impact Statement (DEIS) does not adequately address Section 405-4.5(a)(15) of the Hawaii Revised Statutes relating to compatibility and minimizing adverse impacts of wind energy systems on agricultural land rated Class A and B by the Land Study Bureau. This Section of the statutes reads as follows: "Wind energy facilities, including the appurtenances associated with the production and transmission of wind generated energy; provided that the wind energy facilities and appurtenances are compatible with agriculture uses and cause minimal adverse impact on agricultural land;" The DEIS should elaborate on how the displacement of portions of high quality agricultural land, currently in crop production and rated Class "B" by the Land Study Bureau, for the construction and operation of wind turbines and accessory uses, constitute a compatible use and causes minimal adverse impact on the agricultural lands being sought for the wind farm. The DEIS states that lands lost to the project will be replaced by other areas for crop production. Replacement areas should be identified and its qualities described as to whether the replacement lands are suitable for similar crops currently being produced on the project lands. More information on and an analysis of the impact of the project may have on existing agricultural operations should be included in the Second Draft EIS. For example, please describe the impacts the construction of new roadways, wind turbine pads and fencing, overhead or underground electrical hardware, and other construction activities would have on crop production either temporarily or permanently and on future agricultural operations.*

Response CO-5.1: As requested, the Second Draft EIS has been expanded to address impacts to agriculture in the Second Draft EIS in new Section 3.20 (existing conditions) and Section 4.22 (impacts analysis). Under Alternative 2 (the Proposed Action), approximately 36.3 acres of land with Land Study Bureau (LSB) rating of A

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737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

and B (most productive soils) within the wind farm site would be directly impacted by construction activities. This accounts for 12 percent of the total LSB lands with ratings A and B. Under Alternative 2, approximately 21.6 acres of land with LSB rating of A and B within the wind farm site would be impacted by operations over the long term. This accounts for 7 percent of total LSB lands with ratings A and B.

A subset of these lands are actively farmed. Under Alternative 2, up to approximately 8.2 acres of actively farmed lands, spread across three of five farmers, would be disrupted during construction. This accounts for 5 percent of the total actively farmed lands within the wind farm site. During long term operations, up to approximately 4.6 acres of actively farmed lands, among three farmers, would be impacted. This accounts for 2.9 percent of the total actively farmed lands within the wind farm site.

To ensure that there is no net loss of active agricultural activities during Project operation, NPMPP would work with Malaekahana Hui West, LLC to identify suitable agricultural land within each of the three farmers leased areas. Within each of the three farmers leased areas, only a portion of the area is actively farmed, leaving remaining acreage that could be converted to actively farmed lands. To the extent requested by Malaekahana Hui West, LLC, NPMPP would work with Malaekahana Hui West, LLC to assist farmers in preparing this non-farmed lands for agricultural production so that there would be no net loss in active agriculture.

Comment CO-5.2*: In addition, the Second Draft EIS should state that a Special Use Permit (SUP) may be required if the County in which the project is located determines that the project is not compatible with agricultural uses. In this case, the Department of Planning and Permitting (OPP) is the agency that would determine whether the project is a compatible use and cause minimal adverse impact on agricultural land. At this time, until submission of additional information indicating that the wind energy facilities and appurtenances are compatible with existing and future agricultural uses and associated accessory uses (e.g., farm dwellings) and cause minimal adverse impact on agricultural land, the OPP determines that the wind energy project is subject to obtaining a Special Use Permit for the portions of the project located within Class "B" lands.*

Response CO-5.2: Information has been added to Section 5.2.5 of the Second Draft EIS regarding the potential need for a Special Use Permit if the City and County of Honolulu determines that the Project is not compatible with agricultural uses. Additional information has been added to Section 4.22 – Agriculture of the Second Draft EIS explaining how the Project is compatible with existing and future agricultural uses and how the Project will cause minimal adverse impact on agricultural land. NPMPP will coordinate with the Department of Planning and Permitting (DPP) regarding DPP's determination of whether the Project is subject to obtaining a Special Use Permit for the portions of the project located within Class "B" lands.

Comment CO-5.3*: Mountain Areas: Avoid disturbances caused by utility corridors and other uses on areas with high concentrations of native species.*

The Second Draft EIS should address this guideline. In particular, how does the project's location and layout avoid the area's native species? The Second Draft EIS should provide and analysis of relocating the project in other areas which do not require Federal Incidental Take Permit.

Response CO-5.3: Information has been added to Section 5.3.2 – Sustainable Communities Plan. The Project requires compliance with the Federal Endangered Species Act and Migratory Bird Treaty Act, and the State HRS 196-D which prohibits the “take” of any endangered or threatened species (see Section 5.1.1, 5.1.3, and 5.2.1, respectively, and Section 4.9 – Vegetation, Section 4.10 – Wildlife, and Section 4.11 – Threatened and Endangered Species of the EIS). The proposed wind farm site met siting criteria including, but not limited to, minimizing adverse impacts to native and endangered species. The proposed Project is not located within any natural reserves or other sensitive biological areas.

Sections 3.8 – Wildlife and 3.9 – Threatened and Endangered Species of the EIS discuss the native wildlife species that may occur in or pass through the wind farm site. As stated in Section 4.10 – Wildlife of the EIS, with the exception of some avian species and bat (discussed in detail in Section 4.11 – Threatened and Endangered Species of the EIS) most of the wildlife species likely to breed or forage within the wind farm site are common, non-native, and widespread, and the habitats affected are abundant in the surrounding area. Construction of the Project would not affect any unique or high quality wildlife habitats and no large contiguous blocks of high quality wildlife habitat would be fragmented as a result of the Project. Alternative project locations on Oahu which were considered but eliminated from further study are discussed in Section 2.3.4 – Alternate Location on Oahu of the EIS. As native sea birds and the Hawaiian hoary bat have the potential to occur anywhere on Oahu, there is no alternative site on Oahu, or in Hawaii, that would not require a federal incidental take permit for the construction and operation of a wind power facility.

Comment CO-5.4*: Electrical Power Development: Locate and design system elements such as renewable electrical power facilities, substations, communication sites, and transmission lines, including consideration of underground transmission lines, to mitigate any potential adverse impacts on scenic and natural resources, as well as public safety considerations.*

Mitigation measures for the project's visual impacts other than increasing setbacks have not been thoroughly analyzed. In addition, the daylight simulations were done using an overcast sky background which serves to reduce the tower and blades visual impacts. The visual impact of towers and blades may be more significant when compared to the background's natural environment, especially during hours of full sun light. When considered together with the existing Kahuku Wind Farm, the appearance. We recommend that the Second Draft EIS include additional design and location alternatives for analysis, such as lower and more slender towers and heights with smaller blades, avoidance of prominent hilltop locations, tower and blade colors to blend with the background terrain, and further setbacks to reduce the project's visual impacts on public viewing locations.

Response CO-5.4: Information has been added to Section 5.3.2 – Sustainable Communities Plan. Section 2.1 – Alternative Development and Screen Criteria and Section 2.3.4 – Alternate Location on Oahu of the EIS discuss alternatives considered but eliminated from detailed study, including an alternative with a greater setback distance as well as smaller and larger project alternatives. This alternative was eliminated because it was not a practicable option given adjacent land use constraints in military lands and topographic constraints.

Turbines and towers will be painted a uniform matte white or off-white as recommended by the FAA and the Department of Defense; the use of a matte finish would inhibit reflections or glare. There are no additional measures that could reasonably be implemented to further reduce the potential visual impacts due to the large scale of wind turbines; therefore, a certain degree of impacts is unavoidable.

Several attempts were done to photograph the background for the visual simulations during full sunlight. However, these attempts proved to be of similar or worse overcast sky quality. The visual simulations from the Kahuku Community Center use a new background photograph for comparison.

The Second Draft EIS evaluates a 9-turbine Project called the Modified Proposed Action Option which discloses the impacts from a project consisting of fewer, larger generation capacity turbines as well as refinements in the Project design such as shifting of individual turbine locations. It is important to note that at least some visual impact from a utility-scale wind farm is unavoidable no matter where a project is located on Oahu. Under the Modified Proposed Action Option, agricultural impacts would be less than described for Alternative 2.

Comment CO-5.5*: We also recommend that the Second Draft EIS address public safety of farmers and their dwellings/properties. The DEIS and recent aerial imagery shows what appears to be numerous farm structures, some of which could be farm dwelling or farm buildings located in the vicinity of the wind turbines. Occupants of affected farm dwellings could experience destruction or bodily injury in the case of a catastrophic event involving wind turbine failure. More information and ensuing analysis of the potential impact should be submitted for the Second Draft EIS and to the DPP as part of the SUP application.*

Response CO-5.5: General safety risks during construction are discussed in Section 4.18 – Public Health and Safety. As described in Section 4.18 of the EIS, wind turbine tower collapse and blade throw are very rare occurrences and have largely been eliminated due to technological improvements and mandatory safety standards. A Site Safety Handbook would be developed and implemented during construction and operation which would include measures for notifying farmers of upcoming construction activities, access restrictions, and other measures to ensure safety is maintained during construction. Standard construction best management practices would be implemented to reduce the potential for accidents or injuries. During operations measures would include notifying farmers of upcoming maintenance activities, access restrictions, natural events (i.e., high winds), and other measures to ensure safety is maintained during operations. NPMPP would work with Malaekahana Hui West, LLC to identify any additional measures such as signage which could be implemented during Project operation to keep farmers working in proximity to Project facilities apprised of safety issues.

Comment CO-5.6*: Agriculture: Protect agricultural lands from conversion to uses that are primarily residential, industrial, or commercial in purpose.*

Allow for appropriate non-agricultural uses that are compatible with open space and resource character, such as recreational or educational programs, or other uses consistent with the character of a rural agricultural area which provides supplemental income necessary to sustain the primary agricultural activity. There should be a direct connection between those activities and the maintenance of agricultural uses on the same or nearby properties.

Recognize the Contribution of Agricultural Lands to Koo/au Loa 's Rural Character.

Koolau Loa's rural character is in large part defined by the region's agricultural areas. Allowable uses should be appropriate to onsite or adjacent resources and open space settings. Any onsite development must be low-key, low-impact and predominantly open space in character.

Agriculture and open space help define the region's rural character. Pursuant to the Plan, conversion of agricultural lands to non-agricultural uses is strongly discouraged. When a conversion is allowed, the nonagricultural use should be compatible with the open space and which provide supplemental income to sustain the primary agricultural activity.

It's not clear that the Project will provide supplemental income to sustain the existing farming activities nor is the project low-key, low-impact, or predominantly open space in character. Therefore, the Second Draft EIS should address the above policies and guidelines of the Plan pertaining to agriculture. Unless information is submitted to show the project is consistent with the Plan, the Department of Planning and Permitting cannot determine that the project is consistent with the vision, policies, and guidelines of the Koolau Loa Sustainable Communities Plan.

Response CO-5.6: References to these policies from the Koolau Loa Sustainable Communities Plan (SCP) have been added to Section 5.3.2 – Sustainable Communities Plans of the Second Draft EIS. As discussed in Section 3.20 – and 4.22 - Agriculture, construction and operation of the Project would impact less than 7 percent of LSB

rated A and B lands within the wind farm site over the long-term, and less that 1 percent within the Koolauloa District. Alternative 2 would directly impact up to approximately 8.2 acres of actively farmed land during construction within the wind farm site, of which 4.6 acres would be temporarily displaced over the long -term. This displaced active farm land would be relocated to existing unused farm land within each farmer's lease area on the Malaekahana Hui West, LLC property; therefore, no net loss of agriculture would occur under Alternative 2. To the extent requested by Malaekahana Hui West, LLC, NPMPP would work with farmers to prepare this suitable land for agricultural production (e.g., grubbing, grading, soil amendments, extend irrigation, etc.) so that there would be no net loss in active agriculture. NPMPP would also work with Malaekahana Hui West, LLC to provide and maintain the irrigation system to the existing and potential future farm areas.

Comment CO-5.7*: Show the locations of the propose turbine sites on Figure 3.6.1.*

Response CO-5.7: This figure is consistent with all of the affected environment figures showing existing conditions, none of which show the proposed turbine locations.

Comment CO-5.8*: Use the current Rules Relating to Storm Drainage Standards and not the NOAA precipitation data to calculate stormwater runoff for all the turbine sites.*

Response CO-5.8: The Preliminary Drainage Study in Appendix H of the Second Draft EIS has been updated to apply the current Rules Relating to Storm Drainage Standards to calculate stormwater runoff for all of the turbine locations.

Comment CO-5.9*: The DEIS would be much clearer had the presentation been separated into the actual wind farm location sites and the addressing HCP requirements in a separate Appendix or Section that was identified in the Executive Summary.*

Response CO-5.9: The Draft EIS is a joint Federal and State document that meets the requirements of both the Hawaii Environmental Policy Act (HEPA) and the National Environmental Policy Act (NEPA). The approval of the Habitat Conservation Plan (HCP) and the issuance of the Incidental Take Permit (ITP) by the U.S. Fish and Wildlife Service is the federal Proposed Action and therefore must be analyzed in detail in the main body of the EIS. Each resource includes a section analyzing the impacts of construction and operation of the project and a section analyzing impacts of approval of the HCP and issuance if the ITP. Identification of this approach has been added to the executive summary of the Second Draft EIS.

Comment CO-5.10*: Wind machines are a permitted use with an approved Conditional Use Permit -Minor (CUP-Minor). We concur that an approved CUP-Minor would be required for joint development of two or more adjacent lots.*

Response CO-5.10: Thank you for confirming that the Project will require a CUP-Minor. As discussed in a meeting with the DPP in July 15, 2015, the Project will prepare and process three separate CUP-Minor applications eliminating the need for a joint development permit.

Comment CO-5.11*: Section 5.3.3 City and County of Honolulu, states that "The Project is also in compliance with setback requirements for the wind turbines heights and noise standards". The Second Draft EIS should discuss and show how the proposed turbines will be located within the required height setbacks.*

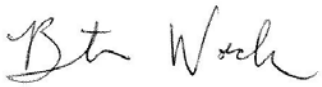
Response CO-5.11: A new figure (Figure 5-1) has been added to the Second Draft EIS showing how the proposed turbines would be located within the required height setbacks.

Comment CO-5.12*: We concur that a minor modification to CUP No. 95/CUP1-106 would be required to add a new dish antenna to the existing utility installation, Type B.*

Response CO-5.12: Thank you for confirming that the Kawela relay station proposed installation of a new dish will require a modification to CUP-Minor No. 95/CUP1-106.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

DEPARTMENT OF TRANSPORTATION SERVICES
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 3RD FLOOR
HONOLULU, HAWAII 96813
Phone: (808) 768-8305 • Fax: (808) 768-4730 • Internet: www.honolulu.gov

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U.S. FISH & WILDLIFE SVC
PACIFIC ISLANDS FWD
HONOLULU, HI 96850

KIRK CALDWELL
MAYOR

MICHAEL D. FORMBY
DIRECTOR

MARK N. GARRITY, AICP
DEPUTY DIRECTOR

TP6/15-612469R

July 15, 2015

CO-6

Ms. Kristi Young, Field Supervisor
Pacific Island Fish and Wildlife Office
U.S. Fish and Wildlife Service
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawaii 96850

Dear Ms. Young:

SUBJECT: Draft Environmental Impact Statement for the Proposed Na Pua Makani Wind Project and Draft Habitat Conservation Plan at Kahuku, Koolauloa, Hawaii, Tax Map Keys: (1) 5-6-005:018 (portion); (1) 5-6-006:18, 047, 051; and (1) 5-6-008:006 (portion)

1 In response to a letter from Brita Woeck, Project Manager, Tetra Tech, dated June 3, 2015, we have no comments to offer at this time.

Thank you for the opportunity to review this matter. Should you have any further questions, please contact Michael Murphy of my staff at 768-8359.

Very truly yours,

Michael D. Formby
Director

TETRA TECH

April 1, 2016

Michael D. Formby, Director
City and County of Honolulu
Department of Transportation Services
650 South King Street, 3rd Floor
Honolulu HI 96813

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Formby:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter dated July 15, 2015 regarding the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Draft Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We appreciate your taking the time to respond to our request for feedback about the Project.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

Federal Letters and Responses

USDA

United States Department of Agriculture

FED-1

August 11, 2015

RECEIVED

AUG 11 2015

U.S. FISH & WILDLIFE SVC
PACIFIC ISLANDS FWD
HONOLULU, HI 96850

Kristi Young
Pacific Island Fish and Wildlife Office
US Fish and Wildlife Service
300 Ala Moana Boulevard, Room 3-122
Honolulu, HI 96850

Subject: USDA-NRCS review of the Draft Environmental Impact Statement for the proposed Na Pua Makani Wind Project and Draft Habitat Conservation Plan

Dear Ms. Young,

1 Thank you for providing the NRCS the opportunity to review and comment on the proposed Na Pua Makani wind project. Please find enclosed NRCS maps and soil reports identifying areas of "Agricultural Lands Important to the State of Hawaii" (ALISH) as well as hydric soils.

Portions of the area proposed for the wind project are classified by ALISH as "Prime Agricultural Lands" (see attached map).

As defined by "Agricultural Lands of Importance to the State of Hawaii Revised" (State Department of Agriculture, November 1977), "Prime Agricultural Land" is:

> *"…land best suited for the production of food, feed, forage and fiber crops. The land has the soil quality, growing season, and moisture supply needed to produce sustained high yields of crops economically when treated and managed, including water management, according to modern farming methods."*

2 Typically, a Farmland Impact Conversion Rating Form (AD-1006) is needed on projects that convert farmlands into non-farmland uses, and have federal programs attached to the project. "Federal programs" are activities or responsibilities of a U.S. federal government agency that involve undertaking, financing, or assisting construction or improvement projects, or acquiring, managing, or disposing of federal lands and facilities. See the website link below for more information on the Farmland Protection Policy Act and a copy of the AD-1006 form with instructions.

3 In addition, hydric soils are located within the project area. The Hydric Soils report indicates that soil map unit HeA contains 15 percent hydric soils. The location and extent of soil map unit HeA can be found on the enclosed soil map. Hydric soils identify potential wetland areas. If wetlands do exist, any proposed impacts on these wetlands would need to demonstrate compliance with the "Clean Water Act", and may need an Army Corp of Engineers 404 permit.

4 The NRCS Soil Survey is a general planning tool and does not eliminate the need for an onsite investigation. If you have any questions concerning the soils or interpretations for this project, please contact Amy Koch, Acting State Soil Scientist, at (808) 541-2600 x 119, or by email at amy.koch@hi.usda.gov

NRCS - Farmland Protection Policy Act Website:
http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/landuse/fppa/

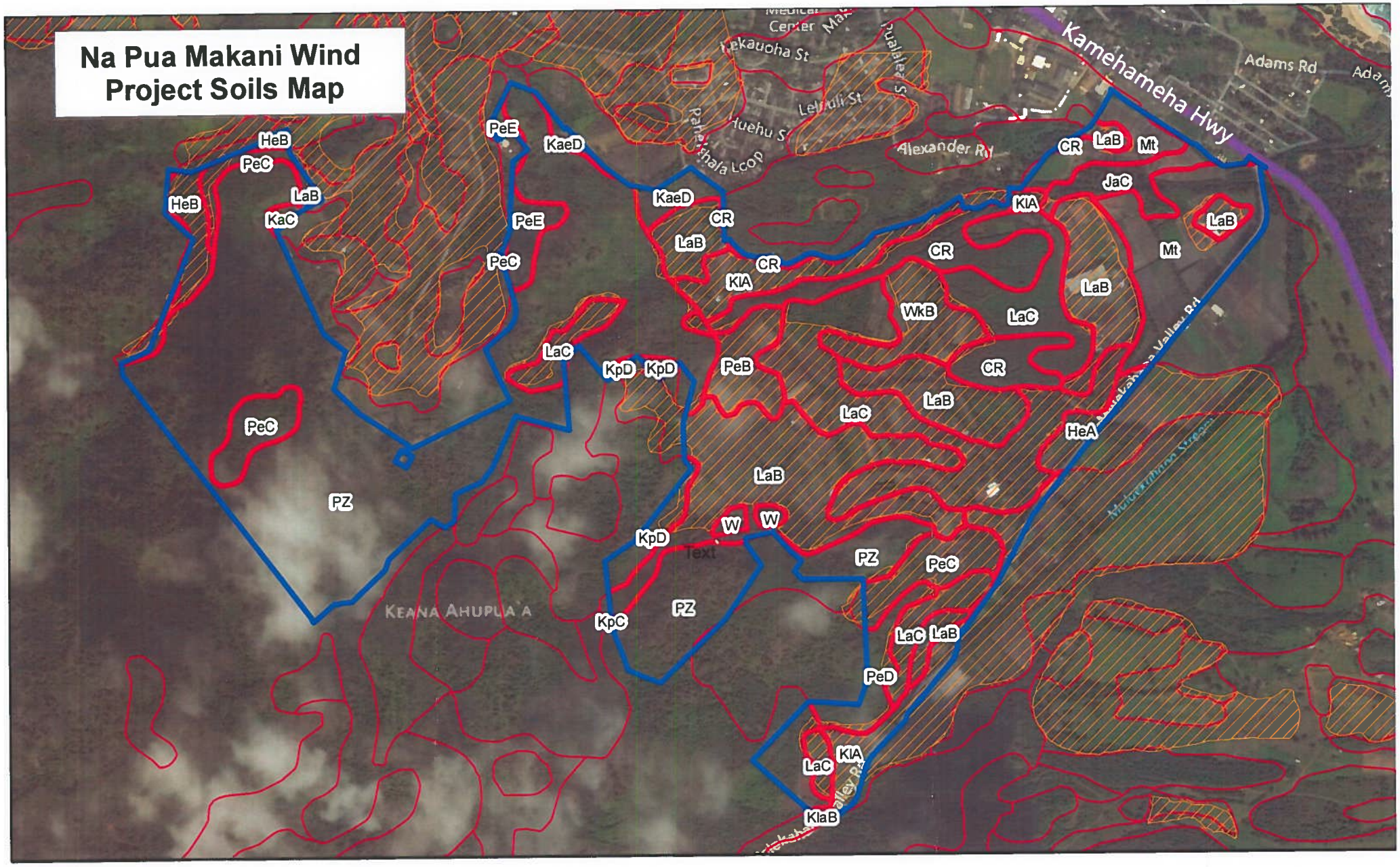
Sincerely,

BRUCE PETERSEN
Director
Pacific Islands Area

Enclosures (7 pages total):

- ALISH/soil map and report
- Hydric soil map and report

Na Pua Makani Wind Project Soils Map



Na_Pua_Makani_wind_site_boundary

Na_Pua_Makani_wind_site_soils

ALISH

Prime Lands

1 inch = 1,250 feet

0 625 1,250 2,500 3,750 Feet

Map is shown at a scale of 1:15,000. Soil maps were created at a scale of 1:24,000. The scale of the map does not in any way improve the detail or precision of the original soil map.

1:15,000

United States Department of Agriculture

NRCS

Map Unit Name

Aggregation Method: No Aggregation Necessary
Tie-break Rule: Lower

Island of Oahu, Hawaii
Survey Area Version and Date: 9 - 09/25/2014

Map symbol	Map unit name	Rating	Map unit percent
CR	Coral outcrop	Coral outcrop	100
HeA	Haleiwa silty clay, 0 to 2 percent slopes	Haleiwa silty clay, 0 to 2 percent slopes	100
HeB	Haleiwa silty clay, 2 to 6 percent slopes	Haleiwa silty clay, 2 to 6 percent slopes	100
JaC	Jaucas sand, 0 to 15 percent slopes	Jaucas sand, 0 to 15 percent slopes	100
KaC	Kaena clay, 6 to 12 percent slopes	Kaena clay, 6 to 12 percent slopes	100
KaeD	Kaena stony clay, 12 to 20 percent slopes	Kaena stony clay, 12 to 20 percent slopes	100
KlA	Kawaihapai clay loam, 0 to 2 percent slopes	Kawaihapai clay loam, 0 to 2 percent slopes	100
KlaB	Kawaihapai stony clay loam, 2 to 6 percent slopes	Kawaihapai stony clay loam, 2 to 6 percent slopes	100
KpC	Kemoo silty clay, 6 to 12 percent slopes	Kemoo silty clay, 6 to 12 percent slopes	100
KpD	Kemoo silty clay, 12 to 20 percent slopes	Kemoo silty clay, 12 to 20 percent slopes	100
LaB	Lahaina silty clay, 3 to 7 percent slopes	Lahaina silty clay, 3 to 7 percent slopes	100
LaC	Lahaina silty clay, 7 to 15 percent slopes	Lahaina silty clay, 7 to 15 percent slopes	100
Mt	Mokuleia clay loam	Mokuleia clay loam	100
PeB	Paumalu silty clay, 3 to 8 percent slopes	Paumalu silty clay, 3 to 8 percent slopes	100
PeC	Paumalu silty clay, 8-15 percent slopes	Paumalu silty clay, 8-15 percent slopes	100
PeD	Paumalu silty clay, 15 to 25 percent slopes	Paumalu silty clay, 15 to 25 percent slopes	100
PeE	Paumalu silty clay, 25 to 40 percent slopes	Paumalu silty clay, 25 to 40 percent slopes	100
PZ	Paumalu-Badland complex	Paumalu-Badland complex	100
W	Water > 40 acres	Water > 40 acres	100
WkB	Waialua silty clay, 3 to 8 percent slopes	Waialua silty clay, 3 to 8 percent slopes	100

Map Unit Name

Rating Options

Attribute Name: Map Unit Name

A soil map unit is a collection of soil areas or nonsoil areas (miscellaneous areas) delineated in a soil survey. Each map unit is given a name that uniquely identifies the unit in a particular soil survey area.

Aggregation Method: No Aggregation Necessary

Aggregation is the process by which a set of component attribute values is reduced to a single value to represent the map unit as a whole.

A map unit is typically composed of one or more "components". A component is either some type of soil or some nonsoil entity, e.g., rock outcrop. The components in the map unit name represent the major soils within a map unit delineation. Minor components make up the balance of the map unit. Great differences in soil properties can occur between map unit components and within short distances. Minor components may be very different from the major components. Such differences could significantly affect use and management of the map unit. Minor components may or may not be documented in the database. The results of aggregation do not reflect the presence or absence of limitations of the components which are not listed in the database. An on-site investigation is required to identify the location of individual map unit components.

For each of a map unit's components, a corresponding percent composition is recorded. A percent composition of 60 indicates that the corresponding component typically makes up approximately 60% of the map unit. Percent composition is a critical factor in some, but not all, aggregation methods.

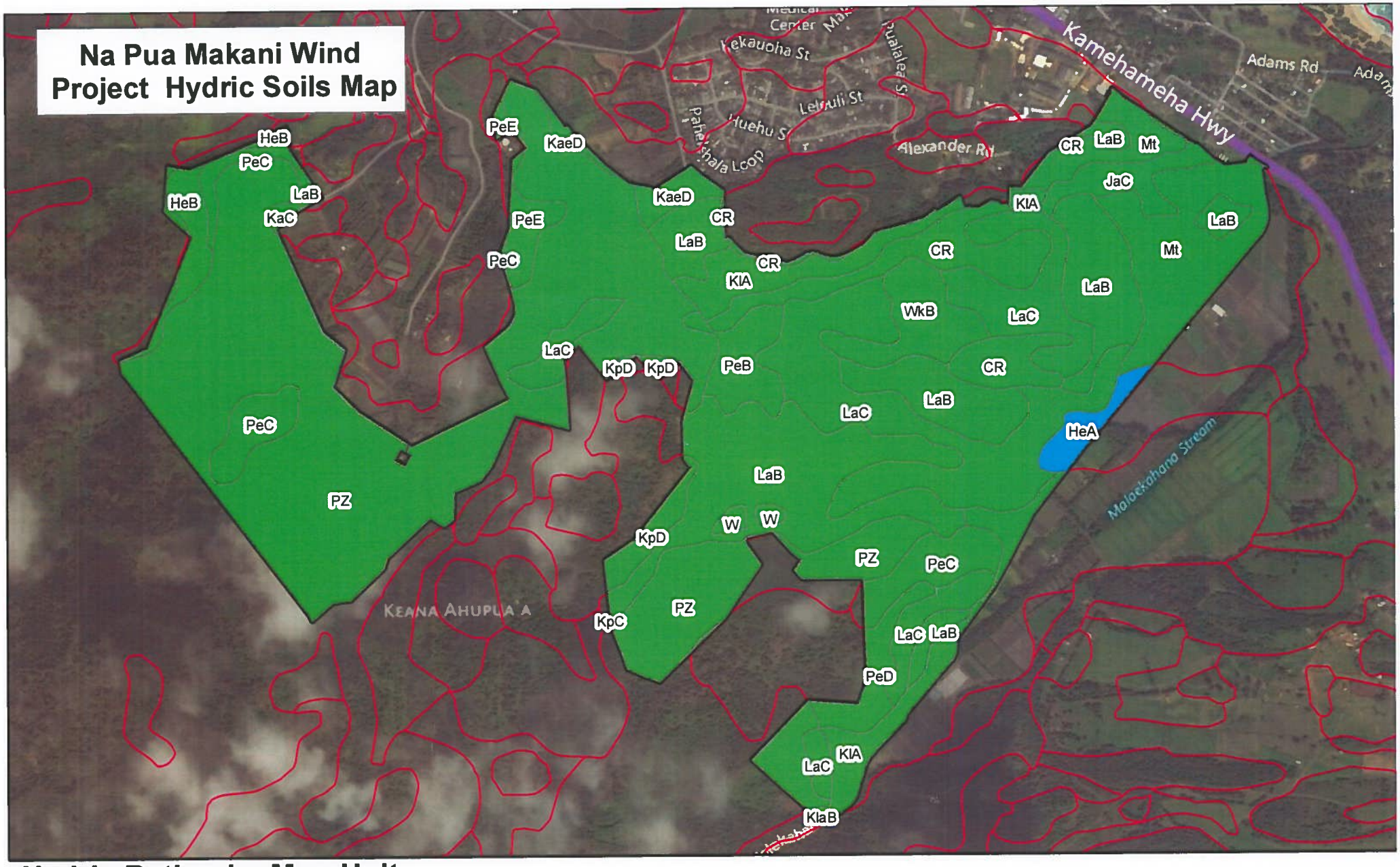
For the attribute being aggregated, the first step of the aggregation process is to derive one attribute value for each of a map unit's components. From this set of component attributes, the next step of the aggregation process derives a single value that represents the map unit as a whole. Once a single value for each map unit is derived, a thematic map for soil map units can be generated. Aggregation must be done because, on any soil map, map units are delineated but components are not.

The majority of soil attributes are associated with a component of a map unit, and such an attribute has to be aggregated to the map unit level before a thematic map can be rendered. Map units, however, also have their own attributes. An attribute of a map unit does not have to be aggregated in order to render a corresponding thematic map. Therefore, the "aggregation method" for any attribute of a map unit is referred to as "No Aggregation Necessary".

Tie-break Rule: Lower

The tie-break rule indicates which value should be selected from a set of multiple candidate values, or which value should be selected in the event of a percent composition tie.

Na Pua Makani Wind Project Hydric Soils Map



Hydric Rating by Map Unit

- 0 % soil map unit consists hydric soils
- 15 % soil map unit consists hydric soils
- Na_Pua_Makani_wind_site_boundary
- Na_Pua_Makani_wind_site_soils

Map is shown at a scale of 1:15,000. Soil maps were created at a scale of 1:24,000. The scale of the map does not in any way improve the detail or precision of the original soil map.

1 inch = 1,250 feet

0 625 1,250 2,500 3,750 Feet

1:15,000

United States Department of Agriculture
NRCS Natural Resources Conservation Service

Hydric Rating by Map Unit

Aggregation Method: Percent Present
Tie-break Rule: Lower

Island of Oahu, Hawaii
Survey Area Version and Date: 9 - 09/25/2014

Map symbol	Map unit name	Rating	Map unit percent
CR	Coral outcrop	0	0
HeA	Haleiwa silty clay, 0 to 2 percent slopes	15	15
HeB	Haleiwa silty clay, 2 to 6 percent slopes	0	0
JaC	Jaucas sand, 0 to 15 percent slopes	0	0
KaC	Kaena clay, 6 to 12 percent slopes	0	0
KaeD	Kaena stony clay, 12 to 20 percent slopes	0	0
KlA	Kawaihapai clay loam, 0 to 2 percent slopes	0	0
KlaB	Kawaihapai stony clay loam, 2 to 6 percent slopes	0	0
KpC	Kemoo silty clay, 6 to 12 percent slopes	0	0
KpD	Kemoo silty clay, 12 to 20 percent slopes	0	0
LaB	Lahaina silty clay, 3 to 7 percent slopes	0	0
LaC	Lahaina silty clay, 7 to 15 percent slopes	0	0
Mt	Mokuleia clay loam	0	0
PeB	Paumalu silty clay, 3 to 8 percent slopes	0	0
PeC	Paumalu silty clay, 8-15 percent slopes	0	0
PeD	Paumalu silty clay, 15 to 25 percent slopes	0	0
PeE	Paumalu silty clay, 25 to 40 percent slopes	0	0
PZ	Paumalu-Badland complex	0	0
W	Water > 40 acres	0	0
WkB	Waialua silty clay, 3 to 8 percent slopes	0	0

Hydric Rating by Map Unit

Rating Options

Attribute Name: Hydric Rating by Map Unit

This rating indicates the percentage of map units that meets the criteria for hydric soils. Map units are composed of one or more map unit components or soil types, each of which is rated as hydric soil or not hydric. Map units that are made up dominantly of hydric soils may have small areas of minor nonhydric components in the higher positions on the landform, and map units that are made up dominantly of nonhydric soils may have small areas of minor hydric components in the lower positions on the landform. Each map unit is rated based on its respective components and the percentage of each component within the map unit.

The thematic map is color coded based on the composition of hydric components. The five color classes are separated as 100 percent hydric components, 66 to 99 percent hydric components, 33 to 65 percent hydric components, 1 to 32 percent hydric components, and less than one percent hydric components.

In Web Soil Survey, the Summary by Map Unit table that is displayed below the map pane contains a column named 'Rating'. In this column the percentage of each map unit that is classified as hydric is displayed.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). Under natural conditions, these soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 2002). These criteria are used to identify map unit components that normally are associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 2006) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and Vasilas, 2006).

References:

Federal Register. July 13, 1994. Changes in hydric soils of the United States.
Federal Register. September 18, 2002. Hydric soils of the United States.
Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.
Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.
Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.
Soil Survey Staff. 2006. Keys to soil taxonomy. 10th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.

Aggregation Method: Percent Present

Aggregation is the process by which a set of component attribute values is reduced to a single value to represent the map unit as a whole.

A map unit is typically composed of one or more "components". A component is either some type of soil or some nonsoil entity, e.g., rock outcrop. The components in the map unit name represent the major soils within a map unit delineation. Minor components make up the balance of the map unit. Great differences in soil properties can occur between map unit components and within short distances. Minor components may be very different from the major components. Such differences could significantly affect use and management of the map unit. Minor components may or may not be documented in the database. The results of aggregation do not reflect the presence or absence of limitations of the components which are not listed in the database. An on-site investigation is required to identify the location of individual map unit components.

For each of a map unit's components, a corresponding percent composition is recorded. A percent composition of 60 indicates that the corresponding component typically makes up approximately 60% of the map unit. Percent composition is a critical factor in some, but not all, aggregation methods.

For the attribute being aggregated, the first step of the aggregation process is to derive one attribute value for each of a map unit's components. From this set of component attributes, the next step of the aggregation process derives a single value that represents the map unit as a whole. Once a single value for each map unit is derived, a thematic map for soil map units can be generated. Aggregation must be done because, on any soil map, map units are delineated but components are not.

The aggregation method "Percent Present" returns the cumulative percent composition of all components of a map unit for which a certain condition is true. For example, attribute "Hydric Rating by Map Unit" returns the cumulative percent composition of all components of a map unit where the corresponding hydric rating is "Yes". Conditions may be simple or complex. At runtime, the user may be able to specify all, some or none of the conditions in question.

Tie-break Rule: Lower

Hydric Rating by Map Unit

The tie-break rule indicates which value should be selected from a set of multiple candidate values, or which value should be selected in the event of a percent composition tie.

April 1, 2016

Bruce Petersen, Director, Pacific Islands Area
Natural Resources Conservation Service
PO Box 5004 Rm. 4-118
Honolulu HI 96850-0050

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Petersen:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter dated August 11, 2015, commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Draft Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment FED-1.1*: …Portions of the area proposed for the wind project are classified by ALISH as "Prime Agricultural Lands" (see attached map).*
As defined by "Agricultural Lands of Importance to the State of Hawaii Revised" (State Department of Agriculture, November 1977), "Prime Agricultural Land" is:
... land best suited for the production of food, feed, forage and fiber crops. The land has the soil quality, growing season, and moisture supply needed to produce sustained high yields of crops economically when treated and managed, including water management, according to modem farming methods.

Response FED-1.1: Thank you for confirming that the wind farm site includes ALISH lands. The presence of, and impacts to, ALISH lands are described in the Draft EIS under Soils and Geology (sections 3.1 and 4.3), Land Use (sections 3.12 and 4.13), Agriculture (expanded discussion in new sections 3.20 and 4.22). NRCS soil types, including hydric soils, within the wind farm site and mitigation areas are identified in tables 3.1-1, 3.1-2, and 3.1-3 of the Draft EIS.

Comment FED-1.2*: Typically, a Farmland Impact Conversion Rating Form (AD-1006) is needed on projects that convert farmlands into non-farmland uses, and have federal programs attached to the project. "Federal programs" are activities or responsibilities of a U.S. federal government agency that involve undertaking, financing, or assisting construction or improvement projects, or acquiring, managing, or disposing of federal lands and facilities. See the website link below for more information on the Farmland Protection Policy Act and a copy of the AD-1006 form with instructions.*

Response FED-1.2: Projects that are subject to the Farmland Protection Policy Act (FPPA) are projects that are completed by a Federal agency or with assistance from a Federal agency. According to the USDA website

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(http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/landuse/fppa/), federal permitting and licensing is not subject to the FPPA. The Na Pua Makani wind project is not being undertaken by a Federal agency, but is requesting an Incidental Take Permit from the U.S. Fish and Wildlife Service (the only federal nexus for the project) which is exempt from the FPPA. Therefore, the Farmland Impact Conversion Rating Form is not needed.

An expanded discussion of agriculture has been added to the Second Draft EIS in sections 3.20 (existing conditions) and 4.22 (effects analysis). Construction of the Project would result in a minor amount of disturbance to active agricultural lands within the wind farm site (areas in crop production). It is anticipated that there may also be temporary access restrictions along existing roads to ensure the safety of farmers within the wind farm site or to irrigation water. To avoid impacts to individual farmers for potential lost agricultural productivity during construction, either due to direct impacts to crops or indirectly through reduced access along roads or to irrigation water, where possible Na Pua Makani Power Partners, LLC will coordinate construction activities such that the impacts on crops would be minimized. If impacts associated with agricultural productivity cannot be avoided during construction, Na Pua Makani Power Partners, LLC will compensate farmers within the wind farm site for the season's lost crops.

During operation, existing agricultural activities and uses within the wind farm site would continue. To ensure that there is no net loss of active agricultural activities during Project operation, Na Pua Makani Power Partners, LLC would work with Malaekahana Hui West, LLC to identify suitable agricultural land within each of the three parcels leased by farmers from Malaekahana Hui West, LLC where active agricultural activities would be impacted over the long-term by the Project (totaling 4.6 acres among 3 farmers). Within each of these lease areas, only a portion of the area identified in Real Property Tax Assessment reports as agricultural use is actively farmed, leaving remaining acreage that could be converted to actively farmed lands. Na Pua Makani Power Partners, LLC would work with Malaekahana Hui West, LLC to assist farmers in preparing this non-farmed lands for agricultural production so that there would be no net loss in active agriculture.

Comment FED-1.3*: …hydric soils are located within the project area. The Hydric Soils report indicates that soil map unit HeA contains 15 percent hydric soils. The location and extent of soil map unit HeA can be found on the enclosed soil map. Hydric soils identify potential wetland areas. If wetlands do exist, any proposed impacts on these wetlands would need to demonstrate compliance with the "Clean Water Act", and may need an Army Corp of Engineers 404 permit.*

Response FED-1.3: Hydrology and water resources (including wetlands) are described in Section 3.2 of the Draft EIS. As discussed in Section 3.2.1 wetland surveys determined that no wetlands are located within the wind farm site. Since the publication of the Draft EIS, a preliminary jurisdictional determination has been made for this Project and all waters within the wind farm site are assumed to be jurisdictional (April 6, 2015). The Project design has also been refined to ensure that Keaaulu, Malaekahana, and Ohia streams can be avoided, and that there would be no placement of dredge or fill material, either temporarily or permanently, below the ordinary high water marks of these streams. All impacts to water bodies within the wind farm site will be avoided. Na Pua Makani Power Partners, LLC is currently consulting with the U.S. Army Corp of Engineers on Section 404 compliance. Information has been added to Section 3.2 of the Second Draft EIS regarding consultation with the U.S. Army Corp of Engineers and Section 404 permitting requirements.

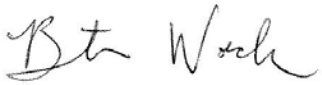
Comment FED-1.4*: The NRCS Soil Survey is a general planning tool and does not eliminate the need for an onsite investigation.*

Response FED-1.4: The NRCS Soil Survey was used to identify soil types within the wind farm site (see Table 3.1-1 and Figure 3.1-1 of the Draft EIS); however, Na Pua Makani Power Partners, LLC understands the

importance of conducting onsite investigations. As discussed in Section 3.2 of the Draft EIS, on-site stream and wetland surveys have been conducted within the wind farm site.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

FED-2

AUG 11 2015

Kristi Young, Acting Field Supervisor
Pacific Islands Fish and Wildlife Office
U.S. Fish and Wildlife Service
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawaii 96950

Subject: Draft Environmental Impact Statement for the Na Pua Makani Wind Project and Habitat Conservation Plan, Kahuku, Hawaii [CEQ# 20150160]

Dear Ms. Young:

The U.S. Environmental Protection Agency has reviewed the Draft Environmental Impact Statement for the Na Pua Makani Wind Project and Habitat Conservation Plan. Our review and comments are provided pursuant to the National Environmental Policy Act, Council on Environmental Quality Regulations (40 CFR Parts 1500-1508), and our NEPA review authority under Section 309 of the Clean Air Act.

1 The EPA supports the development of renewable energy resources in an expeditious and well-planned manner. Accelerating the development of renewable resources and the deployment of clean energy technologies in Hawaii will help the state meet its energy demand, reduce dependence on imported oil, create new jobs, and provide for increased energy security, while reducing greenhouse gas emissions. The proposed incidental take permit represents a coordinated approach to protecting and preserving the eight proposed Covered Species and their habitat, while allowing the proposed wind energy project to proceed. We encourage the U.S. Fish and Wildlife Service to apply its regulatory authorities in a manner that will promote a long-term sustainable balance between the development of renewable energy resources and the protection of ecosystems and human health.

2 Wind power development offers many benefits to society and the environment; however, there can be burdens associated with living in close proximity to wind turbines. The community in the vicinity of the proposed project has been identified as a minority environmental justice population, due to the disproportionate concentration of Native Hawaiians and other Pacific Islanders, and may be less equipped than other communities to deal with those burdens.

3 Based on our review of the DEIS, we have rated the proposed Project and the document *as Environmental Concerns – Insufficient Information* (EC-2). Please see enclosed *Summary of EPA Rating Definitions*. We have concerns regarding potential impacts to aquatic resources. We are also concerned about the proximity of the proposed turbines to residents in Kahuku. We recognize that the Proponent has increased the setbacks beyond what is required by Hawaii regulations. Nonetheless, we remain concerned about the potential impacts of noise and shadow flicker from the proposed Project on residents. Our detailed comments provide recommendations regarding these and other concerns.

We appreciate the opportunity to review this DEIS, and are available to discuss our comments. When the Final EIS is released for public review, please send one hard copy and one CD-ROM to the address above (Mail Code: ENF-4-2). If you have any questions, please contact me at 415-972-3521, or contact Ann McPherson, the lead reviewer for this project. Ann can be reached at 415-972-3545 or mcpherson.ann@epa.gov.

Sincerely,

Kathleen Martyn Goforth, Manager
Environmental Review Section

Enclosures: Summary of the EPA Rating System
EPA's Detailed Comments

SUMMARY OF EPA RATING DEFINITIONS*

This rating system was developed as a means to summarize the U.S. Environmental Protection Agency's (EPA) level of concern with a proposed action. The ratings are a combination of alphabetical categories for evaluation of the environmental impacts of the proposal and numerical categories for evaluation of the adequacy of the Environmental Impact Statement (EIS).

ENVIRONMENTAL IMPACT OF THE ACTION

"LO" (Lack of Objections)

The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

"EC" (Environmental Concerns)

The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact. EPA would like to work with the lead agency to reduce these impacts.

"EO" (Environmental Objections)

The EPA review has identified significant environmental impacts that should be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

"EU" (Environmentally Unsatisfactory)

The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potentially unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the Council on Environmental Quality (CEQ).

ADEQUACY OF THE IMPACT STATEMENT

"Category 1" (Adequate)

EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

"Category 2" (Insufficient Information)

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analysed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses, or discussion should be included in the final EIS.

"Category 3" (Inadequate)

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analysed in the draft EIS, which should be analysed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

*From EPA Manual 1640, Policy and Procedures for the Review of Federal Actions Impacting the Environment.

U.S. EPA DETAILED COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE NA PUA MAKANI WIND PROJECT AND HABITAT CONSERVATION PLAN, KAHUKU, HAWAII, AUGUST 11, 2015

Water Resources

4 According to the Draft Environmental Impact Statement, three streams run through the proposed site and, based on a preliminary delineation, may qualify as jurisdictional waters of the United States (WUS) (pg. 4-21). Although project components are not expected to directly impact the perennial Malaekahana stream, they could impact the intermittent Kea'aulu and Ohia streams (pg. 4-21); however, the DEIS does not quantify the potential impacts to these aquatic resources. While indicating that the project footprint has been designed to avoid jurisdictional features where possible, the document acknowledges that it is not known whether the project would require placement of dredged or fill material temporarily or permanently below the delineated ordinary high water marks (App. I, pg. 20).

Under Section 404 of the Clean Water Act, the U.S. Army Corps of Engineers has authority to regulate the discharge of dredged and fill material into WUS. If a Section 404 permit is required, the U.S. Environmental Protection Agency will review the project for compliance with the Federal Guidelines for Specification of Disposal Sites for Dredged or Fill Materials (40 CFR 230), promulgated pursuant to Section 404(b)(1) of the CWA (Guidelines). Pursuant to the Guidelines, any permitted discharge into WUS must be the Least Environmentally Damaging Practicable Alternative (LEDPA) available to achieve the project purpose. No discharge can be permitted if it will cause or contribute to significant degradation of WUS. If impacts to aquatic resources cannot be avoided, alternatives that minimize impacts must be fully considered. Opportunities may exist to avoid and minimize impacts to waters through sensitive siting criteria, such as the placement of wind turbines out of waters, or by bridging or use of at-grade crossings.

Recommendations:
Consult with the Corps of Engineers to determine whether the proposed project would require a Clean Water Act Section 404 permit. Include, in the Final EIS, the jurisdictional delineation by the Corps and disclose whether the project would require a Section 404 permit.

Quantify and describe, in the FEIS, any direct, indirect/secondary, or temporary impacts to jurisdictional waters. Include a mitigation plan for unavoidable impacts to jurisdictional waters, and evaluate the project alternatives with regard to compliance with the 404(b)(1) Guidelines and authorization of the LEDPA, if applicable.

Characterize the functions of any aquatic features that could be affected by the project that are determined not to constitute jurisdictional waters, and identify measures that would mitigate impacts to such waters.

Setbacks for Wind Turbine Generators

5 The DEIS states that project wind turbines would be set back a minimum of 1,500 feet from the nearest residential areas (pg. 4-233). Elsewhere, the DEIS states that the nearest residence is located 673 feet from a proposed turbine (pg. 4-45).

Recommendation:
Clarify in the FEIS, what the actual minimum setback would be for the proposed project. Include a map that shows the locations of the proposed wind turbines and the residences nearest to them. Disclose the distances between those turbines and residences.

Noise

6 *Baseline Sound Levels*
Appendix D of the DEIS indicates that projected noise levels during project construction and operation were assessed using baseline sound data collected in April/May 2014 and acoustic modeling. Baseline sound data were collected at integer wind speeds where the Project would operate (10 to 39 feet/second) (pg. 3-26). According to the DEIS, the wind turbines under consideration reach their highest operational sound levels at approximately 23 f/s. During this wind speed condition, existing sound levels for the acoustic analysis area were found to range from 45 to 49 dBA Leq (daytime) and 43 to 48 dBA Leq (night) (pg. 3-28). The DEIS does not specify whether the existing Kahuku wind farm, situated north of the proposed project, was operating at all times when baseline sound data were collected, and if so, how many turbines were in operation. In order to determine the cumulative impacts on noise levels that would result from construction and operation of the proposed wind farm, it is important to know whether or not the baseline sound levels account for the maximum impact of the existing Kahuku facility.

Recommendation:
Clarify how many, if any, wind turbines from the Kahuku wind farm were operating when the baseline sound data were collected.

7 *Hawaii Noise Regulations*
Hawaii regulates noise through the Hawaii Administrative Rule (HAR 11-46), which provides daytime and nighttime maximum permissible noise limits[1] according to zoning districts (pg. 4-39). According to the DEIS, the analysis indicates compliance with HAR 11-46, although there would be some small increases in sound levels. In class A zones, most increases would be minimal (up to 4 dBA); however, some residences in Class C zones are predicted to experience increases in excess of 5 dBA (pg. 4-45). The DEIS does not discuss the potential margin of error associated with these values. It concludes that residents at these homes would realize little to no noise impact from the turbines when inside and with windows closed; therefore, noise impacts such as sleep disturbance are not anticipated, and no mitigation is identified (pg. 4-46). EPA believes that it is reasonable to assume that many area residents are accustomed to sleeping with windows open, given that electricity costs in Hawaii are relatively high and not every household has air conditioning; therefore, the impacts may be greater than anticipated in the DEIS.

Recommendations:
Disclose the number and locations of residences that would experience noise increases up to 4dBA, between 4dBA and 5dBA, and in excess of 5 dBA.

[1] HAR 11-46 Noise Limits - (Zone A – 45 dBA night and 55 dBA day; Zone B – 50 dBA night and 60 dBA day; Zone C – 70 dBA day or night).

8 Evaluate predicted and actual noise impacts inside affected homes with windows open. Utilize A-weighted (dBA) and C-weighted (dBC) scales to ensure that potential impacts from low frequency noise are evaluated.

9 Identify, in the FEIS, measures that could mitigate impacts associated with wind turbine noise.

10 Seek a commitment from the Proponent to monitor post-construction noise in the acoustic analysis area and document this commitment in the Record of Decision. We recommend that, at minimum, such monitoring be conducted at the locations of sensitive receptors.

11 In addition, we recommend that the Proponent implement a noise complaint resolution process that would document, investigate, evaluate, and resolve any project-related noise complaints.

12 *World Health Organization Noise Guidelines*
As noted in DEIS Appendix D, EPA published a document in 1974 that identifies noise levels affecting health and welfare. The noise impact assessment states that this EPA report represents the only published study that includes a large database of community reaction to noise to which a proposed project can be readily compared. More recently, the World Health Organization published two guidelines that can be used to assist in providing a framework for assessing noise impacts. The *WHO Night Noise Guidelines for Europe*[2], published in 2009, recommend 40 dBA levels or lower at night time to prevent adverse health impacts, with an interim target of 55 dBA. The *WHO Guidelines for Community Noise*[3], published in 1999, recommend sound levels less than 30 dBA in bedrooms at night for good quality sleep, and less than 35 dBA in classrooms to allow good teaching and learning conditions. The WHO advises that, when the noise is composed of a large proportion of low-frequency sounds, still lower guideline values should be applied; also that outside noise levels should be low enough to allow people to sleep with their bedroom windows open. The baseline nighttime sound levels reported in the DEIS exceed the WHO Night Noise Guidelines.

Recommendation:
Discuss, in the FEIS, the WHO noise guidelines and potential impacts to health associated with outdoor nighttime noise levels in exceedance of 40 dBA, indoor nighttime levels in exceedance of 30 dBA in bedrooms, and indoor daytime levels in exceedance of 35 dBA in classrooms.

Shadow Flicker

13 According to the DEIS, 98 percent of receptors will experience less than 30 hours/year of shadow flicker, which is an unofficial industry standard. Seventeen of 737 receptors modeled, however, had expected shadow flicker impacts of more than 30 hours per year, ranging up to 204 hours and 2 minutes per year at an occupied residence (pg. 4-234). The DEIS concludes that there would be minimal impacts outside of the wind farm boundary (pg. 4-235), and notes that strategic vegetative screening and/or installation of curtains and blinds on windows are effective and economically viable mitigation options (Appendix K, pg. 9).

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[2] See http://www.euro.who.int/__data/assets/pdf_file/0017/43316/E92845.pdf?ua=1 (See pg. VI).
[3] The WHO Guidelines for Community Noise can be downloaded as a pdf from the following website: http://www.euro.who.int/en/health-topics/environment-and-health/noise/publications (See pgs. 46 and 57).

Recommendations:
Specify, in the FEIS, the types and locations of receptors who are likely to be affected by greater than 30 hours of shadow flicker per year.

14 Since curtains and blinds only mitigate shadow flicker if the receptor is indoors with the curtains and blinds closed, discuss, in the FEIS, how shadow flicker could be mitigated in the event that that the receptor is outdoors or is unable or unwilling to remain behind blinds and curtains for the duration of the shadow flickering.

15 Describe where vegetative screening would need to be located in order to be effective, and the species of vegetation that would be used for that purpose. EPA strongly recommends the use of native species to avoid introducing or furthering the spread of invasive non-native species. Clarify who would be responsible for any necessary maintenance of vegetative screens that are established as mitigation.

16 Discuss the feasibility of stopping a particular wind turbine(s) whenever shadow flicker would constitute a nuisance, particularly for the 17 receptors who would experience more than 30 hours of shadow flicker per year.

Community Benefits Package

17 The DEIS states that the Proponent is conducting outreach efforts to define a Community Benefits Package, which may include honoring the commitment of the prior developer to pay $10,000 per wind turbine per year over the life of the project to the Kahuku community, or about $2,000,000 of direct economic benefits (pg. 4-126). Further information about the use of such funds is not provided.

Recommendation:
Discuss, in the FEIS, how the Community Benefits Package funds may be utilized. Describe the process that would be used to decide how such funds would be appropriated.

Project Decommissioning

18 The life of the proposed project is expected to be 21 years, after which the Proponent would evaluate whether to continue operation of the project or to decommission it. The facility may also be upgraded and repowered with renegotiated leases. According to the DEIS, if the project is decommissioned, the goal would be to remove the power generation equipment and return the site to a condition as close as possible to its pre-construction state (pg. 2-25).

Recommendation:
Identify, in the FEIS, bonding or financial assurance strategies for decommissioning and reclamation. Use the projected 21-year lifespan to ascertain the appropriate financial instruments that could be used for bond and/or financial assurance calculations.

April 1, 2016

Kathleen Martyn Goforth, Manager
Environmental Review Section
U.S. Environmental Protection Agency, Region IX
75 Hawthorne Street
San Francisco CA 94105-3901

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Goforth:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter commenting on the Na Pua Makani wind project (Project) and Habitat Conservation Plan Draft Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment FED-2.1*: The EPA supports the development of renewable energy resources in an expeditious and well-planned manner. Accelerating the development of renewable resources and the deployment of clean energy technologies in Hawaii will help the state meet its energy demand, reduce dependence on imported oil, create new jobs, and provide for increased energy security, while reducing greenhouse gas emissions. The proposed incidental take permit represents a coordinated approach to protecting and preserving the eight proposed Covered Species and their habitat, while allowing the proposed wind energy project to proceed. We encourage the U.S. Fish and Wildlife Service to apply its regulatory authorities in a manner that will promote a long-term sustainable balance between the development of renewable energy resources and the protection of ecosystems and human health.*

Response FED-2.1: Thank you for your comment regarding the proposed Habitat Conservation Plan (HCP) and Incidental Take Permit (ITP). The U.S. Fish and Wildlife Service continues to work closely with the applicant to ensure that the Final HCP includes measures to adequately avoid and minimize impacts to listed species to the extent possible and where impacts are unavoidable, develop appropriate compensatory mitigation measures that are based on the best available science and conservation needs of the species. The HCP is a joint Federal and State document and in accordance with State requirements must provide a net benefit to the covered species.

Comment FED-2.2*: Wind power development offers many benefits to society and the environment; however, there can be burdens associated with living in close proximity to wind turbines. The community in the vicinity of the proposed project has been identified as a minority environmental justice population, due to the*

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disproportionate concentration of Native Hawaiians and other Pacific Islanders, and may be less equipped than other communities to deal with those burdens.

Response FED-2.2: The communities of Kahuku and Laie were identified in the Draft EIS as minority environmental justice populations based on the disproportionate concentration of Native Hawaiians and Other Pacific Islanders in these areas relative to Oahu as a whole (30 percent and 35 percent of the population, respectively, versus 9 percent for Honolulu County as a whole). However, it is important to note that in Hawaii, as well as within Honolulu County, a majority of the population (78 percent and 81 percent, respectively) consists of a non-white, minority group (Asian, Native American or other Pacific Islander, and Hispanic or Latino; see Section 3.17 of the EIS for additional information). Potential adverse effects to residents living in the communities in the vicinity of the Project relate to noise, socioeconomics, cultural resources, visual resources, and public health and safety, none of which were determined to be high and adverse. Moreover, the Project would result in short- and long-term socioeconomic benefits to the community through the creation of jobs and generation of tax revenues. Na Pua Makani Power Partners has incorporated input from the surrounding communities in development of the Project design, which has resulted in a number of significant design changes. Additionally, they are working with community leaders to establish a multi-million dollar community benefits fund which will contribute to the local Kahuku community for the life of the Project. For these reasons, Native Hawaiians and other Pacific Islanders are not anticipated to experience a disproportionate share of effects.

Comment FED-2.3*: Based on our review of the DEIS, we have rated the proposed Project and the document as Environmental Concerns - Insufficient Information (EC-2). Please see enclosed Summary of EPA Rating Definitions. We have concerns regarding potential impacts to aquatic resources. We are also concerned about the proximity of the proposed turbines to residents in Kahuku. We recognize that the Proponent has increased the setbacks beyond what is required by Hawaii regulations. Nonetheless, we remain concerned about the potential impacts of noise and shadow flicker from the proposed Project on residents. Our detailed comments provide recommendations regarding these and other concerns.*

Response FED-2.3: We acknowledge your request for additional information related to aquatic resources, as well as noise and shadow flicker impacts. Additional information on these topics has been added to the Second Draft EIS to support the conclusion in the Draft EIS that no significant impacts from noise or shadow flicker are expected as a result of the Project. Please see detailed responses to related comments below.

Comment FED-2.4*: According to the Draft Environmental Impact Statement, three streams run through the proposed site and, based on a preliminary delineation, may qualify as jurisdictional waters of the United States (WUS) (pg. 4-21). Although project components are not expected to directly impact the perennial Malaekahana stream, they could impact the intermittent Kea'aulu and Ohia streams (pg. 4-21); however, the DEIS does not quantify the potential impacts to these aquatic resources. While indicating that the project footprint has been designed to avoid jurisdictional features where possible, the document acknowledges that it is not known whether the project would require placement of dredged or fill material temporarily or permanently below the delineated ordinary high water marks (App. I, pg. 20).*

Under Section 404 of the Clean Water Act, the U.S. Army Corps of Engineers has authority to regulate the discharge of dredged and fill material into WUS. If a Section 404 permit is required, the U.S. Environmental Protection Agency will review the project for compliance with the Federal Guidelines for Specification of Disposal Sites for Dredged or Fill Materials (40 CFR 230), promulgated pursuant to Section 404(b)(l) of the CWA (Guidelines). Pursuant to the Guidelines, any permitted discharge into WUS must be the Least Environmentally Damaging Practicable Alternative (LEDPA) available to achieve the project purpose. No discharge can be permitted if it will cause or contribute to significant degradation of WUS. If impacts to aquatic resources cannot be avoided, alternatives that minimize impacts must be fully considered. Opportunities may exist

to avoid and minimize impacts to waters through sensitive siting criteria, such as the placement of wind turbines out of waters, or by bridging or use of at-grade crossings.

Recommendation:
Consult with the Corps of Engineers to determine whether the proposed project would require a Clean Water Act Section 404 permit. Include, in the Second Draft EIS, the jurisdictional delineation by the Corps and disclose whether the project would require a Section 404 permit.

Quantify and describe, in the FEIS, any direct, indirect/secondary, or temporary impacts to jurisdictional waters. Include a mitigation plan for unavoidable impacts to jurisdictional waters, and evaluate the project alternatives with regard to compliance with the 404(b)(l) Guidelines and authorization of the LEDP A, if applicable.

Characterize the functions of any aquatic features that could be affected by the project that are determined not to constitute jurisdictional waters, and identify measures that would mitigate impacts to such waters.

Response FED-2.4: Since the publication of the Draft EIS, a preliminary jurisdictional determination has been made for this Project and all waters within the wind farm site are assumed to be jurisdictional (April 6, 2015). The Project design has also been refined to ensure that Keaaulu, Malaekahana, and Ohia streams can be avoided, and that there would be no placement of dredge or fill material, either temporarily or permanently, below the ordinary high water marks of these streams. All impacts to water bodies within the wind farm site will be avoided. Na Pua Makani Power Partners, LLC is currently consulting with the U.S. Army Corp of Engineers on Section 404 compliance. Information has been added to Sections 3.2 and 4.4 of the Second Draft EIS regarding consultation with the U.S. Army Corp of Engineers and Section 404 permitting requirements.

Comment FED-2.5: *The DEIS states that project wind turbines would be set back a minimum of 1,500 feet from the nearest residential areas (pg. 4-233). Elsewhere, the DEIS states that the nearest residence is located 673 feet from a proposed turbine (pg. 4-45).*

Clarify in the FEIS, what the actual minimum setback would be for the proposed project. Include a map that shows the locations of the proposed wind turbines and the residences nearest to them. Disclose the distances between those turbines and residences.

Response FED-2.5: In the State of Hawaii, wind turbine setbacks are regulated by the counties. The state has no setback requirements for wind projects. The City and County of Honolulu setback requirement for wind turbines is equivalent to the maximum turbine tip height above the ground from all property lines. Thus, for the tallest turbine model now being considered the required setback is 656 feet (200 meters) from the wind farm TMK parcel boundaries. The Project is currently being designed to meet all City and County of Honolulu setback requirements.

The closest distance between a proposed wind turbine location and a residential property (i.e., zoned residential) is 1,611 feet (491 meters), however there are legal residences on the Department of Agriculture land (i.e., zoned agricultural) adjacent to the wind farm site boundary, the closest of which is 814 feet (248 meters) from the nearest proposed turbine location. Thus the discrepancy in the Draft EIS was a matter of terminology. This information has been clarified in the Second Draft EIS. These residences, which were included as sensitive receptors for noise and shadow flicker analyses, are identified in Figure 1 of the Shadow Flicker report (Appendix K of the EIS).

Comment FED-2.6: *Baseline Sound Levels*

Appendix D of the DEIS indicates that projected noise levels during project construction and operation were assessed using baseline sound data collected in April/May 2014 and acoustic modeling. Baseline sound data were collected at integer wind speeds where the Project would operate (10 to 39 feet/second) (pg. 3-26). According to the DEIS, the wind turbines under consideration reach their highest operational sound levels at approximately 23 f/s. During this wind speed condition, existing sound levels for the acoustic analysis area were found to range from 45 to 49 dBA Leq (daytime) and 43 to 48 dBA Leq (night) (pg. 3-28). The DEIS does not specify whether the existing Kahuku wind farm, situated north of the proposed project, was operating at all times when baseline sound data were collected, and if so, how many turbines were in operation. In order to determine the cumulative impacts on noise levels that would result from construction and operation of the proposed wind farm, it is important to know whether or not the baseline sound levels account for the maximum impact of the existing Kahuku facility.

Recommendation:
Clarify how many, if any, wind turbines from the Kahuku wind farm were operating when the baseline sound data were collected.

Response FED-2.6: Sound levels from construction and operation of the Project were predicted and baseline sound levels were monitored ranging from wind speeds of zero to over 32.8 feet/second (10 meters/second). According to the manufacturer's acoustic sound specifications for the wind turbines under consideration for the Project, the wind turbines reach their highest acoustic emissions at between 19.7 feet/second (6 meters/second) and 26.3 feet/second (8 meters/second) depending on the manufacturer and model. Monitored baseline sound levels at 19.7 feet/second (6 meters/second) range from 42 dBA Leq (at measurement LT-3 at night) to 50 dBA Leq (LT-1 during the day). At 26.3 feet/second (8 meters/second) monitored baseline sound levels ranged from 43 dBA Leq (LT-3 at night) and 51 dBA Leq (LT-1 during the day).

When baseline sound levels were monitored 11 of the 12 existing wind turbines at the Kahuku Wind Farm, including those closest to the Project, were operating; one turbine was not functioning (assumed to be down for maintenance) during deployment of the monitoring equipment and a different turbine not functioning during retrieval of the monitoring equipment two weeks later. Cumulative sound levels anticipated during Project operation were predicted using the highest acoustic emissions as specified by the turbine manufacturers for turbine models being considered for the Project as well as those operating at the Kahuku Wind Farm; therefore, the cumulative acoustic analysis of operational sound levels represents the highest acoustic emissions anticipated during Project operation. This information has been clarified in Appendix D the Second Draft EIS.

Comment FED-2.7: *Hawaii Noise Regulations*
Hawaii regulates noise through the Hawaii Administrative Rule (HAR 11-46), which provides daytime and nighttime maximum permissible noise limits according to zoning districts (pg. 4-39). According to the DEIS, the analysis indicates compliance with HAR 11-46, although there would be some small increases in sound levels. In class A zones, most increases would be minimal (up to 4 dBA); however, some residences in Class C zones are predicted to experience increases in excess of 5 dBA (pg. 4-45). The DEIS does not discuss the potential margin of error associated with these values. It concludes that residents at these homes would realize little to no noise impact from the turbines when inside and with windows closed; therefore, noise impacts such as sleep disturbance are not anticipated, and no mitigation is identified (pg. 4-46). EPA believes that it is reasonable to assume that many area residents are accustomed to sleeping with windows open, given that electricity costs in Hawaii are relatively high and not every household has air conditioning; therefore, the impacts may be greater than anticipated in the DEIS.

Recommendations:

Disclose the number and locations of residences that would experience noise increases up to 4dBA, between 4dBA and 5dBA, and in excess of 5 dBA.

Response FED-2.7: The Draft EIS discloses the uncertainty factors, or k-factors, associated with the predictions in Appendix D, Page 33. The k-factors are set by the wind turbine manufacturers and are 2 dB and 1.5 dB for the turbine models under consideration for the Project, respectively. The wind turbine acoustic emissions were increased by these factors to be conservative. Studies have shown that even with windows open there is attenuation of noise going from outdoor to indoor conditions. For example, the Federal Highways Administration (FHWA) conservatively estimates that noise is reduced by 10 dBA when transitioning from outdoor to indoor conditions with windows open (FHWA, Highway Traffic Noise: Analysis and Abatement Guidance, 2011). Predicted Project sound levels are evaluated at the exterior of each noise sensitive land use; therefore, interior sound levels would be 10 dBA less assuming windows are open at each of the noise sensitive structure. If windows are assumed to be closed, the noise reduction going from outside to inside is typically around 20 dBA. This information has been added to the Second Draft EIS.

Comment FED-2.8: *Evaluate predicted and actual noise impacts inside affected homes with windows open. Utilize A-weighted (dBA) and C-weighted (dBC) scales to ensure that potential impacts from low frequency noise are evaluated.*

Response FED-2.8: The acoustic analysis presented in Appendix D of the Second Draft EIS has been updated to include both dBA and dBC weighting schemes. Low-frequency noise and infrasound are not anticipated to be a concern for the Project because levels are predicted to be below the threshold of human hearing.

Comment FED-2.9: *Identify, in the FEIS, measures that could mitigate impacts associated with wind turbine noise.*

Response FED-2.9: As indicated in the noise impact analysis in Section 4.6 Noise and Appendix D of the EIS, operational noise of the proposed wind turbines would comply with all regulatory requirements established under HAR 11-46. Na Pua Makani Power Partners, LLC would implement a process for documenting, investigating, evaluating, and resolving noise complaints during Project operation. Based on the noise modeling analysis, predicted increases in noise during Project operation are conservative and sound levels would be remain below the Department of Health limits. Therefore, no additional mitigation is proposed.

Comment FED-2.10: *Seek a commitment from the Proponent to monitor post-construction noise in the acoustic analysis area and document this commitment in the Record of Decision. We recommend that, at minimum, such monitoring be conducted at the locations of sensitive receptors.*

Response FED-2.10: As indicated in the noise impact analysis in Appendix D of the EIS, operational noise of the proposed wind turbines would comply with all regulatory requirements established under HAR 11-46; there are no requirements under this statute for post-construction noise monitoring. Therefore, no additional noise monitoring is warranted. Na Pua Makani Power Partners, LLC will institute a noise complaint system during Project operation.

Comment FED-2.11: *In addition, we recommend that the Proponent implement a noise complaint resolution process that would document, investigate, evaluate, and resolve any project-related noise complaints.*

Response FED-2.11: As stated in Section 4.6 of the EIS, Na Pua Makani Power Partners, LLC will implement a noise complaint resolution process for documenting, investigating, evaluating, and resolving noise complaints during Project operation.

Comment FED-2.12: *World Health Organization Noise Guidelines*
As noted in DEIS Appendix D, EPA published a document in 1974 that identifies noise levels affecting health and welfare. The noise impact assessment states that this EPA report represents the only published study that includes a large database of community reaction to noise to which a proposed project can be readily compared. More recently, the World Health Organization published two guidelines that can be used to assist in providing a framework for assessing noise impacts. The WHO Night Noise Guidelines for Europe, published in 2009, recommend 40 dBA levels or lower at night time to prevent adverse health impacts, with an interim target of 55 dBA. The WHO Guidelines for Community Noise, published in 1999, recommend sound levels less than 30 dBA in bedrooms at night for good quality sleep, and less than 35 dBA in classrooms to allow good teaching and learning conditions. The WHO advises that, when the noise is composed of a large proportion of low-frequency sounds, still lower guideline values should be applied; also that outside noise levels should be low enough to allow people to sleep with their bedroom windows open. The baseline nighttime sound levels reported in the DEIS exceed the WHO Night Noise Guidelines.

Recommendation:
Discuss, in the FEIS, the WHO noise guidelines and potential impacts to health associated with outdoor nighttime noise levels in exceedance of 40 dBA, indoor nighttime levels in exceedance of 30 dBA in bedrooms, and indoor daytime levels in exceedance of 35 dBA in classrooms.

Response FED-2.12: Additional discussion of World Health Organization guidelines has been added to Section 4.6 of the Second Draft EIS. It should be noted that interior noise levels would be at least 10 dBA lower than what are predicted for exterior areas at noise sensitive receptors. Additionally, as the noise monitoring for the project indicates, baseline sound levels are already above 40 dBA outside. Therefore, if people are used to sleeping with windows open with this existing level of noise exposure then it can be expected that this would not change as a result of the Project.

The U.S. and the State of Hawaii do not prescribe low-frequency sound level limits or guidelines that would be applicable to the Project. Nevertheless, because Na Pua Makani Power Partners, LLC anticipated that this could be a concern of the public, low-frequency noise was evaluated against the United Kingdom Department for Environment, Food & Rural Affairs (DEFRA) low-frequency noise guidelines. This analysis did not identify any impacts resulting from the Project mainly because monitored baseline low-frequency sound levels are already much higher than what is predicted to result from the Project. In other words, low-frequency noise from the Project would be masked by existing low frequency noise. See section 4.6 and Appendix D of the EIS for further information.

Comment FED-2.13: *According to the DEIS, 98 percent of receptors will experience less than 30 hours/year of shadow flicker, which is an unofficial industry standard. Seventeen of 737 receptors modeled, however, had expected shadow flicker impacts of more than 30 hours per year, ranging up to 204 hours and 2 minutes per year at an occupied residence (pg. 4-234). The DEIS concludes that there would be minimal impacts outside of the wind farm boundary (pg. 4-235), and notes that strategic vegetative screening and/or installation of curtains and blinds on windows are effective and economically viable mitigation options (Appendix K, pg. 9).*

Recommendations:
Specify, in the FEIS, the types and locations of receptors who are likely to be affected by greater than 30 hours of shadow flicker per year.

Response FED-2.13: The Second Draft EIS has been clarified with additional information on the receptors predicted to receive greater than 30 hours of shadow flicker per year. Receptors 647, 609, 607, 608, 610, 743,

648, 450, 645, and 452 are agricultural structures (storage sheds and a warehouse) located within the wind farm site on land owned and leased by Malaekahana Hui West, LLC, for the wind farm. These structures are used by farmers who are also leasing portions of the land primarily for agricultural crop production and who would continue to conduct day-to-day farming activities within the wind farm site during Project operation. These receptors would experience shadow flicker during 2 to 8 months of the year (theoretical maximum of 47 to 234 days with shadow per year), depending on the receptor. The theoretical maximum shadow flicker time per day at these receptors would range from 17 minutes to 2 hours and 20 minutes and would occur in the morning (i.e., prior to 10 a.m.) or late afternoon (i.e., after 4:30 p.m.). Shadow flicker has the potential to occur during a very small portion of an individual farmer's work day, and would not be expected to hinder farming activities.

Receptors 595, 600, 599, 602, 594, 593, and 601 are located adjacent to the wind farm site on land owned by the Department of Agriculture. These are legal residences on agriculturally zoned parcels. These receptors would experience shadow flicker during 3 to 9 months of the year (theoretical maximum of 97 to 256 days with shadow per year), depending on the receptor. The theoretical maximum shadow flicker time per day would range from 40 minutes to 1 hour and 27 minutes and would occur in the mid- to late-afternoon (i.e., primarily between 4:30 p.m. to 6:00 p.m.).

To mitigate for shadow flicker impacts, Na Pua Makani Power Partners, LLC will offer home owners for which shadow flicker is predicted to be greater than 30 hours per year reimbursement for costs up to $800 for adding awnings or blinds to windows facing the wind farm and/or landscaping/trees to block shadow flicker. This mitigation measure has been added to the Second Draft EIS.

Comment FED-2.14: *Since curtains and blinds only mitigate shadow flicker if the receptor is indoors with the curtains and blinds closed, discuss, in the FEIS, how shadow flicker could be mitigated in the event that that the receptor is outdoors or is unable or unwilling to remain behind blinds and curtains for the duration of the shadow flickering.*

Response FED-2.14: Shadow flicker impacts estimated for the Project would primarily occur within the wind farm site with zero hours of shadow flicker per year predicted for 98 percent of sensitive receptors. As noted in Section 4.18 of the EIS, however, predicted shadow flicker greater than 30 hours a year does not necessarily create a nuisance and is still well below concerns for impacts to health such as triggering epileptic seizures (Epilepsy Action 2008). As discussed above, the duration of shadow flicker predicted the remaining sensitive receptors is of relatively short duration and would only occur if a person is within direct line of site of the turbines. At the legal residences adjacent to the wind farm site, existing vegetation and topography would minimize exposure to shadow flicker if a person were outdoors. To mitigate for shadow flicker impacts, Na Pua Makani Power Partners will offer home owners for which shadow flicker is predicted to be greater than 30 hours per year reimbursement for costs up to $800 for adding awnings or blinds to windows facing the wind farm and/or landscaping/trees to block shadow flicker. This mitigation measure has been added to the Second Draft EIS.

Comment FED-2.15: *Describe where vegetative screening would need to be located in order to be effective, and the species of vegetation that would be used for that purpose. EPA strongly recommends the use of native species to avoid introducing or furthering the spread of invasive non-native species. Clarify who would be responsible for any necessary maintenance of vegetative screens that are established as mitigation.*

Response FED-2.15: The existing land use within the wind farm site is agriculture (truck crops) and as described in Section 3.7 of the EIS, outside of actively farmed areas the vegetation is predominantly non-native shrubland and forest dominated by a mixture of aggressive non-native weedy species that took over following the abandonment of agricultural production of sugar cane (Section 3.7 of the EIS describes the historic land uses of the area). For legal residences on the Department of Agriculture land adjacent to the wind farm site where more

than 30 hours of shadow flicker per year is predicted, Na Pua Makani Power Partners, LLC, will reimburse home owners for costs up to $800 for adding awnings or blinds and/or landscaping/trees to block shadow flicker during the limited daytime periods during which it would occur (see the response to comment FED-2.13 for additional discussion). This mitigation measure has been added to the Second Draft EIS. If landscaping/trees are chosen, choice of plantings and subsequent maintenance would be up to the discretion of individual home owners and planting of native vegetation will be encouraged.

Comment FED-2.16: *Discuss the feasibility of stopping a particular wind turbine(s) whenever shadow flicker would constitute a nuisance, particularly for the 17 receptors who would experience more than 30 hours of shadow flicker per year.*

Response FED-2.16: As discussed in Section 3.16 of the EIS, the shadow flicker level of 30 hours per year has been widely used in the industry as a target value in the absence of formal guidelines. However, predicted shadow flicker greater than this amount does not necessarily create a nuisance and is still well below concerns for impacts to health such as triggering epileptic seizures (Epilepsy Action 2008). Shadow flicker impacts generally occur during low angle sunlight conditions, typically during sunrise and sunset times of the day. They also occur seasonally (i.e., during some months and not in others). Therefore, the extent to which people are exposed to shadow flicker depends on the whether or not people are consistently present and within direct line of site to the turbine, as well as other factors such as cloud cover, turbines being operational which influence the number of days and time period within a day during which shadow flicker occurs. Additionally, the degree of annoyance and the amount of shadow flicker that will cause annoyance is subjective. Therefore, taking a turbine out of operation for shadow flicker nuisance is not being considered.

Comment FED-2.17: *The DEIS states that the Proponent is conducting outreach efforts to define a Community Benefits Package, which may include honoring the commitment of the prior developer to pay $10,000 per wind turbine per year over the life of the project to the Kahuku community, or about $2,000,000 of direct economic benefits (pg. 4-126). Further information about the use of such funds is not provided.*

Recommendation:
Discuss, in the FEIS, how the Community Benefits Package funds may be utilized. Describe the process that would be used to decide how such funds would be appropriated.

Response FED-2.17: Na Pua Makani Power Partners, LLC, has committed to establishing a Community Benefit fund and is in discussion with Kahuku community members regarding the details of its administration. It is anticipated that a 501 C3 Non-profit corporation will be formed and that Project funds ($10,000 per wind turbine per year) would go to the Non-profit. It is anticipated that the Non-profit would be governed and administered by a board of local community members who would make decisions as to the use of the proceeds and which activities, programs, groups, and events would be sponsored. To date, Na Pua Makani Power Partners, LLC, has provided support to a number of local groups including Kahuku.org School to Work program, Kahuku High School Project Grad, Kahuku Elementary School May Day, Kahuku High School rugby, basketball, volleyball, and soccer teams, as well as providing food for families in need.

Comment FED-2.18: *The life of the proposed project is expected to be 21 years, after which the Proponent would evaluate whether to continue operation of the project or to decommission it. The facility may also be upgraded and repowered with renegotiated leases. According to the DEIS, if the project is decommissioned, the goal would be to remove the power generation equipment and return the site to a condition as close as possible to its pre-construction state (pg. 2-25).*

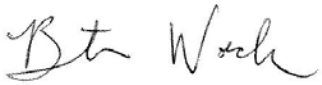
Recommendation:

Identify, in the FEIS, bonding or financial assurance strategies for decommissioning and reclamation. Use the projected 21-year lifespan to ascertain the appropriate financial instruments that could be used for bond and/or financial assurance calculations.

Response FED-2.18: The State requires the decommissioning of wind projects at the end of the project. Na Pua Makani Power Partners, LLC, would provide the landowner with security as may be required under the terms of the leases to secure decommissioning obligations.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Individual Letters and Responses

IND-1

Ms. Suzanne Case, Chairperson
Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

Dear Chairwoman,

1 I congratulate the developer for his open and honest approach to providing information and getting facts out to the community.

2 The bottom line here is that we need to stop importing foreign oil and start producing more of our energy from clean sources like the sun, wind and ocean.

Being an isolated island state 2,500 miles away from the mainland, we have to move towards more self sufficiency. This wind project is a step in the right direction.

Mahalo,

Daniel Armstrong
92-1132 Pamanaat #226
Kapolei Hi 96707

TETRA TECH

April 1, 2016

Daniel Aemslvong
92-1132 Panana St #220
Kapolei HI 96707

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Aemslvong:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-1.1*: I congratulate the developer for his open and honest approach to providing information and getting facts out to the community.*

Response IND-1.1: Na Pua Makani Power Partners, LLC continues its involvement in the community. Chapter 7 of the Second Draft EIS will include an updated summary of Project outreach efforts.

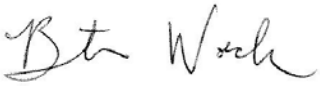
Comment IND-1.2*: The bottom line here is that we need to stop importing foreign oil and start producing more of our energy from clean sources like the sun, wind, and ocean. Being an isolated island state 2,500 miles away from the mainland, we have to move towards more self-sufficiency. This wind project is a step in the right direction.*

Response IND-1.2: As described in Section 1.3 of the EIS, the proposed Project would provide a clean source of renewable energy and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals. These goals have increased from 70 to 100 percent clean energy since the publication of the Draft EIS. As noted in your comment, generation and integration of wind energy into the electric grid decreases fossil fuel import and consumption.

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

IND-2

June 23, 2015

Ms. Suzanne Case, Chairperson
Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

Aloha,

1 I would like to comment on the wind farm project before your department.

There is lots of talk, misinformation and emotionalism out in our community regarding wind mills and what they do or don't do to our health.

I am happy that the developer has taken the time and spent the money to do a complete environmental review to bring out the facts and refute the myths out here in the community.

2 Nothing is perfect, including this planned wind farm. But to me, it's way better than building more power plants and burning more coal, oil and even trash to provide our homes with electricity.

Mahalo,

Stacy Ako
45077E Waikalua Rd
Kaneohe, HI 96744

TETRA TECH

April 1, 2016

Ms. Stacy Ako
45077 E Waikalua Road
Kaneohe, HI 96744

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Ako:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter dated June 23, 2015 commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-2.1*: I would like to comment on the wind farm project before your department.*

There is lots of talk, misinformation and emotionalism out in our community regarding wind mills and what they do or don't do to our health. I am happy that the developer has taken the time and spent the money to do a complete environmental review to bring out the facts and refute the myths out here in the community.

Response IND-2.1: Na Pua Makani Power Partners, LLC continues its involvement in the community. Chapter 7 of the Second Draft EIS will include an updated summary of Project outreach efforts.

Comment IND-2.2*: Nothing is perfect, including this planned wind farm. But to me, it's way better than building more power plants and burning more coal, oil and even trash to provide our homes with electricity.*

Response IND-2.2: As described in Section 1.3 of the EIS, the proposed Project would provide a clean source of renewable energy and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals. These goals have increased from 70 to 100 percent clean energy since the publication of the Draft EIS.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

IND-3

Ms. Suzanne Case, Chairperson
Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

Dear Chairwoman,

1 We live on an island and we have to share our limited resources. The west side already has the industrial parks, power plants and landfills. But this benefits everyone on Oahu.

I'm for clean wind energy, and since Kahuku is the best place for windmills, we should do our part for the aina to wean Hawaii off of foreign oil.

STEVE ANDERSON
58-024 KAPUAI PLACE
HALEIWA HI 96712

TETRA TECH

April 1, 2016

Mr. Steve Anderson
58-024 Kapuhi Place
Haleiwa HI 96712

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Anderson:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-3.1*: We live on an island and we have to share our limited resources. The west side already has the industrial parks, power plants and landfills. But this benefits everyone on Oahu. I'm for clean energy, and since Kahuku is the best place for windmills, we should do our part for the aina to wean Hawaii off of foreign oil.*

Response IND-3.1: As mentioned in your comment and described in Section 1.3 of the EIS, the proposed Project would provide a clean source of renewable energy. It would also assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals which have increased from 70 to 100 percent clean energy since the publication of the Draft EIS.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

IND-4

June 23, 2015

Ms. Suzanne Case, Chairperson
Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

Dear Chairperson:

1 The planned Na Pua Makani wind project for Kahuku is important to our community for several reasons.

First, it is a clean energy project that helps Hawaii become more energy independent and move away from burning fossil fuels for electricity.

2 Second, the developer has offered us a generous community benefits package, which would help us address some of the many needs in Kahuku.

3 Third, the project will create permanent jobs that are badly needed in our area.

4 And finally, it provides low-cost electricity and will help lower electricity bills for Oahu.

Mahalo,

Simplicio Caban
P. O. Box 125
Kahuku, HI, 96744

TETRA TECH

April 1, 2016

Mr. Simplicio Caban
P.O. Box 125
Kahuku HI 96744

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Caban:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter dated June 23, 2015 commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-4.1*: The planned Na Pua Makani wind project for Kahuku is important to our community for several reasons. First, it is a clean energy project that helps Hawaii become more energy independent and move away from burning fossil fuels for electricity.*

Response IND-4.1: As described in Section 1.3 of the EIS, the proposed Project would provide a clean source of renewable energy and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals. In doing so, the Project would contribute to energy self-sufficiency by increasing the ratio of indigenous to imported energy use. As a source of renewable energy, the Project would increase energy security for the State and reduce reliance on fossil-fuel based energy production.

Comment IND-4.2*: Second, the developer has offered us a generous community benefits package, which would help us address some of the many needs in Kahuku.*

Response IND-4.2: As noted in your comment, and described in Section 4.12 of the EIS, the proposed Project would provide a long-term community benefits package. Na Pua Makani Power Partners, LLC continues to work with the community to determine the best approach for management of the funds that will be contributed to the community.

Comment IND-4.3*: Third, the project will create permanent jobs that are badly needed in our area.*

Response IND-4.3: As described in Section 4.12 of the EIS, the proposed Project would provide short-term and long-term jobs for the economy. It is estimated that 43 short-term jobs and 3 permanent jobs would result from construction and operation of the Proposed Action.

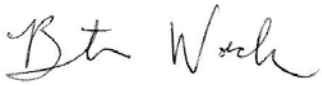
Comment IND-4.4*: And finally, it provides low-cost electricity and will help lower electricity bills for Oahu.*

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

Response IND-4.4: As described in Section 1.3 of the EIS, the cost of electricity from renewable energy is currently about one-half the cost of electricity from burning oil. Hawaii has signed into law a requirement for 100 percent of electricity from renewable sources over the next 25 years and as the percentage of renewables increases, the average cost of electricity will decrease.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

IND-5

June 23, 2015

Ms. Suzanne Case,
Chairwoman for the Board of Land and Natural Resources
State of Hawaii
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

Dear Chairwoman,

1 We continue to import most of the fuel for our electricity in the form of coal and oil. No one can predict what the future will bring. Just think if there is a major shipping strike and we cannot replenish our fuel supplies? Or what happens if the cost of a barrel of oil triples from current prices?

I'm for clean energy and a sustainable future based on our own energy resources. No one will take away Hawaii's wind and sun. That is why I support this project.

SAMSON CHUN
PO BOX 777
HALEIWA HI 96712

Yours truly,

TETRA TECH

April 1, 2016

Mr. Samson Chun
PO Box 777
Haleiwa, HI 96712

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Chun:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter dated June 23, 2015 commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-5.1*: We continue to import most of the fuel for our electricity in the form of coal and oil. No one can predict what the future will bring. Just think if there is a major shipping strike and we cannot replenish our fuel supplies? Or what happens if the cost of a barrel of oil triples from current prices?*

I'm for clean energy and a sustainable future based on our own energy resources. No one will take away Hawaii's wind and sun. That is why I support this project.

Response IND-5.1: As described in Section 1.3 of the EIS, the proposed Project would provide a clean source of renewable energy and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals. These goals have increased from 70 to 100 percent clean energy since the publication of the Draft EIS. Generation and integration of renewable energy into the electric grid through projects such as Na Pua Makani decreases fossil fuel import and consumption, and improves energy independence.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

IND-6

Ms. Suzanne Case, Chairperson
Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

June 23, 2015

Dear Chairwoman,

1 All of us support renewable energy and understand the value of reducing the amount of imported oil to Hawaii. The state has goals for greater energy independence to help keep our aina healthier and cleaner.

With the approval of this wind project, Na Pua Makani, the state will continue to move in the right direction of having 100% of our energy from green sources by the year 2045.

Mahalo,

P.O. Box 175
Kaaawa, HI, 96730

Jon Hipa

TETRA TECH

April 1, 2016

Mr. Jon Hipa
P.O. Box 175
Kaaawa HI 96730

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Hipa:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter dated June 23, 2015 commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-6.1: *All of us support renewable energy and understand the value of reducing the amount of imported oil to Hawaii. The state has goals for greater energy independence to help keep our aina healthier and cleaner.*

With the approval of this wind project, Na Pua Makani, the state will continue to move in the right direction of having 100% of our energy from green sources by the year 2045.

Response IND-6.1: As described in Section 1.3 of the EIS, the proposed Project would provide a clean source of renewable energy and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals which have increased from 70 to 100 percent clean energy since the publication of the Draft EIS. As noted in your comment, generation and integration of wind energy into the electric grid decreases fossil fuel import and consumption, resulting in benefits to the environment such as reduced greenhouse gas emissions, particulate-related health effects, and other forms of pollution associated with coal or diesel fuel electric generation.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

IND-7

June 23, 2015

Ms. Suzanne Case, Chairperson
Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

Dear Ms. Case:

1 Please register my support for the Na Pua Makani wind project. I think the developer has done a good job explaining all the facts and answering questions in the community about noise, property values, health concerns and other issues that have been brought up. These are addressed in their environmental impact statement and I am satisfied with their project.

Sincerely,

Joe Kalili
P.O. Box 71
Haula, HI, 96717
Joe Kalili

TETRA TECH

April 1, 2016

Mr. Joe Kalili
P.O. Box 71
Hauula HI 96717

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Kalili:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter dated June 23, 2015 commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-7.1*: Please register my support for the Na Pua Makani wind project. I think the developer has done a good job explaining all the facts and answering questions in the community about noise, property values, health concerns and other issues that have been brought up. These are addressed in their environmental impact statement and I am satisfied with their project.*

Response IND-7.1: Na Pua Makani Power Partners, LLC continues its involvement in the community. Chapter 7 of the Second Draft EIS will include an updated summary of Project outreach efforts.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

IND-8

June 23, 2015

Ms. Suzanne Case,
Chairwoman for the Board of Land and Natural Resources
State of Hawaii
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

Dear Chairwoman,

1 The developer of Na Pua Makani has worked with the community to revise his project and address many of the concerns that were raised. I think he's done a good job reaching out to the public and explaining what his project does, and its long term benefits.

Please give him the same favorable consideration that he has shown to the community. That is why I support his project.

Frederick D Lawrence

67-186 Kanoulu Street
Waialua HI 96791

TETRA TECH

April 1, 2016

Mr. Frederick Lawrence
67-186 Kanoulu Street
Waialua HI 96791

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Lawrence:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter dated June 23, 2015 commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-8.1*: The developer of Na Pua Makani has worked with the community to revise his project and address many of the concerns that were raised. I think he's done a good job reaching out to the public and explaining what his project does, and its long term benefits. Please give him the same favorable consideration that he has shown to the community. That is why I support this project.*

Response IND-8.1: Na Pua Makani Power Partners, LLC continues its involvement in the community. Chapter 7 of the Second Draft EIS will include an updated summary of Project outreach efforts.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

IND-9

June 23, 2015

Ms. Suzanne Case
Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

1 Clean energy is the way to go. The new Kahuku wind farm is a move in the right direction to helping our island state get away from burning fossil fuels for electricity. Thank you for the opportunity to state my support for this project.

Fredrick O. Lawrence

TETRA TECH

April 1, 2016

Mr. Fredrick Lawrence
No address provided

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Lawrence:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter dated June 23, 2015 commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-9.1*: Clean energy is the way to go. The new Kahuku wind farm is a move in the right direction to helping our island state get away from burning fossil fuels for electricity. Thank you for the opportunity to state my support for this project.*

Response IND-9.1: As described in Section 1.3 of the EIS, the proposed Project would provide a clean source of renewable energy and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals. These goals have increased from 70 to 100 percent clean energy since the publication of the Draft EIS. As noted in your comment, generation and integration of wind energy into the electric grid decreases fossil fuel import and consumption, and increases energy independence.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

IND-10

Ms. Suzanne Case, Chairperson
Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

June 23, 2015

Dear Chairperson,

1 I would like to provide my comments on the Na Pua Makani draft environmental statement.

The developer has said his project will be the lowest priced renewable energy project in the history of Hawaii and helps to reduce the $6 billion of foreign oil that Hawaii imports.

Those are good things for Hawaii, and we should be supporting, not discouraging future projects like this.

Sincerely,

Billy Long
P.O. Box 175
Kaaawa, HI., 96730

TETRA TECH

April 1, 2016

Mr. Billy Long
PO Box 175
Kaaawa HI 96730

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Long:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter dated June 23, 2015 commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-10.1*: The developer has said his project will be the lowest priced renewable energy project in the history of Hawaii and helps to reduce the $6 billion of foreign oil that Hawaii imports. Those are good things for Hawaii and, and we should be supporting, not discouraging future projects like this.*

Response IND-10.1: As described in Section 1.3 of the EIS, the proposed Project would provide a clean source of renewable energy and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals which have increased from 70 to 100 percent clean energy since the publication of the Draft EIS. Generation and integration of renewable energy into the electric grid through projects such as Na Pua Makani would decrease fossil fuel import and consumption, and increase energy independence. The cost of electricity from renewable energy is currently about one-half the cost of electricity from burning oil.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

IND-11

June 23, 2015

Ms. Suzanne Case
Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

Aloha Chairwoman,

1 I would like to state my support for this new wind farm project in Kahuku. It will help keep our energy bills lower, create jobs and bring us more clean energy to help our environment. For these reasons, I support Na Pua Makani.

Mahalo nui loa,

Hudson Lote

TETRA TECH

April 1, 2016

Mr. Hudson Lote
No address provided

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Lote:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter dated June 23, 2015 commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-11.1*: I would like to state my support for this new wind farm project in Kahuku. It will help keep our energy bills lower, create jobs and bring us more clean energy to help our environment. For these reasons, I support Na Pua Makani.*

Response IND-11.1: As described in Section 1.3 of the EIS, the proposed Project would provide a clean source of renewable energy and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals. These goals have increased from 70 to 100 percent clean energy since the publication of the Draft EIS. Generation and integration of renewable energy into the electric grid through projects such as Na Pua Makani would decrease fossil fuel import and consumption, and increase energy independence. As mentioned in your comment and described in Sections 4.5 and 4.12 of the EIS, the Project would contribute to reducing the cost of electricity, provide short- and long-term jobs, and would reduce greenhouse gas emissions other forms of pollution associated with coal or diesel fuel electric generation.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

IND-12

June 23, 2015

Ms. Suzanne Case, Chairperson
Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

1 I like windmills and I support the Na Pua Makani Wind Energy Project. To me, windmills are evidence that we are doing something about the problems that face our community, such as high electric bills, dependence on expensive foreign oil, pollution from power plants that burn oil and coal, climate change, and jobs in our community.

2 The wind project will also provide funds for Kahuku to take care of many problems that are not being fixed by the county and the state. I hope the state and federal will approve the EIS so we can enjoy all the benefits this project will deliver.

Mahalo,

P.O. BOX 177

~~[illegible]~~

[illegible]

Samuel Midallia

TETRA TECH

April 1, 2016

Mr. Samuel Midallia
[Address not provided]

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Midallia:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter dated June 23, 2015 commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-12.1*: I like windmills and I support the Na Pua Makani Wind Energy Project. To me, windmills are evidence that we are doing something about the problems that face our community, such as high electric bills, dependence on expensive foreign oil, pollution from power plants that burn oil and coal, climate change, and jobs in our community.*

Response IND-12.1: As described in Section 1.3 of the EIS, the proposed Project would provide a clean source of renewable energy and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals. These goals have increased from 70 to 100 percent clean energy since the publication of the Draft EIS. As mentioned in your comment and described in Sections 4.5 and 4.12 of the EIS, the Project would contribute to reducing the cost of electricity, provide short- and long-term jobs, and would reduce greenhouse gas emissions other forms of pollution associated with coal or diesel fuel electric generation.

Comment IND-12.2*: The wind project will also provide funds for Kahuku to take care of many problems that are not being fixed by the county and the state. I hope the state and federal will approve the EIS so we can enjoy all the benefits this project will deliver.*

Response IND-12.2: As described in Sections 4.12, Na Pua Makani Power Partners, LLC, has committed to establishing a Community Benefit fund and is in discussion with Kahuku community members regarding the details of its administration. It is anticipated that Project funds ($10,000 per wind turbine per year) would be administered by a board of local community members who would make decisions as to the use of the proceeds and which activities, programs, groups, and events would be sponsored.

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

IND-13

June 23, 2015

Ms. Suzanne Case, Chairperson
Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

1 I went through the list of impacts listed in the Draft EIS, and I don't see any serious problems. It appears that possible impacts, like the ones on endangered species, have been addressed by a plan and what they will do will actually improve the situation for the species that are listed.

Considering the benefits Na Pua Makani will deliver, when compared to a small number of issues, I am in support of this project and hope that it is built.

That is my mana'o,

Mahalo,

Emmett Nothnagle
PO# 897 HALEIWA, HI, 96712
#808-436-7906
emmettnothnagle@gmail.com

TETRA TECH

April 1, 2016

Mr. Emmett Nothnagle
P.O. Box 897
Haleiwa HI 96712

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Nothnagle:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter dated June 23, 2015 commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-13.1*: I went through the list of impacts listed in the Draft EIS, and I don't see any serious problems. It appears that possible impacts, like the ones on endangered species, have been addressed by a plan and what they will do will actually improve the situation for the species that are listed.*

Considering the benefits Na Pua Makani will deliver, when compared to a small number of issues, I am in support of this project and hope that it is built.

Response IND-13.1: As described in Section 2.5 of the EIS, Na Pua Makani Power Partners, LLC, in collaboration with the U.S. Fish and Wildlife Service and Hawaii Division of Forestry and Wildlife, has prepared a Habitat Conservation Plan (HCP). The HCP incorporates measures to avoid, minimize, and mitigate impacts to threatened and endangered species. Mitigation measures include the protection (fence installation or maintenance) and/or enhancement (invasive plant species control) of native ecosystems, reduction in predation pressure (protective fencing), and research and management will have long-term beneficial effects to these species.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

IND-14

Michaela Primacio
P.O. Box 509
Kahuku, HI 96731

June 23, 2015

Aloha,

1 My name is Michaela Primacio and I support The Na Pua Makani Project in Kahuku! It's unfortunate that the term "Wind Mill" has become a derogatory word in our community. It sounds like the "annoying neighbor that lives next door," I'm sure some of us can relate to that right? I am fortunate and blessed to have a lot of great neighbors in Kahuku however; some of us aren't always that lucky. What are some of the common remarks that we hear with having "annoying neighbors": too loud, too messy, too many people, too many cars, maybe too many kids even, I mean the list could go on and on right? However, none of us really know what challenges or difficulties our "annoying neighbor" maybe going through. Moreover, how many of us take the time to talk to our neighbors, get to know them, say hello, or actually try to resolve an issue/or concern in a positive win-win situation that will benefit everyone?

To me, the "Wind Mills" are neither good nor bad; but have the potential to be great neighbors! There here to stay and I don't see them going away anytime soon. I believe the additional wind

2 mills proposed by The Na Pua Makani project will generate future dividends for all stakeholders involved:

1) According to the State of Hawaii and the US Department of Energy, the State's goal is to achieve 100% clean energy by 2045 through its clean energy initiative goals;
2) According to the Hawaiian Electric Company March 2014 Clean Energy Update, there primary goal is to lower customer bills through seeking clean energy projects that will help reduce the cost in generating, transmitting, and distributing power;

IND-14

3

3) According to the Na Pua Makani Project Community Facts page, Na Pua Makani will honor the community benefit agreement whereby, the Kahuku Community will receive $10,000 per turbine each year over the life of the project.

To this end, I challenge all of us to think about how much oil/gas/or fuel we consume in our day-to-day activities and what changes can we make now toward a sustainable energy future.

April 1, 2016

Ms. Michaela Primacio
P.O. Box 509
Kahuku HI 96731

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Primacio:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter dated June 23, 2015 commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-14.1*: My name is Michaela Primacio and I support The Na Pua Makani Project in Kahuku! It's unfortunate that the term "Wind Mill" has become a derogatory word in our community. It sounds like the "annoying neighbor that lives next door," I'm sure some of us can relate to that right? I am fortunate and blessed to have a lot of great neighbors in Kahuku however; some of us aren't always that lucky. What are some of the common remarks that we hear with having "annoying neighbors": too loud, too messy, too many people, too many cars, maybe too many kids even, I mean the list could go on and on right? However, none of us really know what challenges or difficulties our "annoying neighbors" maybe going through. Moreover, how many of us take the time to talk to our neighbors, get to know them, say hello, or actually try to resolve an issue/or concern in a positive win-win situation that will benefit everyone?*

To me, the "Wind Mills" are neither good or bad; but have the potential to be great neighbors! There here to stay and I don't see them going away anytime soon.

Response IND-14.1: The purpose and need for the Project is described in Chapter 2 of the EIS. The EIS describes both the adverse effects and the benefits of the Project in Chapter 4. Na Pua Makani Power Partners, LLC continues its involvement in the community. Chapter 7 of the Second Draft EIS will include an updated summary of Project outreach efforts.

Comment IND-14.2*: I believe the additional wind mills proposed by The Na Pua Makani project will generate future dividends for all stakeholders involved:*

1) According to the State of Hawaii and the US Department of Energy, the Sate's goal is to achieve 100% clean energy by 2045 through its clean energy initiative goals;

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737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

2) According to the Hawaiian Electric Company March 2014 Clean Energy Update, there primary goal is to lower customer bills through seeking clean energy projects that will help reduce the cost in generating, transmitting, and distributing power;

Response IND-14.2: As described in Section 1.3 of the EIS, the proposed Project would provide a clean source of renewable energy and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals. Subsequent to publication of the Draft EIS, Hawaii has signed into law a requirement for 100 percent of electricity from renewable sources over the next 25 years.

Regarding reducing electricity costs, based on the most recent 2014 Renewable Portfolio Standard Status Report approximately 80 percent of Hawaii's energy is currently derived from fossil fuels and approximately 20 percent comes from renewable sources (Hawaiian Electric Company, Inc. et al. 2014). The cost of electricity for the consumers/residents of Hawaii is the blended average cost of all sources (e.g. oil, wind, solar, etc.) and current rates reflect that high cost from burning oil. Over time, as the proportion of energy coming from renewable sources increases, the average cost of electricity is expected to decrease. This information has been added to EIS Section 4.12 – Socioeconomics. The cost of electricity for the consumers / residents of Hawaii is the blended average cost of all sources (e.g. oil, wind, solar, etc.) and current rates reflect that high cost from burning oil. Over time, as the proportion of energy coming from renewable sources increases, the average cost of electricity is expected to decrease.

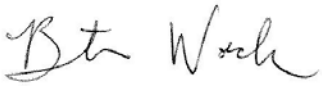
Comment IND-14.3*: According to the Na Pua Makani Project Community Facts page, Na Pua Makani will honor the community benefit agreement whereby, the Kahuku Community will receive $10,000 per turbine each year over the life of the project.*

To this end, I challenge all of us to think about how much oil/gas/or fuel we consume in our day-to-day activities and what changes can we make now toward a sustainable energy future.

Response IND-14.3: As noted in your comment and described in Sections 4.12, Na Pua Makani Power Partners, LLC, has committed to establishing a Community Benefit fund and is in discussion with Kahuku community members regarding the details of its administration. It is anticipated that Project funds ($10,000 per wind turbine per year) would be administered by a board of local community members who would make decisions as to the use of the proceeds and which activities, programs, groups, and events would be sponsored.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

IND-15

Dr. Don Sand
54-135 Honomu Pl
Hau`ula, Hawai`i

July 16, 2015

Ms. Kristi Young, Field Supervisor
U.S. Fish and Wildlife Service
Pacific Island Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Honolulu, HI 96850

Re: Na Pua Makani HCP and DEIS

Aloha Ms. Young,

My family and I have owned property in the Ko`olauloa area for generations and I am thrilled to be able to call this area my home. I work in Kahuku and I've dedicated my life to assisting the youth of Kahuku High School ensure themselves of a promising future.

1 In furtherance of my and their future, I am writing to express my support for alternative energy projects in Hawai`i. While I am concerned about the public safety, especially distance from schools and communities of such projects, and I am also concerned about the natural beauty of this beautiful area, I feel it is important that we do something to ensure the survival of the islands and its peoples. I believe well thought out and placed alternative energy projects are a key to accomplishing this.

We cannot ensure our future and our keiki's future without alternative energy.

Malama Pono,

Dr. Don Sand

TETRA TECH

April 1, 2016

Mr. Don Sand
54-135 Honomu Place
Hau`ula HI 96717

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Dr. Sand:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter dated July 16, 2015 commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-15.1*: In furtherance of my and their* [the youth of Kahuku High School] *future, I am writing to express my support for alternative energy projects in Hawaii. While I am concerned about the public safety, especially distance from schools and communities of such projects, and I am also concerned about the natural beauty of this beautiful area. I feel it is important that we do something to ensure the survival of the islands and its peoples. I believe well thought out and placed alternative energy projects are a key to accomplishing this.*

We cannot ensure our future and our keiki's future without alternative energy.

Response IND-15.1: The City and County of Honolulu setback requirement for wind turbines is equivalent to the maximum turbine tip height above the ground from all property lines. Thus, for the tallest turbine model being considered for the Project the required setback is 656 feet (200 meters) from the wind farm TMK parcel boundaries. The Project is currently being designed to meet all City and County of Honolulu setback requirements.

Within the EIS, the noise (Section 4.6), visual resource (4.16), public health and safety (Section 4.18), and public infrastructure and services (Section 4.20) analyses specifically addressed the impacts of the Project in relation to the Kahuku high school, Kahuku elementary school, Kahuku medical center and the Kahuku community center all of which are important locations within the community. The visual resource analysis also evaluates impacts from other locations within the community where the Project is expected to be visible. The Project as designed would meet all County noise requirements and industry standard health and safety requirements.

A number of screening criteria were considered during the selection of the proposed Project location, described in Section 2.1 of the EIS. They include but are not limited to the availability of a sufficient wind resource, access to adequate and available transmission capacity, availability of contiguous land that is designated to allow wind energy development, and site-specific conditions such as topography which influence construction feasibility.

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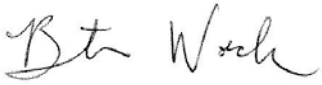
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

Alternatives that were considered but eliminated from detailed study, including greater setback distances and alternative project locations on Oahu, are described in Section 2.3 of the EIS.
The proposed Project would provide a clean source of renewable energy and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals. These goals increased from 70 to 100 percent clean energy since the publication of the Draft EIS.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

IND-16

June 23, 2015

Ms. Suzanne Case, Chairperson
Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

Chairperson Case,

1 In my way of looking at things, a new wind farm in the hills above Kahuku is much more acceptable than another smoke belching power plant on the leeward coast.

We cannot afford to keep burning imported oil and sending all our hard earned dollars to the Middle East or the big petroleum companies.

Time to move forward with our own home grown, island based renewable energy through wind and solar.

Mahalo,

Nainoa Soren
55-655 Wailoa Pl.
808 375.3904

Nainoa Soren

TETRA TECH

April 1, 2016

Ms. Nainoa Soren
55-655 Naniloa Loop
Laie, HI 96762

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Soren:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter dated June 23, 2015 commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-16.1*: In my way of looking at things, a new wind farm in the hills above Kahuku is much more acceptable than another smoke belching power plant on the leeward coast.*

We cannot afford to keep burning imported oil and sending all our hard earned dollars to the Middle East or the big petroleum companies.

Time to move forward with our own home grown, island based renewable energy through wind and solar.

Response IND-16.1: As described in Section 1.3 of the EIS, the proposed Project would provide a clean source of renewable energy and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals. These goals have increased from 70 to 100 percent clean energy since publication of the Draft EIS. Generation and integration of renewable energy into the electric grid through projects such as Na Pua Makani would decrease fossil fuel import and consumption, and increase energy independence.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

IND-17

June 23, 2015

Ms. Suzanne Case, Chairperson
Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

Dear Chairperson,

1 The Na Pua Makani wind energy project will be good for our community and I support it. They have gone beyond what was required to reach out to the people in Kahuku and Ko'olauloa to get feedback and hear concerns.

When people complained about the location of some of the windmills, Champlin agreed to move them farther away from Kahuku. And when some said the wind farm would take up all the space on the electric lines and prevent people from installing rooftop solar, Champlin had people from the HECO explain that the wind farm would use a high voltage power line, not the residential electric lines and would not affect anyone's ability to install a rooftop solar system.

2 I believe they answered all the questions and concerns that reasonable people have. Because the project will provide benefits to our community, like lower electricity bills and a community benefit package of two million dollars, I believe we will be better off and I hope that DLNR will approve it.

Mahalo for the opportunity to comment in support of this project.

Abraham K. Ueda
P.O. Box 889
Kahuku Hi 96731

TETRA TECH

April 1, 2016

Mr. Abraham Ueda
P.O. Box 889
Kahuku, HI 96731

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Ueda:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter dated June 23, 2015 commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-17.1*: The Na Pua Makani wind energy project will be good for our community and I support it. They have gone beyond what was required to reach out to the people in Kahuku and Koolauloa to get feedback and hear concerns.*

When people complained about the location of some of the windmills, Champlin agreed to move them farther away from Kahuku. And when some said the wind farm would take up all the space on the electric lines and prevent people from installing rooftop solar, Champlin had people from the HECO explain that the wind farm would use a high voltage power line, not the residential electric lines and would not affect anyone's ability to install a rooftop solar system

Response IND-17.1: Na Pua Makani Power Partners, LLC continues its involvement in the community. Chapter 7 of the Second Draft EIS will include an updated summary of Project outreach efforts.

As noted in your comment, and described in Section 2.1 of the EIS, the Project design has been modified several times in response to community input. Turbine locations were eliminated to maintain setback requirements, reduce visual impacts, and increase the distance between the Project and the community. An up to 14 turbine project was presented during the public scoping period. In response to public comments many of which related to visual impacts, the number of turbines was further reduced and a Project of up to 10 turbines was presented in the Draft EIS.

Chapter 2 of the EIS describes the many factors that were taken into account in the siting of the Project. These include sufficient wind resource, access to adequate and available transmission capacity, and proximity to existing transmission lines. These factors help determine the viability and economic feasibility of a project.

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737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

As noted in your comment, and discussed in Section 4.12 of the EIS, the Project would not affect the ability of individual homeowners to install rooftop photovoltaic systems (rooftop solar systems). In a letter dated June 5, 2014, HECO confirmed that the Project would connect to a different, higher voltage electrical system than rooftop photovoltaic systems. Therefore, the presence of the Project would not impact the ability of HECO customers to safely and reliable connect rooftop solar systems to local distribution circuits.

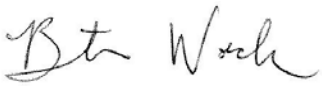
Comment IND-17.2*: I believe they answered all the questions and concerns that reasonable people have. Because the project will provide benefits to our community, like lower electricity bills and a community benefits package of two million dollars, I believe we will be better off and I hope that DLNR will approve it.*

Response IND-17.2: Production of wind-generated energy by the Project would replace a portion of the State's electricity that is currently generated by burning fossil fuels. Currently, approximately 80 percent of Hawaii's energy is currently derived from fossil fuels and approximately 20 percent comes from renewable sources (Hawaiian Electric Company, Inc. et al. 2014). As the proportion of electricity provided by renewable sources increase in Hawaii it is anticipated that electricity rates will drop.

As described in Sections 4.12 of the EIS, Na Pua Makani Power Partners, LLC, has committed to establishing a Community Benefit fund and is in discussion with Kahuku community members regarding the details of its administration. It is anticipated that Project funds ($10,000 per wind turbine per year) would be governed and administered by a board of local community members who would make decisions as to the use of the proceeds and which activities, programs, groups, and events would be sponsored.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

IND-18

June 23, 2015

Ms. Suzanne Case, Chairperson
Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

1 I am writing in support of the Na Pua Makani wind project. We have a lot of young men from Kahuku and other communities in the area who work in the construction industry. This project will provide many of them work right here in Kahuku.

After the construction is pau, there will be some jobs at the wind farm for the people who will operate it and maintain it. Every new job we get in Kahuku counts and the developer said he would try to hire people from our town. We need this project. I hope it gets the okay to go ahead.

Mahalo,

92-747 MAKAKILO DR #38
KAPOLEI HI 96707

TETRA TECH

April 1, 2016

Unknown Sender
92-747 Makakilo Drive #38
Kapolei HI 96707

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

To Whom It May Concern:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter dated June 23, 2015 commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-18.1*: I am writing in support of the Na Pua Makani wind project. We have a lot of young men from Kahuku and other communities in the area who work in the construction industry. This project will provide many of them work right here in Kahuku.*

After construction is pau, there will be some jobs at the wind farm for the people who will operate it and maintain it. Every new job we get in Kahuku counts and the developer said he would try to hire people from our town. We need this project. I hope it gets the okay to go ahead.

Response IND-18.1: As mentioned in your comment, and described in section 4.12 of the EIS, the Project would have both short-term and long-term economic benefits. Direct employment of 43 full-time equivalent jobs during construction and 3 permanent jobs during operation would become during construction and operation of the proposed Project. Local workers would be employed where possible, including workers from nearby communities.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

IND-19

June 23, 2015

Ms. Suzanne Case,
Chairwoman for the Board of Land and Natural Resources
State of Hawaii
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

Dear Chairwoman,

1 Please record my support for the Na Pua Makani wind project in Kahuku. Having more clean energy like solar, wind and ocean thermal is the wave of the future and will keep our aina clean. This is the direction our state needs to go for a sustainable future.

66-184 Waikanaiele Road
Haleiwa, HI 96712

Yours truly,

TETRA TECH

April 1, 2016

Unknown Sender
66-184 Walikanahele Road
Haleiwa HI 96712

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

To Whom It May Concern:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter dated June 23, 2015 commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-19.1*: Please record my support for the Na Pua Makani wind project in Kahuku. Having more clean energy like solar, wind and ocean thermal is the wave of the future and will keep our aina clean. This is the direction our state needs to go for a sustainable future.*

Response IND-19.1: Na As described in Section 1.3 of the EIS, the proposed Project would provide a clean source of renewable energy and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals. These goals have increased from 70 to 100 percent clean energy since the publication of the Draft EIS. Generation and integration of renewable energy into the electric grid through projects such as Na Pua Makani would decrease fossil fuel import and consumption, and increase energy independence.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

IND-20

June 23, 2015

Ms. Suzanne Case, Chairperson
Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

Dear Chairperson Case,

1 I've listened to all the arguments against the new wind farm and have come to the conclusion that they are based only on nimby-ism, not in my back yard.

But the fact remains Kahuku is one of the best places to situate a wind farm because of the constant breeze we have. The transmission lines are available so building it here in the hills above Kahuku makes the most economic sense.

If the goal is to reduce electricity costs with green energy, then we have to place facilities like this wind farm in the most ideal locations.

Sincerely yours,

Dino Vendiola
56-270 Huehu St.
Kahuku, HI, 96731

Dino Vendiola

TETRA TECH

April 1, 2016

Mr. Dino Vendiola
56-270 Huehu Street
Kahuku HI 96731

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Vendiola:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter dated June 23, 2015 commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-20.1*: I've listened to all the arguments against the new wind farm and have come to the conclusion that they are based only on nimby-ism, not in my backyard.*

But the fact remains Kahuku is one of the best places to situate a wind farm because of the constant breeze we have. The transmission lines are available so building it here in the hills above Kahuku makes the most economic sense.

If the goal is to reduce electricity costs with green energy, then we have to place facilities like this wind farm in the most ideal locations.

Response IND-20.1: There are many factors that are considered in the siting of a renewable energy project. Those relevant to the Project are described in Section 2.1 of the EIS and, as mentioned in your comment, include sufficient wind resource, access to adequate and available transmission capacity, and proximity to existing transmission lines. These factors help determine the viability and economic feasibility of a project.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

IND-21

Ms. Suzanne Case, Chairperson
Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

Chair Woman Case:

1 I am for this Na Pua Makani wind farm project because clean energy is the right thing to do for our keiki and our future generations. Renewable energy is less polluting and its way better for our environment to help keep our air and ocean water clean.

Sincerely,

Mona Wago
54-122 Panoewa St.
Hauula, HI., 96717

TETRA TECH

April 1, 2016

Ms. Mona Wago
54-122 Puuowaa Street
Hauula HI 96717

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Wago:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-21.1*: I am for this Na Pua Makani wind farm project because clean energy is the right thing to do for our keiki and our future generations. Renewable energy is less polluting and its way better for our environment to help keep our air and ocean water clean.*

Response IND-21.1: As described in Section 1.3 of the EIS, the proposed Project would provide a clean source of renewable energy and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals. These goals have increased from 70 to 100 percent clean energy since the publication of the Draft EIS. Incorporation of renewable energy into the electricity grid through projects such as Na Pua Makani decreases fossil fuel import and consumption, resulting in benefits to the environment such as reduced greenhouse gas emissions, particulate-related health effects, and other forms of pollution associated with coal or diesel fuel electric generation.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

IND-22

June 23, 2015

Ms. Suzanne Case, Chairperson
Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

Dear Chair,

1 I support the Na Pua Makani renewable energy project for three reasons: it will be good for our community, good for our economy and good for our environment.

Thank you for recording my comments in favor of this project.

Mahalo,

Kainalu Werner

Kainalu Werner
~~PO BOX 2013~~ 87-228 E Saint John Road

TETRA TECH

April 1, 2016

Ms. Kainaiu Werner
87-228 E St. Johns Road
Waianae, HI 96792

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Werner:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-22.1*: I support the Na Pua Makani renewable energy project for three reasons: it will be good for our community, good for our economy and good for our environment.*
Thank you for recording my comments in favor of this project.

Response IND-22.1: The EIS describes both the beneficial and adverse effects of the Project. As noted in your comment, the Project would have beneficial impacts to the community and to the economy associated with a long-term community benefits package ($10,000 per turbine per year) and through job creation and spending associated with Project construction and implementation of mitigation under the Habitat Conservation Plan (Section 4.12 of the EIS). The Project would also benefit the environment through reduced greenhouse gas emissions and other forms of pollution associated with coal or diesel fuel electric generation (Section 4.5 of the EIS).

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

IND-23

June 23, 2015

Ms. Suzanne Case, Chairperson
Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

1 I support the Na Pua Makani renewable energy project.

I am satisfied that the wind farm will not have a big impact on our community and that it will provide several benefits, including a community benefit fund of two million dollars.

2 I believe Champlin Wind will be a good neighbor, based on their actions so far. They have taken an interest in our community and supported programs for the students at Kahuku High School.

I hope your department will approve this environmental impact statement so we can enjoy the benefits of this project.

Thank You,

Kekoa Werner

Mahalo,

2013 P.O Box

Kekoa Werner

April 1, 2016

Mr. Kekoa Werner
Unknown address

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Werner:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter dated June 23, 2015 commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-23.1*: I support the Na Pua Makani renewable energy project. I am satisfied that the wind farm will not have a big impact on our community and that it will provide several benefits, including a community benefit fund of two million dollars.*

Response IND-23.1: As mentioned in your comment and described in Sections 4.12 of the EIS, Na Pua Makani Power Partners, LLC, has committed to establishing a Community Benefit fund and is in discussion with Kahuku community members regarding the details of its administration. It is anticipated that Project funds ($10,000 per wind turbine per year) would be governed and administered by a board of local community members who would make decisions as to the use of the proceeds and which activities, programs, groups, and events would be sponsored.

Comment IND-23.2*: I believe Champlin Wind will be a good neighbor, based on their actions so far. They have taken an interest in our community and supported programs for the students at Kahuku High School.*

I hope your department will approve this environmental impact statement so we can enjoy the benefits of this project.

Response IND-23.2: Na Pua Makani Power Partners, LLC continues its involvement in the community. Chapter 7 of the Second Draft EIS will include an updated summary of Project outreach efforts. To date, Na Pua Makani Power Partners, LLC, has provided support to a number of local groups including Kahuku.org School to Work program, Kahuku High School Project Grad, Kahuku Elementary School May Day, Kahuku High School rugby, basketball, volleyball, and soccer teams, as well as providing food for families in need.

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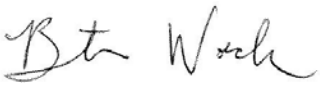
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

IND-24

Ms. Suzanne Case, Chairperson
Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

June 23, 2015

Dear Chairwoman Case,

1 We need to bring down the cost of electricity from the high cost of oil by using more wind, solar and renewable sources like bio-fuel. Regarding the EIS, how
2 much is the difference in cost of electricity between oil and wind generation like the Na Pua Makani project?

Mahalo,

Timmy Welch
54-303 Kawaewae Way
Hauula, HI, 96717

April 1, 2016

Mr. Timmy Wescot
54-303 Kawaewae Way
Hauula, HI 96717

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Wescot:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter dated June 23, 2015 commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-24.1*: We need to bring down the cost of electricity from the high cost of oil by using more wind, solar and renewable sources like bio-fuel.*

Response IND-24.1: Production of wind-generated energy by the Project would replace a portion of the State's electricity that is currently generated by burning fossil fuels. Based on the most recent 2014 Renewable Portfolio Standard Status Report approximately 80 percent of Hawaii's energy is currently derived from fossil fuels and approximately 20 percent comes from renewable sources (Hawaiian Electric Company, Inc. et al. 2014). The cost of electricity for the consumers/residents of Hawaii is the blended average cost of all sources (e.g. oil, wind, solar, etc.) and current rates reflect that high cost from burning oil. Over time, as the proportion of energy coming from renewable sources increases, the average cost of electricity is expected to decrease. This information has been added to EIS Section 4.12 – Socioeconomics.

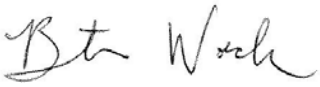
Comment IND-24.2*: Regarding the EIS, how much is the difference in cost of electricity between oil and wind generation like the Na Pua Makani project?*

Response IND-24.2: The cost of electricity from renewable energy is currently about one-half the cost of electricity from burning oil.

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

IND-25

June 23, 2015

Ms. Suzanne Case, Chairperson
Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

Dear Chairperson Case,

1 We have to start moving ahead with our own renewable energy resources for the future of Hawaii. As our population grows our demand for electricity increases. And if we don't approve more solar and wind projects on Oahu like Na Pua Makani, we will continue to depend on imported foreign oil to generate electricity.

Let's move forward into the future with clean energy.

Mahalo,

Aisa Wily

P.O. BOX 447
LAIE, HI
96762

Aisa Wily

TETRA TECH

April 1, 2016

Ms. Aisa Wily
P.O. Box 447
Laie HI 96762

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Wily:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter dated June 23, 2015 commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-25.1*: We have to start moving ahead with our own renewable energy resources for the future of Hawaii. As our population grows our demand for electricity increases. And if we don't approve more solar and wind projects on Oahu like Na Pua Makani, we will continue to depend on imported foreign oil to generate electricity. Let's move forward into the future with clean energy.*

Response IND-25.1: As described in Sections 1.3 and 4.12 of the EIS, the proposed Project would provide a clean source of renewable energy to Oahu and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals. In doing so, the Project would contribute to energy self-sufficiency by increasing the ratio of indigenous to imported energy use. As a source of renewable energy, the Project would increase energy security for the State and reduce reliance on fossil-fuel based energy production.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

March 16, 2016

Ms. Aisa Wily
P.O. Box 447
Laie HI 96762

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Wily:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter dated June 23, 2015 commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment IND-25.1*: We have to start moving ahead with our own renewable energy resources for the future of Hawaii. As our population grows our demand for electricity increases. And if we don't approve more solar and wind projects on Oahu like Na Pua Makani, we will continue to depend on imported foreign oil to generate electricity. Let's move forward into the future with clean energy.*

Response IND-25.1: As described in Sections 1.3 and 4.12 of the EIS, the proposed Project would provide a clean source of renewable energy to Oahu and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals. In doing so, the Project would contribute to energy self-sufficiency by increasing the ratio of indigenous to imported energy use. As a source of renewable energy, the Project would increase energy security for the State and reduce reliance on fossil-fuel based energy production.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. If you would like a copy of the Final EIS or portions thereof, please submit a request in writing to Tetra Tech, Inc., Attention: Brita Woeck 737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck

Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

NĀ PUA MAKANI
Clean Energy Powering Hawai'i's Future

Na Pua Makani Wind Project
Draft Environmental Impact Statement
Public Comment Form

For more information visit:
http://oeqc.doh.hawaii.gov/Shared%20Documents/Environmental_Notice/Archives/2010s/2015-06-08.pdf

Comments can be submitted by email to **NaPuaMakanihcp@fws.gov**, or by U.S. Mail addressed to:

Pacific Island Fish and Wildlife Office
U.S. Fish and Wildlife Service
ATTN: Kristi Young, Field Supervisor
300 Ala Moana Boulevard, Room3-122
Honolulu, Hawaii 96850
*All comments should be submitted/postmarked by **August 11, 2015.**

IND-26

Name: ANDREA ANIKT

Address: PO BOX 646
KAAWA HI. 96730

Email: andreapeatmoss@gmail.com

Please check the box next to the topic area(s) you're commenting about. Write your comments on reverse page, or attach to this form.

- ☐ Air quality and Climate Change
- ☐ Cultural, Archaeological and Historic Resources
- ☒ Environmental Justice
- ☐ Geology and Soils
- ☐ Hazardous and Regulated Materials and Waste
- ☐ Hydrology and Water Resources
- ☒ Land Use
- ☐ Military
- ☐ Natural Hazards
- ☒ Noise
- ☒ Public Health and Safety
- ☐ Public Infrastructure and Services
- ☒ Recreation and Tourism
- ☐ Socioeconomics Resources
- ☒ Threatened and Endangered Species
- ☐ Transportation
- ☐ Vegetation
- ☒ Visual Resources
- ☒ Wildlife
- ☐ Other: _____

NĀ PUA MAKANI
Clean Energy Powering Hawai'i's Future

Comments:

1 I made previous comments before this wind project had draft environmental statement. I know that these turbines life span now is said to be 10 years — that means that there is a lot of large ecologically daunting clean up to do & dumping of these in our short-supply of landfill space on island. ① Is there an exit strategy for the project to take these away?

2 ② Why not use bladeless (eg VORTEX) technology?

3 ③ The low income Kanuku area has made protest after protest to the project. This has been ignored after they took the benefits initially for the community but now there are too many planned for this place. ④ Threatened & endangered native & migratory birds are killed by these blades & it is an ecosystem nearby with marsh & a wildlife refuge that will be affected adversely.

4

5 ⑤ It is bad land use policy on an island to take up this land with these turbines. Land is too scarce. ⑥ We have had people in the vicinity complain of their noise.

6

7 ⑦ The blades are extremely dangerous when we have strong winds / hurricanes — They have been know to fly miles away from their base in Europe. Why would they be safer here?

Thank you for your comments.

April 1, 2016

Ms. Andrea Anixt
P.O. Box 646
Kaaawa HI 96730

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Anixt:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-26.1*: I made previous comments before this wind project had draft environmental statement. I know that these turbines life span now is said to be 10 years - that means that there is a lot of large ecologically daunting clean up to do & dumping of these in our short-supply of landfill spaces on island? Is there an exit strategy for the project to take these away?*

Response IND-26.1: The anticipated life of the proposed Project is 21 years (one year of construction and 20 years of commercial operation). After that time, Na Pua Makani Power Partners, LLC would evaluate whether to continue operation of the Project or to decommission it. Section 2.4.8 of the EIS describes the process of decommissioning, the goal of which would be to remove the power generation equipment and return the site to a condition as close to its pre-construction state as possible within one year as contractually required. All decommissioning- and restoration-related waste would be handled and disposed of or recycled, as appropriate, in accordance with county, State, and Federal laws and permit requirements.

Comment IND-26.2*: Why not use bladeless (eg VORTEX) technologies?*

Response IND-26.2: The wind turbine models being considered for the Na Pua Makani wind farm site are those most appropriate for site-specific wind conditions and terrain as well as economic and energy production considerations. Bladeless technologies are still in the research and development stage and are not yet commercially viable or available. Therefore, they are not considered for the Project.

Comment IND-26.3*: The low income Kahuku area has made protest after protest to the project. This has been ignored after they took the benefits initially for the community, but now there are too many planned for this place.*

Response IND-26.3: The proposed Project site was determined by a number of factors as noted in EIS Section 2.1 – Alternative Development and Screening Criteria including, but not limited to, the location of the proposed

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

Project needed to have good wind resources, access to adequate and available transmission capacity, available contiguous land that is designated to allow wind energy development, site conditions namely topography, and compliance with the City and County setback distances. The location of the proposed Project met these siting criteria including setback distances. Other locations were investigated but did not meet the criteria. Chapter 2 of the EIS describes Project alternatives such as alternative locations which were considered but not carried forward for further analysis.

Na Pua Makani Power Partners, LLC continues its involvement in the community. Chapter 7 of the Second Draft EIS will include an updated summary of Project outreach efforts. Na Pua Makani Power Partners, LLC, has committed to establishing a Community Benefit fund (see Section 4.12 of the EIS) and is in discussion with Kahuku community members regarding the details of its administration. It is anticipated that Project funds ($10,000 per wind turbine per year) would be governed and administered by a board of local community members who would make decisions as to the use of the proceeds and which activities, programs, groups, and events would be sponsored.

Comment IND-26.4*: Threatened and endangered nature & migratory birds are killed by these blades & it is an ecosystem nearby with marsh & a wildlife refuge that will be affected adversely.*

Response IND-26.4: There will be no adverse effects to marsh habitats as none occur within the wind farm site, or to the James Campbell National Wildlife Refuge which is located approximately 0.75 miles north. However, the EIS discloses the potential for the Project to impact threatened and endangered species, as well as other migratory birds, transiting through the wind farm site (see Section 4.10 and 4.11 of the EIS). As described in Section 2.5 of the EIS, because of the potential for these impacts Na Pua Makani Power Partners, LLC, has worked in conjunction with the U.S. Fish and Wildlife Service and Hawaii Division of Forestry and Wildlife to develop a Habitat Conservation Plan. The Habitat Conservation Plan incorporates measures to avoid and minimize impacts to these species, as well as mitigation for unavoidable impacts.

Comment IND-26.5*: It is bad land use policy on an island to take up this land with these turbines. Land is too scarce.*

Response IND-26.5: Land use plans and policies are discussed in detail in Section 3.12 and 4.14 and Chapter 5 of the EIS. Wind farms are an allowable use on zoned agricultural lands with a Conditional Use Permit minor. Na Pua Makani Power Partners, LLC, is working with the City and County of Honolulu Department of Planning and Permitting to obtain a Conditional Use Permit minor for the Project and to ensure that the Project is compatible with existing land uses.

Comment IND-26.6*: We have had people in the vicinity complain of their noise.*

Response IND-26.6: It is true that persons in the immediate vicinity of the wind farm may hear a swooshing sound characteristic of wind turbines, with audibility limited to areas closest to the turbines. However, as discussed in the Noise Impact Assessment (Appendix D of the EIS), which takes into account predicted Project noise as well as baseline noise levels include noise from the existing Kahuku Wind Farm, the Project would be in compliance with all Hawaii Department of Health noise regulations during operation.

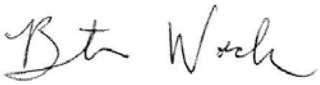
Comment IND-26.7*: The blades are extremely dangerous when we have strong winds/hurricanes. They have been known to fly miles away from their base in Europe. Why would they be safer here?*

Response IND-26.7: Instances of wind turbine collapse and blade throw are very infrequent and primarily due to improper construction. Commercial scale wind turbines are designed to International Electrotechnical

Commission standards (IEC 61400). Selection of a particular model takes into account site-specific wind conditions. The wind turbine models being considered for the Project are designed to operation in wind speeds of up to 55 miles per hour and withstand 50-year occurrence gusts of 94 miles per hour. They have a built-in cut-out speed, such that when wind speeds exceed 55 miles per hour, the wind turbine stops operating. Under extreme conditions, the rotor pitch can also be changed to a neutral position (facing into the wind with blades coming to a stop). These adjustments are made by the wind turbine controller (a computer system that runs self-diagnostic tests, starts and stops the turbine, and makes adjustments as wind speeds vary); however a built-in SCADA system allows 24/7 remote control of the facility. Additional information regarding high winds/hurricanes and wind turbine safety has been added to Section 4.18 – Public Health and Safety of the Second Draft EIS.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

IND-27

June 23, 2015

Ms. Suzanne Case, Chairperson
Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

1 I live in Kahuku and I support this Na Pua Makani wind project. I went to Kahuku High School and the developer of the project has been supporting programs at the high school. He has also sponsored community events. Kahuku is not a rich community and it really helps when a company will help out the community like this.

We have a lot of needs in our community and the wind project can help us take care of many of those. I hope you will approve this project.

Mahalo,

Dana Woolsey
41-305 Waiokeola ST.
Waimanalo HI.
96795

TETRA TECH

April 1, 2016

Ms. Dana Woolsey
41-305 Waiokeola Street
Waimanalo HI 96795

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Woolsey:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter dated June 23, 2015 commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-27.1*: I live in Kahuku and I support this Na Pua Makani wind project. I went to Kahuku High School and the developer of the project has been supporting programs at the high school. He has also sponsored community events. Kahuku is not a rich community and it really helps when a company will help out the community like this. We have a lot of needs in our community and the wind project can help us take care of many of those. I hope you will approve this project.*

Response IND-27.1: As described in Section 4.12 of the EIS, Na Pua Makani Power Partners, LLC, has committed to establishing a Community Benefit fund and is in discussion with Kahuku community members regarding the details of its administration. It is anticipated that Project funds ($10,000 per wind turbine per year) would be governed and administered by a board of local community members who would make decisions as to the use of the proceeds and which activities, programs, groups, and events would be sponsored.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

NĀ PUA MAKANI
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Comments can be submitted by email to **NaPuaMakanihcp@fws.gov**, or by U.S. Mail addressed to:

Pacific Island Fish and Wildlife Office
U.S. Fish and Wildlife Service
ATTN: Kristi Young, Field Supervisor
300 Ala Moana Boulevard, Room3-122
Honolulu, Hawaii 96850
*All comments should be submitted/postmarked by **August 11, 2015.**

IND-28

Name: Mana F. Feagai

Address: 55-488 Iosepa St. B
Laie, HI 96762

Email: already on file

Please check the box next to the topic area(s) you're commenting about. Write your comments on reverse page, or attach to this form.

- ☑ Air quality and Climate Change
- ☑ Cultural, Archaeological and Historic Resources
- ☑ Environmental Justice
- ☑ Geology and Soils
- ☑ Hazardous and Regulated Materials and Waste
- ☑ Hydrology and Water Resources
- ☑ Land Use
- ☐ Military
- ☑ Natural Hazards
- ☑ Noise
- ☑ Public Health and Safety
- ☑ Public Infrastructure and Services
- ☐ Recreation and Tourism
- ☑ Socioeconomics Resources
- ☑ Threatened and Endangered Species
- ☑ Transportation
- ☑ Vegetation
- ☑ Visual Resources
- ☑ Wildlife
- ☐ Other: _____

NĀ PUA MAKANI
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Comments:

1 I am strongly OPPOSED to the turbine project and adding more turbines to an already saturated area. NO MORE TURBINES!!!

Thank you for your comments.

April 1, 2016

Ms. Mana Feagai
55-488 Iosepa Street B
Laie HI 96762

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Feagai:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-28.1*: I am strongly opposed to the turbine project and adding more turbines to an already saturated area. NO MORE TURBINES!!!*

Response IND-28.1: Na Pua Makani Power Partners, LLC, acknowledges your opposition to the Project. A number of screening criteria were considered during the selection of the proposed Project location, described in Section 2.1 of the EIS. They include but are not limited to the availability of a sufficient wind resource, access to adequate and available transmission capacity, availability of contiguous land that is designated to allow wind energy development, and site-specific conditions such as topography which influence construction feasibility. Alternatives that were considered but eliminated from detailed study, including greater setback distances and alternative project locations on Oahu, are described in Section 2.3 of the EIS.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
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U.S. Fish and Wildlife Service
ATTN: Kristi Young, Field Supervisor
300 Ala Moana Boulevard, Room3-122
Honolulu, Hawaii 96850
*All comments should be submitted/postmarked by **August 11, 2015.**

IND-29

Name: George Wallace

Address: 54-135 Honomu Place
Hauula, HI 96717

Email: keokiemail@gmail.com

Please check the box next to the topic area(s) you're commenting about. Write your comments on reverse page, or attach to this form.

- ☐ Air quality and Climate Change
- ☐ Cultural, Archaeological and Historic Resources
- ☐ Environmental Justice
- ☐ Geology and Soils
- ☐ Hazardous and Regulated Materials and Waste
- ☐ Hydrology and Water Resources
- ☐ Land Use
- ☐ Military
- ☐ Natural Hazards
- ☐ Noise
- ☐ Public Health and Safety
- ☐ Public Infrastructure and Services
- ☐ Recreation and Tourism
- ☐ Socioeconomics Resources
- ☐ Threatened and Endangered Species
- ☐ Transportation
- ☐ Vegetation
- ☐ Visual Resources
- ☐ Wildlife
- ☐ Other: _____

NĀ PUA MAKANI
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Comments:

1 My daughter graduated from Kahuku High School eight years ago. Of her 10 best friends, she is the only one left on the island. There are no jobs. One of the biggest reasons there are no jobs is the cost of electricity. I don't really like to look at the windmills. However, I'd rather look at them and keep our children than to not have them. For that reason alone, I support this project.

Thank you for your comments.

TETRA TECH

April 1, 2016

Mr. George Wallace
54-135 Honomu Place
Hau'ula HI 96717

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Wallace:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-29.1*: My daughter graduated from Kahuku High School eight years ago. Of her 10 best friends, she is the only one left on the island. There are no jobs. One of the biggest reasons there are no jobs is the cost of electricity. I don't really like to look at the windmills. However, I'd rather look at them and keep our children than to not have them. For that reason alone, I support this project.*

Response IND-29.1: The proposed Project would contribute to the goals outlined in Hawaii's Renewable Portfolio Standards and the Hawaii Clean energy initiative by increasing the percentage of the state's energy that is derived from clean, renewable sources. Hawaii has signed into law a requirement for 100 percent of electricity from renewable sources over the next 25 years and as the percentage of renewables increases, the average cost of electricity will decrease. Additionally, the Project would have beneficial impacts to the community and to the economy, including but not limited to, job creation.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

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U.S. Fish and Wildlife Service
ATTN: Kristi Young, Field Supervisor
300 Ala Moana Boulevard, Room3-122
Honolulu, Hawaii 96850
*All comments should be submitted/postmarked by **August 11, 2015.**

IND-30

Name: Melissa Primacio

Address: PO BOX 158
Kaneohe HI 96731

Email: melissaprimacio@gmail.com

Please check the box next to the topic area(s) you're commenting about. Write your comments on reverse page, or attach to this form.

- ☐ Air quality and Climate Change
- ☐ Cultural, Archaeological and Historic Resources
- ☐ Environmental Justice
- ☐ Geology and Soils
- ☐ Hazardous and Regulated Materials and Waste
- ☐ Hydrology and Water Resources
- ☐ Land Use
- ☐ Military
- ☐ Natural Hazards
- ☐ Noise
- ☐ Public Health and Safety
- ☐ Public Infrastructure and Services
- ☐ Recreation and Tourism
- ☐ Socioeconomics Resources
- ☐ Threatened and Endangered Species
- ☐ Transportation
- ☐ Vegetation
- ☐ Visual Resources
- ☐ Wildlife
- ☐ Other: _____

NĀ PUA MAKANI
Clean Energy Powering Hawai'i's Future

Comments:

1 I am in support of the windmill project. I am a resident of Kahuku.

Thank you for your comments.

TETRA TECH

April 1, 2016

Ms. Melissa Primacio
P.O. Box 158
Kahuku HI 96731

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Primacio:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-30.1*: I am in support of the windmill project. I am a resident of Kahuku.*

Response IND-30.1: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your support of the proposed Project.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

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U.S. Fish and Wildlife Service
ATTN: Kristi Young, Field Supervisor
300 Ala Moana Boulevard, Room3-122
Honolulu, Hawaii 96850
*All comments should be submitted/postmarked by **August 11, 2015.**

IND-31

Name: Ghia Borges

Address: PO Box 300 Haiku, HI 96717

Email: ghulana@yahoo.com

Please check the box next to the topic area(s) you're commenting about. Write your comments on reverse page, or attach to this form.

- ☐ Air quality and Climate Change
- ☑ Cultural, Archaeological and Historic Resources
- ☑ Environmental Justice
- ☑ Geology and Soils
- ☑ Hazardous and Regulated Materials and Waste
- ☑ Hydrology and Water Resources
- ☑ Land Use
- ☑ Military
- ☑ Natural Hazards
- ☑ Noise
- ☑ Public Health and Safety
- ☑ Public Infrastructure and Services
- ☑ Recreation and Tourism
- ☐ Socioeconomics Resources
- ☑ Threatened and Endangered Species
- ☐ Transportation
- ☑ Vegetation
- ☐ Visual Resources
- ☑ Wildlife
- ☐ Other: _____

NĀ PUA MAKANI
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1 **Comments:** I am opposed to Na Pua Makani Wind Project. I am opposed to the exploitation of our 'āina and our resources and our wild life.

Thank you for your comments.

TETRA TECH

April 1, 2016

Ms. Ghia Borges
P.O. Box 300
Hau`ula HI 96717

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Borges:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-31.1*: I am opposed to Na Pua Makani wind project. I am opposed to the exploitation of our aina and our resources and our wildlife.*

Response IND-31.1: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the proposed Project. The purpose and need for the proposed Project are described in Chapter 2 of the EIS.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

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Pacific Island Fish and Wildlife Office
U.S. Fish and Wildlife Service
ATTN: Kristi Young, Field Supervisor
300 Ala Moana Boulevard, Room3-122
Honolulu, Hawaii 96850
*All comments should be submitted/postmarked by **August 11, 2015.**

IND-32

Name: Nakia Nae'ole

Address:

Email: nakia-naeole@gmail.com

Please check the box next to the topic area(s) you're commenting about. Write your comments on reverse page, or attach to this form.

- ☐ Air quality and Climate Change
- ☐ Cultural, Archaeological and Historic Resources
- ☑ Environmental Justice
- ☐ Geology and Soils
- ☐ Hazardous and Regulated Materials and Waste
- ☐ Hydrology and Water Resources
- ☑ Land Use
- ☐ Military
- ☐ Natural Hazards
- ☐ Noise
- ☐ Public Health and Safety
- ☐ Public Infrastructure and Services
- ☐ Recreation and Tourism
- ☐ Socioeconomics Resources
- ☑ Threatened and Endangered Species
- ☐ Transportation
- ☐ Vegetation
- ☐ Visual Resources
- ☒ Wildlife
- ☑ Other: Ko pae 'āina! Education

Mike Cupberth

NĀ PUA MAKANI
Clean Energy Powering Hawai'i's Future

1 **Comments:** As there has been no significant impact towards my home's energy-use bill, I find difficult to support the expansion into more land for the erection of more wind turbines. I as a native-Hawaiian (Kānaka Maoli)

2 would like to know if there are significant programs set up to help the native-Hawaiian population as a result of the new turbines being proposed to be built. If an educational venture was created to seek out the educational development ~~for~~ of renewable energy for native-Hawaiian children, I could possibly see myself supporting a project of such magnitude.

3 I do not believe that the proposed building of these wind turbines have the best interest in mind for our environment, nor the visual impact it will create for our children to live with in the future.

Thank you for your comments.

April 1, 2016

Ms. Nakia Nae'ole
No address provided

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Nae'ole:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-32.1*: As there has been no significant impact towards my home's energy-use bill, I find difficult to support the expansion into more land for the erection of more wind turbines.*

Response IND-32.1: The proposed Project would contribute to the goals outlined in Hawaii's Renewable Portfolio Standard and the Hawaii Clean energy initiative by increasing the percentage of the state's energy that is derived from clean, renewable sources. Hawaii has signed into law a requirement for 100 percent of electricity from renewable sources over the next 25 years and as the percentage of renewables increases, the average cost of electricity will decrease. Based on the most recent 2014 Renewable Portfolio Standard Status Report approximately 80 percent of Hawaii's energy is currently derived from fossil fuels and approximately 20 percent comes from renewable sources (Hawaiian Electric Company, Inc. et al. 2014). The cost of electricity for the consumers / residents of Hawaii is the blended average cost of all sources (e.g. oil, wind, solar, etc.) and current rates reflect that high cost from burning oil. Over time, as the proportion of energy coming from renewable sources increases, the average cost of electricity is expected to decrease.

Comment IND-32.2*: I as a native-Hawaiian (Kanaka Maoli) would like to know if there are significant programs set up to help the native Hawaiian population as a result of the new turbines being proposed to be built. If an educational venture was created to seek out the educational development of renewable energy for native-Hawaiian children, I could possibly see myself supporting a project of such magnitude.*

Response IND-32.2: As described in Sections 4.12, Na Pua Makani Power Partners, LLC, has committed to establishing a Community Benefit fund and is in discussion with Kahuku community members regarding the details of its administration. It is anticipated that Project funds ($10,000 per wind turbine per year) would be administered by a board of local community members who would make decisions as to the use of the proceeds and which activities, programs, groups, and events would be sponsored. This could include educational programs and activities.

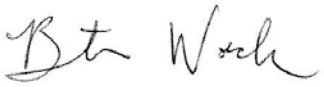
Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

Comment IND-32.3*: I do not believe that the proposed building of these wind turbines have the best interest in mind for our environment, nor the visual impact it will create for our children to live with in the future.*

Response IND-32.3: As described in Sections 1.3 and 4.12 of the EIS, the proposed Project would provide a clean source of renewable energy to Oahu and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals. In doing so, the Project would contribute to energy self-sufficiency by increasing the ratio of indigenous to imported energy use. As a source of renewable energy, the Project would increase energy security for the State and reduce reliance on fossil-fuel based energy production. The EIS discloses the potential environmental impacts of the proposed Project, including visual resources which are depicted in visual simulations of the wind turbines from key viewpoints within the community. These can be found in Section 4.16 of the EIS.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

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U.S. Fish and Wildlife Service
ATTN: Kristi Young, Field Supervisor
300 Ala Moana Boulevard, Room3-122
Honolulu, Hawaii 96850
*All comments should be submitted/postmarked by **August 11, 2015.**

IND-33

Name: Vasalolo Taualii

Address: P.O. Box 360
Kaunakakai, HI 96748

Email: vasa@me.com

Please check the box next to the topic area(s) you're commenting about. Write your comments on reverse page, or attach to this form.

- ☐ Air quality and Climate Change
- 1 ☒ Cultural, Archaeological and Historic Resources – Wind turbines do not support Hi culture or history – it devalues it.
- ☐ Environmental Justice
- ☐ Geology and Soils
- 2 ☒ Hazardous and Regulated Materials and Waste – What are plans to dispose of toxic materials & debris from project
- ☐ Hydrology and Water Resources
- ☒ Land Use
- ☐ Military
- ☐ Natural Hazards
- 3 ☐ Noise – Wind turbines have negative health impact – physically & emotionally on those living in close proximity to WM.
- ☒ Public Health and Safety
- ☐ Public Infrastructure and Services
- ☒ Recreation and Tourism – People come to Hi for beauty. WM detracts & take away from this beauty
- ☐ Socioeconomics 4 urces
- ☒ Threatened and Endangered Species
- ☐ Transportation
- ☐ Vegetation
- ☐ Visual Resources
- ☐ Wildlife
- ☒ Other: 6 HARD/Actual costs of each turbine – impact on reducing current utility costs when & how much reduction do consumers actually receive, when?

5 How does WM Co. deal with damage to Hi birds & other environmental surroundings

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Comments:

7 1) Negative health impact on children/community

8 2) Disrespect for culture, environment & beauty of Hawai'i and its history.

9 3) Who benefits?
a. Manufacturers — a. Production made with ? fuel
b. Hard costs per wind mill
b. Contractors: a. cost of installation - labor, land, Ad/promo - lease etc
b. maintenance
c. Sub contractors
d. other hidden costs
e. Costs of removal? New installation pro-rated over 20 years?

10 When and how do consumers' benefit in the long run. when initial & continuing costs are More than current rates.

Thank you for your comments.

April 1, 2016

Ms. Vasaloloa Taualii
P.O. Box 360
Kahuku HI 96731

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Taualii:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-33.1*: Wind turbines do not support HI culture or history - it devalues it.*

Response IND-33.1: A Cultural Impact Assessment was conducted for the proposed Project and is included as Appendix G to the EIS. Based upon the ethnographic interviews conducted as part of the CIA there does not appear to be a need for traditional access to the wind farm site for the collection of natural resources or for performing traditional cultural practices and no traditional activities were identified within the wind farm site. The Cultural Impact Assessment concludes that the Project would have no effect to traditional cultural uses and practices.

Comment IND-33.2*: What are plans to dispose of toxic materials & debris from project.*

Response IND-33.2: Section 4.7 of the EIS describes the storage and handling of hazardous materials and wastes during construction and operation of the proposed Project. Waste generated during Project construction would include construction debris, concrete wash water, used oil, and other vehicle fluids, and restroom waste. Used oil from the turbines would be the primary waste generated during Project operation. Used oil would temporarily be stored in the on-site operations and maintenance building. All waste, including non-hazardous waste, would be disposed of off-site at an appropriately permitted facility which include the City and County of Honolulu's Waimanalo Gulch landfill, the H-power facility in Kapolei, or to the privately-owned PVT landfill (construction wastes only), which is authorized specifically to receive construction and demolition waste. The Project will have a Hazardous Materials and Wastes Management Plan which will detail proper waste storage and disposal procedures.

Section 2.4.8 of the EIS describes the process of Project decommissioning, the goal of which would be to remove the power generation equipment and return the site to a condition as close to its pre-construction state as possible within one year as contractually required. All decommissioning- and restoration-related waste would be handled

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

and disposed of or recycled, as appropriate, in accordance with county, State, and Federal laws and permit requirements.

Comment IND-33.3*: Wind turbines have negative health impact - physically & emotionally on those living in close proximity to WM [windmills].*

Response IND-33.3: Public health and safety are discussed in Section 4.18 of the EIS. Seventeen separate independent scientific reviews have been conducted both nationally and internationally to examine the relationship between wind turbines and possible human health effects associated with audible (the "whooshing" sound created by the rotating blades) and inaudible noise, vibration, shadow flicker, and electromagnetic fields (EMF). To date, no scientific peer-reviewed study has demonstrated a direct link between people living in proximity to modern wind turbines and resulting physiological health effects. The following are a sample of conclusions from the scientific studies that have been conducted:

- "After careful consideration and deliberation of the body of evidence, [the National Health and Medical Research Council] concludes that there is currently no consistent evidence that wind farms cause adverse health effects in humans." (NHMRC 2015)
- "Cross-sectional studies, despite their inherent limitations in assessing causal links, however, have consistently shown that some people living near wind turbines are more likely to report annoyance than those living farther away. These same studies have also shown that a person's likelihood of reporting annoyance is strongly related to their attitudes toward wind turbines, the visual aspect of the turbines, and whether they obtain economic benefit from the turbines. Our review suggests that these other risk factors play a more significant role than noise from wind turbines in people reporting annoyance." (McCunney et al. 2014)
- "while some people living near wind turbines report symptoms such as dizziness, headaches, and sleep disturbance, the scientific evidence available to date does not demonstrate a direct causal link between wind turbine noise and adverse health effects. The sound level from wind turbines at common residential setbacks is not sufficient to cause hearing impairment or other direct health effects, although some people may find it annoying." (UK Health Protection Agency 2010)
- "There is no evidence that the audible or sub-audible sounds emitted by wind turbines have any direct adverse physiological effects."(Colby 2009)
- "None of the... evidence reviewed suggests an association between noise from wind turbines and pain and stiffness, diabetes, high blood pressure, tinnitus, hearing impairment, cardiovascular disease, and headache/migraine." (MassDEP and MDPH 2012)
- "Although opposition to wind farms on aesthetic grounds is a legitimate point of view, opposition to wind farms on the basis of potential adverse health consequences is not justified by the evidence." (Chatham-Kent Public Health Unit 2011)
- "The electromagnetic fields produced by the generation and export of electricity from a wind farm do not pose a threat to public health..."(NHMRC 2010)

Additional summary information on the available wind turbine health studies has been added to the Second Draft EIS.

Sources:

Chatham-Kent Public Health Unit. 2008. The Health Impact of Wind Turbines: A Review of the Current White, Grey, and Published Literature. Prepared for Chatham-Kent Municipal Council, Chatham Ontario. June 2008.

Colby, David W., M.D.; Robert Dobie, M.D.; Geoff Leventhall, Ph.D.; David M. Lipscomb, Ph.D.; Robert J. McCunney, M.D.; Michael T. Seilo, Ph.D.; and Bo Søndergaard, M.Sc. 2009. Wind Turbine Sound and

Health Effects: An Expert Panel Review. Prepared for: American Wind Energy Association and Canadian Wind Energy Association. December 2009.

MassDEP and MDPH (Massachusetts Department of Public Health). 2012. Wind Turbine Health Impact Study: Report of Independent Expert Panel. January 2012. Available online at: http://www.mass.gov/eea/docs/dep/energy/wind/turbine-impact-study.pdf.

McCunney, R.J., K.A. Mundt, D. Colby, R. Dobie, K. Kaliski, and M. Blais. 2014. Wind Turbines and Health: A Critical Review of the Scientific Literature. Journal of Environmental and Occupational Medicine 56(11):e108-e130. Available online at: http://canwea.ca/comprehensive-scientific-literature-review-on-wind-turbines-and-human-health-now-published/

NHMRC (Australian Government National Health and Medical Research Council). 2015. NHMRC Statement: Evidence on Wind Farms and Human Health. February 2015.

NHMRC (Australian Government National Health and Medical Research Council). 2010. Wind Turbines and Health – A Rapid Review of Evidence. July 2010. http://www.nhmrc.gov.au/_files_nhmrc/publications/attachments/new0048_evidence_review_wind_turbines_and_health.pdf

UK Health Protection Agency. 2010. Health Effects of Exposure to Ultrasound and Infrasound. Report for the Ad Hoc Expert Group on Noise and Health by the Health Protection Agency. February 2010. http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1265028759369

Comment IND-33.4*: People come to HI for beauty. WM [windmills] detracts & take away from this beauty.*

Response IND-33.4: Section 4.12 of the EIS provides assessment of the anticipated visual impacts of the proposed Project, including a comparison of existing conditions to the computer simulated view of the turbines from five key observation locations in the community. As noted in the EIS, the Project will be most visible form the locations within one mile from the wind farm site. Although the visibility of the Project is unavoidable, the proposed Project would be compatible with nearby existing residential, commercial, public, and agricultural land uses. It is important to note that the existing Kahuku Wind Farm that is directly adjacent to the proposed Project has co-existed in the Kahuku community since 2011.

Comment IND-33.5*: How does WM [windmill] company deal with damage to HI birds & other environmental surroundings.*

Response IND-33.5: The EIS discloses the potential for the Project to impact birds and bats, transiting through the wind farm site (see Section 4.10 and 4.11 of the EIS). Because of the potential for these impacts Na Pua Makani Power Partners, LLC has worked in conjunction with the U.S. Fish and Wildlife Service and Hawaii Division of Forestry and Wildlife to develop a Habitat Conservation Plan. The Habitat Conservation Plan incorporates measures to avoid and minimize impacts to these species, as well as mitigation for unavoidable impacts. These include measures such as the use of shielded on-site lighting, selection of un-guyed met towers, and transmission line marking to minimize attraction and collision by birds, avoiding vegetation removal during the bat pupping season, and implementing low wind speed curtailment to reduce operational the risk of collision for bats. The Habitat Conservation Plan also includes mitigation for unavoidable impacts.

Comment IND-33.6*: Hard/actual costs of each turbine - impact on reducing current utility costs. When & how much reduction do consumers actually receive. When?*

Response IND-33.6: The proposed Project would contribute to the goals outlined in Hawaii's Renewable Portfolio Standard and the Hawaii Clean energy initiative by increasing the percentage of the state's energy that is derived from clean, renewable sources. Hawaii has signed into law a requirement for 100 percent of electricity from renewable sources over the next 25 years and as the percentage of renewables increases, the average cost of

electricity will decrease. Right now, more than 70 percent of the electricity generated in Hawaii is from burning oil and less than 10 percent of electricity is from renewable sources. The cost of electricity for the consumers / residents of Hawaii is the blended average cost of all sources (e.g. oil, wind, solar, etc.) and current rates reflect that high cost from burning oil. Over time, as the proportion of energy coming from renewable sources increases, the average cost of electricity is expected to decrease.

Comment IND-33.7*: Negative health impact on children/community.*

Response IND-33.7: Please see response to Comment IND-33.3 regarding potential health impacts.

Comment IND-33.8*: Disrespect for culture, environment, & beauty of Hawaii, and its history.*

Response IND-33.8: Please see responses to Comments IND-33.1, IND-33.4, and IND-33.5 which address these same topics.

Comment IND-33.9*: Who benefits?*
a. manufacturers - *a. Production made with ? fuel*
b. Hard costs per wind mill
b. Contractors - *a. Cost of installation - labor, land, ad/promo-lease, etc.*
b. Maintenance
c. Subcontractors
d. Other hidden costs
e. Costs of removal? New installation pro-rated over 20 years?

Response IND-33.9: Costs associated with the proposed Project area discussed in Section 4.12 of the EIS. The Project would have a total expected installed cost of approximately $97 million, including equipment costs (turbines, blades, towers), balance of materials (concrete, rebar, transformers, electrical connection equipment), construction labor, and other development costs (engineering, financing, and legal services, easement costs) based on filings made with the Public Utilities Commission (PUC). Equipment costs are the largest estimated cost component accounting for about 70 percent of the estimated total.

Construction of the proposed Project would also generate GET tax revenues, with the majority of the project components, materials, and construction-related services expected to be subject at the state-level to either GET tax of 4.172 percent. Local purchases by construction workers and others employed directly and indirectly by the Project would also generate GET tax revenue.

Operational costs are in addition to this amount and would be dependent on the actual staffing needs, post-construction environmental compliance associated with the project Habitat Conservation Plan (which include ongoing post-construction monitoring and mitigation for impacts to threatened and endangered species). Local operations and maintenance expenditures would generate state and local GET tax revenues. Costs for implementation of the HCP (mitigation and monitoring) are anticipated to be approximately $4.6 million dollars over the life of the Project (see Appendix F of the Project Habitat Conservation Plan for additional detail).

Finally, as described in Sections 4.12, Na Pua Makani Power Partners, LLC, has committed to establishing a Community Benefit fund and is in discussion with Kahuku community members regarding the details of its administration. It is anticipated that Project funds ($10,000 per wind turbine per year) would be administered by a board of local community members who would make decisions as to the use of the proceeds and which activities, programs, groups, and events would be sponsored.

Comment IND-33.10*: When and how do consumers' benefit in the long run when initial & continuing costs are more than current rates.*

Response IND-33.10: The purpose of the proposed Project is to provide clean, renewable wind energy for the island of Oahu, and to assist HECO in meeting Hawaii's Renewable Portfolio Standard (RPS) requirements and the State's goal to reduce electricity costs. The power generated by the Project would be sold to HECO pursuant to the RPS under a long-term, fixed-price contract with fixed annual escalation providing long-term price stability for consumers. As noted above, as the proportion of energy coming from renewable sources increases in Hawaii and on Oahu, the average cost of electricity is expected to decrease.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

NĀ PUA MAKANI
Clean Energy Powering Hawai'i's Future

Na Pua Makani Wind Project
Draft Environmental Impact Statement
Public Comment Form

For more information visit:
http://oeqc.doh.hawaii.gov/Shared%20Documents/Environmental_Notice/Archives/2010s/2015-06-08.pdf

Comments can be submitted by email to **NaPuaMakanihcp@fws.gov**, or by U.S. Mail addressed to:

Pacific Island Fish and Wildlife Office
U.S. Fish and Wildlife Service
ATTN: Kristi Young, Field Supervisor
300 Ala Moana Boulevard, Room3-122
Honolulu, Hawaii 96850
*All comments should be submitted/postmarked by **August 11, 2015.**

IND-34

Name: Jon Barlow

Address: 74-5576 Pawai Pl. Ste J #715

Email: jbarlow001@gmail.com

Please check the box next to the topic area(s) you're commenting about. Write your comments on reverse page, or attach to this form.

- ☐ Air quality and Climate Change
- ☐ Cultural, Archaeological and Historic Resources
- ☐ Environmental Justice
- ☐ Geology and Soils
- ☐ Hazardous and Regulated Materials and Waste
- ☐ Hydrology and Water Resources
- ☒ ~~Land Use~~
- ☐ Military
- ☐ Natural Hazards
- ☐ Noise
- ☐ Public Health and Safety
- ☐ Public Infrastructure and Services
- ☐ Recreation and Tourism
- ☒ Socioeconomics Resources
- ☐ Threatened and Endangered Species
- ☐ Transportation
- ☐ Vegetation
- ☐ Visual Resources
- ☐ Wildlife
- ☒ Other: New Technologies or advances in existing

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Comments:

~~Why is it that the wind generators~~ have to be so high.

1 Given fact that HEI is attempting to sell out to NextERA and Gov Ige just signed Bill demanding 100% Clean Energy by 2045, is there any moratorium and/or contingency to regulate electric rates to ceiling when we already pay highest rates in the Nation — who or what's going to make sure NextERA doesn't raise rate to squeeze what they can out of the people.

WE WILL BE ABLE TO MAKE IT TO 2045

2 There is OTEC Technology that prove how viable it is to generate power from the Ocean. with ~~what~~ Closed-Cycle system. using NH_3 (Ammonia) working medium a HAZMAT, but manageable and benign to the Environment.

Why can't you consider activating the Open-Cycle OTEC which not only outputs electricity but can produce potable water and Hawaiian Salt as by products. thereby increasing profitability of the system benefit for sustaining the Future of Hawaii.

Thank you for your comments.

TETRA TECH

April 1, 2016

Mr. John Barlow
74-5576 Pawai Place
Kailua-Kona HI 96740

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Barlow:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-34.1*: Given fact that HEI is attempting to sell out to NextEra, and Gov Ige just signed Bill demanding 100% clean energy by 2045, is there any moratorium and/or contingency to regulate electric rates to ceiling when we already pay highest rates in the Nation - who and what's going to make sure NextEra doesn't raise rate to squeeze what they can out of the people.*

Response IND-34.1: The NextEra/HEI acquisition is outside of the scope of this EIS. The proposed Project will not have bearing on rate changes that occur as a result of the acquisition. The Public Utilities Commission will make the decision on the merger and consider rate impacts to the ratepayers among other things.

Comment IND-34.2*: There is OTEC Technology that prove how viable it is to generate power from the ocean with closed-cycle system. Using NH3 (Ammonia) working medium a HAZMAT, but manageable and benign to the environment.*

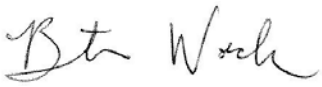
Why can't you consider activating the open-cycle OTEC which not only outputs electricity but can produce potable water and Hawaiian salt by products, thereby increasing profitability of the system benefit for sustaining the future of Hawaii.

Response IND-34.2: Section 2.3 of the EIS describes alternatives that were considered but not carried forward for analysis. One of these was the use different types of renewable energy generation. Although wind power is not the only type of renewable energy which could contribute to meeting the State's Renewable Portfolio Standard (RPS) goals, Na Pua Makani Power Partners, LLC, is a wind energy development company. The purpose of the Project is to contribute to the amount of renewable wind energy on Oahu to help achieve the State's goals and State RPS law as well as HECO requirements under the RPS. There are a number of other renewable energy sources such as OTEC which are complementary to wind energy, and the proposed Project would not preclude other developers from pursuing these energy sources.

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

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Pacific Island Fish and Wildlife Office
U.S. Fish and Wildlife Service
ATTN: Kristi Young, Field Supervisor
300 Ala Moana Boulevard, Room3-122
Honolulu, Hawaii 96850
*All comments should be submitted/postmarked by **August 11, 2015.**

IND-35

Name: MITCH DMOHOWSKI

Address: 1288 ALA MOANA BLVD, UNIT 15G
HONOLULU, HI 96814

Email: MITCH4@ALUM.MIT.EDU

Please check the box next to the topic area(s) you're commenting about. Write your comments on reverse page, or attach to this form.

- ☐ Air quality and Climate Change
- ☐ Cultural, Archaeological and Historic Resources
- ☐ Environmental Justice
- ☐ Geology and Soils
- ☐ Hazardous and Regulated Materials and Waste
- ☐ Hydrology and Water Resources
- ☐ Land Use
- ☐ Military
- ☐ Natural Hazards
- ☐ Noise
- ☐ Public Health and Safety
- ☐ Public Infrastructure and Services
- ☐ Recreation and Tourism
- ☐ Socioeconomics Resources
- ☐ Threatened and Endangered Species
- ☐ Transportation
- ☐ Vegetation
- ☐ Visual Resources
- ☐ Wildlife
- ☐ Other: _____

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1 **Comments:** I AM IN SUPPORT OF THIS WIND PROJECT AND CLEAN ENERGY.

WIND USES A LOCAL RESOURCE AND AVOIDS FOSSIL FUEL IMPORTS.

2 WIND IS SAFE AND CLEAN AND CREATES LOCAL JOBS AND ARE GOOD NEIGHBORS.

3 THIS PROJECT WILL GENERATE ELECTRICITY CHEAPER THAN OIL AND WILL HELP STABALIZE ELECTRIC BILLS.

4 PERSONALLY, I THINK WIND TURBINES ARE BEAUTIFUL.

Thank you for your comments.

TETRA TECH

April 1, 2016

Mr. Mitch Dmohowski
1288 Ala Moana Boulevard, Unit 15G
Honolulu, HI 96814

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Dmohowski:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-35.1*: I am in support of this wind project and clean energy. Wind uses a local resource and avoids fossil fuel imports.*

Response IND-35.1: As mentioned in your comment and described in Section 1.3 of the EIS, the proposed Project would provide a clean source of renewable energy to Oahu and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals. As noted in your comment, generation and integration of wind energy into the electric grid through projects such as Na Pua Makani decreases fossil fuel import and consumption, and increases energy independence.

Comment IND-35.2*: Wind is safe and clean and creates local jobs and are good neighbors.*

Response IND-35.2: Public health and safety are described in Section 4.18 of the EIS. Industry standard practices would be implemented to ensure that safety is maintained during construction and operation. As mentioned in your comment and described in Section 4.12 of the EIS, the proposed Project would provide short- and long-term benefits to the local economy through worker employment, construction spending and taxes.

Comment IND-35.3*: This project will generate electricity cheaper than oil and will help stabilize electric bills.*

Response IND-35.3: The cost of electricity from renewable energy is currently about one-half the cost of electricity from burning oil. Therefore, as more renewable energy is integrated in the grid, electricity rates are expected to decrease.

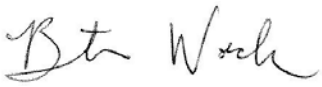
Comment IND-35.4*: Personally, I think wind turbines are beautiful.*

Response IND-35.4: Visual simulations of the propose Project are provided in Section 4.16 of the EIS.

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

IND-36

Ms. Suzanne Case
Chairwoman,
Board of Land and Natural Resources
State of Hawaii
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

Dear Chair Case and members of the BLNR,

1 I would like to register my support for the Na Pua Makani wind project planned for the Kahuku area.

The project will provide "clean energy" to the electrical grid, help lower our utility bills, and be good for the environment.

Mahalo,

Detreck Abraham
P.O. Box 724
Haiku, Hawaii, 96717

TETRA TECH

April 1, 2016

Mr. Detreck Abraham
P.O. Box 724
Hau`ula HI 96717

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Abraham:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-36.1*: I would like to register my support for the Na Pua Makani wind project planned for the Kahuku area. The project will provide "clean energy" to the electrical grid, help lower our utility bills, and be good for the environment.*

Response IND-36.1: As mentioned in your comment and described in Section 1.3 of the EIS, the proposed Project would provide a clean source of renewable energy to Oahu and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals. The cost of electricity from renewable energy is currently about one-half the cost of electricity from burning oil. Therefore, as more renewable energy is integrated in the grid, electricity rates are expected to decrease.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

IND-37

Honorable Suzanne Case
Chairwoman,
State Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

Dear Chair and BLNR members,

1 I am in support of the planned Na Pua Makani wind farm because we need to get off importing expensive foreign oil and be more self sufficient in generating electrical energy.

We live on an island, and we cannot keep depending on shipping in our food, our energy and our basic needs. Besides, wind energy will be better for our
2 environment.

Please give the Na Pua Makani wind project your favorable consideration.

Aloha,

Lorraine Aho
45-077E WAIKALUA RD.
Kaneohe, HI, 96744

April 1, 2016

Ms. Lorreine Aho
45-077 E Waikalua Road
Kaneohe HI 96744

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Aho:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-37.1*: I am in support of the planned Na Pua Makani wind farm because we need to get off importing expensive foreign oil and be more self sufficient in generating electrical energy. We live on an island, and we cannot keep depending on shipping in our food, our energy and our basic needs.*

Response IND-37.1: As described in Sections 1.3 and 4.12 of the EIS, the proposed Project would provide a clean source of renewable energy to Oahu and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals. In doing so, the Project would contribute to energy self-sufficiency by increasing the ratio of indigenous to imported energy use. As a source of renewable energy, the Project would increase energy security for the State and reduce reliance on fossil-fuel based energy production.

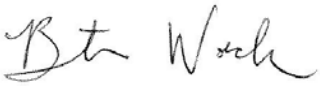
Comment IND-37.2*: Besides, wind energy will be better for our environment.*

Response IND-37.2: Environmental benefits of the proposed Project include reduced greenhouse gas emissions, particulate-related health effects, and other forms of pollution associated with coal or diesel fuel electric generation. These are described in detail in EIS Sections 4.5 – Air Quality and Climate Change and 4.12 – Public Health and Safety.

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

IND-38

Ms. Suzanne Case
Chairwoman,
Board of Land and Natural Resources
State of Hawaii
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

Aloha Chair Case and Members of the Board,

1 I write in strong support of the proposed Na Pua Makani wind project planned for Kahuku. The community needs the benefit package the developer has agreed to provide. The state and the City and County do not provide the kinds of support to our remote rural community that Honolulu and other urban communities receive. The community benefit fund will go a long way toward filling the current funding gaps that affect our students, seniors, and community members of all ages.

2 The only complaint I've heard relates to the aesthetics of the turbines. I understand why some people might feel this way. However, we must keep in mind that this project will not be here in perpetuity, and during the time it is in operation, it will do a great deal of good.

As far as I'm concerned, the changes to the views in Kahuku are small compared to the many benefits this project will deliver. Please consider the significant benefits and minimal impacts in your decision.

Sincerely,

Bob Comeau
P.O. Box 77
KAAAWA, HI., 96730

TETRA TECH

April 1, 2016

Mr. Bob Comeau
P.O. Box 77
Kaaawa HI 96730

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Comeau:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-38.1*: I write in strong support of the proposed Na Pua Makani wind project planned for Kahuku. The community needs the benefit package the developer has agreed to provide. The state and the City and County do not provide the kinds of support to our remote rural community that Honolulu and other urban communities receive. The community benefit fund will go a long way toward filling the current funding gaps that affect our students, seniors, and community members of all ages.*

Response IND-38.1: As described in Sections 4.12 of the EIS, Na Pua Makani Power Partners, LLC, has committed to establishing a Community Benefit fund and is in discussion with Kahuku community members regarding the details of its administration. It is anticipated that Project funds ($10,000 per wind turbine per year) would be administered by a board of local community members who would make decisions as to the use of the proceeds and which activities, programs, groups, and events would be sponsored.

Comment IND-38.2*: The only complaint I've heard relates to the aesthetics of the turbines. I understand why some people might feel this way. However, we must keep in mind that this project will not be here perpetuity, and during the time it is in operation, it will do a great deal of good. As far as I'm concerned, the changes to the views in Kahuku are small compared to the many benefits this project will deliver. Please consider the significant benefits and minimal impacts in your decision.*

Response IND-38.2: Visual resources, including visual simulations of the proposed Project, are discussed in Section 4.16 of the EIS. The analysis provides a rating of visual impacts that takes into account the existing aesthetic character of the area. Depending on the viewpoint, visual impacts of the proposed Project would be minor to moderate.

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

IND-39

August 7, 2015

Ms. Suzanne Case, Chairperson
Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

Dear Ms. Case:

1 Please register my support for the Na Pua Makani wind project. I think the developer has done a good job explaining all the facts and answering questions in the community about noise, property values, health concerns and other issues that have been brought up. These are addressed in their environmental impact statement and I am satisfied with their project.

Sincerely,

Lexie Latu

Lexie Latu
56-270 Leleuli St.
Kahuku, HI ~~96706~~ 96731

TETRA TECH

April 1, 2016

Ms. Lexie Latu
56-270 Leleuli Street
Kahuku HI 96731

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Latu:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter dated August 7, 2015 commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-39.1*: Please register my support for the Na Pua Makani wind project. I think the developer has done a good job explaining all the facts and answering questions in the community about noise, property values, health concerns and other issues that have been brought up. These are addressed in the environmental impact statement and I am satisfied with their project.*

Response IND-39.1: Na Pua Makani Power Partners, LLC continues its involvement in the community. Chapter 7 of the Second Draft EIS will include an updated summary of Project outreach efforts.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

August 7, 2015

IND-40

Ms. Suzanne Case, Chairperson
Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

Dear Chairwoman,

1 I congratulate the developer for his open and honest approach to providing information and getting facts out to the community.

2 The bottom line here is that we need to stop importing foreign oil and start producing more of our energy from clean sources like the sun, wind and ocean.

Being an isolated island state 2,500 miles away from the mainland, we have to move towards more self sufficiency. This wind project is a step in the right direction.

Mahalo,

Peni Latu

56-270 Leleuli St.
Kahuku, HI 96731

April 1, 2016

Ms. Peni Latu
56-270 Leleuli Street
Kahuku HI 96731

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Latu:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter dated August 7, 2015 commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-40.1*: I congratulate the developer for his open and honest approach to providing information and getting facts out to the community.*

Response IND-40.1: Na Pua Makani Power Partners, LLC, continues its involvement in the community. Chapter 7 of the Second Draft EIS will include an updated summary of Project outreach efforts.

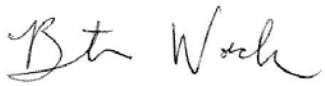
Comment IND-40.2*: The bottom line here is that we need to stop importing foreign oil and start producing more of our energy from clean sources like the sun, wind, and ocean. Being in an isolated island state 2,500 miles away from the mainland, we have to move towards more self sufficiency. This wind project is a step in the right direction.*

Response IND-40.2: As described in Section 1.3 of the EIS, the proposed Project would provide a clean source of renewable energy and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals. These goals have increased from 70 to 100 percent clean energy since the publication of the Draft EIS. As a source of renewable energy, the Project would increase energy security for the State and reduce reliance on fossil-fuel based energy production.

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

August 7, 2015

IND-41

Ms. Suzanne Case, Chairperson
Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

Dear Chairwoman,

1 We live on an island and we have to share our limited resources. The west side already has the industrial parks, power plants and landfills. But this benefits everyone on Oahu.

I'm for clean wind energy, and since Kahuku is the best place for windmills, we should do our part for the aina to wean Hawaii off of foreign oil.

Mahalo for your time!

Roxane Latu

Roxane K Latu

56-270 Leleuli St.
Kahuku, HI 96731

TETRA TECH

April 1, 2016

Ms. Roxane Latu
56-270 Leleuli Street
Kahuku HI 96731

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Latu:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter dated August 7, 2015 commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-41.1*: We live on an island and we have to share our limited resources. The west side already has the industrial parks, power plants and landfills. But this benefits everyone on Oahu. I'm for clean wind energy, and since Kanuku is the best place for windmills, we should do our part for the aina to wean Hawaii off of foreign oil.*

Response IND-41.1: As mentioned in your comment and described in Section 1.3 of the EIS, the proposed Project would provide a clean source of renewable energy to Oahu. It would also assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals which have increased from 70 to 100 percent clean energy since the publication of the Draft EIS. As a source of renewable energy, the Project would increase energy security and energy independence for the State and reduce reliance on fossil-fuel based energy production.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

IND-42

Ms. Suzanne Case, Chairperson
Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

Dear Chairwoman,

1 I congratulate the developer for his open and honest approach to providing information and getting facts out to the community.

2 The bottom line here is that we need to stop importing foreign oil and start producing more of our energy from clean sources like the sun, wind and ocean.

Being an isolated island state 2,500 miles away from the mainland, we have to move towards more self sufficiency. This wind project is a step in the right direction.

Mahalo,

Gillian D.R, Yamagata CAA Athletic Director
Kahuku High & Intermediate School
P: (808)293-8950 ext 364 | f: (808)293-8960
gillian_yamagata@notes.k12.hi.us

TETRA TECH

April 1, 2016

Ms. Gillian Yamagata
Gillian_yamagata@notes.k12.hi.us

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Yamagata:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-42.1*: I congratulate the developer for his open and honest approach to providing information and getting facts out to the community.*

Response IND-42.1: Na Pua Makani Power Partners, LLC, continues its involvement in the community. Chapter 7 of the Second Draft EIS will include an updated summary of Project outreach efforts.

Comment IND-42.2*: The bottom line here is that we need to stop importing foreign oil and start producing more of our energy from clean sources like the sun, wind and ocean. Being an isolated island state 2,500 miles away from the mainland, we have to move towards more self sufficiency. This wind project is a step in the right direction.*

Response IND-42.2: As described in Section 1.3 of the EIS, the proposed Project would provide a clean source of renewable energy and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals. These goals have increased from 70 to 100 percent clean energy since the publication of the Draft EIS. As a source of renewable energy, the Project would increase energy security and energy independence for the State and reduce reliance on fossil-fuel based energy production.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

IND-43

John Primacio, Jr.
P.O. Box 278
Kahuku, Hawaii 96731
(808) 291-9939

July 17, 2015

Honorable Susan Case, Chairwoman
Board of Land and Natural Resources
State of Hawaii
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

Aloha Ms. Case,

My name is John "Jr." Primacio. I am a life-long resident of Kahuku and Koolauloa. Over the past fifty plus years I have been involved in many, many community activities and concerns benefitting Kahuku and Koolauloa communities. These involvements and commitments include: Plantation Union Representative; President of Kahuku Housing Corporation; Kahuku Community Association Board of Directors; Kahuku Hospital Board member; Kahuku Elderly Housing Board member; President of North Shore Strategy Planning Committee; Resort Training, Inc. Board member. I also served as the Kahuku Representative on Neighborhood Board #28 for many years. Currently I am an Advisory Board member for the First Wind Project.

1 I mention these activities only to offer a means of credibility to my recommendation of support for this very beneficial energy project, beneficial to everyone, not only the Kahuku Community.

2 Wind energy is not new to Kahuku. Back in the early 1980's we were the first community to support windmills as an alternative energy source. I recall the large dedication ceremony mauka, and the follow-up luncheon at, what is now, Turtle Bay Resort. Both events were attended by NASA (with their 300-feet, single blade tower) and community, State and Federal dignitaries, including Senator Daniel Inouye and Representative Patsy Mink. Unfortunately, spurred on by falling oil prices, and inferior wind turbine technology, the entire alternative energy effort was dropped.

3 When Na Pua Makani first proposed this project, most of the initial environmental concerns were not based on accurate information. These concerns included: Autism in children; harmful effects of Electro-Magnetic activity too close to homes and schools; cultural desecration, etc., with the foremost concern being the visual negative impact of the windmill tower/turbines.

I have studied, closely, Na Pua Makani's recent draft EIS and I support it. They have satisfactorily adjusted, studied, and addressed my concerns, effectively separating fact from unfounded allegations. I urge BLNR to support their draft EIS, also.

4 In closing, I need to inform the board of the community benefit commitment put forth by Na Pua Makani. Tentatively this offer includes a financial commitment to the community of $10,000 per turbine, per year. I am a member of a community advisory group that is currently working on designing and creating an organizational structure to address this most beneficial, community wise, PMK commitment.

5 Alternative, sustainable energy is our future. Your support and acceptance of Na Pua Makani's wind project will be appreciated.

Mahalo,

John "Jr." Primacio
P.O. Box 278
Kahuku, Hawaii 96731
(808) 291-9939

April 1, 2016

Mr. John Primacio
P.O. Box 278
Kahuku HI 96731

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Primacio:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter dated July 17, 2015 commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-43.1*: I mention these activities only to offer a means of credibility to my recommendation of support for this very beneficial energy project, beneficial to everyone, not only the Kahuku Community.*

Response IND-43.1: Environmental benefits of the proposed Project include reduced greenhouse gas emissions, particulate-related health effects, and other forms of pollution associated with coal or diesel fuel electric generation. These are described in detail in EIS Sections 4.5 – Air Quality and Climate Change and 4.12 – Public Health and Safety.

Comment IND-43.2*: Wind energy is not new to Kahuku. Back in the early 1980's we were the first community to support windmills as an alternative energy source. I recall the large dedication ceremony mauka, and the follow-up luncheon at, what is now, Turtle Bay Resort. Both events were attended by NASA (with their 300-foot, single blade tower) and community, State and Federal dignitaries, including Senator Daniel Inouye and Representative Patsy Mink. Unfortunately, spurred on by failing oil prices, and inferior wind turbine technology, the entire alternative energy effort was dropped.*

Response IND-43.2: Thank you for your comments regarding the history of alternative energy development in Kahuku.

Comment IND-43.3*: When Na Pua Makani first proposed this project, most of the initial environmental concerns were not based on accurate information. These concerns included: Autism in children; harmful effects of Electro-Magnetic activity too close to homes and schools; cultural desecration, etc., with the foremost concern being the visual negative impact of the windmill tower/turbines.*

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

I have studied, closely, Na Pua Makani's recent draft EIS and I support it. They have satisfactorily adjusted, studied, and addressed my concerns, effectively separating fact from unfounded allegations. I urge BLNR to support their draft EIS, also.

Response IND-43.3: Thank you for your comment regarding your review of the EIS. Impacts associated with public health and safety, archaeological and cultural resources, and visual resources are discussed in EIS Sections 4.18, 4.13, and 4.16, respectively.

Comment IND-43.4*: In closing, I need to inform the board of the community benefit commitment put forth by Na Pua Makani. Tentatively this offer includes a financial commitment to the community of $10,000 per turbine, per year. I am a member of a community advisory group that is currently working on designing and creating an organizational structure to address this most beneficial, community wise, PMK commitment.*

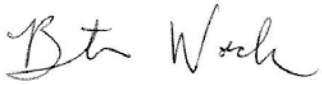
Response IND-43.4: As described in Sections 4.12 of the EIS, Na Pua Makani Power Partners, LLC, has committed to establishing a Community Benefit fund and is in discussion with Kahuku community members regarding the details of its administration. It is anticipated that Project funds ($10,000 per wind turbine per year) would be administered by a board of local community members who would make decisions as to the use of the proceeds and which activities, programs, groups, and events would be sponsored.

Comment IND-43.5*: Alternative, sustainable energy is our future. Your support and acceptance of Na Pua Makani's wind project will be appreciated.*

Response IND-43.5: As described in Section 1.3 of the Draft EIS, the proposed Project would provide a clean source of renewable energy and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals. These goals have increased from 70 to 100 percent clean energy since the publication of the Draft EIS.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

IND-44

Chairwoman Suzanne Case
Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

Dear Chair and BLNR members,

1 I have been following the Na Pua Makani wind project and like what I see. The developer has been very open with the community and has done his best to address any concerns that have come up.

2 Additionally, he has been active in the community, to be a good neighbor, and has even agreed to a community benefits package for the area.

3 Please give the Na Pua Makani wind project your favorable consideration.

Mahalo,

Ben Rabanal
54-303 Kawaewae way
Hauula, HI., 96717

April 1, 2016

Mr. Ben Rabanal
54-303 Kawaewae Way
Hauula HI 96717

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Rabanal:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-44.1*: I have been following the Na Pua Makani wind project and like what I see. The developer has been very open with the community and has done his best to address any concerns that have come up.*

Response IND-44.1: Na Pua Makani Power Partners, LLC continues its involvement in the community. Chapter 7 of the Second Draft EIS will include an updated summary of Project outreach efforts.

Comment IND-44.2*: Additionally, he has been active in the community, to be a good neighbor, and has even agreed to a community benefits package for the area.*

Response IND-44.2: As described in Sections 4.12 of the EIS, Na Pua Makani Power Partners, LLC, has committed to establishing a Community Benefit fund and is in discussion with Kahuku community members regarding the details of its administration. It is anticipated that Project funds ($10,000 per wind turbine per year) would be administered by a board of local community members who would make decisions as to the use of the proceeds and which activities, programs, groups, and events would be sponsored.

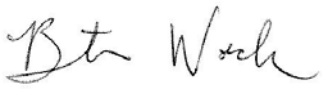
Comment IND-44.3*: Please give the Na Pua Makani wind project your favorable consideration.*

Response IND-44.3: Thank you for your comment.

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Tom Narvaez
PO Box 698
Kahuku, HI 96731

IND-45

August 10, 2015

Kristi Young, Field Supervisor
U.S. Fish and Wildlife Service
Pacific Island Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Honolulu, HI 96850

Russell Y. Tsuji
Department of Land and Natural Resources
Land Division
1151 Punchbowl Street, Room 220
Honolulu, HI 96813

Re: Na Pua Makani HCP and DEIS

To whom it concerns;

1 I am writing this letter to express my support for the Na Pua Makani project near Kahuku.

I am a long term resident farmer in the Kahuku area agricultural park, which is immediately adjacent to existing wind turbines and immediately adjacent to the proposed Na Pua Makani project. The turbines are and will be located very close to my place. Even though the wind towers will be so close to me, I am in favor of the Na Pua Makani project because we must take appropriate steps to end global warming today. I'm more concerned about global warming and the raising ocean depths in my front yard than I am about wind turbines in my back yard.

2 I personally believe that there might be better long term solutions, such a geothermal and the power of the oceans, but we can't wait for these technologies to be developed before taking action. Wind technology is available today and using more of it today will allow us to immediately reduce the amount of fossil fuel, global warming electricity produced.

For these reasons I support the Na Pua Makani project.

Mahalo,

Tom Narvaez

April 1, 2016

Mr. Tom Narvaez
P.O. Box 698
Kahuku HI 96731

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Narvaez:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter dated August 10, 2015 commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-45.1*: I am writing this letter to express my support for the Na Pua Makani project near Kahuku. I am a long term resident farmer in the Kahuku area agricultural park, which is immediately adjacent to existing wind turbines and immediately adjacent to the proposed Na Pua Makani project. The turbines are and will be located very close to my place. Even though the wind towers will be so close to me, I am in favor of the Na Pua Makani project because we must take appropriate steps to end global warming today. I'm more concerned about global warming and the raising ocean depths in my front yard than I am about wind turbines in my back yard.*

Response IND-45.1: As described in Section 1.3 of the EIS, the proposed Project would provide a clean source of renewable energy and would assist HECO in meeting its Renewable Portfolio Standard (RPS) and Hawaii's Clean Energy Initiative goals. Like other small islands, Hawaii is considered vulnerable to predicted global climate change impacts such as rising sea levels, changes in the frequency of extreme weather, coral-reef bleaching, and ocean acidification. Production of wind-generated energy by the proposed Project would replace a portion of the State's electricity that is currently generated by burning fossil fuels, thus reducing greenhouse gas emissions and other forms of pollution and helping to meet goals embodied in the State's Global Warming Solutions Act of 2007.

Comment IND-45.2*: I personally believe that there might be better long term solutions, such as geothermal and the power of the oceans, but we can't wait for these technologies to be developed before taking action. Wind technology is available today and using more of it today will allow us to immediately reduce the amount of fossil fuel, global warming electricity produces. For these reasons, I support the Na Pua Makani project.*

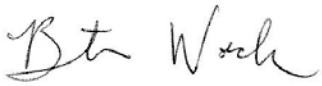
Response IND-45.2: Section 2.3 of the EIS describes alternatives that were considered but not carried forward for analysis. One of these was the use different types of renewable energy generation. Although wind power is not the only type of renewable energy which could contribute to meeting the State's RPS goals, Na Pua Makani Power Partners, LLC, is a wind energy development company. There are a number of other renewable energy sources

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

such as geothermal and ocean thermal energy conversion which are complementary to wind energy, and the proposed Project would not preclude other developers from pursuing these energy sources.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

IND-46

Honorable Suzanne Case
Chairwoman,
Board of Land and Natural Resources
State of Hawaii
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

Dear Chair and BLNR members,

1 The Na Pua Makani wind project that is planned for the hills above Kahuku will contribute to the State of Hawaii's energy goal of obtaining 100% of our electrical energy from renewable sources, such as solar, wind, ocean, bio-fuels and other "clean energy" fuels. This is a step forward to our clean energy future, and projects like this should be embraced and encouraged.

That is why I am in support of the Na Pua Makani project.

Aloha,

Cheryl Wago
54-122 Puuoroa St.
Hauula, HI, 96717

TETRA TECH

April 1, 2016

Ms. Cheryl Wago
54-122 Puuowaa Street
Hau`ula HI 96717

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Wago:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-46.1*: The Na Pua Makani wind project that is planned for the hills above Kahuku will contribute to the State of Hawaii's energy goal of obtaining 100% of our electrical energy from renewable sources, such as solar, wind, ocean, bio-fuels and other "clean energy" fuels. This is a step forward to our clean energy future, and projects like this should be embraced and encouraged. This is why I am in support of the Na Pua Makani project.*

Response IND-46.1: As described in Section 1.3 of the Draft EIS, the proposed Project would provide a clean source of renewable energy and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals. These goals have increased from 70 to 100 percent clean energy since the publication of the Draft EIS.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

IND-47

Ms. Suzanne Case
Chairwoman,
Board of Land and Natural Resources
State of Hawaii
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

Dear Ms. Case,

1 I am writing you in support of the Na Pua Makani wind project in Kahuku. Let's face it. There's no way a wind project is going to make everybody happy. Some people just don't like the way wind turbines look. To me, they represent things that I love, like clean air and water, environmental sensitivity and lower electric bills.

Mahalo for considering my views,

Wade Wago
54-122 Puuowaa St.
Hauula, HI, 96717

TETRA TECH

April 1, 2016

Mr. Wade Wago
54-122 Puuowaa Street
Hau`ula HI 96717

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Wago:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-47.1*: I am writing you in support of the Na Pua Makani wind project in Kahuku. Let's face it. There's no way a wind project is going to make everyone happy. Some people just don't like the way wind turbines look. To me, they represent things that I love, like clean air and water, environmental sensitivity and lower electric bills.*

Response IND-47.1: Na Pua Makani Power Partners acknowledges your support of the Project. The purpose of the EIS is to identify both the beneficial and adverse effects of the proposed Project. Effects to visual resources, including visual simulations from key viewpoints, air quality and climate change, hydrology and water resources, and socioeconomics were studied closely and described in chapter 4 of the EIS.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

NĀ PUA MAKANI
Clean Energy Powering Hawai'i's Future

RECEIVED
AUG 14 2015
U.S. FISH & WILDLIFE SVC
PACIFIC ISLANDS FWD
HONOLULU, HI 96850

Na Pua Makani Wind Project
Draft Environmental Impact Statement
Public Comment Form

For more information visit:
http://oeqc.doh.hawaii.gov/Shared%20Documents/Environmental_Notice/Archives/2010s/2015-06-08.pdf

Comments can be submitted by email to **NaPuaMakanihcp@fws.gov**, or by U.S. Mail addressed to:

Pacific Island Fish and Wildlife Office
U.S. Fish and Wildlife Service
ATTN: Kristi Young, Field Supervisor
300 Ala Moana Boulevard, Room3-122
Honolulu, Hawaii 96850
*All comments should be submitted/postmarked by **August 11, 2015.**

IND-48

Name: BOB UYEDA

Address: 56-388 HUEHU ST.
KAHUKU, HI., 96731

Email:

Please check the box next to the topic area(s) you're commenting about. Write your comments on reverse page, or attach to this form.

- ☐ Air quality and Climate Change
- ☐ Cultural, Archaeological and Historic Resources
- ☐ Environmental Justice
- ☐ Geology and Soils
- ☐ Hazardous and Regulated Materials and Waste
- ☐ Hydrology and Water Resources
- ☐ Land Use
- ☐ Military
- ☐ Natural Hazards
- ☐ Noise
- ☐ Public Health and Safety
- ☐ Public Infrastructure and Services
- ☐ Recreation and Tourism
- ☑ Socioeconomics Resources
- ☐ Threatened and Endangered Species
- ☐ Transportation
- ☐ Vegetation
- ☐ Visual Resources
- ☐ Wildlife
- ☐ Other: _____

NĀ PUA MAKANI
Clean Energy Powering Hawai'i's Future

1 **Comments:** I ATTENDED THE PUBLIC HEARING IN KAHUKU, AND I AM SATISFIED THAT THE DRAFT EIS HAS LOOKED AT ALL AREAS AFFECTING THIS PROPOSAL. I AM SUPPORTIVE OF THE SOCIO-ECONOMICS BENEFITS IT WILL PROVIDE FOR US, AND SO I AM IN SUPPORT OF THE WIND ENERGY PROPOSAL.

Thank you for your comments.

TETRA TECH

April 1, 2016

Bob Uyeda
56-388 Huehu Street
Kahuku HI 96731

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Uyeda:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter received August 14, 2015 commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-48.1*: I attended the public hearing in Kahuku, and I am satisfied that the Draft EIS has looked at all areas affecting this proposal. I am supporting of the socio-economics benefits it will provide for us, and so I am in support of the wind energy proposal.*

Response IND-48.1: As mentioned in your comment and described in Section 4.12 - Socioeconomics of the EIS, the proposed Project would provide short- and long-term benefits to the local economy through worker employment, construction spending and taxes. Na Pua Makani Power Partners, LLC, has committed to establishing a Community Benefit fund and is in discussion with Kahuku community members regarding the details of its administration. It is anticipated that Project funds ($10,000 per wind turbine per year) would be governed and administered by a board of local community members who would make decisions as to the use of the proceeds and which activities, programs, groups, and events would be sponsored.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

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Pacific Island Fish and Wildlife Office
U.S. Fish and Wildlife Service
ATTN: Kristi Young, Field Supervisor
300 Ala Moana Boulevard, Room3-122
Honolulu, Hawaii 96850
*All comments should be submitted/postmarked by **August 11, 2015.**

IND-49

Name: KEAWE RILLAMAS

Address: P.O. BOX 303
KAHUKU, HI, 96731

Email:

Please check the box next to the topic area(s) you're commenting about. Write your comments on reverse page, or attach to this form.

- ☐ Air quality and Climate Change
- ☐ Cultural, Archaeological and Historic Resources
- ☐ Environmental Justice
- ☐ Geology and Soils
- ☐ Hazardous and Regulated Materials and Waste
- ☐ Hydrology and Water Resources
- ☐ Land Use
- ☐ Military
- ☐ Natural Hazards
- ☐ Noise
- ☐ Public Health and Safety
- ☐ Public Infrastructure and Services
- ☐ Recreation and Tourism
- ☐ Socioeconomics Resources
- ☐ Threatened and Endangered Species
- ☐ Transportation
- ☐ Vegetation
- ☐ Visual Resources
- ☐ Wildlife
- ☑ Other: _____

NĀ PUA MAKANI
Clean Energy Powering Hawai'i's Future

1 **Comments:** Aloha, I am writing to let you know that I am in favor of the Na Pua Makani wind proposal. I feel they have looked at all that is needed to make sure this project will not have a negative impact in the area. We need alternative energy for our future and this project will surely help us reach that goal!

Thank you for your comments.

TETRA TECH

April 1, 2016

Keawe Rillamas
P.O. Box 303
Kahuku HI 96731

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Rillamas:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-49.1*: Aloha, I am writing to let you know that I am in favor of the Na Pua Makani wind proposal. I feel they have looked at all that is needed to make sure this project will not have a negative impact in the area. We need alternative energy for our future and this project will surely help us reach that goal!*

Response IND-49.1: As described in Section 1.3 of the EIS, the proposed Project would provide a clean source of renewable energy and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals. These goals have increased from 70 to 100 percent clean energy since the publication of the Draft EIS. As a source of renewable energy, the Project would increase energy security and energy independence for the State and reduce reliance on fossil-fuel based energy production.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

NĀ PUA MAKANI
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Pacific Island Fish and Wildlife Office
U.S. Fish and Wildlife Service
ATTN: Kristi Young, Field Supervisor
300 Ala Moana Boulevard, Room3-122
Honolulu, Hawaii 96850
*All comments should be submitted/postmarked by **August 11, 2015**.

IND-50

Name: PHYLLIS MOSES

Address: 47-508 KINANA WAY
Kaneohe, HI., 96744

Email:

Please check the box next to the topic area(s) you're commenting about. Write your comments on reverse page, or attach to this form.

- ☐ Air quality and Climate Change
- ☐ Cultural, Archaeological and Historic Resources
- ☐ Environmental Justice
- ☐ Geology and Soils
- ☐ Hazardous and Regulated Materials and Waste
- ☐ Hydrology and Water Resources
- ☐ Land Use
- ☐ Military
- ☐ Natural Hazards
- ☐ Noise
- ☐ Public Health and Safety
- ☐ Public Infrastructure and Services
- ☐ Recreation and Tourism
- ☐ Socioeconomics Resources
- ☐ Threatened and Endangered Species
- ☐ Transportation
- ☐ Vegetation
- ☐ Visual Resources
- ☐ Wildlife
- ☐ Other: _____

NĀ PUA MAKANI
Clean Energy Powering Hawai'i's Future

1

Comments: ALOHA, VERY BRIEFLY, I AM IN SUPPORT OF THIS WIND ENERGY PROPOSAL. FUTURE SUSTAINABLE ENERGY IS VERY IMPORTANT, AND THIS WILL HELP OUR COMING ENERGY NEEDS. MAHALO!

Thank you for your comments.

TETRA TECH

April 1, 2016

Phyllis Moses
47-508 Kinana Way
Kaneohe HI 96744

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Moses:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-50.1*: Aloha, very briefly I am in support of this wind energy proposal. Future sustainable energy is very important and this will help our coming energy needs. Mahalo!*

Response IND-50.1: As described in Section 1.3 of the EIS, the proposed Project would provide a clean source of renewable energy and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals. These goals have increased from 70 to 100 percent clean energy since the publication of the Draft EIS. As a source of renewable energy, the Project would increase energy security and energy independence for the State and reduce reliance on fossil-fuel based energy production.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

NĀ PUA MAKANI
Clean Energy Powering Hawai'i's Future

Na Pua Makani Wind Project
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Comments can be submitted by email to **NaPuaMakanihcp@fws.gov**, or by U.S. Mail addressed to:

Pacific Island Fish and Wildlife Office
U.S. Fish and Wildlife Service
ATTN: Kristi Young, Field Supervisor
300 Ala Moana Boulevard, Room3-122
Honolulu, Hawaii 96850
*All comments should be submitted/postmarked by **August 11, 2015.**

IND-51

Name: James Moses

Address: 47-508 Kinana Way
Kaneohe, HI., 96744

Email:

Please check the box next to the topic area(s) you're commenting about. Write your comments on reverse page, or attach to this form.

- ☐ Air quality and Climate Change
- ☐ Cultural, Archaeological and Historic Resources
- ☐ Environmental Justice
- ☐ Geology and Soils
- ☐ Hazardous and Regulated Materials and Waste
- ☐ Hydrology and Water Resources
- ☐ Land Use
- ☐ Military
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- ☐ Noise
- ☐ Public Health and Safety
- ☐ Public Infrastructure and Services
- ☐ Recreation and Tourism
- ☐ Socioeconomics Resources
- ☐ Threatened and Endangered Species
- ☐ Transportation
- ☐ Vegetation
- ☐ Visual Resources
- ☐ Wildlife
- ☐ Other: _____

NĀ PUA MAKANI
Clean Energy Powering Hawai'i's Future

1 **Comments:** MET WITH THE WIND Project proposal representative, AND after discussing the draft EIS, I'M WRITING TO extend MY SUPPORT FOR this Na Pua MAKANI WIND energy Proposal. They have, in my opinion, adequately addressed all ENVIORNMENTAL CONCERNS.

Thank you for your comments.

TETRA TECH

April 1, 2016

James Moses
47-508 Kinana Way
Kaneohe HI 96744

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Moses:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-51.1*: Met with the wind project proposal representative, and after discussing the draft EIS, I'm writing to extend my support for this Na Pua Makani wind energy proposal. They have, in my opinion, adequately addressed all environmental concerns.*

Response IND-51.1: Na Pua Makani Power Partners, LLC continues its involvement in the community. Chapter 7 of the Second Draft EIS will include an updated summary of Project outreach efforts. The purpose and need for the Project is described in Chapter 2 of the EIS. The EIS describes both the adverse effects and the benefits of the Project in Chapter 4.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

Woeck, Brita

From: aaron_nadig@fws.gov on behalf of NaPuaMakanihcp, FW1 <napuamakanihcp@fws.gov>
Sent: Thursday, July 23, 2015 11:07 AM
To: Woeck, Brita
Cc: Jodi Charrier; Leila Gibson
Subject: Fwd: Na Pua Makani HCP and DEIS

Categories: Green Category

IND-52

---------- Forwarded message ----------
From: **Kealohi Fotu** <kealohichicky@gmail.com>
Date: Thu, Jul 23, 2015 at 5:05 AM
Subject: Na Pua Makani HCP and DEIS
To: NaPuaMakanihcp@fws.gov

To whom it may concern,

1 I live in Hauula and I graduated from Kahuku High School. While I really, really hated it when the first windmills went up, I don't see why there is so much fuss about a few more. Especially when this project is putting them farther away where we will barely see them.

2 Hawai'i does need some alternative energy solutions (and as I said, there are already windmills there) so I support this project.

Malama Pono,

--
-Kealohilani Fotu-

April 1, 2016

Kealohilani Fotu
kealohichicky@gmail.com

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Fotu:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your email dated July 23, 2015 commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-52.1*: I live in Hauula and I graduated from Kahuku High School. While I really, really hated it when the first windmills went up, I don't see why there is so much fuss about a few more. Especially when this project is putting them farther away where we will barely see them.*

Response IND-52.1: A number of screening criteria were considered during the selection of the proposed Project location, described in Section 2.1 of the EIS. They include but are not limited to the availability of a sufficient wind resource, access to adequate and available transmission capacity, availability of contiguous land that is designated to allow wind energy development, and site-specific conditions such as topography which influence construction feasibility. The location of the proposed Project met these siting criteria including setback distances. Other locations were investigated but did not meet the criteria.

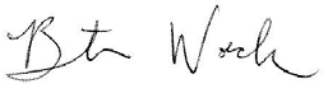
As described in Section 2.3 of the EIS, the proposed Project went through multiple changes including setback distances based on comments received during the public scoping process. This resulted in turbines being located farther from the community. Visual impacts of the proposed Project are described in Section 4.16 of the EIS and include visual simulations of the turbines.

Comment IND-52.2*: Hawai'i does need some alternative energy solutions (and as I said, there are already windmills there) so I support this project.*

Response IND-52.2: As described in Section 1.3 of the Draft EIS, the proposed Project would provide a clean source of renewable energy and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals. These goals have increased from 70 to 100 percent clean energy since publication of the Draft EIS.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Woeck, Brita

From: aaron_nadig@fws.gov on behalf of NaPuaMakanihcp, FW1 <napuamakanihcp@fws.gov>
Sent: Thursday, July 23, 2015 11:08 AM
To: Woeck, Brita
Cc: Jodi Charrier; Leila Gibson
Subject: Fwd: Na Pua Makani HCP and DEIS

Categories: Green Category

IND-53

---------- Forwarded message ----------
From: **Tukuafu Fotu** <tukufotu@gmail.com>
Date: Thu, Jul 23, 2015 at 5:11 AM
Subject: Na Pua Makani HCP and DEIS
To: NaPuaMakanihcp@fws.gov

Aloha,

1 I am a recent married and I am starting my life in Hau'ula. One of the biggest issues I'm facing is the cost of electricity. I feel it is very important to make the sacrifices necessary to reduce these cost, for that reason I support this project.

-Tukuafu Fotu

TETRA TECH

April 1, 2016

Tukuafu Fotu
tukufotu@gmail.com

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Fotu:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your email dated July 23, 2015 commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-53.1*: I am a recent married and I am starting my life in Hau'ula. One of the biggest issues I'm facing is the cost of electricity. I feel it is very important to make the sacrifices necessary to reduce these cost, for that reason I support this project.*

Response IND-53.1: As described in Section 1.3 of the EIS, the proposed Project would provide a clean source of renewable energy and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals. Subsequent to publication of the Draft EIS, Hawaii has signed into law a requirement for 100 percent of electricity from renewable sources over the next 25 years. Based on the most recent 2014 Renewable Portfolio Standard Status Report approximately 80 percent of Hawaii's energy is currently derived from fossil fuels and approximately 20 percent comes from renewable sources (Hawaiian Electric Company, Inc. et al. 2014). The cost of electricity for the consumers / residents of Hawaii is the blended average cost of all sources (e.g. oil, wind, solar, etc.) and current rates reflect that high cost from burning oil. Over time, as the proportion of energy coming from renewable sources increases, the average cost of electricity is expected to decrease.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

Woeck, Brita

From: aaron_nadig@fws.gov on behalf of NaPuaMakanihcp, FW1 <napuamakanihcp@fws.gov>
Sent: Thursday, July 23, 2015 11:09 AM
To: Woeck, Brita
Cc: Jodi Charrier; Leila Gibson
Subject: Fwd: Na Pua Makani HCP and DEIS

Categories: Green Category

IND-54

---------- Forwarded message ----------
From: **Debi Lee** <debi.wwlifereset@gmail.com>
Date: Thu, Jul 23, 2015 at 5:25 AM
Subject: Na Pua Makani HCP and DEIS
To: NaPuaMakanihcp@fws.gov

Aloha,

1 I have lived in Hauula for over a decade and my daughter attended and graduated from Kahuku High School. She had many friends who have been forced to leave their island home because the cost of living, including electricity, is so high.

2 I was shocked and appalled when the first windmills went up by the highway near Kahuku and even more shocked when they went up to be seen from Waimea Valley. I hate them all! However, I know that we have to do something to combat the costs of electricity.

The only reason I am okay with the new windmills is that the skyline is already ruined and most of the new windmills will not even be seen. I have been pleased with the efforts of the developer to move the windmills farther back from the community. This will make a big difference with how much will be seen from the community areas. I have also been pleased with the willingness the developer has had to contribute to the needs of the community.

3

1 We need to do something to lower costs of electricity. For these reasons, I support this project.

Mahalo for considering our input.

Debi

April 1, 2016

Debi Lee
debi.wwlifereset@gmail.com

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Lee:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your email dated July 23, 2015 commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-54.1*: I have lived in Hauula for over a decade and my daughter attended and graduated from Kahuku High School. She had many friends who have been forced to leave their island home because the cost of living, including electricity, is so high.*

We need to do something to lower costs of electricity. For these reasons I support this project.

Response IND-54.1: The proposed Project would contribute to the goals outlined in Hawaii's Renewable Portfolio Standards and the Hawaii Clean energy initiative by increasing the percentage of the state's energy that is derived from clean, renewable sources. Hawaii has signed into law a requirement for 100 percent of electricity from renewable sources over the next 25 years and as the percentage of renewables increases, the average cost of electricity will decrease.

Comment IND-54.2*: I was shocked and appalled when the first windmills went up by the highway near Kahuku and even more shocked when they went up to be seen from Waimea Valley. I hate them all! However, I know that we have to do something to combat the costs of electricity.*

The only reason I am okay with the new windmills is that the skyline is already ruined and most of the new windmills will not even be seen. I have been pleased with the efforts of the developer to move the windmills farther back from the community. This will make a big difference in how much will be seen from the community areas.

Response IND-54.2: A number of screening criteria were considered during the selection of the proposed Project location, described in Section 2.1 of the EIS. They include but are not limited to the availability of a sufficient wind resource, access to adequate and available transmission capacity, availability of contiguous land that is designated to allow wind energy development, and site-specific conditions such as topography which influence

construction feasibility. Alternatives that were considered but eliminated from detailed study, including greater setback distances and alternative project locations on Oahu, are described in Section 2.3 of the EIS. The location of the proposed Project met these siting criteria and as designed is compliant with setback requirements. Other locations were investigated but did not meet the criteria.

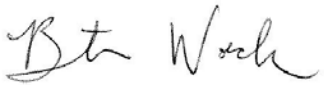
As mentioned in your comment and described in Section 2.3 of the EIS, the proposed Project went through multiple changes including setback distances based on comments received during the public scoping process. This resulted in turbines being located farther from the community. Visual impacts of the proposed Project are described in Section 4.16 of the EIS and include visual simulations of the turbines.

Comment IND-54.3*: I have also been pleased with the willingness the developer has had to contribute to the needs of the community.*

Response IND-54.3: Na Pua Makani Power Partners, LLC continues its involvement in the community. Chapter 7 of the Second Draft EIS will include an updated summary of Project outreach efforts. As described in Sections 4.12, Na Pua Makani Power Partners, LLC, has committed to establishing a Community Benefit fund and is in discussion with Kahuku community members regarding the details of its administration. It is anticipated that Project funds ($10,000 per wind turbine per year) would be administered by a board of local community members who would make decisions as to the use of the proceeds and which activities, programs, groups, and events would be sponsored. This could include educational programs and activities.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

IND-55

Chris Wilson
P.O. Box 311

Laie, HI 96762

RECEIVED
JUL 23 2015
U.S. FISH & WILDLIFE SVC
PACIFIC ISLANDS FWD
HONOLULU, HI 96850

Ms. Kristi Young, Field Supervisor

U.S. Fish and Wildlife Service

Pacific Island Fish and Wildlife Office

300 Ala Moana Boulevard, Room 3-122

Honolulu, HI 96850

Re: Na Pua Makani HCP and DEIS

Aloha Ms. Young,

1 I am writing to express my support for alternative energy and specifically to voice my thoughts about the proposed Na Pua Makani wind project in Kahuku.

2 I feel the windmills should be positioned as far away from the Kahuku school campuses and the community as possible. There are also some additional benefits I would like to see. I feel that the

3 windmills should provide a discount on electricity to those impacted by the view and the shadows of the blades, with those closest to the windmills getting the largest reduction on their electric bills.

4 I would also like to see if Na Pua Makani Wind could provide funds for Kahuku High School Seniors for academic excellence, for students going on the national competitions such as We the People, History Day, International Science Fair, National Art and Photography contests, etc. Na Pua Makani Wind could become a sponsor of Kahuku Red Raider Scholar program to recognize the top 3 students in 12 academic areas during the May Night cultural festival. Na Pua Makani Wind could also provide tours of their facility to our students, have students build a mock-up diorama display of working miniature windfarm that could actually transform wind into electrical energy (using 3d printers).

One idea you may want to consider is equating donations to the school with the number of times that a number of times the blades of your wind turbines spin. For example, if a wind turbine spins 100,000 times a year and you offer one penny for each spin to the school, that means $10,000 could be donated to the school. Perhaps you could offer a contest to a student to guess the number of times the wind turbines spin per year.

5 I think it is important that we create sustainable alternative energy programs and done correctly, as I've expressed, I support this project.

Mahalo,

Chris Wilson

35 year resident of Ko'olauloa

TETRA TECH

April 1, 2016

Chris Wilson
P.O. Box 311
Laie HI 96762

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Wilson:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter received July 23, 2015 commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-55.1*: I am writing to express my support for alternative energy and specifically to voice my thoughts about the proposed Na Pua Makanni wind project in Kahuku.*

Response IND-55.1: As described in Section 1.3 of the EIS, the proposed Project would provide a clean sources of renewable energy to Oahu. The proposed Project would contribute to the goals outlined in Hawaii's Renewable Portfolio Standards and the Hawaii Clean energy initiative by increasing the percentage of the state's energy that is derived from clean, renewable sources.

Comment IND-55.2*: I feel the windmills should be positioned as far away from the Kahuku school campuses and the community as possible.*

Response IND-55.2: A number of screening criteria were considered during the selection of the proposed Project location, described in Section 2.1 of the EIS. They include but are not limited to the availability of a sufficient wind resource, access to adequate and available transmission capacity, availability of contiguous land that is designated to allow wind energy development, and site-specific conditions such as topography which influence construction feasibility and compliance with City and County setback requirements. Alternatives that were considered but eliminated from detailed study, including greater setback distances and alternative project locations on Oahu, are described in Section 2.3 of the EIS. The location of the proposed Project met these siting criteria including setback distances. Other locations were investigated but did not meet the criteria.

As mentioned in your comment and described in Section 2.3 of the EIS, the proposed Project went through multiple changes including setback distances based on comments received during the public scoping process. This resulted in turbines being located farther from the community. Visual impacts of the proposed Project are described in Section 4.16 of the EIS and include visual simulations of the turbines.

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

Comment IND-55.3*: There are also some additional benefits I would like to see. I feel that the windmills should provide a discount on electricity to those impacted by the view and the shadows of the blades, with those closest to the windmills getting the largest reduction on their electric bills.*

Response IND-55.3: As described in Section 1.3 of the EIS, the cost of electricity from renewable energy is currently about one-half the cost of electricity from burning oil. Based on the most recent, 2014 Renewable Portfolio Standard Status Report approximately 80 percent of Hawaii's energy is currently derived from fossil fuels and approximately 20 percent comes from renewable sources (Hawaiian Electric Company, Inc. et al. 2014). The cost of electricity for the consumers / residents of Hawaii is the blended average cost of all sources (e.g. oil, wind, solar, etc.) and current rates reflect that high cost from burning oil. Over time, as the proportion of energy coming from renewable sources increases, the average cost of electricity is expected to decrease.

Comment IND-55.4*: I would also like to see if Na Pua Makani Wind could provide funds for Kahuku High School Seniors for academic excellence, for students going on the national competitions such as We the People, History Day, International Science Fair, National Art and Photography contests, etc. Na Pua Makani Wind could become a sponsor of Kahuku Red Raider Scholar program to recognize the top 3 students in 12 academic areas during the May Night cultural festival. Na Pua Makani Wind could also provide tours of their facility to our students, have students build a mock-up diorama display of working miniature windfarm that could actually transform wind into electrical energy (using 3d printers).*

One idea you may want to consider is equating donations to the school with the number of times that a number of times the blades of your wind turbines spin. For example, if a wind turbine spins 100,000 times a year and you offer one penny for each spin to the school, that means $10,000 could be donated to the school. Perhaps you could offer a contest to a student to guess the number of times the wind turbines spin per year.

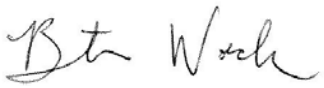
Response IND-55.4: As described in Sections 4.12, Na Pua Makani Power Partners, LLC, has committed to establishing a Community Benefit fund and is in discussion with Kahuku community members regarding the details of its administration. It is anticipated that Project funds ($10,000 per wind turbine per year) would be administered by a board of local community members who would make decisions as to the use of the proceeds and which activities, programs, groups, and events would be sponsored. This could include educational programs and activities.

Comment IND-55.5*: I think it is important that we create sustainable alternative energy programs and done correctly, as I've expressed, I support this project.*

Response IND-55.5: Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service acknowledge your support for the proposed Project. The purpose and need for the proposed Project are described in Chapter 2 of the EIS.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

NĀ PUA MAKANI
Clean Energy Powering Hawai'i's Future

KAIRIM

Na Pua Makani Wind Project
Draft Environmental Impact Statement
Public Comment Form

For more information visit:
http://oeqc.doh.hawaii.gov/Shared%20Documents/Environmental_Notice/Archives/2010s/2015-06-08.pdf

Comments can be submitted by email to **NaPuaMakanihcp@fws.gov**, or by U.S. Mail addressed to:

Pacific Island Fish and Wildlife Office
U.S. Fish and Wildlife Service
ATTN: Kristi Young, Field Supervisor
300 Ala Moana Boulevard, Room3-122
Honolulu, Hawaii 96850
*All comments should be submitted/postmarked by **August 11, 2015.**

IND-56

Name: Joshua Mendez

Address: PO Box 77
Kaaawa HI 96730

Email:

Please check the box next to the topic area(s) you're commenting about. Write your comments on reverse page, or attach to this form.

- ☐ Air quality and Climate Change
- ☑ Cultural, Archaeological and Historic Resources
- ☐ Environmental Justice
- ☐ Geology and Soils
- ☐ Hazardous and Regulated Materials and Waste
- ☐ Hydrology and Water Resources
- ☑ Land Use
- ☐ Military
- ☐ Natural Hazards
- ☐ Noise
- ☐ Public Health and Safety
- ☐ Public Infrastructure and Services
- ☐ Recreation and Tourism
- ☐ Socioeconomics Resources
- ☐ Threatened and Endangered Species
- ☐ Transportation
- ☐ Vegetation
- ☑ Visual Resources
- ☐ Wildlife
- ☐ Other: _____

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Comments:

1 Support project.

Thank you for your comments.

TETRA TECH

April 1, 2016

Joshua Mendez
P.O. Box 77
Kaaawa HI 96730

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Mendez:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-56.1*: Support project.*

Response IND-56.1: Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service acknowledge your support for the proposed Project. The purpose and need for the proposed Project are described in Chapter 2 of the EIS.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

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Na Pua Makani Wind Project
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http://oeqc.doh.hawaii.gov/Shared%20Documents/Environmental_Notice/Archives/2010s/2015-06-08.pdf

Comments can be submitted by email to **NaPuaMakanihcp@fws.gov**, or by U.S. Mail addressed to:

Pacific Island Fish and Wildlife Office
U.S. Fish and Wildlife Service
ATTN: Kristi Young, Field Supervisor
300 Ala Moana Boulevard, Room3-122
Honolulu, Hawaii 96850
*All comments should be submitted/postmarked by **August 11, 2015.**

IND-57

Name: KATRINA Comean

Address: PO Box 77
KAAWA HI 96730

Email:

Please check the box next to the topic area(s) you're commenting about. Write your comments on reverse page, or attach to this form.

- ☐ Air quality and Climate Change
- ☐ Cultural, Archaeological and Historic Resources
- ☐ Environmental Justice
- ☐ Geology and Soils
- ☐ Hazardous and Regulated Materials and Waste
- ☐ Hydrology and Water Resources
- ☐ Land Use
- ☐ Military
- ☐ Natural Hazards
- ☐ Noise
- ☐ Public Health and Safety
- ☐ Public Infrastructure and Services
- ☐ Recreation and Tourism
- ☑ Socioeconomics Resources
- ☐ Threatened and Endangered Species
- ☐ Transportation
- ☐ Vegetation
- ☑ Visual Resources
- ☐ Wildlife
- ☐ Other: Support

1

NĀ PUA MAKANI
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Comments:

Thank you for your comments.

April 1, 2016

Katrina Comeau
P.O. Box 77
Kaaawa HI 96730

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Comeau:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-57.1*: Support*

Response IND-57.1: Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service acknowledge your support for the proposed Project. The purpose and need for the proposed Project are described in Chapter 2 of the EIS.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

NĀ PUA MAKANI
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Pacific Island Fish and Wildlife Office
U.S. Fish and Wildlife Service
ATTN: Kristi Young, Field Supervisor
300 Ala Moana Boulevard, Room3-122
Honolulu, Hawaii 96850
*All comments should be submitted/postmarked by **August 11, 2015.**

IND-58

Name: Matthew Comeau

Address: PO Box 77
Kaaawa 96730

Email:

Please check the box next to the topic area(s) you're commenting about. Write your comments on reverse page, or attach to this form.

- ☐ Air quality and Climate Change
- ☐ Cultural, Archaeological and Historic Resources
- ☐ Environmental Justice
- ☐ Geology and Soils
- ☐ Hazardous and Regulated Materials and Waste
- ☐ Hydrology and Water Resources
- ☐ Land Use
- ☐ Military
- ☐ Natural Hazards
- ☐ Noise
- ☐ Public Health and Safety
- ☐ Public Infrastructure and Services
- ☐ Recreation and Tourism
- ☐ Socioeconomics Resources
- ☐ Threatened and Endangered Species
- ☐ Transportation
- ☐ Vegetation
- ☐ Visual Resources
- ☐ Wildlife
- ☐ Other: Support

1

NĀ PUA MAKANI
Clean Energy Powering Hawai'i's Future

Comments:

Thank you for your comments.

TETRA TECH

April 1, 2016

Matthew Comeau
P.O. Box 77
Kaaawa HI 96730

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Comeau:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-58.1*: Support*

Response IND-58.1: Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service acknowledge your support for the proposed Project. The purpose and need for the proposed Project are described in Chapter 2 of the EIS.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

NĀ PUA MAKANI
Clean Energy Powering Hawai'i's Future

RECEIVED
JUL 20 2015
U.S. FISH & WILDLIFE SVC
PACIFIC ISLANDS FWD
HONOLULU, HI 96850

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Pacific Island Fish and Wildlife Office
U.S. Fish and Wildlife Service
ATTN: Kristi Young, Field Supervisor
300 Ala Moana Boulevard, Room3-122
Honolulu, Hawaii 96850
*All comments should be submitted/postmarked by **August 11, 2015**.

IND-59

Name: Robert Comean

Address: PO Box 77
Kaaawa 96730

Email:

Please check the box next to the topic area(s) you're commenting about. Write your comments on reverse page, or attach to this form.

- ☐ Air quality and Climate Change
- ☐ Cultural, Archaeological and Historic Resources
- ☐ Environmental Justice
- ☐ Geology and Soils
- ☐ Hazardous and Regulated Materials and Waste
- ☐ Hydrology and Water Resources
- ☐ Land Use
- ☐ Military
- ☐ Natural Hazards
- ☐ Noise
- ☐ Public Health and Safety
- ☐ Public Infrastructure and Services
- ☐ Recreation and Tourism
- ☐ Socioeconomics Resources
- ☐ Threatened and Endangered Species
- ☐ Transportation
- ☐ Vegetation
- ☑ Visual Resources
- ☐ Wildlife
- ☐ Other: _____

NĀ PUA MAKANI
Clean Energy Powering Hawai'i's Future

Comments:

1 Support –

Thank you for your comments.

TETRA TECH

April 1, 2016

Robert Comeau
P.O. Box 77
Kaaawa HI 96730

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Comeau:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-59.1*: Support*

Response IND-59.1: Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service acknowledge your support for the proposed Project. The purpose and need for the proposed Project are described in Chapter 2 of the EIS.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

IND-60

Ms. Suzanne Case, Chairperson
Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

Chair Woman Case:

1 I am for this Na Pua Makani wind farm project because clean energy is the right thing to do for our keiki and our future generations. Renewable energy is less polluting and its way better for our environment to help keep our air and ocean water clean.

Sincerely,

Seamus Fitzgerald
Kahuku Rugby, Coach

TETRA TECH

April 1, 2016

Seamus Fitzgerald
Kahuku Rugby, Coach
No address provided

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Fitzgerald:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-60.1*: I am for this Na Pua Makani wind farm project because clean energy is the right thing to do for our keiki and our future generations. Renewable energy is less polluting and its way better for our environment to help keep our air and ocean water clean.*

Response IND-60.1: As described in Section 1.3 of the EIS, the proposed Project would provide a clean source of renewable energy and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals. These goals have increased from 70 to 100 percent clean energy since the publication of the Draft EIS. Generation and integration of renewable energy into the electric grid through projects such as Na Pua Makani would decrease fossil fuel import and consumption, and increase energy independence. As mentioned in your comment and described in Sections 4.5 of the EIS, the Project would reduce greenhouse gas emissions and other forms of pollution associated with coal or diesel fuel electric generation.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

IND-61

June 23, 2015

Ms. Suzanne Case, Chairperson
Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

Dear Ms. Case:

1

Please register my support for the Na Pua Makani wind project. I think the developer has done a good job explaining all the facts and answering questions in the community about noise, property values, health concerns and other issues that have been brought up. These are addressed in their environmental impact statement and I am satisfied with their project.

Sincerely,

Iolene Kanahele
55-526 Iosepa St.
Laie, Hawaii 96762

TETRA TECH

April 1, 2016

Jolene Kanahele
55-526 Iosepa Street
Laie HI 96762

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Kanahele:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter dated June 23, 2015 commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-61.1*: Please register my support for the Na Pua Makani wind project. I think the developer has done a good job explaining all the facts and answering questions in the community about noise, property values, health concerns and other issues that have been brought up. These are addressed in their environmental impact statement and I am satisfied with their project.*

Response IND-61.1: Na Pua Makani Power Partners, LLC continues its involvement in the community. Chapter 7 of the Second Draft EIS will include an updated summary of Project outreach efforts. Noise, property values, and public health and safety are discussed in Section 4.6, 4.12, and 4.18 of the EIS, respectively.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

IND-62

Shawn Keliiliki
55-087B Lanihuli St.
Laie, HI 96762

Dear Chairwoman,

1 I congratulate the developer for his open and honest approach to providing information and getting facts out to the community.

2 The bottom line here is that we need to stop importing foreign oil and start producing more of our energy from clean sources like the sun, wind and ocean.

Being an isolated island state 2,500 miles away from the mainland, we have to move towards more self sufficiency. This wind project is a step in the right direction.

Mahalo,

Shawn Keliiliki
Resident

April 1, 2016

Shawn Keliiliki
55-087B Lanihuli Street
Laie HI 96762

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Keliiliki:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-62.1*: I congratulate the developer for his open and honest approach to providing information and getting facts out to the community.*

Response IND-62.1: Na Pua Makani Power Partners, LLC continues its involvement in the community. Chapter 7 of the Second Draft EIS will include an updated summary of Project outreach efforts.

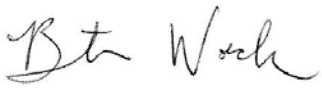
Comment IND-62.2*: The bottom line here is that we need to stop importing foreign oil and start producing more of our energy from clean sources like the sun, wind and ocean. Being an isolated island state, 2,500 miles away from the mainland, we have to move towards more self sufficiency. This wind project is a step in the right direction.*

Response IND-62.2: As described in Section 1.3 of the EIS, the proposed Project would provide a clean source of renewable energy and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals. These goals have increased from 70 to 100 percent clean energy since the publication of the Draft EIS. As a source of renewable energy, the Project would increase energy security and energy independence for the State and reduce reliance on fossil-fuel based energy production.

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

NĀ PUA MAKANI
Clean Energy Powering Hawai'i's Future

Na Pua Makani Wind Project
Draft Environmental Impact Statement
Public Comment Form

For more information visit:
http://oeqc.doh.hawaii.gov/Shared%20Documents/Environmental_Notice/Archives/2010s/2015-06-08.pdf

Comments can be submitted by email to **NaPuaMakanihcp@fws.gov**, or by U.S. Mail addressed to:

Pacific Island Fish and Wildlife Office
U.S. Fish and Wildlife Service
ATTN: Kristi Young, Field Supervisor
300 Ala Moana Boulevard, Room3-122
Honolulu, Hawaii 96850
*All comments should be submitted/postmarked by **August 11, 2015.**

IND-63

Name: CINDY TUTOR

Address: 55-488 IOSEPA ST
LAIE, HI 96762

Email: tutorc@hotmail.com

Please check the box next to the topic area(s) you're commenting about. Write your comments on reverse page, or attach to this form.

- ☐ Air quality and Climate Change
- ☐ Cultural, Archaeological and Historic Resources
- ☐ Environmental Justice
- ☐ Geology and Soils
- ☐ Hazardous and Regulated Materials and Waste
- ☐ Hydrology and Water Resources
- ☐ Land Use
- ☐ Military
- ☐ Natural Hazards
- ☑ Noise
- ☑ Public Health and Safety
- ☐ Public Infrastructure and Services
- ☑ Recreation and Tourism
- ☑ Socioeconomics Resources
- ☑ Threatened and Endangered Species
- ☐ Transportation
- ☑ Vegetation
- ☑ Visual Resources
- ☐ Wildlife
- ☐ Other: _____

NĀ PUA MAKANI
Clean Energy Powering Hawai'i's Future

1 **Comments:** I am AGAINST the additional (and current) windmills proposed for Kahuku for the following reasons

NOISE - the Low frequency noises produced by the current turbines are like the annoying bass sounds that vibrate in your chest when someone drives by with their music blasting - you can feel it! This produces a public HEALTH HAZARD. If you can't get away from it you'll be sick from it.

2 The Huge monstrosities mar the beautiful view. I can't believe what has happened at Waimea Bay! It's absolutely appalling

3 As people realize their health and landscapes are diminishing they will move away and property values decline. We're already a economically depressed area this will just make it WORSE!

4 Na Pua Makani claims they will protect the endangered wild life and replace the "take". HOW?! If we could do that at will they wouldn't be endangered!

5 The vegetation will be cleared creating erosion problems. Agriculture doesn't do well around turbines.

6 NEW Less invasive technologies are on the cusp of being released. DO NOT SACRIFICE our community for out dated obsolete turbines that give our skyline a BLACK EYE!!!

Thank you for your comments.

April 1, 2016

Cindy Tutor
55-488 Iosepa Street
Laie HI 96762

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Tutor:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-63.1*: I am AGAINST the additional (and current) windmills proposed for Kahuku for the following reasons*

Noise – the low frequency noise produced by the current turbines are like the annoying bass sounds that vibrate in your chest when someone drives by with their music blasting – you can feel it! This produces a public HEALTH HAZARD. If you can't get away from it you'll be sick from it.

Response IND-63.1: Na Pua Makani Power Partners, LLC conducted baseline sound monitoring for the proposed Project. Existing and predicted low-frequency noise was evaluated against the United Kingdom Department for Environment, Food & Rural Affairs (DEFRA) low-frequency noise guidelines, as the U.S. and State of Hawaii do not have low frequency sound guidelines. This analysis did not identify any potential for impacts resulting from the Project primarily because monitored baseline low-frequency sound levels in the vicinity of the wind farm site are already much higher than what is predicted to result from the proposed Project. That is, low-frequency noise from the Project would be masked by existing low frequency noise. See section 4.6 and Appendix D of the EIS for further information.

Public health and safety are discussed in Section 4.18 of the EIS. Seventeen separate independent scientific reviews have been conducted both nationally and internationally to examine the relationship between wind turbines and possible human health effects associated with audible (the "whooshing" sound created by the rotating blades) and inaudible noise, vibration, shadow flicker, and electromagnetic fields (EMF). To date, no scientific peer-reviewed study has demonstrated a direct link between people living in proximity to modern wind turbines and resulting physiological health effects (NHMRC 2015, McCunney et al. 2014, UK Health Protection Agency 2010, Colby 2009, MassDEP and MDHP 2012, Chatham-Kent Public Health Unit 2011, NHMRC 2010).

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737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
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Specifically, related to low frequency noise "there is no evidence that the audible or sub-audible sounds emitted by wind turbines have any direct adverse physiological effects" (Colby 2009).

Sources:

Chatham-Kent Public Health Unit. 2008. The Health Impact of Wind Turbines: A Review of the Current White, Grey, and Published Literature. Prepared for Chatham-Kent Municipal Council, Chatham Ontario. June 2008.

Colby, David W., M.D.; Robert Dobie, M.D.; Geoff Leventhall, Ph.D.; David M. Lipscomb, Ph.D.; Robert J. McCunney, M.D.; Michael T. Seilo, Ph.D.; and Bo Søndergaard, M.Sc. 2009. Wind Turbine Sound and Health Effects: An Expert Panel Review. Prepared for: American Wind Energy Association and Canadian Wind Energy Association. December 2009.

MassDEP and MDPH (Massachusetts Department of Public Health). 2012. Wind Turbine Health Impact Study: Report of Independent Expert Panel. January 2012. Available online at: http://www.mass.gov/eea/docs/dep/energy/wind/turbine-impact-study.pdf.

McCunney, R.J., K.A. Mundt, D. Colby, R. Dobie, K. Kaliski, and M. Blais. 2014. Wind Turbines and Health: A Critical Review of the Scientific Literature. Journal of Environmental and Occupational Medicine 56(11):e108-e130. Available online at: http://canwea.ca/comprehensive-scientific-literature-review-on-wind-turbines-and-human-health-now-published/

NHMRC (Australian Government National Health and Medical Research Council). 2015. NHMRC Statement: Evidence on Wind Farms and Human Health. February 2015.

NHMRC (Australian Government National Health and Medical Research Council). 2010. Wind Turbines and Health – A Rapid Review of Evidence. July 2010. http://www.nhmrc.gov.au/_files_nhmrc/publications/attachments/new0048_evidence_review_wind_turbines_and_health.pdf

UK Health Protection Agency. 2010. Health Effects of Exposure to Ultrasound and Infrasound. Report for the Ad Hoc Expert Group on Noise and Health by the Health Protection Agency. February 2010. http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1265028759369

Comment IND-63.2*: The huge monstrosities mar the beautiful view. I can't believe what has happened at Waimea Bay! It's absolutely appalling.*

Response IND-63.2: Section 4.16 – Visual Resources of the EIS discloses that the Project will be most visible form the locations within one mile from the wind farm site. Although the visibility of the Project is unavoidable, the proposed Project would be compatible with nearby existing residential, commercial, public, and agricultural land uses. It is important to note that the existing Kahuku Wind Farm that is directly adjacent to the proposed Project has co-existed in the Kahuku community since 2011.

Comment IND-63.3*: As people realize their health and landscapes are diminishing they will move away and property values decline. We're already a economically depressed area this will just make it WORSE!*

Response IND-63.3: The EIS discusses potential impacts to the property values in Section 4.12 – Socioeconomics. Several recent studies on this topic were reviewed. Most of these studies found no evidence that the presence of an operating wind facility affected residential property values and concluded that more research is required to more fully understand the impacts of wind facility development on property values.

Comment IND-63.4*: Na Pua Makani claims they will protect the endangered wildlife and replace the "take." HOW?!! If we could do that at will they wouldn't be endangered.*

Response IND-63.4: The EIS in Section 3.9 and 4.11 includes a detailed discussion of potential impacts to threatened and endangered species. Due to the potential for significant impacts to threatened and endangered species, Na Pua Makani Power Partners, LLC in collaboration with the U.S. Fish and Wildlife and Hawaii Division of Forestry and Wildlife have developed a Habitat Conservation Plan which includes measures to avoid, minimize, and mitigate potential impacts to these species in association with construction and operation of the Project. These measures are designed to benefit the species covered under the Habitat Conservation Plan.

Comment IND-63.5*: The vegetation will be creating erosion problems. Agriculture doesn't do well around turbines.*

Response IND-63.5: The Second Draft EIS discloses impacts from stormwater runoff to streams within the wind farms and downstream properties including nearshore waters in Section 4.4 Hydrology and Water Resources. The proposed Project would result in up to approximately 10.1 acres of impervious surfaces which includes 10 acres of gravel surfaces which would be considered semi-pervious.

This increase in impervious surface is less than 0.1 percent of the watersheds within which the Project is located. The net increase in stormwater runoff was estimated at 11.9 cubic feet per second. With the implementation of stormwater control measures, such as seepage pits, drywells, and/or retention/detention basins during construction and operations, as necessary, the Project would be designed to ensure that no net additional changes in drainage would occur off-site to downstream properties including streams and near shore waters.

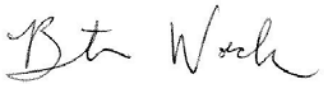
Comment IND-63.6*: NEW less invasive technologies are on the cusp of being released. DO NOT SACRIFICE our community for outdated obsolete turbines that give our skyline a BLACK EYE!!!*

Response IND-63.6: There are a number of other renewable energy sources that would produce power such as solar, geothermal (on islands other than Oahu), or biofuels which are all complementary to wind energy, and the proposed Project would not preclude other renewable energy projects from being developed. In order for the State of Hawaii to meet its Renewable Portfolio Standards goal of 100 percent renewable energy generation for the electric grid, all types of renewable energy technologies will need to be pursued.

The wind turbine models being considered for the Na Pua Makani wind farm site are those most appropriate for site-specific wind conditions and terrain as well as economic and energy production considerations. New less invasive technologies are still in the research and development stage and are not yet commercially viable or available. Therefore, they are not considered for the Project.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

IND-64

Ms. Suzanne Case, Chairperson
Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

Dear Chairwoman,

1 I congratulate the developer for his open and honest approach to providing information and getting facts out to the community.

2 The bottom line here is that we need to stop importing foreign oil and start producing more of our energy from clean sources like the sun, wind and ocean.

Being an isolated island state 2,500 miles away from the mainland, we have to move towards more self sufficiency. This wind project is a step in the right direction.

Mahalo,

Sara M. Johnson
55-133 Kulanui Street A
Laie, Hawaii 96762

April 1, 2016

Sara M. Johnson
55-133 Kulanui Street A
Laie HI 96762

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Johnson:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-64.1*: I congratulate the developer for his open and honest approach to providing information and getting facts out to the community.*

Response IND-64.1: Na Pua Makani Power Partners, LLC continues its involvement in the community. Chapter 7 of the Second Draft EIS will include an updated summary of Project outreach efforts.

Comment IND-64.2*: The bottom line here is that we need to stop importing foreign oil and start producing more of our energy from clean sources like the sun, wind and ocean. Being an isolated island state 2,500 miles away from the mainland, we have to move towards more self sufficiency. This wind project is a step in the right direction.*

Response IND-64.2: As described in Section 1.3 of the EIS, the proposed Project would provide a clean source of renewable energy and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals. These goals have increased from 70 to 100 percent clean energy since the publication of the Draft EIS. As a source of renewable energy, the Project would increase energy security and energy independence for the State and reduce reliance on fossil-fuel based energy production.

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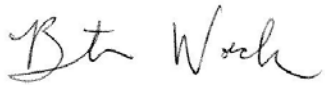
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

IND-65

Ms. Suzanne Case, Chairperson
Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

Dear Chairwoman,

1 I congratulate the developer for his open and honest approach to providing information and getting facts out to the community.

2 The bottom line here is that we need to stop importing foreign oil and start producing more of our energy from clean sources like the sun, wind and ocean.

Being an isolated island state 2,500 miles away from the mainland, we have to move towards more self sufficiency. This wind project is a step in the right direction.

Mahalo,

Mibi L. Harp
55-133 Kulanui Street B
Laie, Hawaii 96762

April 1, 2016

Mibi Harp
55-133 Kulanui Street B
Laie HI 96762

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Harp:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-65.1*: I congratulate the developer for his open and honest approach to providing information and getting facts out to the community.*

Response IND-65.1: Na Pua Makani Power Partners, LLC continues its involvement in the community. Chapter 7 of the Second Draft EIS will include an updated summary of Project outreach efforts.

Comment IND-65.2*: The bottom line here is that we need to stop importing foreign oil and start producing more of our energy from clean sources like the sun, wind and ocean. Being an isolated island state 2,500 miles away from the mainland, we have to move towards more self sufficiency. This wind project is a step in the right direction.*

Response IND-65.2: As described in Section 1.3 of the EIS, the proposed Project would provide a clean source of renewable energy and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals. These goals have increased from 70 to 100 percent clean energy since the publication of the Draft EIS. As a source of renewable energy, the Project would increase energy security and energy independence for the State and reduce reliance on fossil-fuel based energy production.

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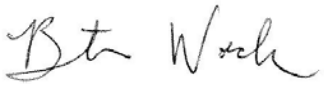
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

IND-66

Ms. Suzanne Case, Chairperson
Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

Dear Chairwoman,

1 I congratulate the developer for his open and honest approach to providing information and getting facts out to the community.

2 The bottom line here is that we need to stop importing foreign oil and start producing more of our energy from clean sources like the sun, wind and ocean.

Being an isolated island state 2,500 miles away from the mainland, we have to move towards more self sufficiency. This wind project is a step in the right direction.

Mahalo,

Daniel J. Johnson
55-133 Kulanui Street A
Laie, Hawaii 96762

April 1, 2016

Daniel J. Johnson
55-133 Kulanui Street A
Laie HI 96762

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Johnson:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-66.1*: I congratulate the developer for his open and honest approach to providing information and getting facts out to the community.*

Response IND-66.1: Na Pua Makani Power Partners, LLC continues its involvement in the community. Chapter 7 of the Final EIS will include an updated summary of Project outreach efforts.

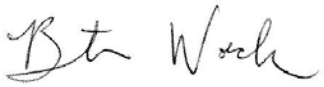
Comment IND-66.2*: The bottom line here is that we need to stop importing foreign oil and start producing more of our energy from clean sources like the sun, wind and ocean. Being an isolated island state 2,500 miles away from the mainland, we have to move towards more self sufficiency. This wind project is a step in the right direction.*

Response IND-66.2: As described in Section 1.3 of the EIS, the proposed Project would provide a clean source of renewable energy and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals. These goals have increased from 70 to 100 percent clean energy since the publication of the Draft EIS. As a source of renewable energy, the Project would increase energy security and energy independence for the State and reduce reliance on fossil-fuel based energy production.

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

IND-67

Ms. Suzanne Case, Chairperson
Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

Dear Chairwoman,

1 I congratulate the developer for his open and honest approach to providing information and getting facts out to the community.

2 The bottom line here is that we need to stop importing foreign oil and start producing more of our energy from clean sources like the sun, wind and ocean.

Being an isolated island state 2,500 miles away from the mainland, we have to move towards more self sufficiency. This wind project is a step in the right direction.

Mahalo,

LeeW. Harp
55-133 Kulanui Street B
Laie, Hawaii 96762

April 1, 2016

Lee W. Harp
55-133 Kulanui Street B
Laie HI 96762

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Harp:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-67.1*: I congratulate the developer for his open and honest approach to providing information and getting facts out to the community.*

Response IND-67.1: Na Pua Makani Power Partners, LLC continues its involvement in the community. Chapter 7 of the Final EIS will include an updated summary of Project outreach efforts.

Comment IND-67.2*: The bottom line here is that we need to stop importing foreign oil and start producing more of our energy from clean sources like the sun, wind and ocean. Being an isolated island state 2,500 miles away from the mainland, we have to move towards more self sufficiency. This wind project is a step in the right direction.*

Response IND-67.2: As described in Section 1.3 of the EIS, the proposed Project would provide a clean source of renewable energy and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals. These goals have increased from 70 to 100 percent clean energy since the publication of the Draft EIS. As a source of renewable energy, the Project would increase energy security and energy independence for the State and reduce reliance on fossil-fuel based energy production.

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

IND-68

June 23, 2015

Ms. Suzanne Case, Chairperson
Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

Dear Ms. Case:

1 Please register my support for the Na Pua Makani wind project. I think the developer has done a good job explaining all the facts and answering questions in the community about noise, property values, health concerns and other issues that have been brought up. These are addressed in their environmental impact statement and I am satisfied with their project.

Sincerely,

John P. Keliiliki
55-087B Lanihuli St.
Laie, HI 96762

TETRA TECH

April 1, 2016

John Keliiliki
55-087B Lanihuli Street
Laie HI 96762

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Keliiliki:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter dated June 23, 2015 commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment IND-68.1*: Please register my support for the Na Pua Makani wind project. I think the developer has done a good job explaining all the facts and answering questions in the community about noise, property values, health concerns and other issues that have been brought up. These are addressed in their environmental impact statement and I am satisfied with their project.*

Response IND-68.1: Na Pua Makani Power Partners, LLC continues its involvement in the community. Chapter 7 of the Final EIS will include an updated summary of Project outreach efforts. Noise, property values, and public health and safety are discussed in Section 4.6, 4.12, and 4.18 of the EIS, respectively.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

IND-69

June 23, 2015

Ms. Suzanne Case, Chairperson
Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

Dear Ms. Case:

1 Please register my support for the Na Pua Makani wind project. I think the developer has done a good job explaining all the facts and answering questions in the community about noise, property values, health concerns and other issues that have been brought up. These are addressed in their environmental impact statement and I am satisfied with their project.

Sincerely,

Charlene N. Keliiliki

Charlene N. Keliiliki
55-087B Lanihuli St.
Laie, HI 96762

TETRA TECH

April 1, 2016

Charlene N. Keliiliki
55-087B Lanihuli Street
Laie HI 96762

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Keliiliki:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter dated June 23, 2015 commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment IND-69.1*: Please register my support for the Na Pua Makani wind project. I think the developer has done a good job explaining all the facts and answering questions in the community about noise, property values, health concerns and other issues that have been brought up. These are addressed in their environmental impact statement and I am satisfied with their project.*

Response IND-69.1: Na Pua Makani Power Partners, LLC continues its involvement in the community. Chapter 7 of the Final EIS will include an updated summary of Project outreach efforts. Noise, property values, and public health and safety are discussed in Section 4.6, 4.12, and 4.18 of the EIS, respectively.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. If you would like a copy of the Final EIS or portions thereof, please submit a request in writing to Tetra Tech, Inc., Attention: Brita Woeck 737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

Organization Letters and Responses

ORG-1

August 11, 2015

Via e-mail
Field Supervisor
U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122,
Honolulu, Hawai'i 96850
napuamakanihcp@fws.gov

Re: Na Pua Makani HCP and Draft EIS

Dear Sir or Madam,

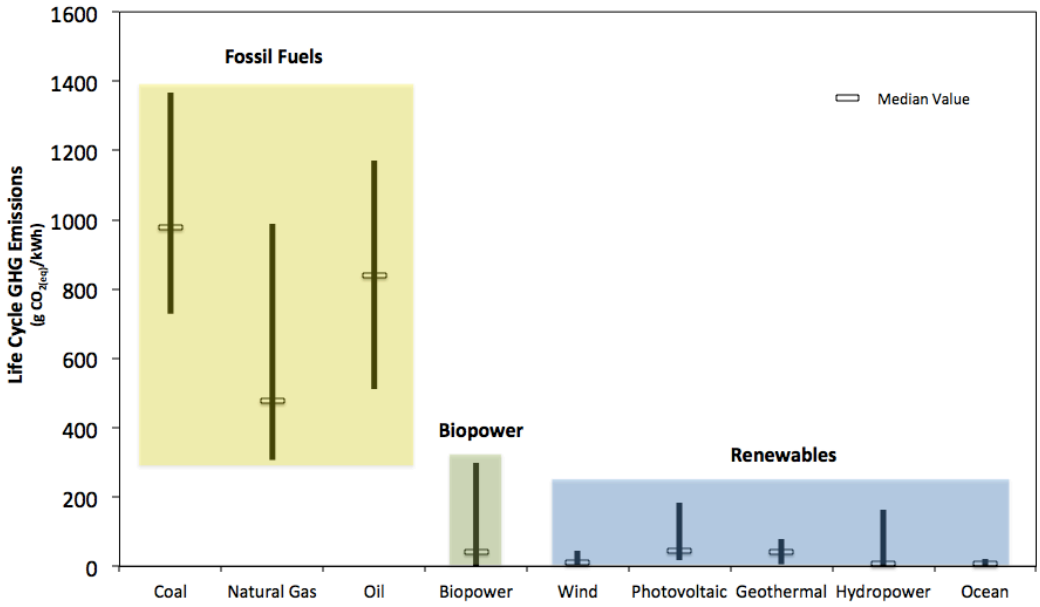
Blue Planet Foundation is Hawai'i-based nonprofit organization. We work to clear the path for local, clean, renewable power. We want to make our communities stronger, our energy more secure, our environment healthier, and our economy more robust.

1 In the past decade, Hawai'i has imported tens of billions of dollars worth of fossil fuels like oil and coal. According to the U.S. Environmental Protection Agency's ("EPA") most recent Toxic Releases Inventory for Hawai'i, those fossil fuels are associated with the largest sources of toxic materials in our islands. The biggest emitter on the EPA's list was Oahu's coal power plant. Nine of the top twelve facilities on the list were fossil fuel power plants or fossil fuel refineries. Our island is no place for toxic emissions. Renewable energy is the answer to this problem.

2 New renewable energy installations are vital for protecting our environment and achieving the state's clean energy goals and mandates. Our analysis indicates that O'ahu will require hundreds more megawatts of clean power added to the grid, both as distributed renewable generation and centralized renewable generation.

3 In addition to limiting toxic releases in Hawai'i, renewable energy also reduces carbon dioxide emissions, thus reducing the primary cause of climate change. Life cycle emissions analysis, accounting for emissions at each step of production, show that wind and solar power is far cleaner than fossil fuel-fired power.[1]

[1] These data were compiled by the National Renewable Energy Laboratory's (NREL) Life Cycle Assessment (LCA) Harmonization project. NREL experts systematically reviewed thousands of estimates of LCA GHG emissions published between 1970 and 2011. LCA estimates presented consider emissions from all stages in the lifecycle of an energy source, from component manufacturing, to operation of the



4

Reflecting these benefits of clean energy, a recent report by the University of Hawai‘i Center on the Family found overwhelming public support for more renewable energy, with 64% of residents in “strong support” of “developing more renewable energy sources for the State of Hawai‘i,” 21% in “support,” and 12% in support of a particular type (or types) of renewable energy.[2] Only 2% opposed or strongly opposed more renewable energy.

Asked whether particular forms of energy are “a good idea for Hawai‘i,” 92% responded “yes” for solar, and 86% responded “yes” for wind. These were the two most favored forms of energy. Only 12% and 13% answered “yes” for oil and coal—the primary existing sources of fossil fuel electricity in Hawai‘i. These were the two least favored forms of energy.

Characteristics such as these render renewable energy projects far superior to the alternative provided by large, polluting, fossil fuel generating stations.

Thank you,

Richard Wallsgrove
Program Director

---

generation facility to its decommissioning, and including acquisition, processing and transport of any required fuels. Note that for natural gas, the methane leakage rate implied by these estimates is much lower than leakage measured by some scientists. Thus, the total climate impact of natural gas emissions may be even greater than reflected in this chart.

[2] *See Report on Public Attitudes About Renewable Energy in Hawai‘i*, http://uhfamily.hawaii.edu/publications/brochures/9314e_14101012_COF_RenewableEnergy_Report-FINAL.pdf.

TETRA TECH

April 1, 2016

Richard Wallsgrove, Program Director
Blue Planet Foundation
55 Merchant Street, 17th Floor
Honolulu HI 96813

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Wallsgrove:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter dated August 11, 2015, commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Draft Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment ORG-1.1*: In the past decade, Hawai'i has imported tens of billions of dollars worth of fossil fuels like oil and coal. According to the U.S. Environmental Protection Agency's ("EPA") most recent Toxic Releases Inventory for Hawai'i, those fossil fuels are associated with the largest sources of toxic materials in our islands. The biggest emitter on the EPA's list was Oahu's coal power plant. Nine of the top twelve facilities on the list were fossil fuel power plants or fossil fuel refineries. Our island is no place for toxic emissions. Renewable energy is the answer to this problem.*

Response ORG-1.1: The Project would contribute to reductions in fossil fuel use in Hawaii. Chapter 2 of the EIS provides additional information on the Project's purpose and need.

Comment ORG-1.2*: New renewable energy installations are vital for protecting our environment and achieving the state's clean energy goals and mandates. Our analysis indicates that O'ahu will require hundreds more megawatts of clean power added to the grid, both as distributed renewable generation and centralized renewable generation.*

Response ORG-1.2: The Project would contribute to the goals outlined in the Hawaii's Renewable Portfolio Standards and the Hawaii Clean energy initiative by increasing the percentage of the state's energy that is derived from clean, renewable sources. It also would support recently passed state statutes designed to promote energy efficiency and renewable energy sources.

Comment ORG-1.3*: In addition to limiting toxic releases in Hawai'i, renewable energy also reduces carbon dioxide emissions, thus reducing the primary cause of climate change. Life cycle emissions analysis, accounting for emissions at each step of production, show that wind and solar power is far cleaner than fossil fuel-fired power.*

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

Note: These data were compiled by the National Renewable Energy Laboratory's (NREL) Life Cycle Assessment (LCA) Harmonization project. NREL experts systematically reviewed thousands of estimates of LCA GHG emissions published between 1970 and 2011. LCA estimates presented consider emissions from all stages in the lifecycle of an energy source, from component manufacturing, to operation of the generation facility to its decommissioning, and including acquisition, processing and transport of any required fuels. Note that for natural gas, the methane leakage rate implied by these estimates is much lower than leakage measured by some scientists. Thus, the total climate impact of natural gas emissions may be even greater than reflected in this chart.

Response ORG-1.3: Thank you for the information on life cycle emissions. Long-term beneficial effects to air quality and climate change resulting from the Project are discussed in Section 4.5 of the EIS. The energy potentially generated by the Project would eliminate the use of approximately 13.44 barrels of oil for every hour of operation, which in turn would reduce emissions of carbon dioxide (CO2) and other air pollutants including sulfur dioxide (SO2), nitrogen oxides (NOx), and mercury (Hg).

Comment ORG-1.4*: Reflecting these benefits of clean energy, a recent report by the University of Hawai'i Center on the Family found overwhelming public support for more renewable energy, with 64% of residents in "strong support" of "developing more renewable energy sources for the State of Hawai'i," 21% in "support," and 12% in support of a particular type (or types) of renewable energy. Only 2% opposed or strongly opposed more renewable energy.*

Asked whether particular forms of energy are "a good idea for Hawai'i," 92% responded "yes" for solar, and 86% responded "yes" for wind. These were the two most favored forms of energy. Only 12% and 13% answered "yes" for oil and coal—the primary existing sources of fossil fuel electricity in Hawai'i. These were the two least favored forms of energy.

Characteristics such as these render renewable energy projects far superior to the alternative provided by large, polluting, fossil fuel generating stations.
See Report on Public Attitudes About Renewable Energy in Hawai'i,
http://uhfamily.hawaii.edu/publications/brochures/9314e_14101012_COF_RenewableEnergy_Report-FINAL.pdf.

Response ORG-1.4: Thank you for the information regarding public support for renewable energy development in Hawaii.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

ORG-2

July 23, 2015

Approving Agency
State Board of Land and Natural Resources
Department of Land and Natural Resources
Attn: Suzanne Case
1151 Punchbowl Street, Kalanimoku Building
Honolulu, HI 96813

Cc: Applicant
Champlin Hawai'i Wind Holdings, LLC
Attn: Mike Cutbirth
2020 Alameda Padre Serra, Suite 105
Santa Barbara, CA 93103

Cc: Consultant
Tetra Tech, Inc.
Attn: Brita Woeck
737 Bishop Street, Suite 2340
Mauka Tower, Honolulu, HI 96813

Re: Draft Environmental Impact Statement and Habitat Conservation Plan; Na Pua Makani Wind Energy Project

Dear Ms. Case,

Blue Planet Foundation is Hawai'i-based nonprofit organization. We work to clear the path for local, clean, renewable power. We want to make our communities stronger, our energy more secure, our environment healthier, and our economy more robust.

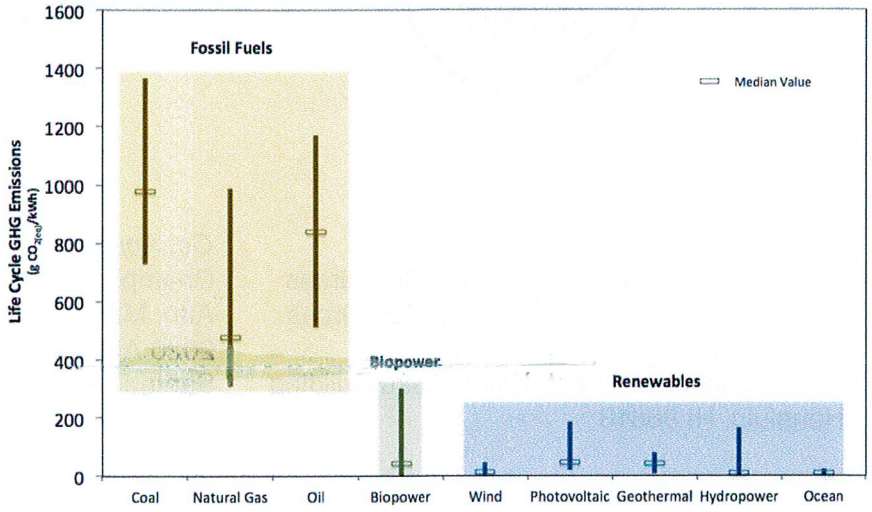
1 In the past decade, Hawai'i has imported tens of billions of dollars worth of fossil fuels like oil and coal. According to the U.S. Environmental Protection Agency's ("EPA") most recent Toxic Releases Inventory for Hawai'i, those fossil fuels are associated with the largest sources of toxic materials in our islands. The biggest emitter on the EPA's list was Oahu's coal power plant. Nine of the top twelve facilities on the list were fossil fuel power plants or fossil fuel refineries. Our island is no place for toxic emissions. Renewable energy is the answer to this problem.

2 New renewable energy installations are vital for protecting our environment and achieving the state's clean energy goals and mandates. Our analysis indicates that O'ahu will require hundreds more megawatts of clean power added to the grid, both as distributed renewable generation and centralized renewable generation.

info@blueplanetfoundation.org
55 Merchant Street 17th Floor • Honolulu, Hawai'i 96813 • 808-954-6161 • blueplanetfoundation.org

3

In addition to limiting toxic releases in Hawai'i, renewable energy also reduces carbon dioxide emissions, thus reducing the primary cause of climate change. Life cycle emissions analysis, accounting for emissions at each step of production, show that wind and solar power is far cleaner than fossil fuel-fired power.[1]



4

Reflecting these benefits of clean energy, a recent report by the University of Hawai'i Center on the Family found overwhelming public support for more renewable energy, with 64% of residents in "strong support" of "developing more renewable energy sources for the State of Hawai'i," 21% in "support," and 12% in support of a particular type (or types) of renewable energy.[2] Only 2% opposed or strongly opposed more renewable energy.

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Characteristics such as these render renewable energy projects far superior to the alternative provided by large, polluting, fossil fuel generating stations.

Thank you,

Richard Wallsgrove
Program Director

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[1] These data were compiled by the National Renewable Energy Laboratory's (NREL) Life Cycle Assessment (LCA) Harmonization project. NREL experts systematically reviewed thousands of estimates of LCA GHG emissions published between 1970 and 2011. LCA estimates presented consider emissions from all stages in the lifecycle of an energy source, from component manufacturing, to operation of the generation facility to its decommissioning, and including acquisition, processing and transport of any required fuels. Note that for natural gas, the methane leakage rate implied by these estimates is much lower than leakage measured by some scientists. Thus, the total climate impact of natural gas emissions may be even greater than reflected in this chart.

[2] *See Report on Public Attitudes About Renewable Energy in Hawai'i*, http://uhfamily.hawaii.edu/publications/brochures/9314e_14101012_COF_RenewableEnergy_Report-FINAL.pdf.

April 1, 2016

Richard Wallsgrove, Program Director
Blue Planet Foundation
55 Merchant Street, 17th Floor
Honolulu HI 96813

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Wallsgrove:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter dated July 23, 2015, commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Draft Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment ORG-2.1*: In the past decade, Hawai'i has imported tens of billions of dollars worth of fossil fuels like oil and coal. According to the U.S. Environmental Protection Agency's ("EPA") most recent Toxic Releases Inventory for Hawai'i, those fossil fuels are associated with the largest sources of toxic materials in our islands. The biggest emitter on the EPA's list was Oahu's coal power plant. Nine of the top twelve facilities on the list were fossil fuel power plants or fossil fuel refineries. Our island is no place for toxic emissions. Renewable energy is the answer to this problem.*

Response ORG-2.1: The Project will contribute to reductions in fossil fuel use in Hawaii. Chapter 2 of the EIS provides additional information on the Project's purpose and need.

Comment ORG-2.2*: New renewable energy installations are vital for protecting our environment and achieving the state's clean energy goals and mandates. Our analysis indicates that O'ahu will require hundreds more megawatts of clean power added to the grid, both as distributed renewable generation and centralized renewable generation.*

Response ORG-2.2: The Project would contribute to the goals outlined in the Hawaii's Renewable Portfolio Standards and the Hawaii Clean energy initiative by increasing the percentage of the state's energy that is derived from clean, renewable sources. It also would support recently passed state statutes designed to promote energy efficiency and renewable energy sources.

Comment ORG-2.3*: In addition to limiting toxic releases in Hawai'i, renewable energy also reduces carbon dioxide emissions, thus reducing the primary cause of climate change. Life cycle emissions analysis, accounting*

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

for emissions at each step of production, show that wind and solar power is far cleaner than fossil fuel-fired power.

Response ORG-2.3: Thank you for the information on life cycle emissions. Long-term beneficial effects to air quality and climate change resulting from the Project are discussed in Section 4.5 of the EIS. The energy potentially generated by the Project would eliminate the use of approximately 13.44 barrels of oil for every hour of operation, which in turn would reduce emissions of carbon dioxide (CO2) and other air pollutants including sulfur dioxide (SO2), nitrogen oxides (NOx), and mercury (Hg).

Comment ORG-2.4*: Reflecting these benefits of clean energy, a recent report by the University of Hawai‘i Center on the Family found overwhelming public support for more renewable energy, with 64% of residents in “strong support” of “developing more renewable energy sources for the State of Hawai'i," 21 % in "support," and 12% in support of a particular type (or types) of renewable energy. 2 Only 2% opposed or strongly opposed more renewable energy.*

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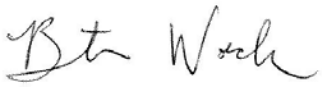
Characteristics such as these render renewable energy projects far superior to the alternative provided by large, polluting, fossil fuel generating stations.

Response ORG-2.4: Thank you for the information regarding public support for renewable energy development in Hawaii.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

ORG-3

Hawai‘i Construction Alliance

P.O. Box 179441
Honolulu, HI 96817
(808) 348-8885

July 6, 2015

Suzanne Case, Chairperson
Board of Land and Natural Resources
Kalanimoku Building
1151 Punchbowl Street
Honolulu, Hawai‘i 96813

RE: Comments on the Draft Environmental Impact Statement for the Nā Pua Makani Wind Farm Project

Dear Chairperson Case,

The Hawai‘i Construction Alliance is comprised of the Hawai‘i Regional Council of Carpenters; the Operative Plasterers' and Cement Masons' Union, Local 630; International Union of Bricklayers & Allied Craftworkers, Local 1; the Laborers' International Union of North America, Local 368; and the Operating Engineers, Local Union No. 3. Together, the member unions of the Hawai‘i Construction Alliance represent 15,000 working men and women in the basic crafts of Hawai‘i's construction industry.

We offer the following comments in support of the Draft Environmental Impact Statement ("DEIS") for the Nā Pua Makani Wind Farm Project ("Project").

It is our understanding that the Project will consist of up to 10 wind turbine generators, with a generating capacity of up to approximately 25 megawatts (MW), which will create clean, renewable wind energy and help HECO to meet its renewable portfolio standard requirements. We further understand that, in addition to installation of the wind turbine generators themselves, the Project will also include supporting infrastructure such as internal access roads, wind turbine assembly lay down areas, overhead and underground transmission and collector lines, an on-site substation, an operations and maintenance building, an associated storage yard, and a parking area.

1 We are pleased that the DEIS extensively discusses the positive economic benefits that the Project will create for the community in general and for our membership in particular. Under the preferred alternative, the Project is expected to result in the creation of 43 full-time equivalent construction jobs, with total construction earnings expected to total approximately $3 million (Page 4-124). We agree with the DEIS' conclusion that "direct wages to local workers and secondary spending by construction workers for housing, food and other goods and services" as a result of the Project will result in beneficial economic impacts for our island's economy (Page 6-2).

2 We strongly commend the commitment the Project has made to ensure that "Local workers would be employed where possible, including workers from nearby communities and the greater Honolulu urbanized area, approximately one hour's drive from the wind farm site" (Page 4-124). The commitment to employ workers from nearby communities will help to reduce construction-related traffic impacts and will also help to invigorate the economies of those communities. The Project's overall commitment to local workers will allow our members to apply and hone their high-quality skills here in the islands.

3 Finally, for our unions, the top priority is the health and safety of our members. Therefore, we greatly appreciate the discussion in Section 4.18.3.1, which addresses potential safety issues associated with construction of the Project. The proposal for a "Site Safety Handbook" and the planned measures such as safety zones or setbacks, temporary fencing around staging areas, storage yards, and excavation areas, and worker safety practices (Page 4-232) are admirable.

The Hawai‘i Construction Alliance thanks you for the opportunity to provide these comments in support of the Draft Environmental Impact Statement ("DEIS") for the Nā Pua Makani Wind Farm Project. Please do not hesitate to contact me should you have any questions.

Mahalo,

Tyler Dos Santos-Tam
Executive Director
Hawai‘i Construction Alliance
execdir@hawaiiconstructionalliance.org

CC: Mike Cutbirth
Champlin Hawai‘i Wind Holdings, LLC
2020 Alameda Padre Serra, Suite 105
Santa Barbara, California 93103

Brita Woeck
Tetra Tech, Inc.
737 Bishop Street, Suite 2340
Honolulu, Hawai‘i 96813

April 1, 2016

Tyler Dos Santos-Tam, Executive Director
Hawai‘i Construction Alliance
PO Box 179441
Honolulu HI 96817

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Dos Santos-Tam:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter dated July 6, 2015, commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Draft Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment ORG-3.1*: We are pleased that the DEIS extensively discusses the positive economic benefits that the Project will create for the community in general and for our membership in particular. Under the preferred alternative, the Project is expected to result in the creation of 43 full-time equivalent construction jobs, with total construction earnings expected to total approximately $3 million (Page 4-124). We agree with the DEIS' conclusion that "direct wages to local workers and secondary spending by construction workers for housing, food and other goods and services" as a result of the Project will result in beneficial economic impacts for our island's economy (Page 6-2).*

Response ORG-3.1: As mentioned in your comment, and described in Section 4.12 - Socioeconomics of the EIS, the Project would have both short-term and long-term economic benefits. Direct employment of 43 full-time equivalent jobs during construction as well as construction-related expenditures and spending by construction workers would benefit the local economy. Operation of the Project would have similar, but smaller impacts.

Comment ORG-3.2*: We strongly commend the commitment the Project has made to ensure that "Local workers would be employed where possible, including workers from nearby communities and the greater Honolulu urbanized area, approximately one hour's drive from the wind farm site" (Page 4-124). The commitment to employ workers from nearby communities will help to reduce construction related traffic impacts and will also help to invigorate the economies of those communities. The Project's overall commitment to local workers will allow our members to apply and hone their high-quality skills here in the islands.*

Response ORG-3.2: As mentioned in your comment, and described in section 4.12 – Socioeconomics of the EIS, local purchases of construction materials, employment of local residents, and the temporary relocation of construction workers to the wind farm site would have a positive impact on local businesses. Traffic impacts

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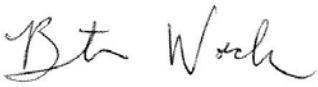
during construction are expected to be minor due to anticipated construction traffic trips and Project compliance with anticipated permit requirements of the Hawaii Department of Transportation and City and County of Honolulu oversized and overweight loads (see Section 4.17 – Transportation of the EIS for additional information).

Comment ORG-3.3*: Finally, for our unions, the top priority is the health and safety of our members. Therefore, we greatly appreciate the discussion in Section 4.18.3.1, which addresses potential safety issues associated with construction of the Project. The proposal for a "Site Safety Handbook" and the planned measures such as safety zones or setbacks, temporary fencing around staging areas, storage yards, and excavation areas, and worker safety practices (Page 4-232) are admirable.*

Response ORG-3.3: As noted in your comment, and discussed in Section 4.18 – Public Health and Safety of the EIS, a Site Safety Handbook would be prepared and implemented prior to the start of Project construction. The Site Safety Handbook would outline measures such as establishing safety zones or setbacks from construction work areas and would identify requirements for temporary fencing around staging areas, storage yards, and excavations during construction to control and restrict public access to the construction area, as well as outline worker safety practices. A Fire Management Plan and a Spill Prevention, Containment, and Countermeasures plan would also be implemented during construction to reduce safety risks associated with potential fire hazards and exposure to hazardous and flammable materials.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

ORG-4

July 8, 2015

RECEIVED
JUL 09 2015
U.S. FISH & WILDLIFE SVC
PACIFIC ISLANDS FWD
HONOLULU, HI 96850

Kristi Young, Field Supervisor,
U.S. Fish and Wildlife Service,
Pacific Islands Fish and Wildlife Office,
300 Ala Moana Boulevard, Room 3-122,
Honolulu, Hawaii 96850

Dear Ms. Young,

Pacific Resource Partnership (PRP) is a not-for-profit organization that represents the Hawaii Regional Council of Carpenters, the largest construction union in the state, and more than 240 of Hawaii's top contractors. Through this unique partnership, PRP has become an influential voice for responsible construction and an advocate for creating a stronger, more sustainable Hawaii in a way that promotes a vibrant economy, creates jobs and enhances the quality of life for all residents.

1 The Pacific Resource Partnership, in keeping with its mission of creating a stronger, more sustainable Hawaii, supports the Na Pua Makani wind farm as an important step in toward that goal.

The project's positive impacts, as detailed in the Draft EIS, deliver a broad range of benefits. By providing both construction and permanent jobs, decreasing the use of fossil fuels and our dependence on foreign oil, while increasing state and county revenues, and contributing to the stabilization and lowering of Oahu's electric rates, Na Pua Makani will be good for the surrounding community, the island of Oahu and the entire state.

2 Because the possible impacts of the proposed Na Pua Makani project have been carefully studied and all of the analysis and research conducted has found the project will have no have no significant adverse impacts, the project should be moved forward without delay.

Thank you for the opportunity to comment in support of this important step towards energy independence and a more sustainable Hawaii.

Mahalo,

Brooke Wilson
Government Relations Manager

PRP
PACIFIC RESOURCE PARTNERSHIP

THE POWER OF PARTNERSHIP
WWW.PRP-HAWAII.COM
PHONE → 808.528.5557
1100 ALAKEA STREET / 4TH FLOOR
HONOLULU / HI 96813
TWITTER: @PRPHAWAII
WWW.FACEBOOK.COM/PACIFICRESOURCEPARTNERSHIP

April 1, 2016

Brooke Wilson, Government Relations Manager
Pacific Resource Partnership
1100 Alakea Street, 4th Floor
Honolulu HI 96813

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Wilson:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter dated July 8, 2015, commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Draft Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment ORG-4.1*: The Pacific Resource Partnership, in keeping with its mission of creating a stronger, more sustainable Hawaii, supports the Na Pua Makani wind farm as an important step in toward that goal.*
The Project's positive impacts, as detailed in the Draft EIS, deliver a broad range of benefits. By providing both construction and permanent jobs, decreasing the use of fossil fuels and our dependence on foreign oil, while increasing state and county revenues, and contributing to the stabilization and lowering of Oahu's electric rates, Na Pua Makani will be good for the surrounding community, the island of Oahu and the entire state.

Response ORG-4.1: As mentioned in your comment and described in Chapter 2 of the EIS, the Project would contribute to the goals outlined in the Hawaii's Renewable Portfolio Standards and the Hawaii Clean energy initiative by increasing the percentage of the state's energy that is derived from clean, renewable sources. It also would support recently passed state statutes designed to promote energy efficiency and renewable energy sources.

Comment ORG-4.2*: Because the possible impacts of the proposed Na Pua Makani project have been carefully studied and all of the analysis and research conducted has found the project will have no significant adverse impacts, the project should be moved forward without delay.*

Response ORG-4.2: As mentioned in your comment, implementation of best management practices, avoidance and minimization measures, and additional mitigation where impacts are unavoidable would reduce all potential Project-related impacts. These measures are described in Chapters 2 and 4 of the EIS and include all elements of the Project Habitat Conservation Plan.

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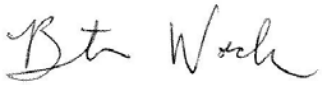
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

ORG-5

Chamber of Commerce HAWAII
The Voice of Business

July 8, 2015

Kristi Young, Field Supervisor
U.S. Fish and Wildlife Service
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawaii 96850

The Chamber of Commerce Hawaii advocates on behalf of our members to protect employers from increasing business costs, support the progress of new industries and sectors, and create an environment that will attract new business.

1 One of the biggest contributors to the cost of operating a business in Hawaii is the high cost of electricity. This cost also makes Hawaii less attractive to new businesses and makes it more difficult for new industries to take root. Because the Na Pua Makani wind project will contribute to lowering the cost of electricity for our members and encourage more commercial activity, we support this project.

2 According to the Hawaiian Electric Company in its filing to the state Public Utilities Commission, the Na Pua Makani project will save Oahu customers "millions of dollars in avoided fuel costs."

3 In addition, the project will be an employer and provide jobs during construction, as well as permanent jobs once the facility begins operations.

4 Given that the studies conducted for the Draft EIS have determined the project would have no significant negative impacts, we ask that the project be approved and be allowed to begin operations and deliver the anticipated benefits for Hawaii businesses.

Thank you for the opportunity to comment in support of this project.

Sherry Menor-McNamara
President and CEO

1132 Bishop Street, Suite 2105 • Honolulu, Hawaii 96813 • Phone: (808) 545-4300 • Facsimile: (808) 545-4369

April 1, 2016

Sherry Menor-McNamara, President and CEO
Chamber of Commerce Hawaii
1132 Bishop Street, Suite 2105
Honolulu HI 96813

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Menor-McNamara:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter dated July 8, 2015, commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Draft Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment ORG-5.1*: One of the biggest contributors to the cost of operating a business in Hawaii is the high cost of electricity. This cost also makes Hawaii less attractive to new businesses and makes it more difficult for new industries to take root. Because the Na Pua Makani wind project will contribute to lowering the cost of electricity for our members and encourage more commercial activity, we support this project.*

Response ORG-5.1: As mentioned in your comment and described in Chapter 2 of the EIS, the Project would contribute to the goals outlined in the Hawaii's Renewable Portfolio Standards and the Hawaii Clean energy initiative by increasing the percentage of the state's energy that is derived from clean, renewable sources. It also would support recently passed state statutes designed to promote energy efficiency and renewable energy sources.

Comment ORG-5.2*: According to the Hawaiian Electric Company in its filing to the state Public Utilities Commission, the Na Pua Makani project will save Oahu customers "millions of dollars in avoided fuel costs."*

Response ORG-5.2: Production of wind-generated energy by the Project would replace a portion of the State's electricity that is currently generated by burning fossil fuels. This would eliminate the use of approximately 13.44 barrels of oil for every hour of operation, thereby contributing to a decrease in the State's dependency on fossil fuels. As noted in your comment, and discussed in Section 4.12 of the EIS, the Project would generate electricity at a cost that is approximately half the cost of generating electricity by burning fossil fuels and HECO has stated in filings with the PUC that the Project would save the ratepayers millions of dollars over the life of the Project.

Comment ORG-5.3*: In addition, the project will be an employer and provide jobs during construction, as well as permanent jobs once the facility begins operations.*

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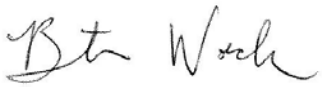
Response ORG-5.3: As mentioned in your comment, and described in section 4.12 of the EIS, the Project would have both short-term and long-term economic benefits. Direct employment of 43 full-time equivalent jobs during construction as well as construction-related expenditures and spending by construction workers would benefit the local economy. Operation of the Project would have similar, but smaller impacts.

Comment ORG-5.4: *Given that the studies conducted for the Draft EIS have determined the project would have no significant negative impacts, we ask that the project be approved and be allowed to begin operations and deliver the anticipated benefits for Hawaii businesses.*

Response ORG-5.4: As mentioned in your comment, implementation of best management practices, avoidance and minimization measures, and additional mitigation where impacts are unavoidable would reduce all potential Project-related impacts. These measures are described in Chapters 2 and 4 of the EIS and include all elements of the Project Habitat Conservation Plan.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

ORG-6

AMERICAN BIRD CONSERVANCY

Shaping the future for birds

Kristi Young, Field Supervisor
Pacific Island Fish and Wildlife Office
U.S. Fish and Wildlife Service
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawai‘i 96850

August 10, 2015

Dear Ms. Young:

American Bird Conservancy (ABC) welcomes this opportunity to comment on the Draft Environmental Impact Statement (EIS) and Habitat Conservation Plan (HCP) for the proposed Na Pua Makani Wind Energy Project on the island of O‘ahu, Hawai‘i. The project would involve construction and operation of up to 12 turbines with a maximum height of 512 feet, along with additional infrastructure, including one permanent and two temporary guyed towers supporting weather instruments and 0.9 miles of new above-ground power lines and towers.

ABC is a 501(c) (3) not-for-profit membership organization whose mission is to conserve native birds and their habitats throughout the Americas. ABC acts by safeguarding the rarest species, conserving and restoring habitats, and reducing threats, while building capacity in the bird conservation movement.

ABC supports the development of clean, renewable sources of energy such as wind power, but also believes that it must be done responsibly and with minimal impact on our public trust resources, including native species of birds and bats, and particularly threatened, endangered and other protected species. ABC believes that rapidly-expanding wind energy development in the U.S. has, unfortunately, gotten way out ahead of the science and regulatory framework, thus putting our nation’s irreplaceable and ecologically-essential birds (and bats) at risk. ABC supports bird smart wind energy development, which is described in some detail on our web site (http://abcbirds.org/program/wind-energy/bird-smart-strategies/).

Despite the wind energy industry’s downplaying of their impact on birds and bats, at least one peer reviewed paper estimated the annual loss of birds and bats at 573,000 and 888,000, respectively at 2012 build-out levels (Smallwood, 2013). There are vastly more turbines now and Loss et al. (2013) have predicted the loss of more than 1.4 million birds annually by 2030 or earlier when the U.S. reaches its goal of 20% of electrical energy being generated by wind.

1 Given that this project has the potential to harm federally-protected species, including the threatened Newell’s Shearwater, the endangered Hawaiian Coot, Hawaiian Moorhen, Hawaiian Duck, Hawaiian Goose, and Hawaiian hoary bat, ABC is glad to see the Service require a more detailed EIS be conducted, instead of a less detailed Environmental Assessment (EA). We suspect such detail will be necessary for planning any wind energy facility in Hawai‘i given the

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number of federally-protected species present in this biologically rich island state. None of

2 these species is listed as occurring on the wind energy project site per se, and for those species that do occur in the area, the HCP considers the habitat unsuitable (e.g., wetland species such as Hawaiian Stilt and Moorhen). This makes it appear at least on the surface that the risk to threatened and endangered species is minimal.

3 That being said, we still have concerns. Our first concern is the plan to issue an Incidental Take Permit (ITP) for the period of 21 years (p. 226). This seems to be an inordinate amount of time to issue a permit for killing ESA-listed species, especially when there is no baseline data on bird or bat mortality at this site. We respectfully request the ITP be issued for a three-year trial period. That way, further options for mitigation and compensatory compensation could be assessed. The HCP contains no explanation of how such annual losses, especially when

4 combined with losses from other wind and solar projects and associated power lines and towers in the archipelago, would cumulatively impact the listed species across the entire state. This seems to be a major weakness of the Draft HCP. It would be irresponsible to assess the impact of wind energy projects on a case-by-case basis independent of other projects that already exist or are planned for the area or region.

5 The HCP lists a number of efforts that will be employed in an attempt to reduce the loss of birds and bats at the project. While we applaud the developer for being willing to include such mitigation, we note that many of the suggested methods have not been tested for their efficacy in reducing bird and bat kill. Should this project be built, we would like to see the 0.9 miles of above-ground power lines and towers conform to Avian Power Line Interaction Committee (APLIC) standards for the reduction of bird collisions (http://www.aplic.org/) and be retrofitted to reduce bird mortality accordingly.

6 We are happy to see that the project plans call for a number of compensatory mitigation projects, and that predator-proof fencing, feral pig control, and forest restoration are included as part of the project. Natural history studies should not be included as a form of compensatory mitigation. The inclusion of the first three measures is appropriate since public trust resources will be taken, but the level of compensation should be commensurate with the ultimate and cumulative impact that this project has on the region's wildlife, and this cannot be assessed *a priori*. A shorter ITP period would allow assessment to occur during the operation of the project, and the scope of appropriate mitigation projects be revisited. We also wonder if

7 the developer has considered the removal of feral cats as a potential form of mitigation. Feral cats are a significant problem on O'ahu and are a major source of bird mortality, especially to the endangered water birds. We therefore suggest the developer include feral cat removal as a potential form of mitigation.

8 Wind turbines kill hundreds of thousands of birds annually in the U.S. alone, and when added to morality from a variety of other anthropogenic causes, including feral cats and non-native mongooses and rats, commercial fishing, building collisions, power line and tower collisions and

electrocution, pesticides and pollution, and habitat loss, even our most common species are in precipitous decline. These impacts are cumulative and consequently all major sources of mortality must be addressed. ABC is concerned about the impact of the project on migratory bird species found in the vicinity of the proposed project site. Table 3-46 lists nearly 80 species that are known to be found in the vicinity of the project. Although only a small fraction (11) were actually seen during the surveys conducted for the study, this may reflect a problem with survey methodology, which can be influenced by many factors. Predictive models are sometimes useful, but are only as good as the information that we plug into them. That is another argument for not granting a 21-year ITP before more information is available.

9

10 It should also be noted that collisions are not the only impacts that wind turbines can have on birds. New studies are revealing serious impacts in the form of displacement. In the Great Plains, for example, USGS scientists recently found that wind energy projects were influencing the distribution of breeding grassland birds, also leading to serious population declines (Shaffer and Buhl 2015). The authors express concern, based on their findings, that new wind facilities are often being placed in "prime wildlife habitat." That observation confirms a recent study by ABC that found tens of thousands of turbines already existing in sensitive bird habitat and tens of thousands more planned. This will be an important consideration as Hawai'i moves towards 100% renewable energy, especially given the number of threatened and endangered birds that reside in the archipelago.

11 As pointed out in our May 22, 2014 letter to Regional Director Robyn Thorson, the numbers of recorded takes of protected species at wind energy sites in Hawai'i may currently be within legal limits established by incidental take permits, but they are not trivial, and, as you know, these are likely underestimates of the actual mortality. In addition, the loss of even a few endangered species can have a negative impact on their populations. Another reason for concern is that there are many additional wind energy facilities being planned for the Hawaiian Islands, given the recent legislation that the state's energy will become 100 percent renewable. ABC is concerned about the growing, cumulative impact that construction of this many sites would have on the Islands' endangered endemic birds, as well as birds protected by the Migratory Bird Treaty Act. The siting and cumulative impact of this many wind and solar projects on federally-protected birds and the Hawaiian hoary bat is going to become an increasingly troublesome issue.

12

13 With wind energy, siting is critical. The Precautionary Principle should apply here, as with Hawai'i's endangered endemic birds there is little room for error. Such an approach would be highly consistent with Secretary Jewell's recently announced landscape planning and mitigation initiative. Opposition to poorly-sited wind energy is growing among the American public. However, properly sited wind energy projects have an important place in our country's energy portfolio as we strive to reduce reliance on fossil fuels and reduce emissions of greenhouse

gases. This is especially true in Hawai‘i, a state with high energy costs and where a federal/state partnership is actively promoting ambitious goals for “green energy.”

Thank you for your attention to this matter. ABC will be watching this situation closely. Please feel free to contact us if you have any questions.

References

Casey, M. 2015. 30,000 turbines located in critical bird habitats. CBS News, May 20, 2015: http://www.cbsnews.com/news/30000-wind-turbines-located-in-critical-bird-habitats/

McGill, B. 2015. Hawai’i aims for 100 percent renewable power by 2045. Scientific American: http://www.scientificamerican.com/article/Hawai’i-aims-for-100-percent-renewable-power-by-2045/

Loss, S.R., Will, T., and Marra, P.P. 2013. Estimates of bird collision mortality at wind facilities in the contiguous United States. Biological Conservation 168: 201–209.

Manville, A.M. 2005. Bird strikes and electrocutions at power lines, communication towers, and wind turbines: State of the art and state of the science –Next steps toward mitigation. USDA Forest Service Gen. Tech. Rep. PSW-GTR-191: 1051-1064.

Shaffer, J.A., and Buhl, D.A. 2015. Effects of wind-energy facilities on breeding grassland bird distributions. Conservation Biology. Early online publication DOI 10.111/conbi.12569.

Smallwood, S.K. 2012. Comparing bird and bat fatality-rate estimates among North American wind-energy projects. Wildlife Society Bulletin 37 (1): 19–33.

Sincerely,

Michael Hutchins, Ph.D.
Director, Bird Smart Wind Energy Campaign

TETRA TECH

April 1, 2016

Michael Hutchins, Ph.D., Director, Bird Smart Wind Energy Campaign
American Bird Conservancy
4249 Loudoun Ave
The Plains VA 20198

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Hutchins:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter dated August 10, 2015, commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Draft Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment ORG-6.1*: Given that this project has the potential to harm federally-protected species, including the threatened Newell's Shearwater, the endangered Hawaiian Coot, Hawaiian Moorhen, Hawaiian Duck, Hawaiian Goose, and Hawaiian hoary bat, ABC is glad to see the Service require a more detailed EIS be conducted, instead of a less detailed Environmental Assessment (EA). We suspect such detail will be necessary for planning any wind energy facility in Hawai'i given the number of federally-protected species present in this biologically rich island state.*

Response ORG-6.1: Thank you for the comment on the level of environmental analysis being conducted. This is a joint Federal and State EIS evaluating both the federal proposed action (approval of the Habitat Conservation Plan (HCP) and issuance of the Incidental Take Permit (ITP)) as well as the Applicant's proposed action (construction and operation of the wind farm).

Comment ORG-6.2*: None of these species is listed as occurring on the wind energy project site per se, and for those species that do occur in the area, the HCP considers the habitat unsuitable (e.g., wetland species such as Hawaiian Stilt and Moorhen). This makes it appear at least on the surface that the risk to threatened and endangered species is minimal.*

Response ORG-6.2: As with most wind energy projects in Hawaii the greatest potential for project-related impacts to listed species is associated with individuals transiting through the wind farm site. As noted in the EIS, the Na Pua Makani wind farm site does not contain suitable breeding or foraging habitat for the Newell's shearwater, Hawaiian goose, Hawaiian short-eared owl, Hawaiian common moorhen, Hawaiian stilt, Hawaiian coot, or Hawaiian duck. Lack of suitable habitat, and thus likelihood of occurring in the wind farm site on a regular basis does decrease risk to these species. The Hawaiian hoary bat has the potential to forage and roost

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737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

within the wind farm site. The level of anticipated risk is reflected in the estimates of take for each of these species outlined in the HCP.

Comment ORG-6.3*: That being said, we still have concerns. Our first concern is the plan to issue an Incidental Take Permit (ITP) for the period of 21 years (p. 226). This seems to be an inordinate amount of time to issue a permit for killing ESA-listed species, especially when there is no baseline data on bird or bat mortality at this site. We respectfully request the ITP be issued for a three-year trial period. That way, further options for mitigation and compensatory compensation could be assessed.*

Response ORG-6.3: As described in Section 8.3 of the HCP, a shorter permit term (i.e., one less than 21 years) was an alternative considered but not carried forward; this has been added to the Section 2.5 of the Second Draft EIS for clarification. It would be inconsistent with the USFWS 5-Point Policy, which requires that the USFWS consider the expected duration of the covered activities. Additionally, a reduced permit term has the potential to create a legal liability for the applicant associated with non-compliance with the ESA if additional incidental take were to occur outside of the permit term during the remaining years of Project operation. The Na Pua Makani HCP includes opportunities for adaptive management. While there is no site-specific mortality data, take estimates did take into account fatality patterns observed at the adjacent Kahuku wind farm and the Kawailoa wind farm, also located on the north shore of Oahu. Post-construction mortality monitoring is a fundamental component of the HCP, the results of which will be used to gauge compliance with the ITP. Routine reporting requirements ensure that there is regular communication between the applicant and the USFWS regarding project-related impacts and compliance with authorized take limits under the ITP and mitigation obligations.

Comment ORG-6.4*: The HCP contains no explanation of how such annual losses, especially when combined with losses from other wind and solar projects and associated power lines and towers in the archipelago, would cumulatively impact the listed species across the entire state. This seems to be a major weakness of the Draft HCP. It would be irresponsible to assess the impact of wind energy projects on a case-by-case basis independent of other projects that already exist or are planned for the area or region.*

Response ORG-6.4: A discussion of cumulative impacts to the covered species has been added to the HCP and is included in Section 4.11 of the EIS. The HCP also includes discussion of the potential for population level impacts; no population-level impacts are anticipated for any of the covered species.

Comment ORG-6.5*: The HCP lists a number of efforts that will be employed in an attempt to reduce the loss of birds and bats at the project. While we applaud the developer for being willing to include such mitigation, we note that many of the suggested methods have not been tested for their efficacy in reducing bird and bat kill. Should this project be built, we would like to see the 0.9 miles of above-ground power lines and towers conform to Avian Power Line Interaction Committee (APLIC) standards for the reduction of bird collisions (http://www.aplic.org/) and be retrofitted to reduce bird mortality accordingly.*

Response ORG-6.5: As stated in Chapter 2 of the EIS and the HCP, new above-ground portions of power lines associated with the Na Pua Makani project will use line marking devices to improve visibility to birds and follow Avian Protection Plan Guidelines (APLIC 2012).

Comment ORG-6.6*: We are happy to see that the project plans call for a number of compensatory mitigation projects, and that predator-proof fencing, feral pig control, and forest restoration are included as part of the project. Natural history studies should not be included as a form of compensatory mitigation. The inclusion of the first three measures is appropriate since public trust resources will be taken, but the level of compensation should be commensurate with the ultimate and cumulative impact that this project has on the region's wildlife, and this*

cannot be assessed a priori. A shorter ITP period would allow assessment to occur during the operation of the project, and the scope of appropriate mitigation projects be revisited.

Response ORG-6.6: Thank you for your comment regarding mitigation. The selection of mitigation measures included in the Na Pua Makani HCP were developed in collaboration with the Applicant with input from USFWS and Hawaii Division of Forestry and Wildlife (DOFAW). The inclusion of research for the Hawaiian hoary bat stems from the significant need for information regarding the status and life history of this species. The Hawaiian Hoary Bat Recovery Plan (USFWS 1998) describes the first two recovery priorities as: 1) research essential to the conservation of the subspecies and 2) protecting and managing current populations. Therefore, the Applicant has proposed mitigation that includes a combination of Hawaiian hoary bat research and forest management restoration in an area used by Hawaiian hoary bats. The Hawaii Endangered Species Recovery Committee (ESRC), which includes members from the USFWS, DOFAW, U.S. Geological Survey and others, recently put forth recommendations for Hawaiian hoary bat mitigation that apply to all HCP applicants in Hawaii, including Na Pua Makani Power Partners, which include priority research topics which will further the understanding of the species and will be used to inform non-research oriented mitigation for this species in Hawaii. The combination of research and forest restoration under the Project HCP is consistent with Hawaiian Hoary Bat Recovery Plan (USFWS 1998) priorities and ESRC Bat Guidance (DOFAW 2015). Additional discussion of the rationale for including research as mitigation for the Hawaiian hoary bat has been added to the Second Draft EIS. A reduced permit term is not being considered as it would not cover the full operating period of the Project.

Comment ORG-6.7*: We also wonder if the developer has considered the removal of feral cats as a potential form of mitigation. Feral cats are a significant problem on O‘ahu and are a major source of bird mortality, especially to the endangered water birds. We therefore suggest the developer include feral cat removal as a potential form of mitigation.*

Response ORG-6.7: Feral cat trapping at Newell’s shearwater colonies has been shown to be an effective means for reducing mortality and is an appropriate form of mitigation for impacts to this species; however, due to the low level of anticipated take of Newell’s shearwaters associated with the Na Pua Makani project the USFWS and DOFAW have recommended the applicant contribute mitigation funds to the National Fish and Wildlife Foundation (NFWF) fund. The NFWF fund is a general mitigation fund established for the expressed purpose of mitigating impacts to Newell’s shearwaters, with the overall intent of pooling resources to fund larger management projects, such as feral cat trapping, targeted at the recovery of Newell’s shearwater than could have been supported through smaller scale investments such as the Na Pua Makani project alone.

Waterbird mitigation, which involves fencing and other management measures at Hamakua Marsh located downstream from the largest remaining wetland in the State, was developed by the Applicant in consultation with USFWS and DOFAW. It was identified as a priority by the agencies and based on the best available science and site-specific information is expected to provide a net benefit to each waterbird species covered under the HCP.

Comment ORG-6.8: *Wind turbines kill hundreds of thousands of birds annually in the U.S. alone, and when added to morality from a variety of other anthropogenic causes, including feral cats and non-native mongooses and rats, commercial fishing, building collisions, power line and tower collisions and electrocution, pesticides and pollution, and habitat loss, even our most common species are in precipitous decline. These impacts are cumulative and consequently all major sources of mortality must be addressed.*

Response ORG-6.8: Section 4.10 and 4.11 of the EIS provide a discussion of cumulative impacts to non-listed and listed bird species, respectively, including species protected by the Migratory Bird Treaty Act. A variety of anthropogenic factors are considered. An additional discussion of cumulative impacts has been added to the Second Draft HCP.

Comment ORG-6.9*: ABC is concerned about the impact of the project on migratory bird species found in the vicinity of the proposed project site. Table 3-46 lists nearly 80 species that are known to be found in the vicinity of the project. Although only a small fraction (11) were actually seen during the surveys conducted for the study, this may reflect a problem with survey methodology, which can be influenced by many factors. Predictive models are sometimes useful, but are only as good as the information that we plug into them. That is another argument for not granting a 21 - year ITP before more information is available*

Response ORG-6.9: The project surveys are meant to provide a snapshot of species likely to occur in the wind farm site. The EIS lists all species that have been documented in the vicinity of the project based on larger scale survey efforts conducted outside of the scope of this project, and including those with a very low likelihood of occurring within the wind farm site. Additionally, the USFWS has four years of data on all migratory bird fatalities at the adjacent Kahuku wind farm, and therefore has a high level of confidence regarding what bird species actually transit through the area. Measures included in the Project HCP for avoiding and minimizing impacts to listed species will also benefit migratory birds.

Comment ORG-6.10*: It should also be noted that collisions are not the only impacts that wind turbines can have on birds. New studies are revealing serious impacts in the form of displacement. In the Great Plains, for example, USGS scientists recently found that wind energy projects were influencing the distribution of breeding grassland birds, also leading to serious population declines (Shaffer and Buhl 2015). The authors express concern, based on their findings, that new wind facilities are often being placed in "prime wildlife habitat." That observation confirms a recent study by ABC that found tens of thousands of turbines already existing in sensitive bird habitat and tens of thousands more planned. This will be an important consideration as Hawai'i moves towards 100% renewable energy, especially given the number of threatened and endangered birds that reside in the archipelago.*

Response ORG-6.10: Displacement of birds is a potential impact for wind energy projects sited in prime wildlife habitat. However, as described in Section 3.8 of the EIS the Project is not situated in prime wildlife habitat, but rather in an area of active agricultural development. Therefore, the Project is not anticipated to result in displacement of listed or migratory bird species as they are not expected to reside within the wind farm site due to lack of suitable habitat.

Comment ORG-6.11*: As pointed out in our May 22, 2014 letter to Regional Director Robyn Thorson, the numbers of recorded takes of protected species at wind energy sites in Hawai'i may currently be within legal limits established by incidental take permits, but they are not trivial, and, as you know, these are likely underestimates of the actual mortality. In addition, the loss of even a few endangered species can have a negative impact on their populations.*

Response ORG-6.11: Population-level impacts are addressed for each of the Covered Species in the Project HCP. In accordance with Hawaii state regulations, the mitigation outlined in an HCP must be designed to have a net benefit to the species. The HCP also includes many opportunities for adaptive management and evaluating Project-related impacts on an ongoing basis for the life of the Project. This enables the incorporation of new science and understanding of population levels over the term of the ITP. The USFWS continues to work with the USGS regarding development and application of statistical estimators to post-construction mortality monitoring data; tools used to date which include the Evidence of Absence software intended for rare events such as the take of listed species which provide a very conservative assessment of actual fatality levels. It should be noted that the Applicant has also conservatively chosen to include species in the HCP for which risk of Project-related impacts is very low. To date, there have been no waterbird fatalities documented and wind farms in Hawaii and there are only three Hawaiian geese on Oahu.

***Comment ORG-6.12**: Another reason for concern is that there are many additional wind energy facilities being planned for the Hawaiian Islands, given the recent legislation that the state's energy will become 100 percent renewable. ABC is concerned about the growing, cumulative impact that construction of this many sites would have on the Islands' endangered endemic birds, as well as birds protected by the Migratory Bird Treaty Act. The siting and cumulative impact of this many wind and solar projects on federally-protected birds and the Hawaiian hoary bat is going to become an increasingly troublesome issue.*

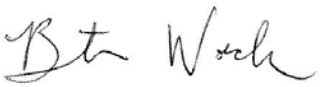
Response ORG-6.12: Sections 4.10 and 4.11 of the EIS include an assessment of cumulative effects to birds, including those protected by the Migratory Bird Treaty Act. A more detailed discussion of cumulative impacts has been added to the Na Pua Makani HCP. To our knowledge, no other land-based wind farms are being planned on Oahu; however, the existing wind farms have been addressed in the cumulative effects analysis. Future wind project proposed in Hawaii will undergo their own NEPA environmental review which will include an analysis of cumulative effects to listed species including the potential for population-level effects.

***Comment ORG-6.13**: With wind energy, siting is critical. The Precautionary Principle should apply here, as with Hawai'i's endangered endemic birds there is little room for error. Such an approach would be highly consistent with Secretary Jewell's recently announced landscape planning and mitigation initiative. Opposition to poorly-sited wind energy is growing among the American public. However, properly sited wind energy projects have an important place in our country's energy portfolio as we strive to reduce reliance on fossil fuels and reduce emissions of greenhouse gases. This is especially true in Hawai'i, a state with high energy costs and where a federal/state partnership is actively promoting ambitious goals for "green energy."*

Response ORG-6.13: Many factors go into wind energy project siting. Chapter 2 of the EIS describes considerations that were taken into account during siting of the Project. Given its location in Hawaii and existing land uses, risk to listed species associated with the Project is low compared to other locations in Hawaii (i.e., it is not located near seabird breeding colonies, concentrations of waterbirds or shorebirds, etc.). Estimates of Project-related take, and the associated requested authorized take, for each species covered under the HCP are based on very conservative assumptions about risk.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

ORG-7

Woeck, Brita

From:	aaron_nadig@fws.gov on behalf of NaPuaMakanihcp, FW1 <napuamakanihcp@fws.gov>
Sent:	Monday, August 17, 2015 12:24 PM
To:	Woeck, Brita
Cc:	Jodi Charrier; Leila Gibson
Subject:	Fwd: Na Pua Makani HCP and draft EIS - Kahuku Community Association's comments
Attachments:	Petitions DEIS.pdf
Categories:	Blue Category

---------- Forwarded message ----------
From: **Kent Fonoimoana-TRIsland** <kent@trisland.com>
Date: Mon, Aug 10, 2015 at 11:31 PM
Subject: Na Pua Makani HCP and draft EIS - Kahuku Community Association's comments
To: "NaPuaMakanihcp@fws.gov" <NaPuaMakanihcp@fws.gov>

To: Richard Hannan, Deputy Regional Director, Pacific Region, U.S. Fish and Wildlife Service, Portland, Oregon.

From: Kent Fonoimoana, President - Kahuku Community Association (KCA)
PO Box 122
Laie, Hawaii 96762

Re: KCA's comments on the draft Environmental Impact Statement (DEIS) for Champlin Wind Energy's (dba Na Pua Makani) proposed wind energy facility proposed for Kahuku, O'ahu, Hawaii.

To whom it may concern,

Please accept the following comments on the DEIS for the proposed Na Pua Makani wind energy facility proposed for Kahuku, Hawaii. KCA's comments will include several petitions in opposition to this proposal as well as comments from concerned citizens. These on-line and door-to-door petitions were submitted to KCA with the intent to include this information as part of our comments on the draft EIS.

1 Following the 2010 installation of Firstwind's 12 turbine 30 megawatt facility in Kahuku, KCA took a position to oppose any subsequent installation of industrial wind facilities within the Kahuku district. The Ko'olauloa Neighborhood Board, which represents several adjoining communities, voted unanimously to oppose Na Pua Makani's proposal.

2 Our community opposes this proposal due to the impacts on; human health and safety, property valuation, curtailment of roof top solar, endangered and protected species, depletion of usable agricultural land, visitor's impressions and intense visual impacts.

3 The Kahuku community is a close knit community and we stand in unison to strongly oppose Na Pua Makani's project. Our opposition does not mean we oppose renewable energy. The vast majority of Kahuku's residents support renewable energy. However, we have done our share and we want to preserve our identity and our collective well-being.

4 The Honolulu city council expressed this sentiment eloquently in their statement regarding land use policies "The council finds and declares that there is a significant public interest served in protecting and preserving the aesthetic beauty of the city. Further, the council finds that the indiscriminate and uncontrolled erection, location, and height of antennas (or similar structures) can be and are detrimental to the city's appearance and, therefore this can cause significant damage to the community's sense of well-being, particularly in residential areas, and can further harm the economy of the city with its tourist trade which relies heavily on the city's physical appearance."

Please review the attached petitions and comments and consider foregoing approval of the DEIS.

Mahalo,

Kent Fonoimoana – President Kahuku Community Association

change.org

Recipient: William Aila, David Ige, and Randy Iwase

Letter: Greetings,

Stop the Champlin Wind Energy Project in Kahuku

Aloha,

5 Champlin Wind Energy is proposing a 45-90 megawatt wind turbine facility in Kahuku. This translates into 15-30 fifty story tall machines in addition to the 12 existing forty two story tall machines we already have. Portions of the project will be upwind and in very close proximity to Kahuku Schools and community. The existing 30 megawatt facility coupled with this new proposal will effectively surround Kahuku on three sides which is unacceptable and irresponsible siting policy.

We, the undersigned, strongly reject this project for the following reasons:

6 1- Health

There are independent studies that support the existence of adverse impacts on humans who live in close proximity to these machines. Sleeplessness or sleep deprivation caused by noise and vibration has had detrimental impacts on folks already living in close proximity to windmills. People across the nation and worldwide are suffering vertigo, headaches, irritability, and a host of other ailments that they attribute to large industrial windmills erected too close to their homes. The subsonic sound created is known as "Infra-sound" and is inaudible to most folks. The condition has been termed "Wind Turbine Syndrome" and is gaining credence as more and more folks are reporting ill effects.

Placing these machines upwind from our schools, hospital and community may impact the health and wellbeing of our children, elderly and common residents.

7 2- Safety

Current safety buffer zones between these machines and occupied structures are woefully inadequate and the City has acknowledged this dificiency. Placing 500' tall machines with moving parts 1200' upwind and in close proximity to Kahuku

schools and community creates an untenable safety hazard. It is not if, but when a major hurricane strikes Oahu, Kahuku residents will be unnecessarily endangered *due to poor siting policy. These machines include three 150' blades at 300'* diameter that are designed to be light and aerodynamic. Each of the three blades on a single turbine weigh in excess of 14,000 lbs. and could become windblown debris that would likely impact human life. To date, not one wind turbine worldwide has been subjected to an 'Iniki type event. To surround Kahuku community with these machines is unacceptable, irresponsible and may be a life altering disaster for some of us who live here.

3- Environmental Impact

8 *There is a significant impact on avian and bat species. The EIS of the First Wind* project as well as this proposal failed to address all avian species as the impacts on 'Iwa or Frigate bird was not studied. There is a robust colony of Wedge Tailed
9 Shearwaters in close proximity to the proposed site. The FAA required flashing red
10 night lights contribute to light pollution and reportedly attracts avian and bat species into the blades that are spinning at the rate of 150-180+ mph. Installation
11 of these facilities often require the removal of surface vegetation as well as the installation of unpaved roads. This practice adds to flooding, topsoil loss as well as increases in "brown water" runoff that may impact our flood prone community and near shore waters.

4- Financial Impacts on the Community

12 Statistical studies show that wind farms placed in close proximity to residential homes has a detrimental impact on the value of private real property. Across the country, realtors have noted increased difficulty in selling homes that are near wind energy facilities. Also, it is more difficult to sell a home that is in close proximity to wind farms and many US municipalities now require the developer to place monies in an escrow account to cover losses suffered by private homeowners whose home values drop or can't be timely sold and if the homeowner choses to move *away from wind farms due to adverse impacts.*

13 Additionally, HECO has stated that Kahuku is at or beyond the saturation rate for renewable energy. The existing wind energy facility has usurped private consumer's options for photo-voltaic panel installation and the addition of another *facility in Kahuku will more than likely severely limit or prevent private citizens* options to utilize other renewables. According to HECO, should a homeowner desire to install PV, there may be a discriminatory fee involved for Kahuku consumers as well as other consumers who live near or downstream of a wind energy facility. Also, the power delivered fluctuates greatly and there is a
14 detrimental impact on privately owned electrical devices of nearby consumers.

5- Epilogue

15 *The State and Federal Government have initiated a policy to commit to renewable* energy yet the vast majority of State and Federally owned buildings lack PV panels or any other renewable energy source. The federal government prohibits the
16 installation of wind mills in close proximity to the Kahuku Army training facility as well as the James Campbell Bird Refuge. The health and welfare of our avian friends are very important and deserve protections. Kahuku residents deserve the same.

17 Kahuku community has done its share for Oahu and it's time for others to do the same. Oahu's rural communities to not want to bear the brunt of our island's *energy needs*.

Signatures

Name	Location	Date
Kent Fonoimoana	Kahuku, HI	2013-12-16
Niue Suschnigg	Kaaawa, HI, United States	2013-12-16
Ben Shafer	Hauula, HI, United States	2013-12-16
Tanoai Reed	Laie, HI, United States	2013-12-16
Angela Huntemer	Kahuku, HI, United States	2013-12-16
Lopaka Aku	Kaneohe, HI, United States	2013-12-16
Bonnie Abzug	Haleiwa, HI, United States	2013-12-16
Carl Hubbell	Laie, HI, United States	2013-12-16
Suzanne Reed	Laie, HI, United States	2013-12-16
James Mccarron	Rush City, MN, United States	2013-12-16
Steven Nihipali	San Antonio, TX, United States	2013-12-16
Coreen Williams	HAUULA, HI, United States	2013-12-16
Lani Tanoai	Kailua-Kona, HI, United States	2013-12-16
Rita Kahaialii	Makawao, HI, United States	2013-12-16
Alani Vaioleti	Kahuku, HI, United States	2013-12-16
Gaye Aalona	Lakewood, WA, United States	2013-12-16
Brian Walsh	Kaaawa, HI, United States	2013-12-16
Susana Wong	Aiea, HI, United States	2013-12-16
Tiffany Reed	Panama City, FL, United States	2013-12-16
JEFFERY COMPOC	KAHUKU, HI, United States	2013-12-16
Jess Kaala Lundgren	Waialua, HI, United States	2013-12-16
Shelley Williams	Madison, AL, United States	2013-12-16
sina auelua	Laie, HI, United States	2013-12-16
Ben Shane	Metairie, LA, United States	2013-12-16
Joshua Bohnet	Provo, UT, United States	2013-12-16
Mae Bruhn	Kaneohe, HI, United States	2013-12-16
Lloyd Hekau	Kahuku, HI, United States	2013-12-16
Barbara Phillip	Kahuku, HI, United States	2013-12-16
rosalie Slater	HNL, HI, United States	2013-12-16
Cindy Tutor	Laie, HI, United States	2013-12-16

Name	Location	Date
Latu Hafoka	Kahuku, HI, United States	2013-12-16
Oreta Tupola	Kahuku, HI, United States	2013-12-16
Robin Kaye	Lānaʻi City, HI, United States	2013-12-16
David Niu	Laie, HI, United States	2013-12-16
beverly zigmond	lanai city, HI, United States	2013-12-16
Mareva Johnson	Las Vegas, NV, United States	2013-12-16
geoffrey paterson	kailua, HI, United States	2013-12-16
Kathryn Vaioleti	Magna, UT, United States	2013-12-16
John Schaumburg	Lanai City, HI, United States	2013-12-16
Sam Moe	Laie, HI, United States	2013-12-16
George Outlaw	Honolulu, HI, United States	2013-12-16
Harold Toelupe	Laie, HI, United States	2013-12-16
Fung sim Wong	Hauula, HI, United States	2013-12-16
Michael Allred	SLC, UT, United States	2013-12-16
Marina Toelupe	West Valley City, UT, United States	2013-12-16
Ron McOmber	Lana'i, HI, United States	2013-12-16
lauren achitoff	Kaaawa, HI, United States	2013-12-16
Burton Greene	Hauula, HI, United States	2013-12-16
Panos Prevedouros	Honolulu, HI, United States	2013-12-16
vaifoou vaioleti	kahuku, HI, United States	2013-12-16
Kimo Sutton	Honolulu, HI, United States	2013-12-16
Dr. Kioni Dudley	Kapolei, HI, United States	2013-12-16
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Clare Carr	Waialua, HI, United States	2013-12-16
Gil Riviere	Waialua, HI, United States	2013-12-16
Brew Rudd	Hauula, HI, United States	2013-12-16
Steven Stone	Wahiawa, HI, United States	2013-12-16
Toni Auld Yardley	Honolulu, HI, United States	2013-12-16
Marian Grey	Honolulu, HI, United States	2013-12-16
Delsa Moe	Laie, HI, United States	2013-12-16
Kahi Wight	Honolulu, HI, United States	2013-12-16
robert trotter	kahuku, HI, United States	2013-12-16

Name	Location	Date
ROBERTS LEINAU	Haleiwa, HI, United States	2013-12-16
Glen Maghanoy	Kahuku, oahu, HI, United States	2013-12-16
Robert Smith	Haleiwa, HI, United States	2013-12-16
Michaela Stejskalová	Praha, Czech Republic	2013-12-16
Erna Ah Sam	Honolulu, HI, United States	2013-12-16
Pamela Boyar	Kailua, HI, United States	2013-12-16
Thomas Thompson	Honolulu, HI, United States	2013-12-16
David Cordero	Honolulu, HI, United States	2013-12-16
Tuika Faumuina	Honolulu, HI, United States	2013-12-16
Theresa Tevaga	Hauula, HI, United States	2013-12-16
Kanalu Okimoto	Laie, HI, United States	2013-12-16
Evern Williams	Honolulu, HI, United States	2013-12-16
Jamie Reid	Laie, HI, United States	2013-12-16
Shennandoah Toelupe	Provo, UT, United States	2013-12-16
ELLYSHA WOLFGRAMM	SLC, UT, United States	2013-12-16
rudy lucero	Honolulu, HI, United States	2013-12-16
Lindy Carlson	French Polynesia	2013-12-16
Kelli Kepka	Waianae, HI, United States	2013-12-16
Gina Eaves	Waialua, HI, United States	2013-12-16
Ornela Mebelli	Tirane, , Albania	2013-12-16
neva fotu	Kahuku, HI, United States	2013-12-16
Bryan Crump	Ewa Beach, HI, United States	2013-12-16
Rosemary Aubrey	Kent, WA, United States	2013-12-16
Solia Tatafu	Kahuku, HI, United States	2013-12-16
Lani Latu	Salt Lake City, UT, United States	2013-12-16
Kawahinehelelani Toelupe	Springville, UT, United States	2013-12-16
lily kava	Kahuku, HI, United States	2013-12-16
Benjamin Faustino	Waipahu, HI, United States	2013-12-16
Robin Fiu	Kahuku, HI, United States	2013-12-16
Lisa Lessing	Haleiwa, HI, United States	2013-12-16
Aurie Sorensen	Laie, HI, United States	2013-12-16
Lori Vimahi	Kahuku, HI, United States	2013-12-16

Name	Location	Date
Rochelle Pereira	Piratini, RS, Brazil	2013-12-16
Gary Kamauoha	Kahuku, HI, United States	2013-12-16
William Quinlan	Haleiwa, HI, United States	2013-12-16
Kathleen Brindo	Lanai City, HI, United States	2013-12-16
Mona IkaKoula	Kahuku, HI, United States	2013-12-16
Vaiola Neiufi	Kahuku, HI, United States	2013-12-16
Josiah Hubbell	Hauula, HI, United States	2013-12-16
Tasi Seui	Laie, HI, United States	2013-12-16
Dallin Muti	Laie, HI, United States	2013-12-16
janice henkel	hauula, HI, United States	2013-12-16
Christell Benkman	Kahuku, HI, United States	2013-12-16
Denise Reed	Hillsboro, OR, United States	2013-12-16
Jaron Hurlbut	kahuku, HI, United States	2013-12-16
Uilani Stokes	Lanai City, HI, United States	2013-12-16
Elaine Nishime	Honolulu, HI, United States	2013-12-17
Jan CANEEN	Laie, HI, United States	2013-12-17
lisa galloway	Lanai City, HI, United States	2013-12-17
Michael Shaw	Lana'i City, HI, United States	2013-12-17
Iwalani Su`apaia	Turlock, CA, United States	2013-12-17
Cynthia Manubag	Irving, TX, United States	2013-12-17
Diane Preza	Lanai City, HI, United States	2013-12-17
christopher woodward	hauula, HI, United States	2013-12-17
Jessica dos Santos	Kahuku, HI, United States	2013-12-17
Jerry Fredricksen	Laie, HI, United States	2013-12-17
ARMINTA NISHIMURA	HONOLULU, HI, United States	2013-12-17
April Purcell -Ah Nee	Laie, HI, United States	2013-12-17
Taliilagi Galeai	Laie, HI, United States	2013-12-17
lemafoe talataina	Marysville, WA, United States	2013-12-17
kalae aalons	Punaluu, HI, United States	2013-12-17
Hinano Tangaro	Laie, HI, United States	2013-12-17
Latoya Wily	Laie, HI, United States	2013-12-17
Christopher Ramirez	Kailua, HI, United States	2013-12-17

Name	Location	Date
Charles Russell	Los Angeles, CA, United States	2013-12-17
Kanani Fredrick	Kahului, HI, United States	2013-12-17
Delicia Tailele	Laie, HI, United States	2013-12-17
Janet Teo	Hauula, HI, United States	2013-12-17
Leona Lolohea	Kahuku, HI, United States	2013-12-17
bruce harvey	lanai city, HI, United States	2013-12-17
Kelly Tsutsui	Haleiwa, HI, United States	2013-12-17
Cora Sanchez	Haleiwa, HI, United States	2013-12-17
Tiana Henderson	Laie, HI, United States	2013-12-17
Blaise-Evans Heneralau	Kailua, HI, United States	2013-12-17
LeeAnn Scovel	Laie, HI, United States	2013-12-17
Titi Ha'o	Kahuku, HI, United States	2013-12-17
Lila Magalei	Kahuku, HI, United States	2013-12-17
Leina Ulii	Laie, HI, United States	2013-12-17
William Ulii	Laie, HI, United States	2013-12-17
ida aspinall	Waipahu, HI, United States	2013-12-17
Chelsea Wily	Laie, HI, United States	2013-12-17
Tatiana Panee	Hauula, HI, United States	2013-12-17
Rhoda Libre	Kauai, HI, United States	2013-12-17
Malie Chong	Kahuku, HI, United States	2013-12-17
faleaka faleta	kahuku, HI, United States	2013-12-17
Ramona Okimoto	Laie, HI, United States	2013-12-17
Jack Damuni	Laie, HI, United States	2013-12-17
Manu Sekona	Honolulu, HI, United States	2013-12-17
david ga	Laie, HI, United States	2013-12-17
Cury Okimoto	Laie, HI, United States	2013-12-17
Patricia Hopkins	Le Roy, NY, United States	2013-12-17
Amber Castillo-Puu	Kaneohe, HI, United States	2013-12-17
Kaipo Pearl	Kahuku, HI, United States	2013-12-17
sone mapu	HAUULA, HI, United States	2013-12-17
Kerry Moea'i	Kahuku, HI, United States	2013-12-17
Loren Holly	Laie, HI, United States	2013-12-17

Name	Location	Date
Cynthia Frith	Kailua, HI, United States	2013-12-17
Valu Alapa	Kaaawa, HI, United States	2013-12-17
Karen Lavaki	Laie, HI, United States	2013-12-17
Selby Fauatea	Lehi, UT, United States	2013-12-17
Melanie Hiram	Hauula, HI, United States	2013-12-17
Sonne Campbell	Laie, HI, United States	2013-12-17
Spencer Mauai	Laie, HI, United States	2013-12-17
RINA LESSARY	Waianae, HI, United States	2013-12-17
Angela Breene	Haleiwa, HI, United States	2013-12-17
Jennifer John	Honolulu, HI, United States	2013-12-17
Joshua Noga	Hauula, HI, United States	2013-12-17
Lyon Logan	Laie, HI, United States	2013-12-18
Lilly Niu	Kahaluu, HI, United States	2013-12-18
Randi Freitas	Haleiwa, HI, United States	2013-12-18
Denice Kuehu	Waialua, HI, United States	2013-12-18
George Wallace	Hauula, HI, United States	2013-12-18
Pono Kealoha	Pearl City, HI, United States	2013-12-18
Amy Lutey	Haleiwa, HI, United States	2013-12-18
jerry miller	haleiwa, HI, United States	2013-12-18
Rochelle Zink	Kaneohe, HI, United States	2013-12-18
WILLIAM AHQUIN	HERRIMAN, UT, United States	2013-12-18
Kurt Fonoimoana	Kahuku, HI, United States	2013-12-18
Jared Anderson	Kahuku, HI, United States	2013-12-18
Caroline Kong	Honolulu, HI, United States	2013-12-18
Francisco Tipoti	Kahuku, HI, United States	2013-12-18
Jan Hamey	Kahuku, HI, United States	2013-12-18
C Mellor	Haleiwa, HI, United States	2013-12-18
Lovette Ubando	Honolulu, HI, United States	2013-12-18
Stacy Walking Heart	Missoula, MT, United States	2013-12-18
travis ingbino	laie, Gambia	2013-12-18
Amanda Boehm	Haleiwa, HI, United States	2013-12-19
Mahina Chillingworth	Wahiawā, HI, United States	2013-12-19

Name	Location	Date
Gen Touli	Laie, HI, United States	2013-12-19
Rina Fa	Laie, HI, United States	2013-12-19
Brynn Miranda	Haleiwa, HI, United States	2013-12-19
Heidi Sawdon	Everett, WA, United States	2013-12-19
Amy Farias	Honolulu, HI, United States	2013-12-19
Mehana Rich	Haleiwa, HI, United States	2013-12-19
James tani	Kahuku, HI, United States	2013-12-19
Faleula Sappa	Pago Pago,	2013-12-19
Charlene Acosta	Honolulu, HI, United States	2013-12-19
Todd Tamura	Laie, HI, United States	2013-12-19
Taniela Falevai Jr.	Kahuku, HI, United States	2013-12-19
Amanda Casabianca-Whelan	Piedmont, CA, United States	2013-12-19
Stephanie Toso	Kahuku, HI, United States	2013-12-19
vasa taualii	Kahuku, HI, United States	2013-12-20
Helene Salanoa	Smithfield, UT, United States	2013-12-21
Tamalalee Kahanu	Kaneohe, HI, United States	2013-12-21
Hillary Togafau	Hauula, HI, United States	2013-12-21
Alicia Batt	Minneapolis, MN, United States	2013-12-21
Curlyn Latu	Kahuku, HI, United States	2013-12-22
Pam Boland	Grovetown, GA, United States	2013-12-23
Jeffrey McGowen	Honolulu, HI, United States	2013-12-26
Faagase Tuigamala	Honolulu, HI, United States	2013-12-27
Pola Wong	Laie, HI, United States	2013-12-29
Benjaline Medlock	Sahuarita, AZ, United States	2013-12-29
Doug Weidman	Lanai city, HI, United States	2013-12-31
Warren Osako	Lanai City, HI, United States	2013-12-31
sally kaye	lanai city, HI, United States	2013-12-31
Hope Shin	Honolulu, HI, United States	2013-12-31
Donna Stokes	Lanai City, HI, United States	2014-01-01
Lea Kauvaka	Hauula, , Fiji	2014-01-01
Curlyn Latu	Kahuku, HI, United States	2014-01-02
M D	Haleiwa, HI, United States	2014-01-02

Name	Location	Date
Maria Feagai	Laie, HI, United States	2014-01-02
Belinda Barnes	Kailua, HI, United States	2014-01-02
Elizabeth Brown	Kahuku, HI, United States	2014-01-02
Lily Fonoimoana	Kahuku, HI, United States	2014-01-02
Joe Wilson	Haleiwa, HI, United States	2014-01-02
Orla Donlyn	Haleiwa, HI, United States	2014-01-02
Kimber Brothers	Kahuku, HI, United States	2014-01-02
Estel Grover	Haleiwa, HI, United States	2014-01-03
Sateki Kava	Kahuku, HI, United States	2014-01-07
Michelle Matson	Honolulu, HI, United States	2014-01-10
Stuart Novick	Honolulu, HI, United States	2014-01-10
Jeanne Vana	Mililani, HI, United States	2014-01-11
KC Connors	Hauula, HI, United States	2014-01-11
Carlton Reed	Kapolei, HI, United States	2014-01-11
Martha Staff	Honolulu, HI, United States	2014-01-11
Sherry Pollack	Kaneohe, HI, United States	2014-01-11
DAN LOUCKS	VANCOUVER, WA, United States	2014-01-11
Harmony Bentosino	Kapolei, HI, United States	2014-01-11
David Youngblood	Kapolei, HI, United States	2014-01-11
Patricia Beekman	Honolulu, HI, United States	2014-01-11
John Droz	Morehead City, NC, United States	2014-01-11
Helen Walker	Kailua, HI, United States	2014-01-11
Glads Bautista	Kapolei, HI, United States	2014-01-11
Michael Uechi	Aiea, HI, United States	2014-01-12
Arthur McEntire	Issaquah, WA, United States	2014-01-12
Karen Luke	Ewa Beach, HI, United States	2014-01-12
Piilani Kaopuiki	Honolulu, HI, United States	2014-01-13
Dennis Egge	Honolulu, HI, United States	2014-01-14
malepe solipo	kahuku, HI, United States	2014-01-15
Chental Mau	Wahiawa, HI, United States	2014-01-16
Salu Tuigamala	Hauula,	2014-01-17
Jarom Hanohano	Orlando, FL, United States	2014-01-17

Name	Location	Date
Emma Aldrich	Laie, HI, United States	2014-01-20
karla schade	Laie, HI, United States	2014-01-20
Alexandra Philbrook	Oakville, Canada	2014-01-20
ann smith	sharpsville,, IN, United States	2014-01-20
Michael & Dorothy Keane	Leitrim, , Ireland	2014-01-20
Gregory Mendiola	San Francisco, CA, United States	2014-01-26
Audra Eugenio	Kahuku, HI, United States	2014-01-26
Dinah Weatherby	Louisville, KY, United States	2014-01-27
Frank f Nascimento	Kailua, HI, United States	2014-01-27
Eleanor Crisostomo	KAHUKU, HI, United States	2014-02-04
Donna Moncevais	Stockton, CA, United States	2014-02-10
Tracy Maghanoy	lauderhill, FL, United States	2014-02-11
Tanya Ingbino Francisco	Laie, HI, United States	2014-02-11
Okesene Faleolo	Honolulu, HI, United States	2014-02-15
JaNae Sika	Laie, HI, United States	2014-02-18
Tēvita O. Ka'ili	Lā'ie, HI, United States	2014-02-21
Louis Montalvo	Danville, CA, United States	2014-02-24
Iwalani Sanders	Haleiwa, HI, United States	2014-02-24
Kim Siufanua	Kaneohe, HI, United States	2014-03-05
Courtney Lawelawe	Kaunakakai, HI, United States	2014-03-05
Larry Castro	Hauula, HI, United States	2014-03-05
Cherish Dalter	Charleston, SC, United States	2014-03-06
Tangi Trilles	Honolulu, HI, United States	2014-03-06
Kerry Long	Honolulu, HI, United States	2014-03-10
Moepulou Alaiasa	Las Vegas, NV, United States	2014-03-10
Lindsey Reichle	Haleiwa, HI, United States	2014-03-10
JAMES LEFFLER	TIPTON, IN, United States	2014-03-10
Russell Rutter	Turtle Creek, PA, United States	2014-03-10
Ginger Der	Haleiwa, HI, United States	2014-03-11
Shardik Castro	Mexico, Mexico	2014-03-17
Noelle Meyers	Wahiawa, HI, United States	2014-03-19
Roxy Redenbaugh	Waialua, HI, United States	2014-03-19

Name	Location	Date
jeff hino	honolulu, HI, United States	2014-03-19
Karl Mortimer-Murphy	Australia	2014-03-24
Allen Anae	Laie, HI, United States	2014-04-01
Tina Jager	Greenville, KY, United States	2014-04-13
Waqa Damuni	Providence, UT, United States	2014-04-14
Aaron Uyehara	Laie, HI, United States	2014-04-14
Geraldine Harrison	Longmont, CO, United States	2014-04-14
Sylvia Rogers	Mobile, AL, United States	2014-04-14
sierra mcdaniel-tanoai	captain cook, HI, United States	2014-04-14
Brandon Mauia	Saint George, UT, United States	2014-04-14
joreen d	Keaau, HI, United States	2014-04-14
semisi uluave	Laie, HI, United States	2014-04-17
Rick Williams	Calgary, Canada	2014-04-18
Tuika Tufaga	Laie, HI, United States	2014-04-24
Anna Christiansen	LAIE, HI, United States	2014-04-24
RaMona IkaKoula	Kahuku, HI, United States	2014-04-24
Lei Kaanaana	Kahuku, HI, United States	2014-04-24
Steve Hoag	Laie, HI, United States	2014-04-25
Fotu Misa	Laie, HI, United States	2014-04-25
Lillie Tongi	Kahuku, HI, United States	2014-04-25
Belinda Otukolo	Salt Lake City, UT, United States	2014-04-25
Ane Malafu	Salt Lake City, UT, United States	2014-04-25
moeiini brady	las vegas, NV, United States	2014-04-28
Vance Fonoimoana	Kahuku, HI, United States	2014-04-28
Gabe Carmona	La Vergne, TN, United States	2014-04-29
Steve Jansen	Santa Clarita, CA, United States	2014-04-29
Dewey Reed	Thousand Oaks, CA, United States	2014-04-29
Chenin Connole	Honolulu, HI, United States	2014-04-29
Rich Harter	Laie, HI, United States	2014-04-29
jeffrey hepler	the woodlands, TX, United States	2014-04-29
linda harter	Laie, HI, United States	2014-04-29
Shaddi Lee	, Australia	2014-04-29

Name	Location	Date
joshua elmore	Waialua, HI, United States	2014-04-29
Bowman Jeremiah	Wailuku, HI, United States	2014-04-29
Angus Adolpho	Mayville, ND, United States	2014-04-29
Joseph Fotu	Daly city, CA, United States	2014-04-29
Grace Alaiasa	Laie, HI, United States	2014-04-29
Britta Rivera	Obersontheim, Germany	2014-04-29
Anue Santiago	Hauula, HI, United States	2014-04-29
william Sellers	Kaneohe, HI, United States	2014-04-29
Miriam Gouveia	Kahuku, HI, United States	2014-04-29
Rt oy Brewer	Laie, HI, United States	2014-04-29
Mapuana Mataele	Laie, HI, United States	2014-04-29
Abraham Nihipali	Hanapepe, HI, United States	2014-04-29
Josiah Hubbell	Hauula, HI, United States	2014-04-29
Ellouise Reed	Kahuku, HI, United States	2014-04-29
Jason Renaud	Laie, HI, United States	2014-04-29
Felita Reed	Kahuku, HI, United States	2014-04-29
Ave Tauvao	Pomona, CA, United States	2014-04-29
Joe Peters	Las Vegas, NV, United States	2014-04-29
Scott Gallegos	Los Angeles, CA, United States	2014-04-29
eru tuiono	Hauula, HI, United States	2014-04-29
Kirk Akina	Pasadena, CA, United States	2014-04-29
Anthony Hall	Hamilton, HI, New Zealand	2014-04-29
jason pili	Makawao, HI, United States	2014-04-30
Seini Kaufusi	Kahuku, HI, United States	2014-04-30
Maxine Vierra	Hauula, HI, United States	2014-05-01
Jared Nikora	Laie, HI, United States	2014-05-01
Kathy Harley	, Australia	2014-05-01
rory pringle	haleiwa, HI, United States	2014-05-05
Joli Johnston	Haleiwa, HI, United States	2014-05-05
Laxmi Diaz	Waialua, HI, United States	2014-05-05
kalani nozaki	haleiwa, HI, United States	2014-05-05
Gopal Butler	Haleiwa, HI, United States	2014-05-06

Name	Location	Date
Norris Alaiasa	Hauula, HI, United States	2014-05-08
Kylie Meyers	Laie, HI, United States	2014-05-08
Kahala Wilson	Laie, HI, United States	2014-05-11
jason ono	Honolulu, HI, United States	2014-05-23
Merania Kekaula	Kahuku, HI, United States	2014-05-29
Ray Thompson	Spanish Fork, UT, United States	2014-06-01
Etuale Liu	Tracy, CA, United States	2014-06-04
susan lashbrook	Placitas, NM, United States	2014-06-04
William Gioia	Tucson, AZ, United States	2014-06-04
Kiana Ho	Haleiwa, HI, United States	2014-06-10
Michelle Tevaga	Laie, HI, United States	2014-06-17
Charlotte Kamauoha	Kahuku, HI, United States	2014-06-22
Jared Anderson	Kahuku, HI, United States	2014-06-23
Michelle Jordan	Laie, HI, United States	2014-06-25
Benjamin Jordan	Laie, HI, United States	2014-06-27
margaret murchie	honolulu, HI, United States	2014-07-08
Samisoni Vuli	Laie, HI, United States	2014-07-08
stella keil	laie, HI, United States	2014-07-24
Rachel Nichols	Wimauma, FL, United States	2014-11-10
Elizabeth Rago	Laie, HI, United States	2014-12-07
Ocean Eale	Haleiwa, HI, United States	2015-01-11
Lei Cummings	Laie, HI, United States	2015-01-28
Siana Burgess	Laie, HI, United States	2015-01-28
Romie Wright	Kapolei, HI, United States	2015-01-28
Y SuniaMafile'o	Modesto, CA, United States	2015-01-28
MOANA SCHWENKE	Laie, HI, United States	2015-01-28
Lopaka Lauaki	Kahuku, HI, United States	2015-01-28
Hazel Fonoimoana	Laie, HI, United States	2015-01-28
Jonathan Reed	Kahuku, HI, United States	2015-01-28
Rich Ballou	Rexburg, ID, United States	2015-01-28
Dallin Muti	Laie, HI, United States	2015-01-29
Beau reed	Canyon Country, CA, United States	2015-01-29

Name	Location	Date
Kimberly Talanoa	Captain Cook, HI, United States	2015-01-29
Winona Ramolete	Honolulu, HI, United States	2015-01-29
Carol Philips	Kualapuu, HI, United States	2015-01-29
Fred Flores	VICTORIA, Canada	2015-01-29
Christopher Reed	Honokaa, HI, United States	2015-01-29
Shaun Lowe	Laie, HI, United States	2015-01-31
Stephanie Walkeapaa	Haleiwa, HI, United States	2015-02-01
Michelle Rosa	Banks, OR, United States	2015-02-01
Dora Doroha	Waialua, HI, United States	2015-02-01
Kiawe Larson	Laie, HI, United States	2015-02-01
Chance King	Princeville, HI, United States	2015-02-02
Russell Moeai	Honolulu, HI, United States	2015-02-24
Mahealani Keo	Hauula, HI, United States	2015-06-18
Dana Ishii	Haleiwa, HI, United States	2015-06-20
Lamar Innes	Laie, HI, United States	2015-06-24
Tiare Lawrence	Makawao, HI, United States	2015-06-24
Cheryl Lua	Alameda, CA, United States	2015-06-24
Joy Hall	Hauula, HI, United States	2015-06-24
Kalei Kahawaii	Hauula, HI, United States	2015-06-24
Leimana Fonoimoana	Kahuku, HI, United States	2015-06-24
Les leonardo	San Jose, CA, United States	2015-06-24
Kehauonalani Moncriffe	Mililani, HI, United States	2015-06-24
Amanda Vendiola	Kahuku, HI, United States	2015-06-24
Casey Bassett	Honolulu, HI, United States	2015-06-24
Kerry Jacques Magiske	salt lake city, UT, United States	2015-06-24
Alexandra Moody	Waialua, HI, United States	2015-06-24
april salcido	Puyallup, WA, United States	2015-06-25
Terina Obina-Pahia	Dublin, CA, United States	2015-06-26
Iliea Kim	Hauula, HI, United States	2015-06-27
harry wasson	Laie, HI, United States	2015-07-02
Ruta Fonoto	Kahuku, HI, United States	2015-07-02
Gaberiella Tafuna	Laie, HI, United States	2015-07-14

Comments

Name	Location	Date	Comment
Niue Suschnigg	Kaaawa, HI	2013-12-16 18	Every month our Electric Bill is gotten higher and we have tried to minimize usage where we can by using the sun but it doesn't get any better. You putting up these additional windmills does NOT help us poor people on the country side. We would like to purchase other means to help lower our electric bills but due to your regulations now we are told we can not. Why? We would like to save some money that would benefit our families here on the North Shore. We work 2-3 jobs just to survive here in Hawaii why are you making harder for us.
		19	There are other area's in Hawaii far on the mountain side where it's not an eyesore and away from our children & schools. Please, Please Don't Do This...
Pamela Hubbell	Laie, HI	2013-12-16 20	My Kids go to Kahuku. The thought of having these close to them wouldn't be such a great idea. A Friend did some resource of the wind mils and found the sounds can cause health problems. Why can't they put them where no kids will be around them. There are plenty of other places on this Island beside here.
Coreen Williams	HAUULA, HI	2013-12-16 21	Kahuku is home to enough wind turbines. We do not need anymore. Anybody who can remember what our beautiful Kahuku looked like before these ugly wind turbines came here can attest that these are just an eyesore. Adding more at this point in time is ridiculous. It can be seen from as far away as Ka'a'awa. When driving through the pineapple fields above Waialua, the turbines dot the landscape and in the evening, the flashing lights are a distraction. If I could undo the existing turbines, I would. These hideous creations have not reduced our energy costs yet we are burdened with hosting these monstrosities.
		22	A simple internet search on wind turbines yields tons of personal stories and studies. There are equal amounts of pros and cons. Pros are that the energy is supposedly less expensive and has the least impact on natural resources. In
		23	this particular case, the biggest con to building more turbines in Kahuku is the location. I already DO NOT agree with the existing turbines and adding more is beyond my comprehension.
		24	The State and the City are tasked with finding a balance between corporations and individuals. Over the years, it appears that politicians desire to please the money that comes from big corporations rather than caring for the citizens it purports to serve. Please find another location for these turbines.
Gaye Aalona	Lakewood, WA	2013-12-16 25	If Oahu's economy is based on tourism; tourist wants to see the natural beauty of the country and experiences that it brings. NOT huge blades that will ultimately effect the landscape and eco system of the windward side of the island.
alani vaioleti	Phoenix, AZ	2013-12-16 26	This is my home. I am concerned with negative repercussions these windmills will have on my community
Brian Walsh	Kaaawa, HI	2013-12-16 27	It makes no sense to site these windmills so close to a residential area when they could easily be sited away from people.
rosalie Slater	HNL, HI	2013-12-16 28	wind technology is inefficient and not worth the money that it cost middle income tax payers to support!
Cindy Tutor	Laie, HI	2013-12-16 29	For the safety and potential growth of the community, STOP the Champlin Wind Energy Project!

Name	Location		Date	Comment
Glen Maghanoy	Kahuku, Oahu, HI	30	2013-12-16	I don't like how close it is and could be to my community. We simply have enough.
Tuika Faumuina	Monroeville, PA	31	2013-12-16	The Kahuku/Laie area is my favorite part of the island because of the absence of big buildings, hotels and eyesores like the ones this wind energy project would bring. I support renewable energy but I also agree that the Kahuku/Laie community has done its part. KEEP THE COUNTRY COUNTRY!!!!
Theresa Tevaga	Hauul, HI	32	2013-12-16	The Windmill we have now promised a savings in our energy; this has not been the case. The few we have now are an eye sore and adding more to the mix of it is unnecessary and wasteful. PLease do not allow this to happen.
Benjamin Faustino	Waipahu, HI	33	2013-12-16	safety for school children
geoffrey paterson	kailua, HI	34	2013-12-16	The ugliness of these structures which are destroying the ambience of our country districts far outweigh the small benefit that they provide in producing electric power.
Donna Kaopuiki Schaumburg	Lana'i City, HI	35 36	2013-12-16	Although Hawaii can harness wind energy, the technology (excessively high, unsightly towers making noise at all hours of the day and night) is counter to the values that Hawaii should have toward the aina. They are also not financially beneficial.
Sam Moe	Laie, HI	37	2013-12-16	Because it affects hundreds of friends in Kahuku.
Ron McOmber	Lana'i, HI	38	2013-12-16	There better ways to produce power
Burton Greene	Hauula, HI	39 40	2013-12-16	Because I agree whole heartely with the adverse effects windmills have on people and communities. Kahuku is no place to have these monstrosities that benefit only the rich investors.
Panos Prevedouros	Honolulu, HI	41	2013-12-16	Wind turbines are counter-productive.
Kimo Sutton	Honolulu, HI	42	2013-12-16	Future cost of energy and the ugly views.
Brew Rudd	Hauula, HI	43	2013-12-16	The children in Ko'olauloa area will be subjected to the same health and safety issues by their attendance at Kahuku Schools. The impact would be wide spread in our rural area. You would even consider allowing this to happen? Enough is enough.
Steven Stone	Wahiawa, HI	44	2013-12-16	These windmills only benefit the companies that make and sell these systems to include the politicians that are bought and supported by these companies.
Marian Grey	Honolulu, HI	45	2013-12-16	Unhealthy to live near these noisy unreliable sources for energy for humans and birds!
Delsa Moe	Laie, HI	46 47 48	2013-12-16	We already have enough windmills in our area and adding more will have a serious negative impact on the rural view planes of our mountains and surrounding landscape. Solar energy is less intrusive to our views since they mount almost flush to our rooftops and benefit each family directly, whereas the windmills don't benefit our community financially at all. Why not consider a solar farm on the now vacant shrimp farm land and disguise it with surrounding low growing plants instead?
robert trotter	kahuku, HI	49	2013-12-16	to close to elementary school
Bill Quinlan	Haleiwa, HI	50	2013-12-16	Proposed windmills too close to houses and school.
Kathleen Brindo	Lanai City, HI	51	2013-12-16	The ecological footprint is too big. Studies show that solar is a more cost effective way.
RaMona IkaKouka	Kahuku, HI	52 53	2013-12-16	Not only is it an UGLY EYE SORE...but it DOESN'T do ANYTHING for our community...& we get NOTHING out of them...studies also show that it CAN BE HARMFUL over the years...& I'm not WILLING to take ANY CHANCEs...& volunteer OUR CHILDREN as LAB RATs! SHAME ON YOU!

Name	Location		Date	Comment
Faleula Seppa	Pago Pago, American Samoa	54	2013-12-19	Have alot of family living in the area.
Todd Tamura	Laie, HI	55	2013-12-19	Too close to the community.
Curlyn Latu	Kahuku, HI	56	2013-12-22	This is important to me because I not only LIVE here in KAHUKU but also WORK at Kahuku ELEM. SCHOOL. It's SAFETY FIRST we always tell our students and then we have this soooooo close....too close....
Faagase Tuigamala	Honolulu, HI	57	2013-12-27	My families live there
Pola Wong	Laie, HI	58	2013-12-29	keeping country county!!
Benjaline Medlock	Tucson, AZ	59	2013-12-29	I was born in Kahuku and raised in the surrounding area and completely support this petition.
Warren Osako	Lanai City, HI	60	2013-12-31	Industrial wind energy facilities have been proven to be very inefficient and are only pursued because the developer stands to make a lot of money from tax incentives, government loans, subsidies, etc. paid for by the tax payer.
Curlyn Latu	Kahuku, HI	61	2014-01-02	I live here in Kahuku and the windmills are too close to our homes and our Elem. School where i work at. There is NO guarantee that they can malfunction and damage our homes and us, residents.
Maria Feagai	Laie, HI	62	2014-01-02	Our children attend Kahuku High and Intermediate School. The wind mills are not only an EYE SORE, they obstruct our view and damage our landscape.
		63		They benefit a few of the wealthy while we, the community have to view the ugly mills on a daily basis. I'm not against alternative sources of energy, I just
		64		don't think it's the right place. We have TOO MANY already!!!
Elizabeth Brown	Kahuku, HI	65	2014-01-02	I live underneath those eye-sore windmills and our beautiful scenery has lost its
		66		beauty...plus I get random migraines when I am at home in comparison to when I am somewhere else...we don't want your windmills...we do not get
		67		cheap electricity...
Kimber Brothers	Kahuku, HI	68	2014-01-02	I support using natural alternative sources to crude oil imports and am one of the extremely lucky home owners in Kahuku to already have a PV system installed and hope that the gov't will make more of an effort to work on improvements with HECO's policies & infrastructure that will allow more of my community to be able to benefit from the PV system option.
		69		However, the existing wind farm in Kahuku is already too much of an eye sore and headache for those of us living under their ugly shadow. The residents
		70		putting up with the propellers whizzing overhead have not seen any improvement to our environment, ecology, or economy because of them.
		71		There is no guarantee Kahuku won't become the next South Point vista as these monstrosities break down, rust, and fall apart.
		72		Why not try installing wind mills in areas where the entire population of that community does not have to bear the brunt of the government's money making deals - say, like over your own roof and see how that works for you?
Stuart Novick	Honolulu, HI	73	2014-01-10	Why don't we just build high rises on the mountains, too? Enough! Time to put an end to this visual blight and locate windmills--if we really need them--in areas that are not scenic.
Jeanne Vana	Mililani, HI	74	2014-01-11	A visual blight. Take a drive down to South Point on the Big island to view and get a glimpse of rusting windmills.

Name	Location		Date	Comment
Aaron Uyehara	Laie, HI	75	2014-04-14	put them in Hawaii Kai....nah just kidding...
semisi uluave	Laie, HI	76	2014-04-17	Because I was born and raised here. My kids as well. These windmills DO NOT serve our area. The power they generate goes elsewhere BUT we have to deal with their "side effects!!!"
Vance Fonoimoana	Kahuku, HI	77	2014-04-29	We live by the dangerous windmills
Gabe Carmona	Nashville, TN	78 79	2014-04-29	First off its sacred land. Secondly, nothing of this magnitude should be that close our children's school. Safety above all.
Steve Jansen	Santa Clarita, CA	80 81	2014-04-29	I don't want to pay thousands of dollars to go to paradise and look at wind mills covering my view of this beautiful place.....I understand in the desert but why ruin the beauty and possibly the tourism.....that will cost the state and the people.....bad idea
Leilani Adolpho	Mayville, ND	82	2014-04-29	I am a 18-yr vet about to retire and return home after serving my country. There are things from my childhood that have kept me serving so that I know I did my part to protect my country. I cannot in good concience protect our country with disregard for protecting my childhood home.
William Sellers	pago pago, American Samoa	83	2014-04-29	we should allocate an area not around the schools and community of northshore/Laie/kahuku.
Miriam Ortiz-Gouveia	KAHUKU, HI	84	2014-04-29	Don't know health implications but imagine it is horrible.b
Ave Tauvao	Pomona, CA	85 86	2014-04-29	Kahuku is my Alma mater. I have family who work and attend there. These wind turbines are a safety hazard and a distraction to the community. They can be placed somewhere else. There are other places.
riordan pringle	charleston, SC	87	2014-05-05	I LIVE HERE
kalani nozaki	haleiwa, HI	88 89	2014-05-05	Things are ugly and the electricity bill is only going up... not helping any locals around here. Build it in town, its already ugly over there! 90
Kahala Wilson	Long Branch, NJ	91	2014-05-11	To protect our school and children and too keep the beauty of our aina. 92
jason ono	Honolulu, HI	93	2014-05-23	dont put cronism and lining your pockets with lobbiest money before the comfort and well being of the good citizens of this state, and great citizens of kahuku.
Ray Thompson	Spanish Fork, UT	94	2014-06-01	As a former resident of Laie I have driven the road from Kahuku to Sunset hundreds of times. I fear the beauty of that drive will be gone when I return to the area. The "North Shore" is world famous. It is the one place I steer all who ask where they should go when they visit Hawaii. Don't ruin it for the visitors upon whom Hawaii relies.
Charlotte Kamauoha	Kahuku, HI	95 96	2014-06-22	I have children with special needs who have sensory integration issues and are adversely impacted by the current wind turbines in Kahuku. I do not want to think about the impact that the additional wind turbines with their proposed placements will do to children and people with sensory issues. Kahuku has done its part in housing the current turbines with very very little to no benefit to our community. If you must have wind turbines, put it elsewhere. 97 Thank you, Charlotte Kamauoha
Jared Anderson	Kahuku, HI	98	2014-06-23	This windmill project will place 450-500 foot tall industrial wind turbines within a half a mile from where my 6 children go to school. Completely irresponsible placement.
Samisoni Vuli	Laie, HI	99	2014-07-08	Life of the members of the community.
stella keil	laie, HI	100	2014-07-24	When I am in Waimea Valley the sounds of the windmills on the hill above.disturb the quiet of the valley. I do not want the same for the students and residences in Kahuku.

Name	Location		Date	Comment
Elaine Nishime	Honolulu, HI	101	2013-12-17	It is dangerous to birds, humans and it's effectiveness is negligible.
Christopher Ramirez	Kailua, HI	104	2013-12-17	I don't want to see Kahuku surrounded by industrial sized windmills.
Tatiana Panee	Hauula, HI	105	2013-12-17	Totally counter-productive. It doesn't benefit the community at all.
Malie Chong	Kahuku, HI	106	2013-12-17	ENOUGH ALREADY!!!!!! There has been windmills in the past and there are windmills now and what has that brought our community???? Nothing but noise pollution, eye sores and unforeseen effects (that I'm sure will surface in time)....please no more!!!!
Jack Damuni	Laie, HI	110	2013-12-17	It is important to us a residence of the north shore to assure that our children will live in a environment that is beneficial to the health and safety of our children. These wind mills pollutes the overall atmosphere of Kahuku and takes away from the beauty that we once new as young children growing up. keep country COUNTRY and keep those wind mills out.
Cynthia Frith	Kailua, HI	112	2013-12-17	More cost effective ways to produce electricity.
Melanie Hiram	Hauula, HI	113	2013-12-17	Keep da country country! Stop littering our neighborhoods.
Rina Lessary	Waianae, HI	114	2013-12-17	NO WINDMILLS AND GMO CROPPING FOR THE ISLAND OF OAHU (END OF STORY)
Lyon Logan	Laie, HI	116	2013-12-18	1. The people who have to see agricultural land go towards something that may have long term effects do not see the benefit of these cost savings.
		117		2. The potential health risks have not been shared with our community.
		118		3. The whole rush it through process most of the times have real negative consequences and ends up hurting in the end.
Pono Kealoha	Pearl City, HI	119	2013-12-18	stop the destruction and genocide of our aina and sovereign kingdom nation http://hawaiiankingdom.org
Kurt Fonoimoana	Kahuku, HI	120	2013-12-18	Set it where it's not visible, besides health problems, and if its in our backyard shouldn't we be compensated, due to these dangers if there is a hurricane are we safe from those blades? Why we take the risk and the island gets the discount, more so HECO controls everything. I'm in the process of getting solar but was told our area has already reached our max. Capacity if this is true why have the windmill. I feel the sun is more effective then the wind. The sunshines everyday the wind blows maybe 70-80 per. Of the time,
Caroline Kong	Honolulu, HI	126	2013-12-18	Stop the land grabs.
Francisco Tipoti	Honolulu, HI	127	2013-12-18	Kahuku has done more than its part for the state to produce an alternative source of energy! Now it worries me that this is so close to home.
Jan Hanney	Kahuku, HI	129	2013-12-18	health & safety of the community I live and work in
Colleen Mellor	Haleiwa, HI	130	2013-12-18	Additional windmills in Kahuku will endanger the health and wealth of all nearby. Please do not allow any additions and focus on keeping the existing 12 windmills operational and efficient. Mahalo
Rina Fa	Laie, HI	131	2013-12-19	Its simply getting out of hand. Electricity is far from affordable for many, so explain to us why we should put up with this??
Amy Farias	Honolulu, HI	132	2013-12-19	While wind turbines have been around for a while, there has not been much study or investigation on their negative health effects on people, animals, and environment. What factual information there is also has not been adequately dispersed. There are some real concerns about the cost-benefit ratio of what we give up for what we get.

102 103 107 108 109 111 115 117 118 121 122 123 124 125 128

Name	Location		Date	Comment
KC Connors	Hau'ula, HI	133 134 135	2014-01-11	Aloha, This Windmill Project is way too close to our schools, Kahuku Intermediate & High and Kahuku Elementary, and its way too close to homes in our Community. There are health, sound and safety concerns, let alone quality of life issues, with such huge towers blocks our views in such a scenic area. Thank you for relocating this project away from our schools & community, and away from such a beautiful scenic area.
Carlton Reed	Kapolei, HI	136 137 138 139	2014-01-11	1) wind frams do not provide enough electricity unless in mass 2) install these frams are an eye sore and do nothing in support of visitors who now would rather vacation on the outer islands 3) the big island shut down there wind farm on south point - hummmm wonder why, I never saw more than two or three operating at any one time. 4) Finally, why should I pay more to support HECO CEO and state/C&C taxes
Martha Staff	Honolulu, HI	140 141	2014-01-11	This is important to me because I love the north shore and value the views there. Existing windmills are already very noticeable and detract from the natural beauty. Then there are the reasons cited in the petition, all of which I agree with.
Patricia Beekman	Honolulu, HI	142	2014-01-11	Benefits don't justify the expense and the windmills are unsightly.
John Droz	Morehead City, NC	143	2014-01-11	Our energy and environmental policies should be science-based. Wind energy is not. See Energypresentation.info
Helen Walker	Kailua, HI	144 145	2014-01-11	First and foremost it's ugly and invasive to our natural environment, and there are other ways to create energy without ruining the environment.
Michael Uechi	Aiea, AS	146 147	2014-01-12	Wind energy is very costly to produce. When the windmills rust, corrode and stop spinning they are too expensive to remove and will end being reminders of stupid investments gone bad.
Arthur McEntire	Issaquah, WA	148 149	2014-01-12	I lived in Hawaii previously and this is an eyesore. There would be better use of the money and personal energy to provide solar panels for all houses rather than these windmills.
Karen Luke	Ewa Beach, HI	150	2014-01-12	We put our utility lines underground so we don't have to look at telephone poles. The visual impact of windmills mars the landscape and does not add to the beauty of our island.
Jarom Hanohano	Orlando, FL	151	2014-01-17	i live here too
Adam Schade	Laie, HI	152	2014-01-20	The wind mills are destroying the beauty of the country. They are loud, intrusive and end up costing us more in energy.
Alexandra Philbrook	Oakville, Canada	153	2014-01-20	We have been visiting the north shore, every year, for the past 7 years. The introduction of these windfarms have taken away from the beauty and nature we have to come to love about the North shore. they are an ugly blight on. Kahuku
Gregory Mendiola	San Francisco, CA	154	2014-01-26	Because of safety and health issues.
dinah weatherby	louisville, KY	155	2014-01-27	A former resident of Kahuku, I am a supporter of alternative energy sources but proper siting of windmills is of the greatest importance. This community should not be surrounded on three sides by windmills. I'm sure there are other sites that will impact humans far less.
JaNae Sika	Laie, HI	156	2014-02-18	Where is the benefit to the people who have to live with these eyesore monstrosities 24/7? This is ridiculous!
Larry Castro	Hauula, HI	157	2014-03-05	Destroying our mountains no can.
Tina Kaelbli	Clemmons, NC	158	2014-04-13	Wind is a FREE, renewable source of energy. It's far better than destroying the Earth for natural resources that are not.

Name	Location		Date	Comment
Ocean Eale	Haleiwa, HI	159	2015-01-11	The windmills are a scam and I'm against that. Solar energy is a more intelligent and practical solution for Hawaii.
Romie Wright	Kapolei, HI	160 161 162	2015-01-28	I'm signing this petition because I agree with the concerns regarding the health and safety of the community, the significant impact on the already stressed environment of this island, and, financially, the financial impact on this agrarian community. Sustainability does not mean more stress on the environment; it's about protecting and helping the environment to thrive. 163
David Fonoimoana	Laie, HI	164 166	2015-01-28	I am opposed to more windmills in Kahuku. We already have windmills that take away from our beautiful mountains. Having them there is no benefit to us. I am more concerned about the affect of having windmills so close to homes and schools. We don't need any more. 165
Rich Ballou	Rexburg, ID	167	2015-01-28	I'm a Kahuku alum and don't want the beauty of the area to be spoiled by ridiculous windmills!!!
Beau Reed	Canyon Country, CA	168 169 170	2015-01-29	my family lives in kahuku and surrounding areas. I come home to visit often and fear for the health concerns that will come with these machines. Along with the loss of land, environmental hazards to The native species and unsightly looks to the beautiful landscape of our land.
Carol Philips	Haleiwa, HI	171	2015-01-29	Put them on Diamond Head instead, it has more wind.
Fred Flores	VICTORIA, Canada	172	2015-01-29	the negative consequences of these windmills trump any energy gains - go solar! 173
Stephanie Walkeapaa	Haleiwa, HI	174	2015-02-01	This is not helping Hawaii people.
Dora Doroha	Waialua, HI	175	2015-02-01	It hasn't made any difference for our electric bills and another thing is they are ugly. 176
isaac johnson	waipahu, HI	177	2015-02-01	Im tired of these eye sore windmills in our mountains.
Russell Moeai	Honolulu, HI	178	2015-02-24	KEEP THE COUNTRY ....COUNTRY , it's the only side to get away...on this island !
Joy Hall	Hauula, HI	179	2015-06-24	Sorry we couldn't be there to oppose more windmills in Kahuku, but I am thinking of you as I graciously sign to"NO MORE WINDMILLS"!!!
Kalei Kahawaii	Hauula, HI	180	2015-06-24	It's my right
Leimana Fonoimoana	Kahuku, HI	181 182 184	2015-06-24	I'm signing because I am a Kahuku resident who is directly affected by the existing windmill phase and who will be affected by the additional phase. I am for energy renewal and so is this community, but I believe we have done our part in stewarding the lands that currently hold Kahuku and Waimea's windmill farm. I am a mother of two children and I am concerned about their health with a near by wind farm and the health effects that have been noted from other wind farms. It is too close to the Elementary and High School and the hospital. Also, as a property owner, these wind farms will bring down my real estate value. Please stop this project and move it somewhere else. 183 185
Les Leonardo	San Jose, CA	186 187 188	2015-06-24	These Giant Turbines are aesthetic blight to the beauty of Kahuku Village a place that is dear to many people hearts. The turbines are also harmful to birds and other Kahuku wildlife. But Kahuku Villagers are mostly not rich or powerful, they need everyone's help!
Kehauonalani Moncrife	Mililani, HI	189	2015-06-24	I have Family and dear friends that live in Kahuku. Im opposed to more wind turbines in a community that does not want it and is not sound for the nearby community to have.
April Salcido	Puyallup, WA	190	2015-06-25	Born and raise in Kahuku, I am proud to be a hawaiian and will always want to remember the way it is.

Name	Location		Date	Comment
Terina Obina-Pahia	Dublin, CA	191 192 193 194 195 196	2015-06-26	I agree, no more turbines near the housing. There is quite the amount of turbines located near the housing that are an eye soar. Does the community benefit from this energy? What is the longevity of these windmills? Nothing last that long in direct salt air and who is going to repair these mills when they are rusted and ready to collapse. I think this windmill will definitely bring down the value of homes in Kahuku. Who wants to live in a Turbine Farm! Is the goal really to create natural energy from these big turbines or to drive the value of the north shore so far down paving the way for investors to come through and snatch up whatever land is left and develop ridiculous resorts. This sounds like a big industry scam. It is heart breaking to watch my home be victimized of big industry persuasion. I miss home the way it was.
Ilea Kim	Hauula, HI	197 198 199	2015-06-27	I think that we have enough turbines in Kahuku as is! The many that we do already have are hardly ever working. It seems like no one cares to maintain them. Why add more? And so close to our schools?! My children go to Kahuku Elementary and I would hate to see this as the back drop. Distribute them to vacant land elsewhere on the island. Why so many on Kahuku land? Don't do it!
harry wasson	Laie, HI	200	2015-07-02	We don't need windmills all over koolauloa, put in waikiki, kalihi, halawa, aiea, pearl city, waipahu, ewa, kapolei, makakilo, koolina.

change.org

Recipient: Kirk Caldwell, George Atta, and William 'Aila Jr.

Letter: Greetings,

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Aloha Mayor Caldwell,
Please consider adopting more stringent safety zone requirements that prevent industrial wind turbines from negatively impacting residential neighborhoods. Due to past catastrophic events involving large wind turbines or systems associated with this technology, a moratorium on issuing permits may be in order until such a time where all prudent safety and proximity issues have been adequately studied and sufficiently addressed.

Signatures

Name	Location	Date
Kent Fonoimoana		2013-04-14
Jessica dos Santos	Kahuku, HI, United States	2013-04-14
Sandy Freitas	Kaneohe, HI, United States	2013-04-14
cody rose	Waialua, HI, United States	2013-04-14
Andrew Wheeler	Kahuku, HI, United States	2013-04-14
Iris Kahaulelio	Waialua, HI, United States	2013-04-15
Josiah Hubbell	Hauula, HI, United States	2013-04-15
Jim ANTHONY	Ka'a'awa, DE, United States	2013-04-15
Scott Wong	Honolulu, HI, United States	2013-04-15
John Barry	Huntington Beach, CA, United States	2013-04-15
Michael Kioni Dudley	Kapolei, HI, United States	2013-04-15
Panos Prevedouros	Honolulu, HI, United States	2013-04-15
Kenneth Capes	Waialua, HI, United States	2013-04-15
Ryan Hitz	Hauula, HI, United States	2013-04-15
LeeAnn Akina	Kahuku, HI, United States	2013-04-15
James Macey	Kapolei, HI, United States	2013-04-15
KC Connors	Hau'ula, HI, United States	2013-04-15
Maria Feagai	Laie, HI, United States	2013-04-15
Ben Shafer	Hauula, HI, United States	2013-04-15
Cindy Tutor	Laie, HI, United States	2013-04-15
Timothy Vandeveer	Honolulu, HI, United States	2013-04-15
Yasiu Kruszynski	Chicago, IL, United States	2013-04-15
Niue Suschnigg	Kahuku, HI, United States	2013-04-15
eddie rothman	haleiwa, HI, United States	2013-04-15
Laura Saxon	morriston, FL, United States	2013-04-15
Aaron Requilman	Kahuku, HI, United States	2013-04-15
John Errett	Kahuku, HI, United States	2013-04-15
Stella Mulivai	Kahuku, HI, United States	2013-04-15
Vance Fonoimoana	Kahuku, HI, United States	2013-04-15
William Quinlan	Haleiwa, HI, United States	2013-04-15

Name	Location	Date
john bain	Haleiwa, HI, United States	2013-04-15
Robin Kaye	Lanai City, HI, United States	2013-04-15
eddie canumay	Kahuku, HI, United States	2013-04-15
Gil Riviere	Waialua, HI, United States	2013-04-15
Dave Betham	Laie, HI, United States	2013-04-15
Dotty Kelly-Paddock	Hauula, HI, United States	2013-04-15
Theone Taala	Laie, HI, United States	2013-04-15
Brew Rudd	Hauula, HI, United States	2013-04-15
Ken Prolo	Kahuku, HI, United States	2013-04-15
Barbara Kahana	Hauula, HI, United States	2013-04-15
Tanya Suhanek	Seward, AK, United States	2013-04-15
Ramona Maiman	Hauula, HI, United States	2013-04-15
Janice Henkel	Hauula, HI, United States	2013-04-15
Michele Nihipali	Hauula, HI, United States	2013-04-16
Carol Philips	Haleiwa, HI, United States	2013-04-16
Valerie Roberts	<Kahuku, HI, United States	2013-04-16
Cindy Betham	Laie, HI, United States	2013-04-16
JEFFERY COMPOC	KAHUKU, HI, United States	2013-04-16
lauren achitoff	Kaaawa, HI, United States	2013-04-16
art hannemann	kahuku, HI, United States	2013-04-16
andrea anixt	Kaaawa, HI, United States	2013-04-16
Cynthia Manubag	Irving, TX, United States	2013-04-16
Cheryl Evans	Salt Lake City, UT, United States	2013-04-16
Larry Te'o	Fort Worth, TX, United States	2013-04-16
Emily Kallin	Sandy, UT, United States	2013-04-16
Linda Avegalio	Hauula, HI, United States	2013-04-16
Jason Renaud	Waimanalo, HI, United States	2013-04-16
RODNEY NAKASHIMA	HONOLULU, HI, United States	2013-04-16
Ann Marie Keoho	Hau'ula, HI, United States	2013-04-16
Jennifer John	Honolulu, HI, United States	2013-04-16
Eric Oler	Pleasanton, CA, United States	2013-04-16
Ron Usedom	Lake delton, WI, United States	2013-04-16

Name	Location	Date
Lisa Hornak	Hauula, HI, United States	2013-04-16
Pua Iuli	Mililani, HI, United States	2013-04-17
Carl Hubbell	Laie, HI, United States	2013-04-17
Clarence. Allen	Waianae, HI, United States	2013-04-18
Toni Auld Yardley	Honolulu, HI, United States	2013-04-18
H Doug Matsuoka	Honolulu, HI, United States	2013-04-18
Allen Anae	Laie, HI, United States	2013-04-18
Shantee Morrissette	Memphis, TN, United States	2013-04-18
Aliitasi Ponder	Kahuku, HI, United States	2013-04-18
Glen Maghanoy	Kahuku, Oahu, HI, United States	2013-04-18
vasa taualii	Kahuku, HI, United States	2013-04-18
Moanikeala Tuaau	Kaneohe, HI, United States	2013-04-18
Iwalani Su`apaia	Turlock, CA, United States	2013-04-18
Lesly Kamae	Laie, HI, United States	2013-04-18
PF BENTLEY	MAUNALOA, HI, United States	2013-04-18
Stephanie Hyatt	Kaaawa, HI, United States	2013-04-18
Joanie Collins	Kealakekua, HI, United States	2013-04-18
Lily Fonoimoana	Kahuku, HI, United States	2013-04-18
Andrea gloria	ewa beach, HI, United States	2013-04-18
Lora Wong-Santiago	Laie, HI, United States	2013-04-18
Burton Greene	Hauula, HI, United States	2013-04-18
Maxine Vierra	Hauula, HI, United States	2013-04-18
Lopaka Lauaki	Kahuku, HI, United States	2013-04-18
sophia salzberg	kahuku, HI, United States	2013-04-18
Angela Breene	Haleiwa, HI, United States	2013-04-18
Christen Vidanovic	Haleiwa, HI, United States	2013-04-18
Katie Grey	Haleiwa, HI, United States	2013-04-18
C Mellor	Haleiwa, HI, United States	2013-04-18
Marie Rangel	Kahuku, HI, United States	2013-04-19
Laura Lapenes	Kahuku, HI, United States	2013-04-19
JaNae Sika	Laie, HI, United States	2013-04-19
Maria Ribeiro	Cascais,	2013-04-19

Name	Location	Date
Val Ching Jr	Kailua, HI, United States	2013-04-19
Stan Mataele	Laie, HI, United States	2013-04-19
Penny Toilolo	Laie, HI, United States	2013-04-19
william I;oa	long beach, CA, United States	2013-04-19
Redmond Tutor	Laie, HI, United States	2013-04-19
Tanoai Reed	Laie, HI, United States	2013-04-19
Charlotte Charles	Kaneohe, HI, United States	2013-04-19
Beau Reed	Canyon Country, CA, United States	2013-04-19
Sharon Tachibana	Honolulu, HI, United States	2013-04-19
S'MON GAGO	Pahoa, HI, United States	2013-04-19
naluai Bruce	laie, HI, United States	2013-04-19
Harris Mataafa	Eagle Mountain, UT, United States	2013-04-19
Alani Vaioleti	Phoenix, AZ, United States	2013-04-19
Kendyl Beschen	Haleiwa, HI, United States	2013-04-19
Tomasina Aalona	Hauula, HI, United States	2013-04-20
Laura Pickard	Kahuku, HI, United States	2013-04-20
Aaron Uyehara	Laie, HI, United States	2013-04-20
Stan Jenkins	Laie, HI, United States	2013-04-20
Shirley Dela Rosa	Laie, HI, United States	2013-04-20
William Ahquin Jr	herriman, UT, United States	2013-04-20
Jan Caneen	Laie, HI, United States	2013-04-22
Jimmy Mapu	Hauula, HI, United States	2013-04-22
Desmond Enesa	Laie, HI, United States	2013-04-22
Melanie Cameron	Laie, HI, United States	2013-04-22
Tanya Francisco	Laie, HI, United States	2013-04-23
Trisha Watson	Honolulu, HI, United States	2013-04-23
Okesene Faleolo	Honolulu, HI, United States	2013-04-24
Hinaleimoana Wong-Kalu	Honolulu, HI, United States	2013-04-26
Carrie Martell	Haleiwa, HI, United States	2013-04-26
Erin Delventhal	Haleiwa, HI, United States	2013-04-26
Marie Rittenhouse	HALEIWA, HI, United States	2013-04-26
Rhoda Libre	Kaumakani, HI, United States	2013-04-28

Name	Location	Date
Daniella Fa'afiti	Auburn, WA, United States	2013-04-29
Joseph Saipale	port hueneme, CA, United States	2013-04-29
Mike Banning	Honolulu, HI, United States	2013-04-29
Renee Silva	Kaneohe, HI, United States	2013-04-29
Junior Tufono	Mission Viejo, CA, United States	2013-04-29
Rina Lessary	Waianae, HI, United States	2013-04-29
Bruce Enos	Pearl City, HI, United States	2013-04-29
Vakautakakala Latuselu	Laie, HI, United States	2013-04-29
Chuck Russell	Los Angeles, CA, United States	2013-04-29
Jack Cambra	Honolulu, HI, United States	2013-04-29
Denise Reed	Hillsboro, OR, United States	2013-04-29
Owen Keliiholokai	Kailua-Kona, HI, United States	2013-04-29
Suzanne Reed	Laie, HI, United States	2013-04-29
Suzanne Reed	Laie, HI, United States	2013-04-29
Afi Pita	Australia	2013-04-29
James McCarron	Rush City, MN, United States	2013-04-29
Clint Eskenazi	Marina del Rey, CA, United States	2013-04-29
Aaron Schoenke	woodland hills, CA, United States	2013-04-29
Hoku Kamakeeaina	Laie, HI, United States	2013-04-29
Shannon Brewer	Laie, HI, United States	2013-04-29
Theodore E Grabow jr	Kahuku, HI, United States	2013-04-29
Tiffany Reed	Panama City, FL, United States	2013-04-29
Paula Hong	Waialua, HI, United States	2013-04-29
vaifoou vaioleti	kahuku, HI, United States	2013-04-29
Norris Alaiasa	Hauula, HI, United States	2013-04-29
Jess Lundgren	waialua, HI, United States	2013-04-29
Lauro Chartrand	Agoura, CA, United States	2013-04-29
Jandin Thornton-Murray	Kailua, HI, United States	2013-04-29
Dan Rizzuto	vancouver, Canada	2013-04-29
Ale Tua	Maywood, CA, United States	2013-04-29
Paul Turnber	Palmdale, CA, United States	2013-04-29
vao miller	Salt Lake City, UT, United States	2013-04-29

Name	Location	Date
Sione Maumalanga	shreveport, LA, United States	2013-04-29
Tagi Galeai	Laie, HI, United States	2013-04-29
Brittney Bostick	Waveland, MS, United States	2013-04-29
JOSEPH KELIIKOA	LAIE, HI, United States	2013-04-29
Todd Tamura	Laie, HI, United States	2013-04-29
Zach Thomson	Honolulu, HI, United States	2013-04-29
Scott Cortese	Kapolei, HI, United States	2013-04-30
Mike Massa	Calabasas, CA, United States	2013-04-30
Teresa Merida	Leavenworth, KS, United States	2013-04-30
Tylene Macklin	Cleveland, OH, United States	2013-04-30
foulon richard	France	2013-04-30
Stephanie Walkeapaa	Haleiwa, HI, United States	2013-04-30
karyn spencer	Kahuku, HI, United States	2013-04-30
Jill Bloom	Elk Grove, CA, United States	2013-04-30
Rochelle Da Silva Pereira	Piratini, , Brazil	2013-04-30
karin mazur	oneida, PA, United States	2013-04-30
Adam Weber	Hood River, OR, United States	2013-05-01
Nicole Nestel	Haleiwa HI, HI, United States	2013-05-02
Concerned Citizen	New City, NY, United States	2013-05-04
Brian Walsh	Kaaawa, HI, United States	2013-05-04
stinger nitro	union city, GA, United States	2013-05-04
Waimea McKeague	Waianae, HI, United States	2013-05-04
Chris Carnel	Agoura Hills, CA, United States	2013-05-04
Louella Taggart	Norwood, MA, United States	2013-05-04
Jensen Hanakahi	Kapolei, HI, United States	2013-05-04
Aaron Fuata	Waianae, HI, United States	2013-05-04
Chenin Connole	cave creek, AZ, United States	2013-05-04
Zach Thomson	Honolulu, HI, United States	2013-05-04
Eric Aiu	Queen Creek, AZ, United States	2013-05-04
KAIAKO KALUNA	Culver City, CA, United States	2013-05-04
Jennifer Kennedy	enterprise, MS, United States	2013-05-04
Angela Huntemer	Kahuku, HI, United States	2013-05-04

Name	Location	Date
Harmony Kahaialii	Laie, HI, United States	2013-05-04
Benjaline Buttel Medlock	Sahuarita, AZ, United States	2013-05-04
jonathan reed	Kahuku, HI, United States	2013-05-04
sele tanoai	Canoga Park, CA, United States	2013-05-04
Ruby So'oto	Kahului, HI, United States	2013-05-04
MiChelle Chavis	Honolulu, HI, United States	2013-05-04
Keola Loo	Tempe, AZ, United States	2013-05-04
Eric Gumpfer	Kailua, HI, United States	2013-05-04
Duane Likens	Denver, CO, United States	2013-05-04
Marsha Lash	Makawao, HI, United States	2013-05-04
petra merkle	Germany	2013-05-04
Ruth Matafeo	Auckland, New Zealand, AK, United States	2013-05-04
Harold Toelupe	Laie, HI, United States	2013-05-04
Ronald Hurlbut	Kahuku, HI, United States	2013-05-04
ron silver	Atlantic Beach, FL, United States	2013-05-04
Nancy Simmons	Las Vegas, NV, United States	2013-05-04
M D	Haleiwa, HI, United States	2013-05-04
sharon stanley	tipperary, , Ireland	2013-05-05
Phillip Medlock	Sahuarita, AZ, United States	2013-05-05
chris burford	christchurch, , United Kingdom	2013-05-05
Aloha Mead	Woodland Hills, CA, United States	2013-05-05
Mike Schmanski	West Hills, CA, United States	2013-05-05
Sharon Willeford	keauhou, HI, United States	2013-05-05
Gregory Barnett	Kailua-Kona, HI, United States	2013-05-05
Paul Robinson	Llanrwst, , United Kingdom	2013-05-05
thierry collart	Täsch, , Switzerland	2013-05-05
William Sellers Jr.	kaneohe, HI, United States	2013-05-05
orla donlyn	Haleiwa, HI, United States	2013-05-05
Tamalalee Kahanu	Kaneohe, HI, United States	2013-05-05
Samuel Le	Tarzana, CA, United States	2013-05-05
Sal Patane	Kahuku, HI, United States	2013-05-05
Anthony Morris	Marina del Rey, CA, United States	2013-05-05

Name	Location	Date
eddie johnson	waianae, HI, United States	2013-05-05
Thorn Williams	NEWHALL, CA, United States	2013-05-08
Coreen Williams	HAUULA, HI, United States	2013-05-09
Christina Runyon	Kaaawa, HI, United States	2013-05-09
Starr Domingo	Kaaawa, HI, United States	2013-05-09
Tanya Aiau	Kaaawa, HI, United States	2013-05-09
Amani Magalei	Bothell, WA, United States	2013-05-10
malepe solipo	kahuku, HI, United States	2013-05-15
Esther Ikakoula-Mane	Kahuku, HI, United States	2013-05-15
Anapogi Tevaga	Kenmore, WA, United States	2013-05-15
Deena Mercurio	Kahuku, HI, United States	2013-05-17
Ghialana Borges	Kahuku, HI, United States	2013-05-17
Normagene Greene	Hauula, HI, United States	2013-05-18
RaMona IkaKoula	Kahuku, HI, United States	2013-05-20
RosaMaria Hurst	Laie, HI, United States	2013-05-22
Ke`Alii Greene	Hauula, HI, United States	2013-05-23
Pam Boland	Grovetown, GA, United States	2013-08-10
Shennandoah Toelupe	Provo, UT, United States	2013-08-15
Marina Sauvao	Kahuku, HI, United States	2013-08-15
afiafioaiga tonga	kahuku, HI, United States	2013-08-16
Joe Mauai	Laie, HI, United States	2013-08-16
Miriam Ortiz-Gouveia	KAHUKU, HI, United States	2013-08-17
joseph hall jr	baltimore, MD, United States	2013-08-18
cindy aban	waipahu, HI, United States	2013-09-24
Walter Peters	Honolulu, HI, United States	2013-12-16
samuela langi	kaneohe, HI, United States	2013-12-16
Gil Riviere	Waialua, HI, United States	2013-12-16
Ruby Sooto	Kahului, HI, United States	2013-12-17
Rhoda Libre	Kauai, HI, United States	2013-12-17
Antya Miller	Haleiwa, HI, United States	2013-12-18

Name	Location		Date	Comment
Joseph keliiko	wahiawa, HI	202	2013-04-29	WELL VERY IMPORTANT THE THE PEOPLE AND COMMUNITY LEADERS , STATE LEADERS NEED THINK ABOUT THEIR COMMUNITY, FAMILIES, FRIENDS, ETC. . WE THE PEOPLE MUST HAVE SAFE ISLAND NOT LIVED BUT TRUST THAT THINGS MAKE BETTER PLACE WE CAN TREASURE THE BLESSING WITH OUR CHILDRENS EVERYONE JOY NEED WELL DESERVED. MAHALO!
Jess Lundgren	waialua, HI	203 204	2013-04-30	the north shore windmill project is very very corrupt & should be stopped there are already about 50 not in use just sitting & creating huge visual pollution ! not to mention no extraction plan & lies about amt of electricity produced !! 205
Nicole Nestel	Haleiwa HI, HI	206	2013-05-02	The wind turbines at Waimea are a visual blight and the developers should be forced to relocate them
Brian Walsh	Kaaawa, HI	207 208	2013-05-04	We should proceed with caution. Firstly there needs to be a reasonable setback from homes. Second - the existimng windmills have a poor record of producing electricity - we should make them prove their efficacy before approving more.
Benjaline Buttel Medlock	Sahuarita, AZ	209	2013-05-04	Born and raised near there and agree with their stand point.
MiChelle Chavis	Honolulu, HI	210	2013-05-04	Let's keep Hawai'i, Hawai'i!
Duane Likens	Denver, CO	211	2013-05-04	I am train to work on large Wind Generators.
Ruth Matafeo	Auckland, AK	212	2013-05-04	If it is what the community and those who will be living nearby want...I support listening to these people as they are the ones who will be greatly affected should these turbines go up and problems arises...listen to the people...those whom the Mayor, the county and your local politician are supposed to be serving
Phillip Medlock	Tucson, AZ	213	2013-05-05	supporting my wife and she is from this area.
Aloha Mead	Woodland Hills, CA	214	2013-05-05	Relatives on Oahu
Samuel Le	Tarzana, CA	215	2013-05-05	Friends and Family are close to one of these building sites!
Sal Patane	Kahuku, HI	216 217	2013-05-05	No only is it an " Eye sore" to the beauty of the land or area if needed i sure we can find other ways to produce energy.
Thom Williams	Newhall, CA	218	2013-05-08	It could potentially destroy beautiful countryside near a good friend's home. Leave it as is please!
Christina Runyon	Kaaawa, HI	219 220	2013-05-09	Keep the country country!!! No more land development without properly educated and environmentally friendly decision making. Stop making monetary decisions, start making smart decisions that support local, sustainable, ecosystem friendly community based needs. Look for needs not greed!
malepe solipo	kahuku, HI	221	2013-05-15	This is important to me because I have lived in Kahuku for 30 years and still live there today. These windmills will harm not only our children but all that live in the area. Health issues will arise and they always do!!!! TAKE YOUR WINDMILLS SOME WHERE ELSE CAUSE WE DONT NEED IT AND DONT WANT IT!!!!!!!!!!!!!!!!!!!!!!!!!!!!
Deena Mercurio	Kahuku, HI	222	2013-05-17	Because I live in Kahuku and I don't want these wind mills here!!
Ghialana Borges	Kahuku, HI	223 224	2013-05-17	This is important because my family and I live in this community, the keiki of Ko'olauloa attend Kahuku High & Intermediate School, and we are the ones that will have to face the ramifications of such construction. The negative health effects and safety hazards need to be the main, if not the only, primacy regarding this issue. Environmental racism: "the geographic relationship between environmental degradation and low-income or minority communities"

Name	Location		Date	Comment
Tasi Ponder	Kahuku, HI	225	2013-04-18	Close proximity causes health issues, especially for the elderly and young children. See Journal of Laryngology & Otology : http://journals.cambridge.org/action/displayAbstract?fromPage=online&aid=8853239 . Interferes w/ inner ear and electromagnetic field which affects balance, concentration, causes migraines. Dr. Nina Pierpoint's book on Turbine Syndrome gives details of the affects.
		226		Beware--the federal money wind developers get are huge enough to turn them into community bullies. Even people in the media are being paid off to make fun of people complaining but when you talk to those affected, they aren't laughing.
		227		Mainland farmers have abandoned family farms after agreeing to having a turbine on their property because of health issues. Consider the vibration affect when driving with car windows open on only 1 side.
		228		People are being paid off via community "gifts" and even personal money bribes to look the other way by wind companies, and officials being backed by them. Some are being threatened politically, etc.
		229		To those who want to make the big bucks from federal incentives and fatter bottom line profits....spend the money on building the reinforced roads further away in areas where they won't be seen, heard or felt. Then pay the extra money to help offset affects to our public roadways. It's the cost of you doing your business and it should not be paid by any of us. If you don't want to spend the money to do your business without harming or negatively affecting others...do something else. Once they are up, they are ours to look at, hear and feel forever. Let's teach these self-serving folks that our Aloha for one another is not for sale! Force them to put the turbines further away where they won't hurt us or desecrate sacred lands. If they won't, ask them to leave!
vasaloloa tauafi	kahuku, HI	230	2013-04-18	Political leaders are elected to protect those they represent instead of getting in bed with industrial interests who have no concern for the health or safety of communities impacted by their disregard and indifference for families living next to wind turbines. Where are our leaders and when are they going to stand up and protect our community?
Iwalani Su`apaia	Turlock, CA	231 232	2013-04-18	Safety should always be the number 1 concern, and it ruins our islands landscape. Laie will always be home for me.
Maxine Vierra	Hauula, HI	233	2013-04-18	Safety concerns, keep the country country, eye sore. ← 234
JaNae Sika	Laie, HI	235	2013-04-19	Nothing but useless eyesores! How about fixing the ones that are already there before bringing in more? ← 236
Maria Pilar Almeida Ribeiro	Sao Joao Estoril, Pt	237	2013-04-19	because it is destroying the environment
Val Ching Jr.	Kailua, HI	238	2013-04-19	First and foremost this is a safety issue. A proactive participation by industry and government official working with the community it imperative. Mahalo to all concerns

Name	Location		Date	Comment
Dave Betham	Laie, HI	239	2013-04-15	I have to agree with the safety issue, the setbacks do need to be further than the blade height. I am also in agreement on the locality considering proximity to exting development.
Ken Prolo	Kahuku, HI	240 241	2013-04-15	unsightly, noisy, kills birds, and coal is much more energy efficient.
Ramona Maiman	Hauula, HI	245	2013-04-15	The beauty of Waimea Valley has been forever changed by these hideous turbines... so out of place to the beauty of what should be pristine and protected. Who in gods name allowed these things to be put there!?! It's unbelievable! To add insult to injury these eyesores in Kahuku haven't even been working, for almost a year now. Who is responsible for this debacle? Of course I'll sign a petition to have more stringent protections surrounding these monstrosities. They should NEVER have been put in sight of Waimea or Kahuku. They should have been put further into the interior and hidden from view.
janice henkel	hauula, HI	246	2013-04-15	For aesthetic, safety, and rural serenity purposes.
Carol Philips	Haleiwa, HI	249	2013-04-16	Ridiculous visual blight, solar power more cost effective.
Cindy Betham	Laie, HI	251	2013-04-16	For the reasons Kent gives.
Cynthia Manubag	Irving, TX	252	2013-04-16	Because thats my home where I grew up and went to school. My roots are planted there.
Larry Te'o	Fort Worth, TX	253	2013-04-16	It's an eyesore.
Lindad Avegalio	Hau'ula, HI	254 255	2013-04-16	Although I do support alternative energy as we strive to use less and less fossil fuels, we must ensure that this is done in a responsible manner and does not come at the cost of safety for the surrounding communities. This petition/resolution cites clearly the concerns with the current and proposed wind turbine farm surrounding the Kahuku neighborhood. I wholly support this petition/resolution and urge you to do the same. Thank you.
RODNEY NAKASHIMA	HONOLULU, HI	256	2013-04-16	OUR LANDSCAPE WILL NOT LOOK LIKE PARADISE!
Jennifer John	Honolulu, HI	257 258	2013-04-16	If the wind turbines are going to be built on our 'aina, let them be built only far within proven safe and effective parameters; and mandate that that they be competently managed, maintained, and operated safely and efficiently. Finally, if at any time in the future, it is determined that they are no longer useful or effective in producing their intended energy levels and/or meeting the community's needs, those who own or otherwise oversee their maintenance will be responsible for their breakdown and complete removal so that the natural beauty of Kahuku's skyline is once again restored.
Eric Oler	Pleasanton, CA	259	2013-04-16	i used to live there in the late seventies and eighties and still return there quite often
Pua Iuli	Mililani, HI	260	2013-04-17	Per Kent's reasons

change.org

Makani Pono 'o Kahuku

Recipient: George Atta

Letter: Greetings,

261 Do not permit the placement of industrial wind turbines within 1 mile of schools, hospitals or Police and Fire stations.

Although it may be prudent that our island state transition to increasing our reliance on renewables, the transition to renewable energy should be done in a responsible and well planned manner. Poor planning in the rush to implement renewable wind energy and the associated tax credits can lead to poor policies and unintended consequences that will impact communities for 20+ years. The placement of industrial size wind turbines (some in excess of 500' tall) in close proximity to schools, hospitals, first responder facilities and residential communities is questionable planning while placing them as far away from populated areas would be more sensible.
Like many other communities in Honolulu County, the vast majority of Kahuku community members support renewable energy. But an even larger majority strongly oppose placing more industrial wind turbines in close proximity to Kahuku schools, Kahuku Hospital, Kahuku Police and Fire Stations and our neighborhood. The Kahuku Community Association and the Ko'olauloa Neighborhood Board have collectively voted 19-1 to oppose placing wind turbines in close proximity to Kahuku entities.
Please support our community's desire to protect what we love.

Signatures

Name	Location	Date
Kent Fonoimoana	Kahuku, HI, United States	2015-07-08
Jared Anderson	Kahuku, HI, United States	2015-07-08
Diane Waka	Kahuku, HI, United States	2015-07-08
Sipola Llanos	Kahuku, HI, United States	2015-07-08
Bruce NALUAI	Laie, HI, United States	2015-07-08
Kalani Schrader	Kahuku, HI, United States	2015-07-08
Oreta Tupola	Hauula, HI, United States	2015-07-08
Lopaka Lauaki	Kahuku, HI, United States	2015-07-08
Mahina Chillingworth	Wahiawa, HI, United States	2015-07-08
Coreen Williams	Hauula, HI, United States	2015-07-08
Eddy Tsing	Kahuku, HI, United States	2015-07-08
Mathus Vaiaoga	Laie, HI, United States	2015-07-08
Colleen Mellor	Haleiwa, HI, United States	2015-07-08
Todd Tamura	Laie, HI, United States	2015-07-08
Rima Goode	Berkeley, CA, United States	2015-07-08
andrea anixt	Kaaawa, HI, United States	2015-07-08
shannon denning	Kapolei, HI, United States	2015-07-08
Neva Fotu	Kahuku, HI, United States	2015-07-08
Seini Kaufusi	Kahuku, HI, United States	2015-07-08
Lillie Tongi	Kahuku, HI, United States	2015-07-08
alika idica	Waianae, HI, United States	2015-07-08
Lauren Park	Haleiwa, HI, United States	2015-07-08
Deldrene Herron	Hauula, HI, United States	2015-07-08
Cindy Tutor	Laie, HI, United States	2015-07-08
Latu Hafoka	Kahuku, HI, United States	2015-07-08
Diane Hanzel	Haleiwa, HI, United States	2015-07-08
LUISA NIUTUPUIVAHA	Kahuku, HI, United States	2015-07-08
Suzanne Reed	Laie, HI, United States	2015-07-09
Susan Williams	Haleiwa, HI, United States	2015-07-09
Tanya Ingbino Francisco	Laie, HI, United States	2015-07-09

Name	Location	Date
Lesieli Falepapalangi	Kahuku, HI, United States	2015-07-09
Tanoai Reed	Laie, HI, United States	2015-07-09
Jason Pili	Desert Hot Springs, CA, United States	2015-07-09
Silia Burgess	Laie, HI, United States	2015-07-09
Renee Cabrinha	Hauula, HI, United States	2015-07-09
Beau Reed	Canyon Country, CA, United States	2015-07-09
Salu Tuigamala	Pago Pago, HI, American Samoa	2015-07-09
Tiafau Steve Looney	East Rutherford, NJ, United States	2015-07-09
sara ybarra	Ocala, FL, United States	2015-07-09
Monica Campanis	HONOLULU, HI, United States	2015-07-09
Tui Toki	Suisun City, CA, United States	2015-07-09
Anthony Osa	Australia	2015-07-09
Okesene Faleolo	Honolulu, HI, United States	2015-07-09
Toalei Talataina	El Cajon, CA, United States	2015-07-09
Kaylene Sheldon	Hauula, HI, United States	2015-07-09
Delsa Moe	Laie, HI, United States	2015-07-09
Harris Mataafa	Eagle Mountain, UT, United States	2015-07-09
Macario Labanon	Honolulu, HI, United States	2015-07-09
Aitofele Tofa	Laie, HI, United States	2015-07-09
Talalupelele Niutupuivaha	Kahuku, HI, United States	2015-07-09
Leona Lolohea	Kahuku, HI, United States	2015-07-09
Kawiki Coelho	Waianae, HI, United States	2015-07-09
Veralina Faleolo	Australia	2015-07-09
Kanani Wan	Waianae, HI, United States	2015-07-09
Larry Green	Port Ludlow, WA, United States	2015-07-09
Elizabeth Rago	Laie, HI, United States	2015-07-09
Tatyana Faleolo	Port Hadlock, WA, United States	2015-07-09
Makenna Fausa-Hapi	Auckland, Auckland, New Zealand, New Zealand	2015-07-09
Steven Kean	Haleiwa, HI, United States	2015-07-09
Sera Fifita	Australia	2015-07-09
Lieta Auelua	KAHUKU, HI, United States	2015-07-09

Name	Location	Date
Glenn Alo	Hauula, HI, United States	2015-07-09
Denise Reed	Hillsboro, OR, United States	2015-07-09
Charles Reed	Santa Clarita, CA, United States	2015-07-09
Vika Kinikini	Laie, HI, United States	2015-07-09
Natalie Osa Heald	Auckland, New Zealand	2015-07-09
Tēvita O. Ka'ili	Kahuku, HI, United States	2015-07-09
janice henkel	hauula, HI, United States	2015-07-09
Mia Heinonen	Stockholm, Sweden	2015-07-09
Lucy mariteragi	Laie, HI, United States	2015-07-09
Ben Shafer	Hauula, HI, United States	2015-07-09
Patricia Holmberg	Honolulu, HI, United States	2015-07-09
Jess Lundgren	waialua, HI, United States	2015-07-09
Sasha Perry	Hauula, HI, United States	2015-07-09
Chenin Connole	Honolulu, HI, United States	2015-07-09
travis ingbino	Laie, HI, United States	2015-07-09
Tamalalee Kahanu	Kaneohe, HI, United States	2015-07-09
ELLOUISE Reed	Kahuku, HI, United States	2015-07-09
Sara Sturz	Bisbee, AZ, United States	2015-07-09
Alicia Pepper	Worcester, MA, United States	2015-07-09
Shawn Loiseau	Shrewsbury, MA, United States	2015-07-09
Derik White	Beaverton, OR, United States	2015-07-09
Thida Keo	Hamilton, OH, United States	2015-07-09
Christy Pelletier	Berlin, CT, United States	2015-07-09
Nancy Commadore	Santa Barbara, CA, United States	2015-07-09
Lyon Logan	Hauula, HI, United States	2015-07-09
Brooklyn Sturgill	Tucson, AZ, United States	2015-07-09
Mitch Dennis	Niantic, CT, United States	2015-07-09
Jesse Ryan Kawela Allen	Kailua, HI, United States	2015-07-09
Kathleen Amantiad	San Lorenzo, CA, United States	2015-07-09
MICHELLE GALE	Glendale, AZ, United States	2015-07-09
Chris pirrone	Kahuku, HI, United States	2015-07-09
Lolanda Mainaaupo-Remigio	Kahuku, HI, United States	2015-07-09

Name	Location	Date
Bryant Owan	Laie, HI, United States	2015-07-09
sela makaafi	Honolulu, HI, United States	2015-07-09
Tammy Shea	Pasco, WA, United States	2015-07-09
Rita Kahaialii	Makawao, HI, United States	2015-07-09
Justin Vendiola	Kahuku, HI, United States	2015-07-09
Ronnette Maiava	Hauula, HI, United States	2015-07-09
Melissa allen	Waialua, HI, United States	2015-07-09
Enele Ongoongotau	Kahuku, HI, United States	2015-07-09
Kylie Meyers	Laie, HI, United States	2015-07-09
Elizabeth Chandler	Kahuku, HI, United States	2015-07-09
monica kaanaana	Hauula, HI, United States	2015-07-09
Rina Lessary	Waianae, HI, United States	2015-07-09
Katrina Martinez	Kahuku, HI, United States	2015-07-09
Michael Garcia	Kahuku, HI, United States	2015-07-09
Esther Perry	Kahuku, HI, United States	2015-07-09
LEEANN VOLAVOLA	Waianae, HI, United States	2015-07-09
Celeste Auelua	West Jordan, UT, United States	2015-07-09
Siliva Toelupe	Salt Lake City, UT, United States	2015-07-09
Rich Harter	Laie, HI, United States	2015-07-09
Lavinia Latu	Kahuku, HI, United States	2015-07-09
Val Kuamo'o	Santa Rosa, CA, United States	2015-07-09
Steph Marie	Standish, ME, United States	2015-07-09
grace begay	Glendale, AZ, United States	2015-07-09
Brenda Duncan	Pittsburg, CA, United States	2015-07-09
Cipriano Pereira	Easton, PA, United States	2015-07-10
Jonathan Reed	Kahuku, HI, United States	2015-07-10
Dereck Togiai	West Valley, UT, United States	2015-07-10
lisa sanders	Laie, HI, United States	2015-07-10
Avery Tappe	Stamford, CT, United States	2015-07-10
Christopher Dela Cruz	Kailua, HI, United States	2015-07-10
Amanda Vendiola	Kahuku, HI, United States	2015-07-10
Roselie Falevai	Marysville, WA, United States	2015-07-10

Name	Location	Date
vassiliki emery	Haleiwa, HI, United States	2015-07-10
Keola Morgan	Kahuku, HI, United States	2015-07-10
Rudy Leandri	Clinton, CT, United States	2015-07-10
Sarah sape	Hauula, HI, United States	2015-07-10
Lehua wright	Honolulu, HI, United States	2015-07-10
Lani Latu	Kahuku, HI, United States	2015-07-10
Melissa Moniz	San Antonio, TX, United States	2015-07-10
Gerald Ferro	Hilo, HI, United States	2015-07-11
Cheryl Galiza	Honokaa, HI, United States	2015-07-11
Earl Stone jr	Honolulu, HI, United States	2015-07-11
Salynn Kam	Hauula, HI, United States	2015-07-11
dinah weatherby	louisville, KY, United States	2015-07-11
Jeanyee Plaza	Carlsbad, CA, United States	2015-07-11
Marina Sauvao	Kahuku, HI, United States	2015-07-11
Georgieann Kahawaii	Orlando, FL, United States	2015-07-11
Charlotte Kamauoha	Kahuku, HI, United States	2015-07-11
jerica ikimaka	Las Vegas, NV, United States	2015-07-11
Harrison Melemai	Honolulu, HI, United States	2015-07-11
deja kanuha	Dallas, TX, United States	2015-07-11
Maria Tejada	Kahuku, HI, United States	2015-07-11
Latoya Wily	Kahuku, HI, United States	2015-07-11
Irene Leger	Laie, HI, United States	2015-07-11
Helen Moenoa	Honolulu, HI, United States	2015-07-11
anna chris	Barstow, CA, United States	2015-07-11
Brandie Mendiola	Aiea, HI, United States	2015-07-12
Saia Hafoka	Kahuku, HI, United States	2015-07-12
Camille Christiansen	Laie, HI, United States	2015-07-12
Mikey Bruneau	Ocean View, HI, United States	2015-07-12
lela latu	Lanai City, HI, United States	2015-07-12
Fia Emerson	Kahuku, HI, United States	2015-07-12
Cecilio DelaCruz	Kahuku, HI, United States	2015-07-12
Keoni pau	Koloa, HI, United States	2015-07-12

Name	Location	Date
Michael Aldrich	Laie, HI, United States	2015-07-13
chantelle rillamas	Laie, HI, United States	2015-07-13
MaryElizabeth Rathburn	Haleiwa, HI, United States	2015-07-13
brittni wainee	HALEIWA, HI, United States	2015-07-13
Ocean Eale	Haleiwa, HI, United States	2015-07-14
ms flori p	Kahuku, HI, United States	2015-07-14
Dannell Haiola	Lodi, CA, United States	2015-07-15
Gregory Mendiola	San Francisco, CA, United States	2015-07-15
Linitria Kaio	Kahuku, HI, United States	2015-07-15
Christine Convy	Glenrothes, SCT, United Kingdom	2015-07-15
Thelma Akeripa	Kahuku, HI, United States	2015-07-15
Ben Uluave	Laie, HI, United States	2015-07-15
James Palakiko	Kaneohe, HI, United States	2015-07-16
Lisa Andresen	Conyers, GA, United States	2015-07-16
Lucas Cadina	Kahuku, HI, United States	2015-07-17
Constance Dela Cruz	Kahuku, HI, United States	2015-07-17
Lily Darnell	Haleiwa, HI, United States	2015-07-19
Cheryl Masters	Miami, FL, United States	2015-07-19
sonia waters	Kahuku, HI, United States	2015-07-19
chante waters	Kahuku, HI, United States	2015-07-19
danille waters	Kahuku, HI, United States	2015-07-19
leslie lam	Los Gatos, CA, United States	2015-07-20
Ualani Nagy	Laie, HI, United States	2015-07-23
Jason Renaud	Waimanalo, HI, United States	2015-07-24
Johnny Tapusoa	Waianae, HI, United States	2015-07-24
June Pearl	Kahuku, HI, United States	2015-07-24
Rabecca Makekau	Haleiwa, HI, United States	2015-07-24
Mika Valai	Kahuku, HI, United States	2015-07-25
Sone Mapu	Waianae, HI, United States	2015-07-25
Celene Roberts	Honolulu, HI, United States	2015-07-25
Curlyn Latu	Kahuku, HI, United States	2015-07-25
Miriam Chang	Kaneohe, HI, United States	2015-07-25

Name	Location	Date
Tania Galeai	Laie, HI, United States	2015-07-26
Carl Hubbell	Laie, HI, United States	2015-07-27
Noikulani Kamakeeaina	Laie, HI, United States	2015-07-29
Tevita Vimahi	Kahuku, HI, United States	2015-07-31

Name	Location		Date	Comment
Anna Christiansen	LAIE, HI	262	2015-07-11	Shame on you for terrorizing a small community like this. Build it next to your kids school!
Brandie Mendiola	Aiea, HI	263	2015-07-12	There are enough towers in kahuku!!!!
Cecilio Dela Cruz	Kahuku, HI	264	2015-07-12	I oppose putting turbines near our schools and homes...
Dannell Haiola	Lodi, CA	265	2015-07-15	I too oppose of turbines being built close to our schools, homes n businesses.
Gregory Mendiola	San Francisco, CA	266	2015-07-15	I don't believe wind turbines should be place in close proximity to Kahuku schools or anywhere else.
Linitria Kaio	Kahuku, HI	267	2015-07-15	There are better, less expensive, and less obtrusive options than these windmills. Why don't you try wind turbines, or best yet, Vortex Bladeless. They may be a startup, but they are the best option environmentally and economically. Please stop making poor choices in a wise industry.
Christine Convy	Glenrothes, United Kingdom	268	2015-07-15	There are too many Windfarm applications where councils not conducting appropriate due diligence and lack of care to the communities. I am strongly opposed to any Industrial Scale Windturbines being within close proximities to existing residential or community properties.
Ben Uluave	Laie, HI	269	2015-07-15	I do not want those turbines in or near Kahuku town. Put them pineapple fields in Wahiawa or Kunia. Better yet, put all da windmills on Kahoolawe.
James Palakiko	Kaneohe, HI	270	2015-07-16	Wind turbines, nuclear power plants and High voltage PowerLine should be placed in 0 population areas. Put businesses there like bars, strip clubs, and other adult voluntary activities. Not schools, hospitals, homes, and HPD/HFD units. Put the wind mills around the state capitol and city hall. If it must go in neighborhoods put them in HECO's board of directors, CEO, COO, CFO, neighborhood.
Constance Dela Cruz	Kahuku, HI	271	2015-07-17	I am in opposition of any more windmills being built in Kahuku.
leslie lam	Los Gatos, CA	272	2015-07-20	to keep wind turbines away from schools and residential properties and populated areas .
Jason Renaud	Waimanalo, HI		2015-07-24	B
Rabecca Makekau	Haleiwa, HI	273	2015-07-24	These windmills are supposed to bring us energy and make our electric bills cheaper. I have not seen any decrease in my electric.
Mika Valai	Kahuku, HI	274	2015-07-25	I'm signing because I'm tired of being bullied by big businesses who think they can just go to communities and payoff politicians and destroy lives.
Sone Mapu	Waianae, HI	275	2015-07-25	The reads I find I am not comfortable with like the Cotaminating of water etc.
Curlyn Latu	Kahuku, HI	276	2015-07-25	I'm signing because I work. At the kahuku Elem. School Special needs children that have difficulties focusing from loid sounds if too close n the spinnong distracting ..they'll rather look at. The mills than learn focis whats at hand....they are loud with a very imitatating acreeching sound when too close because a student of ours lives right below up in mountain and needed a ride home and I gave him a ride ...the sound was like someone scratching on a blackboard slowly....that's my personal experience....how can our students n teachers deal with that!!! Love idea of renewable energy but please Back it up! Waaaay Back!!!! Thank you....
Miriam Chang	Kaneohe, HI	277 278 279 280	2015-07-25	They are soooooooo huge, unsightly, visually disturbing—particularly to those with visual/perceptive challenges, they are a threat to our birds . . . . And we on the North Shore have yet to benefit from these obtrusive structures—still no answer to oir transportation needs, from improved bus service to improved roads!!! Why dont u put the next set on the hills around Lanikai or Hawaii Kai??

Name	Location		Date	Comment
Salu Tuigamala	Pago Pago, Americ Samoa	281	2015-07-09	I'm signing because I grew up here and my grandchildren are growing up here too. I don't what them to have any safety or health issues down the line because they're too close to the school they attend or even to their home.
Anthony OSA	Australia	282	2015-07-09	Its a hazard for the community. It shouldnt go ahead.
Kaylene Sheldon	Hauula, HI	283	2015-07-09	I want my children & family to be safe! Responsible sustainability is our kuleana!
Delsa Moe	Laie, HI	284 285 286	2015-07-09	Kahuku has ample windmills close to the residential areas. Additional windmills will affect the serenity and beauty of this rural area. Move them further away from housing and school areas or replace with another form of alternative energy.
Aitofele Tofa	Laie, HI	287 288	2015-07-09	These people are here to make money!!!!! They are poisoning our lands.....there are no more room for this crap!!!!!! Take it with you and go back to the mainland.....the beauty of our lands are disappiring... We need homes for our local people that are really are local.....that's rite I said locals only.....not all these people from outside.... I want to buy a home but it just got more expensive..... That's my view.... So if your not from here then go back where you came from and make your home town a better place to live...
Talalupelele Niutupuivaha	Kahuku, HI	289	2015-07-09	Slow down. Technology is upgrading and outdating these old wind turbines. Lets see what the future hold in capturing wind energy.
Kanani Wan	Waianae, HI	290	2015-07-09	I don't want the near schools. Study of long term effects should be done before placing near schools.
Glenn Alo	Hauula, HI	291	2015-07-09	Enough already. land in Oklahoma is being damaged by windmills! Don't want that in our little country town. Aloha!
Vika Kinikini	Hauula, HI	292	2015-07-09	I oppose the new proposal to build more turbines in the country!!
janice henkel	hauula, HI	293	2015-07-09	The only people that want more turbines in Kahuku are those that stand to make a profit. The residents that will be affected are against this. Loud and clear, NO MORE WINDMILLS IN KAHUKU!!!
Ben Shafer	Hauula, HI	294	2015-07-09	It's the pono thing to do.
Jess Lundgren	waialua, HI	295	2015-07-09	Windmills are a lie & a con the people are being tricked - do not support windmills !!
Chenin Connole	Honolulu, HI	296	2015-07-09	I'm signing because our beautiful Hawai'i becomes more and more unrecognizable. We don't need anymore wind turbines on our land out there. Nuff already.
ELLOUISE Reed	Kahuku, HI	297 298	2015-07-09	I'm signing because I don't want these windmills so close to our schools & homes. These windmills do not even service us... There are other more efficient & responsible renewable energy, and not at our health or safety expense!
Brooklyn sturgill	Tucson, AZ	299	2015-07-09	preserve our schools!!!
Jesse Ryan Kawela Allen	kailua, HI	300	2015-07-09	I agree with the goals of this petition.
Kathleen Amantiad	San Lorenzo, CA	301	2015-07-09	This is a place I call home, well being and safety of the people air the utmost important. I support cleab energy but not at the risk of the people's safety. Build these else where! We have those windmills here in California but no where near residential areas!
Chris pirrone	Kahuku, HI	302	2015-07-09	agred. These things are useless
Lolanda Mainaaupo-Remigio	Kahuku, HI	303	2015-07-09	Why don't they put PV instead if big windmills?

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change.org

Recipient: Kirk Caldwell, George Atta, and William 'Aila Jr.

Letter: Greetings,

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Aloha Mayor Caldwell,
Please consider adopting more stringent safety zone requirements that prevent industrial wind turbines from negatively impacting residential neighborhoods. Due to past catastrophic events involving large wind turbines or systems associated with this technology, a moratorium on issuing permits may be in order until such a time where all prudent safety and proximity issues have been adequately studied and sufficiently addressed.

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We the undersigned oppose SB2526 in that the set back distance of 1000 feet is too short and we recommend the distance from residential dwellings to be ½ mile or greater.

Name	Address	Contact Info.
Fred Silva	56-465 Pahelehala Lp.	9273455
Stefkin Diopulos	56-401 Hulehua St.	429-1569
Leonard & Ling Lopes	56-115 " "	293-2186
[illegible]	56-371 Pahelehala	
Phil & Andrea Bruner	56-464 Pahelehala Lp	293-1022
Alika Patricio	Joelpatricio1980@yahoo.com	
Richard DeVincent	66927 Hekupi Waialua	
[illegible]	95-536 [illegible]	
Janelle Chalka	PO BOX 861, Waianae Hi	96792 mzelle808@yahoo.com
Jillian Makepa-Mikaele	PO BOX 1195, Waianae HI	96792 baes.motif@gmx.com
DAVID F. Cunningham	58-031 Kamala Pl. Haleiwa, Hi	96712
robynantonucci@yahoo.com Robyn Antonucci	95-270 Waikalani Dr. Mililani	96789
Kristal Rosa	1634 Kealia Dr.	Kristalrosa@ymail.com
Charles Chanalle	81-163 Palani St. Waianae, HI	271-4603
Kainoa Bergamenta	1552 Aiaaolda Lp	kaohynbrada@hotmail.com
Jonah Auto	92893 Palaelael St Makaha, Lo	HI 96707
Allan A. Peacham	1253 Aunui Dr.	690-0933
Kenneth J. Estores	2446 California Ave	96706 383-2456
Karen Pauhaua	248 Kanilau Ave #32 Honolulu	Kestores@hawaii.edu
* Betty Kemp	99-1032 Moanalua Rd #304	96701
* PRP AIEA @ hawaii.rr.com		
	61-736 Papailua Rd Haleiwa Hi	96712
deanna6944@hotmail.com Deanna Cunningham	58-301 Kamala Pl. #1 Haleiwa	96712
Jacob [illegible]	P.O. Box 393, Haleiwa, Jacobrg@msn.com	637-5714
100 Joe Parker	95-270 Waikalani Dr. Apt. 301 Mililani	96789 joesmokerjoe@yahoo
Matt & Renee Voorhies	59-503 Makana Rd. Haleiwa, HI	matthawaii@aol.com
Jimmy & Sheila Feyleaki	53-841 Kamehoy Hauula HI	96717 (808) 947-2616
Chad Albert	264 S. 3rd Ave Upland CA	91786 chadalbert@hotmail.com
Cab Jones	P.O. Box Haleiwa, HI	96712 305-359-2227
Elisa Rosario	61-160 Iliohu Pl. Haleiwa Hi	96712 # 291 50-70
IONA TEUPAA JR.	56-388 PAHELEHALA LP. KAHUKU, HI	96731 293-2590
Priscilla Tamanguro	56-408 Pahelehala Lp. Kahuku, HI	96731 277-8143
Herbert Rego	56-399 Pahelehala Lp. Kahuku	96731
Sione Fetui Falevai	56-395 PAHELEHALA Lp. Kahuku	96731
Naimoa Soren	56-399 Pahelehala Lp. Kahuku HI	96731
Honiara Lautaha	56-398 Pahelehala lp. Kahuku	HI 96731
Veamoni Lautaha	56-398 Pahelehala lp. Kahuku	Hi 96731
Wanza U. Falevai	56-395 Pahelehala lp. Kahuku	Hi. 96731
Vincent Thur. K. Falevai	56-395 Pahelehala Lp. Kahuku	Hi. 96731
Uilani A. Falevai		

We the undersigned oppose SB2526 in that the set back distance of 1000 feet is too short and we recommend the distance from residential dwellings to be 1½ mile or greater.

Name	Address	Contact Info.
Kimo Kahananui	56-145 Kahana St Kahuku 96731	232-0008
Debbie Kahananui	same as above	
Hiram Akina	56-403 Lelenli St. Kahuku HI 96731	293-2726
Pamela Akina	56-403 Lelenli St. Kahuku HI 96731	293-2726
Amber Jayeng	56-398 Pahehala Lp Kahuku	232-2139
Sandi Jayeng	" "	"
Kuulei Akina	56-403 Lelenli St. Kahuku 96731	293-2726
Hana Akina	56-403 Lelenli St. Kahuku 96731	293-2726
Nehoa Akina	56-403 Lelenli St. Kahuku 96731	293-2726
Dominga Maghanoy	56-142 KAHANA, St. Kahuku, 96731	
Luis Maghanoy Sr.	" " " " " "	
Byron Logan	P.O. Box 59, Kahuku, HI 96731	293-1591
Aline Logan	P.O. Box 59, Kahuku, HI 96731	293-1591
Renee Kumai	P.O. Box 59, Kahuku, HI 96731	675-8136
Amy Agustin	Po Box 819, Kahuku HI 96731	306-7632
Anson Agustin	Po Box 819, Kahuku HI 96731	479-1382
Anita Cahigas	P.O. Box 345 KAHUKU HI. 96731	293-5357
Juanito Cahigas	P.O. BOX 345 KAHUKU HI. 96731	293-5357
Solo Waka	56-102 Kahana St Kahuku HI 96731	
Diane Waka	" " " " " " 96731	
MARIZEL VISAYA	56-106 KAHANA ST. KAHUKU 96731	
ARMANDO VISAYA	" " " " " "	664)0627
RODNEY TONGI	56-386 PAHELEHALA LP	627-2295
Tuifuas	56-099 Kahana S.t.	293-9784
ISAAC SILVA	56-455 PAHELEHALA LOOP	
RACHEL KEKAULA		293-1133
DUDLEY KEKAULA		
MERANIA KEKAULA		
APRIL KEKAULA		
KAWAI KEKAULA		
68 Maria Pacheco	57-091 Lalo Kuilima - Kahuku	375-8027
Lucy Hafoka	56-427 Pahelehala Lp 29731	293-1974
ANTHONY CALIMLIM	56-428 PAHELEHALA LOOP	~~[illegible]~~
Ron Rodrigues	56-433 " "	685-8536
Jacob Pascua	56-445 Pahelehala	216-2177
Jerame Cabiles	56-445 Pahalehala Lp	864-0616
Bryon Pitra	56459 Pahelehala Lp	429-9376
Vamahi, Leo	56-410 Huehu St	293-9293

We the undersigned oppose SB2526 in that the set back distance of 1000 feet is too short and we recommend the distance from residential dwellings to be ½ mile or greater.

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Name	Address	Contact Info.
Lia Nakasone	56023 Pualaka Way	293-9807
Charlene Chun	56418 Pahelehala Loop	2939607
Frederick & Rose Padeken	56-440 Pahelehala Loop	2938628
James Hix	56-405 Pahelehala Loop	293-4114
Rene Hix	Same	
Martha Neuman	55-345 Kam Hwy	293-1682
Todd Neumann	55-345 Kam Hwy	265-9079
Josephine Faustino	Kahuku	
Gregory P Faustino	56 103 Kahana	2937205
[illegible]	P.O. Box 334 56717	283-5343
Rena Stant	55-646 Wahinepee St. 96762	293-8036
Daryl Stant	55-646 Wahinepee St 96762	
Brooke Hilton	56-423 Pahelehala Lp. 96731	540-447-0123
Tania Moe	56-423 Pahelehala Lp. 96731	301 788-3413
Rachel Kekaula	56-455 Pahelehala Lp 96731	
Mary Jo Kahananui	56-145 Kahana 96731	(232-0008)
Benjamin Kahananui	56-145 Kahana 96731	(232-0008)
Elizabeth [illegible]	56-426 Leleuli St, Kahuku	226-1458
[illegible]	56-419 Leleuli St Kahuku	226-87-24
Ramona Ikakoula	56-138 Kahana St. Kahuku, HI 96731	(808)852-8835
Ronald J. Mane Jr.	56-138 Kahana St. 96731	861-1248
Esther M. Ikakoula-Mane	56-138 Kahana St. 96731	(808)861-1248
Mitzie Lokotui	56-233 Leleuli Street	
Loren C. Wanday	56-138 Kahana St. Kahuku 96731	852-8835
Dane Mizusawa	56-141 Kahana St. Kahuku	96731-381-9[illegible]
Teneli T. Tupola	56-149 Kahana St Kahuku	96731-478-7775
Melissa Leiataua	56-153 Kahana St. Kahuku 96731	293-8191
Tiotala Leiataua	56-153 Kahana St Kahuku 96731	293-8191
Aisa Wily	56-151 Kahana St Kahuku 96731	630-1443
Karen Wily	56-151 Kahana St Kahuku 96731	630-1443
Artevia Wily-Ava	561-151 Kahana St Kahuku 96731	630-1443
Latoya Wily	561-151 Kahana St. Kahuku 96731	630-1443
Pierre Tallene	561-151 Kahana St. Kahuku 96731	630-1443
Justin Ava	561-151 Kahana St Kahuku 96731	630-1443
Louise Wily	561-151 Kahana St. Kahuku 96731	630-1443
Kelli Maletta	56-150 Kahana St. Kahuku, HI 96731	293-2004
Matt Maletta	56-150 Kahana St. Kahuku, HI 96731	293-2004

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We, the undersigned, **are OPPOSED to Na Pua Makani's proposed plan to install more wind turbines in the Kahuku area**.

NO MORE WINDMILLS IN KAHUKU!

Name	Address	Email/Phone #	Comments
1 Tusipepa Kamauoha	56-132 Huehu Pl.	293-9364	too close to residential area
2 Charlotte Kamauoha	56-132 Huehu Place, Kahuku	636-5040	I oppose additional wind turbines in Kahuku!
3 Ellouise Reed	56-415 Huehu St Kahuku, HI 96731	224-0730	I oppose additional wind turbines in Kahuku!
4 Hoku Wolfgramm	56-136 Huehu Pl Kahuku, HI 96731	724-4570	
5 Laura Lepeses	56-127 Huehu Pl Kahuku, HI 96731	255-1937	I oppose the windmills
6 Cky Lepe	Kahuku 96731	293-2359	
7 U. Lee	56-127 Huehu Pl Kahuku HI 96731		
8 Joseph NAPEAHI JR	56-109 Huehu Pl. Kahuku, HI 96731	397-8894	AOLE WINDMILL
9 William Falevi	56-120 Huehu Place Kahuku HI	255-2025	
10 Sophia Nawahine	56-113 Huehu Pl. Kahuku, HI 96731	389-8070	=ENOUGH, ALREADY! = NO MORE WINDMILLS
11 Caleb Nawahine	56-113 Huehu Pl. Kahuku, HI 96731	590-1879	No windmills Bumbai
12 Afi ~~Tonga~~ Tonga	56-279 Leleuli St Kahuku HI 96731	687-1819	oppose additional, were not benefiting from it/our cam looks ugly!
13 Lanolive Tauiluli	56-279 Leleuli Kahuku 96731	293 2694	No more
14 Tevita Tonga	56-279 Leleuli St Kahuku 96731	2203607	oppose
15 Janae Alo	56382 Huehu St. Kahuku, HI.	jahnayalo@yahoo.com 4295921	
16 Randy Maiava	56382 Huehu St Kahuku, HI.	6288585	
17 Ina Taea	56-473 Pahelehala Kahuku, HI 96731	384-2434	I don't want these in my neighborhood!!
18 FABIAN HI TAEA	56-473 PAHELEHALA KAHUKU HI 96731	3914706	TOO CLOSE
19 PIO Palepepalangi	56-410 KAHUKU	382-6980	NO MORE WINDMILL
20 ELBERTA SOREN	56-399 PAHELEHALA Lp. KAHUKU 96731		

Mahalo for your support!

We, the undersigned, **are OPPOSED to Na Pua Makani's proposed plan to install more wind turbines in the Kahuku area**.

NO MORE WINDMILLS IN KAHUKU!

Name	Address	Email/Phone #	Comments
1 Elizza Keni	55-650 Loala st, Laie	bemkenif @yahoo.	no more!!
2 Bil Keni	" "	" "	
3 Kelli Teo	55-660 Naniloa Laie	Kelli.teo@gmail.com	
4 David Teo		"	
5 Crimson Castillo	56-298 Huehu St	Crimson.castillo@gmail.com	
6 Jamie Reid	55-623 Naniloa Lp Laie, HI 96762	jj_Denise@yahoo	
7 Ernest Reid	55-623 Naniloa Lp Laie, HI	esreid79@hotmail.	
8 Teresa Thompson	PO Box 185 Laie, HI 96762	teri_maiava@yahoo	
9 Annie Polvado	2302 Ahakapu St. Kaneohe HI 96782	annie.polvado08 @gmail.com	
10 Lilani Puaba	55-545 Naniloa Lp	cpualoo@hotmail.com	Not by school
11 Junior Pututau	54-173 Kawaipuna st Hauula Hi 96717	Jr1putitdown@yahoo.com	
12 Nanga Pututau	" "	" "	
13 Saitui Moeai	55-628 MOANA ST. LAIE, HI 96762	smoeai15@ Punahou.edu.	NO MORE!!
14 Joanne Moeai	" "	moeai.joanne@ yahoo.com	
15 Terry Moeai	" "	terry.moeai@ gmail.com	
16 Tia Moeai	" "		
17 Lisah-Marie Purcell	55-616 Iosepa St. Laie HI 96762	purcell3308@gmail.com	NO MORE WINDMILLS!!
18 Paulo Purcell	" "	" "	" "
19 Tutasi/JR EZEKIELA	55-565 Naniloa Lp. Laie HI 96762		NO MORE
20 Sala Afakaa	55-149 laie HI 96731		Think about our keiki first!!

Mahalo for your support!

We, the undersigned, **are OPPOSED to Na Pua Makani's proposed plan to install more wind turbines in the Kahuku area**.

NO MORE WINDMILLS IN KAHUKU!

Name	Address	Email/Phone #	Comments
1 Annie Tagatauli	55-155 Kulanui St. Laie, Hi 96762		NO!
2 Mona Ah Hoy	55-472 Pelekana St Laie, Hi. 96762		No!
3 Kehaulani Fanene	55-159 Kulanui St Laie, HI 96762		
4 Leah Taala	55-470 Kam Hwy Laie, HI 96762		
5 Elaine Beatty	56-402 Leleuli St Kahuku		
6 Barry Beatty	56-402 Leleuli Kahuku		
7 Blane Beatty	55-706 Wahinepee Laie		
8 Eleni Beatty	55-706 Wahinepee Laie		
9 Salome Unga	55-706B Wahinepee Laie		
10 Vika Kinikini	55-706B Wahinepee Laie		
11 Karen Lauaki	56-146 Kahana St. Kahuku		IPITS
12 Tiere Kaitoku	55-476 Iosepa St. Laie, HI 96762		
13 Ben Ah Sing	45-049 Malulani St. Kaneohe HI, 96744		
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Mahalo for your support!

We, the undersigned, **are OPPOSED to Na Pua Makani's proposed plan to install more wind turbines in the Kahuku area**.

NO MORE WINDMILLS IN KAHUKU!

Name	Address	Email/Phone #	Comments
1 Conrad Anjeng	P.O. Box 204	293-5534	
2 Deborah Sarsona	PO Box 860 Kahuku HI 96731	293-5920	
3 Lisa Evangelista	P.O Box 244 Kahuku 96731	293. 4488	
4 VICTOR EVANGELISTA	P.O Box 244 KAHUKU, HI 96731	808TOYOTATRUCK@gmail.com	
5 Megan Dye	PO Box 244 Kahuku, HI 96731	megandye823@gmail.com	
6 [illegible]	Box 81 Kahuku, Hi	714 803 5979	
7 Mr. AFUALO 8-6-15	Box 298 Kahuku HI 96731	NONE	Amazed - Don't you want Free Electricity? Pay for the rest of Life. Air is Free from God.
8 Leslie Llanos	Box 759 Kahuku, Hi 96731	freefood7@yahoo.com	
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Mahalo for your support!

We, the undersigned, **are OPPOSED to Na Pua Makani's proposed plan to install more wind turbines in the Kahuku area**.

NO MORE WINDMILLS IN KAHUKU!

Name	Address	Email/Phone #	Comments
1 SAMASON I FALEPAPALANGA	56-284 HUEHU ST. KAHUKU HI 96731	(808)989-7909 blossomfomoolcom	I have no proof how it benefits my family/community
2 BLOSSOM FOMOIMOAM	56-406 Huehu Kahuku HI	808 382-9374	
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NO MORE WINDMILLS IN KAHUKU!

ne	Address	Email/Phone #	Comments
DEN PULI	45-044 NAIKALUA KANEOHE, HI 96744	931.9710 KUAANA.BOCUMAI	
2 Redmond Tutor	55-488 Iosepa St Laie, HI 96162	386.5063	
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NO MORE WINDMILLS IN KAHUKU!

Name	Address	Email/Phone #	Comments
1 Kehealani Toomalatai	56-608 Pualalea Pl. Kahuku, 96731	ettelani@hawaii.rr.com (808) 753-8013	
2 Candice Tupou	56-298 Huehu St. Kahuku, 96731	candice.tupou@yahoo.com (808) 389-4832	
3 Valu Alapa	51-301 Kekio Rd Kaaawa, HI 96730	alapa85@yahoo.com (808) 590-5121	
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Mahalo for your support!

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We, the undersigned, **are OPPOSED to Na Pua Makani's proposed plan to install more wind turbines in the Kahuku area**. We strongly oppose any and all future projects that place wind turbines within 1 mile of the existing residential community, Kahuku Elementary and Kahuku High Schools.

Name	Address	Email/Phone #	Comments
1 Jonathan Miller	55-481 Moana Street	293-7352	STOP IT!
2 Yvonne Hernandez	55-483 Moana Street	428-3971	Stop it!
3 Katherine Fone	"	"	" "
4 Motaumu Alisa	55 479 Moana St	426 6921	" "
5 Miracela Hung	55-472A Palekana St.	276-7063	
6 Ammon Kaopua	55-497 Palekana St	487-1342	I support this cause
7 MJohanan	55-475A Moana	675-3660	
8 [illegible]	55455 MOANA ST		
9 BALEYS			
10 Rackley	542 Moana	678-3578	STOP.
11 [illegible]	55-446 MOANA St.	457-2666	"
12			
13 CORNWALL	55445 Moana St	480 272 0715	"
14 Bybee	55-450 Moana	772-7609	"
15 [illegible]	55455 Moana St	5095050066	"
16 JKalla	55159 Kulanui	3725636	"
17 Muaina Thomas	55-469 Iosepa	772-6871	
18 Muaina Luella	55 469 Iosepa	224-4215	
19 Muaina John	55-469 Iosepa	224-4215	
20 Harry Todhope	55-480 IOSEPA ST	358-4636	

Mahalo for your support!

We, the undersigned, **are OPPOSED to Na Pua Makani's proposed plan to install more wind turbines in the Kahuku area**. We strongly oppose any and all future projects that place wind turbines within 1 mile of the existing residential community, Kahuku Elementary and Kahuku High Schools.

Name	Address	Email/Phone #	Comments
1 Yvonne Hurlbut	56-608 Pualalea Place Kahuku HI 96731	forlyf9200gmail.com 777-7527	Too many and too close to our homes & children
2 Gordon Tilley	56-623 Pualalea Pl. Kahuku, HI 96731	butchtilley@yahoo.com	Danger to the community nearby.
3 Debbie DeSilva	56-381 Kekauohai		
4 Willy DeSilva	56-424 Ieleuli St Kahuku HI 96731		Not in our town
5 NOELANI DESILVA	" " " "		
6 Evilyn Relator	56-470 Pahekehala 96731	relatore@byuhi.edu	no benefit to community
7 Sunday Mariteragi	55-510 Moana St		Definitely UN-KO'O Lau!!
8 David Hunter	55-512 Moana St.	808-293-9234	Eyesore to Island and community
9 Staci Iafeta	55-514 Moana St	808-683-2118	Keep Country-Country!
10 Kari Uluave	55-519 Moana St	808-387-9154	NO!
11 Ma Rama	55-525 Moana	293-9593	No
12 Tapusoa's	55-517 Moana St	781-0044	NO
13 Cummings	55-525 Moana St	782-9951	No!
14 Stephanie Robertson	55-559 Moana St.	288-9686	no — thank you!
15 Robin McCulloch	55-170 Puuahi St. Laie	293-8185	—
16 Lal O Jopo	55-167 A Puuahi st	293-9285	
17 Keawe Gilman	55-164 Puuahi Laie HI 96762	391-2039	Not healthy for our community. No!!
18 [illegible]	same	391-2054	No.
19 Kawalina Gilman	55-164 Puuahi St. Laie HI 96762	391-2046	Not planned well.
20 TURA AINUU	55-166	(808) 221-4451	not planned well

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Name	Address	Email/Phone #	Comments
1 Jacosa Ainuu	55-166	bigsamoan@hotmail	B200000!!!
2 Jerica Falevai	55-150 Puuahi St	jtafiti@live.com	
3 Jamie Rickertsen	55-150 Puuahi St Laie, HI 96762	mericke@gmail.com	Give us the energy then!
4 Tala Niutupuivaha	54-055 Kukuna Rd. Hauula 96717	talaniutupuivaha@gmail.com	
5 Nina Blake	55-158 Puuahi St	KUHIA08@GMAIL.COM	
6 Charity Fonoimoana	55-533 Iosepa Laie, Hi 96762	CharityLcf@gmail.com	
7 Malele Fonoimoana	55-533 Iosepa Laie HI 96762		
8 Danielle Kamekona	55-533 Iosepa St 96762	alphaunahuna@gmail.com	
9 Joseph Spurrier	55-525 Iosepa St Laie Hi 96762	laie.joseph.spurrier@gmail.com	
10 Karatahi Spurrier	55-525 Iosepa St. Laie Hi 96762	karatahi@yahoo.com	
11 MARC MYER	55-515 IOSEPA LAIE 96762	MYERM@Hawaii.com	SAVE OUR SHEARWATERS!
12 Holly Boone	55-515 Iosepa Laie 96762	hboone16@hotmail.com	
13 Perry O'Rand Myer	55-515 Iosepa St. Laie, HI 96762	orandtor@hotmail	Go Solar!
14 Sonnie Muaina	55-469 Iosepa St Laie, HI 96762	(808)772-6903 sonniem@hawaii.edu	Let the people have say to!!
15 CARL HUBBELL	55-511 MOANA LAIE 96762	293 5586 CKHUBBZ47@GMAIL.COM	NO WINDMILL
16 Pamela Jones	55-511 Moana St. Laie	phubbz@aol.com	
17 Barbara V Hubbell	55-511 Moana St. Laie 96762	293-9714	
18 Jonathan Rickertsen	55-150 Puuahi St Laie, Hi 96762	293-5426	MOVE UM SOMEWHERE ELSE!
19			
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Name	Address	Email/Phone #	Comments
1 Elisabeth Levi	55-132 Puuahi St. Laie	imua05@yahoo.com	
2 Steve Hoag	55-457 Naniloa Lp. LAIE, HI	trialsbiker9@gmail.com	
3 Jeff [illegible]	55-522 Iosepa St Laie	Kauhise@gmail.com	
4 Rosalie Vaka	55-551 Naniloa Loop Laie	rosalievaka@gmail.com	
5 Hinano Tangaro	55-533 Naniloa Lp Laie	htangaro@gmail	
6 Thomas Tangaro	55533 Naniloa Lp Laie	ttangaro@gmail	
7 Poema Pescaia	55533 Naniloa Lp Laie	ppescaia@yahoo	
8 ERIC BEAVER	54-198 HANAIMOA, Hawaii		
9 Martha Hikila	55-145 Puuahi St. Laie, 96762	mmhikila@aol.com	
10 [illegible]	P.O. Box 794 Kahuku, HI, 96731	Dwythu.Tejada	
11 Ben Martin	Box 444 LAIE HI 96762		Take them down & put them in Waikiki.
12 Hensley K. Enos	51-316A Kam. Hwy Kaaawa, HI 96730	Kahau.enos@gmail.com	
13 Vika Kinikini	55-706 B Wahinepee St Laie, HI-96762	kawelabaystand7@Hotmail.com	
14 Temukisa Uelese	Laie, HI. 96762		
15 David Niu	55-609 Moana St. Laie Hi. 96762	niud808@gmail.com	
16 Sephra Kinikini	55-122 Puuahi St.		
17 Anthony PASI	55-164 KULANUI St		
18 ROGER Escalera	55-407 Kam Hwy	2932008	
19 Elena Dunau	242 Cinto Mauica St	2028850	
20 Kalua Burtch	59-720 Pupukea Hi	234-4506	

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Name	Address	Email/Phone #	Comments
1 Randy P. Barenaba	55-162 Puuahi St.		
2 [illegible]	59-045 Alapio		NO MORE PLEASE
3 Ann Allred	55-491 Iosepa St Laie	alohilani99@hotmail	
4 Stella Keil	55-497 Kam Hy. Laie.	fetu@live.com	It is sad to hear the Windmills when in Waimea valley - don't want them too close
5 ETUA T. TAHAUNI	P.O. Box 694	Hauula	REMOVE OLD ONE & NO MORE [illegible]
6 Ethel Alejado	54-126 Puuowaa St.	Hauula	too close to community - not good!
7 Susan Nauta	55-526 Puuahi St	nellicky@hotmail.com	
8 LANCE PAGADOR	56-297 MAUNULUNU	PAGADORL@GMAIL.COM	
9 Richard Tolleson	54-231 Hauula HRD. Hauula 96717		
10 Clint Mariteragi	55-510 Moana St Laie Hi 96762		
11 Lucy Mariteragi	55-510 Moana St. Laie, Hi 96762		
12 Fraser Black	55-623 Kam Hwy LAIE HI 96762		
13 Kari Uluave	55-519 Moana Laie Hi 96762		
14 Kuulei Aloha Jenkins	PO Box 672 Kahuku Hi 96731	Kuuleialohaj@gmail.com.	
15 George NIANIA	55 158 Kulanui St LAIE Hi 96762		
16 Kalani Ulii	55-526 Moana St Laie Hi 96762		To close to the schools and community
17 Lalani Sumait	54-184 Kawaeku St. Hauula Hi 96717	lsumait@hawaii.rr.com	NO More
18 Verna Eguires	PO Box 773 Haleiwa, Hi 96712	eguiresv@gmail.com	
19 AENOI NAKHOUN	P.O. BOX 348 KAHUKU, HI 96731		LOOK AT OUR MOUNTIANS.... UGLY!!!
20 Sandra Pukahi	P.O. Box 192 Laie, Hi 96762	spukahi@hawaii.rr.com	

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Name	Address	Email/Phone #	Comments
1 Danielle Fullmer	56-423 Leleulist Kahuku Hi 96731		
2 Stephen Green	56-267 Maunawai Kahuku Hi		
3 TESSA BEAHY	PO Box 870 KAHUKU HI		
4 Sarah Matthews	P.O. Box 108 Haleiwa HI 96712		
5 Russ Matthews	P.O. Box 108 Haleiwa HI 96712		
6 Uila Vendida	P.O. Box 364 Kahuku, HI 96731		
7 Doug DEAL	P.O. BOX 697 KAHUKU 96731		
8 Albert Paco	55-562 Moana St Laie, Hi, 96762		
9 [illegible]	56-611 [illegible] Kahuku HI 96731		
10 Melissa Hamel	170 Wilikina Dr Wahiawa Hi 96786		
11 Saane Kauvah	55-518 Moana St Laie, 96762		
12 [illegible]	56370 Kekauwa Kahuku HI 96731		
13 Liz Montgomery	68-416 Kikou Waialua 96791		
14 Angel M Ramos	KAHUKU HI	808 293 9028	
15 Rod [illegible]	56-469 Pahelehala Lp Kahuku, HI 96731		
16 Susan Schirmer	Susan Schirmer PO Box 315 HALEIWA		
17 Adina Pitt	59-219 Alapio Rd.		
18 Tony Schirmer	[illegible] PO BOX 315		
19 Tony Bohnet	P.O Box 572 Kahuku HI		
20 Marie Bohnet	P.O Box 572 Kahuku HI		

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Name	Address	Email/Phone #	Comments
1 Peter Tailele	55-510 Iosepa Laie 96762	ptailele@byuh.edu	
2 Pearl Haida	Laie 96762	lpaie@byuh.edu	
3 CORI ROGERS	55-104 Kulanui La Laie 96762	lojo15@hotmail.com	
4 Samay Sourivong	55-710 Kaum Hwy		
5 Edwin Pereira	P.O. Box 5[illegible] Kahuku		
6 VALERIANO GARRIDO	P.O. BOX 54 KAHUKU, HI 96731	[illegible]@yahoo.com	
7 Rajeev Singh RAJEEV SINGH	P.O. Box 471 KAHUKU, HI 96731	RAJEEV.SINGH@YAHOO.COM	
8 Fetolo Tatofi Leilani Tatofi	455-20C Pahia Rd 455-20C Pahia Rd	tatofi3@hsa.com 808-381-[illegible] 808-381-7249	
9 Noelani Taupun	PO. Box 253 KAHUKU HI	[illegible]	
10 Lance Vendiola	P.O. Box 893 Kahuku	[illegible]	
11 Michael K Apo	53-045 Halai	Michael K Apo	
12 Sharon L. Apo	53-045 Halai	Sharon L Apo	
13 Audra Eugenio	PO Box 162 Kahuku, HI 96731		
14 Ron Thompson	P.O. Box 848	Kahuku	
15 Jane Hoskins	PO Box 312	Kahuku	
16 [illegible]	55-455 [illegible]	Laie	
17 [illegible]	98-1030 MOANALUA RD #108 AIEA HI 96701	SVLUZON@HAWAIIRR.COM	
18 LUCITA HARBOWY	P.O. BOX 903 KAHUKU		
19 Mike Howard	PO Box 434 Kahuku		
20 Aimee Antipala	PO BOX 154 Kahuku		

Mahalo for your support!

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Name	Address	Email/Phone #	Comments
1 Kayla Terupaia	56-380 Pahelehala Kahuku, Hi 96731	293-2590	Not any at all!
2 Vitt Sinoy	55-409 Nanilo Alp Laie, HI 96762	310-1879	No Natural Rubish
3 [illegible]	P.O. Box 24		
Richard Mercurio	PO Box 538 Kahuku		Richard Mercurio
4 Raymond Chun	PO Box 654	Kahuku	
Charlene Chun	" "	"	
5 Genevieve Touli	56-422 Pahelehala Loop Kahuku, Hi		
6 McGuire Kahiali			
[illegible]	56-160 Lekali Pl.	384-5492	Farther away / community should receive some benefit
7 J Kamealoha	85-133 Ala Wai Ma St Waianae 96712	478-5828	
8 Alan Nagata	New Camp Kahuku	House 51	
9 Elias Chang	66 425 Paalaa Rd Haleiwa 96712		Not a benefit to community
10 William Pitter	54 243 Anuilein Hau'ula Hi		No Benefit to Self or community.
11 Sinapati Moe	55-706 #E Waihinapae Laie, HI		
12 [illegible]	PO Box 560 Kahuku, HI 96731	Jane Hayes Estates @gmail.com	
13 Krystle Corpuz	366 Makai Kam Hwy Kahuku, HI 96731	1808 293 9252	
14 David Wedding	58-254 Kam Hwy		NOT NO MORE
Michelle Cummings	Hs. 52 New Camp Kahuku	808-293-8181	
15 John Chaphone	P.O. Box 620. Kahuku Hi. 96731		
16 Azariah Shepardson	P.O. 631 Kahuku HI 96731		
17 Karey Passmore	PO B 406 Kahuku 96731		Better Notification Please
18 Esther Hall	H-419 Walkerville Kahuku, Hi. 96731	780-2023	too close
19 Karen Nihipali	56-322 Huehu St Kahuku HI 96731	724-0500 nnckaren@hotmail.com	Too close to school & housing
20 JOHN HINA	47-549 Hui Ina Kaneohe, HI. 96744		

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Name	Address	Email/Phone #	Comments
1 Eric Minugh	PO Box 2	741-5652	Eye soar, Takes from the land
2 Buddy Lus Barnes	PO Box 854	293-9885	Protect environment
3 Carol Ramos	PO Box 539 96731	293-1983	
4 Hood, Viki	P.O. Box 91 Kahuku	808-365-7415	Too close to community + homes.
5 Ben Masoe	PO Box 351	3870106	[illegible]
6 Allan F Ponciano	Box 830	293-5619	
7 Bonnie Turner	Box 610	321-4024	To many already
8 Daisy Santos	P.O. Box 568	366-0470	why build it so close to the school.
9 Cornelio Vargas	P.O. Box 317	3970030	To close To schools To many
10 Wlanda Mainaaupo Remigio	PO Box 137 Kahuku	293-1653	Photo votech (PV)
11 Janet Fulton	P.O. Box 53 Kahuku, HI 96731	225-9129	Don't like it
12 MATT MAMIZUKA	P.O. BOX 660	450-0526	OPPOSE IT!
13 JASMIN PULLMAN	P.O. BOX 660	238-1010	NOT IN OUR BACKYARD
14 AMNEZ SINGH	P.O. BOX 471 KAHUKU, HI	294-4982	ENOUGH ALREADY
15 Charlene Kahawai	P.O. Box 512 Kahuku, HI 96731	293-5910	concerned about the environment. choose another method
16 Randi-Anne Kobashigawa Gaings	47 665 Ahuimanu Rd Kaneohe, HI 96744	366-1977	oppose it being so close.
17 Richard Mamizuka [illegible]	P.O. BOX 779 KAHUKU HI 96731	808 224-6778	OPOSE
18 Shane Marasco	P.O. Box 567	808-888-3732	To close to School
19 Neva Fotu [illegible]	56-340 Olauniu Pl. Kahuku, HI 96731	808-630-0343	too close to school, can't get solar
20 Jane Fotu [illegible]	56-340 Olauniu Pl. Kahuku, HI 96731	808-630-0343 808-255-7372	Can't get solar

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Name	Address	Email/Phone #	Comments
1 Tusi Avonu	56-310 Huehu St	393-3891	EYE SORE
2 Tiffany Toki	54173 Kawaeku St. Hauula HI	744-4399	Too close to school.
3 Sigoni Toki	96717	"	" "
4 Timena Farley	56-308 Leteuli St Kahuku, HI 96731	ladyT293@yahoo.com 372-0456	Too close
5 Kaiot Farley	56-308 Leteuli St. Kahuku HI 96731	216-7674	TOO CLOSE TO SCHOOL & HOUSING EYE SORE!!!
6 Elpidio Dela Cruz	56-193 Pualalea St	206-6891	Bad for the health
7 Constance Dela Cruz	56-193 Pualalea St	384-2371	
8 Cecilio Dela Cruz	56-193 Pualalea St	ilionsone@gmail.com	too close
9 HILTON ALVES DOS SANTOS	56-193 PUALALEA ST	382-2098	EYE SORE... GO HOME S.O.B!!
10 Jessica A. dos Santos	56-193 Pualalea st 96731	381-4069	Too close and eye sore
11 Keni Kaufusi	56-336 Huehu St Kahuku 96731		Too Close
12 Apolosi. Lauhiy Lauhi	56-607 Pualalea		Too Close
13 Phonesavan	56-592 Pualalea	(808) 554-3533	Too close
14 Carly Sarsona	56-596 Pualalea Pl.	808-364-8616	
15 Margaret Van	56-600 Pualalea Pl	808-382-4899	Too close
16 Ray Agdinaay	56-026 Pualalea	306-3276	Too close
17 Aimeamiti Tanoai	56-015 Pualalea Way	354-6528 725-9762	eye sore, ugly and too close
18 DALE TANOAI	56-015 Pualalea Way	~~354-6528~~	will eventually have loud noise.
19 DEAN TANOAI	56-015 Pualalea	354-6528	it would be so ugly.
20 RONALD HURUBUT	56-608 PUALALEA PL.	808-306-7153	TOO MUCH, TOO CLOSE, TOO UGLY

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Name	Address	Email/Phone #	Comments
1 [signature] PHYLLIS P. TATE	POB 273 KAHUKU, HI	(808) 293-5656	
2 NOEL ACOBA	P.O. BOX 934 KAHUKU, HI 96731	277-9884	
3 RODNEY AI	PO BOX 185	808 293 5787	
4 Melissa Toleafoa	56-402 Leleuli St Kahuku, Hi 96731	808.295.4345	
5 Tim Toleafoa	56-402 Leleuli St. Kahuku, Hi 96731	808.295.4345	
6 Terry Estaran	56-355 Leleuli St Kahuku, Hi 96731	808-990-4659	
7 Hans Tyrone Brown	56-419 Leleuli St. Kahuku, HI	808-779-6049	
8 Hans Silva Brown	56-419 Leleuli St. Kahuku, HI	808-489-2650	
9 Seta Latu	56-275 Leleuli St. Kahuku, HI		
10 Curlyn Latu	56-275 Leleuli St. Kahuku HI	808-364-6239	
11 Manna Brown Lavern Brown	56-419 Leleuli St Kahuku, HI	808-721-0759	
12 Greg Adolpho	55-125 Poohaili St Laie, Hi 96762	808 293 5719 393 6243	
13 Theresa Warner	"	293-5719	
14 Kanoe Mapuhi	55-117 POOHAILI ST. LAIE, HI 96762		
15 Nangi Mapuhi	55-117 Poohaili St. Laie, Hi 96762		
16 Vic Fonoimoana	55-562 Moana St. Laie HI 96762	227-1971	
17 Rebekah Fonoimoana	55-562 Moana St. Laie HI 96762	542-6013	
18 [signature] Caryn Lesuma	55-476 Kam Hwy Laie HI 96762	551-9670	
19 [signature] Vaughn Lesuma	55-476 Kam Hwy Laie HI 96762	489-5054	
20 EDDIE NAUTU [signature]	55-106 POOHAILI ST LAIE HI 96762	808 722-3448	STRONGLY OPPOSED!

Mahalo for your support!

We, the undersigned, **are OPPOSED to Na Pua Makani's proposed plan to install more wind turbines in the Kahuku area**. We strongly oppose any and all future projects that place wind turbines within 1 mile of the existing residential community, Kahuku Elementary and Kahuku High Schools.

Name	Address	Email/Phone #	Comments
1 MARY C. NAUTU McNaughton	55-106 POOHAILI ST. LAIE HI 96762	808.722.3228	
2 Wendy K. Uluave Wendy K. Uluave	54-268 Kaipapauhap Hemula 96717	808-227-9866	
3 Solomon Williams [illegible]	P.O Box 23 Kahuku Hi 96731	808 284-3714	
4 [illegible]	Kahuku Hi 96731 P.O. Box 23	8082843714	
5 [illegible]	P.O. Box 45 Laie HI 96762	808 392-1849	
6 Tenille Marasco	55.131 Poohaili St. Laie, HI. 96762	808.489.6165	
7 Tyra Williams	P.O. Box 23 Kahuku, HI 96731	808-284-0218	
8 Shanisse Kahawai	55-112 Poohaili St Laie, Hi 96762	8087547353	
9 Heather Lingwood	55-099A Lanihuli St, Laie	803-429-1999	
10 John Lingwood	55-099A Lanihuli St	JNRTile@yahoo.com	
11 Hauoli Nawahine	55-131A Naupaka St	olinawahine@msn.com	
12 Betty Nikora	55-706 Wahinepee St. Laie, HI	808-428-7342	
13 Lina Nikora	55-706 Wahinepee St Laie H	808 3088149	
14 Gaylene Wolfe	55-706 Wahinepee Laie HI	808-429-8417	
15 Ke Anuenue Nikora	55-149 Poohaili Laie HI 96762	808 3729582 nuenikora@gmail	
16 MARCUS NIKORA	55-149 POOHAILI ST. LAIE, HI. 96762	808 561-9005 marcusnikora@yahoo	
17 Jared Nikora	55-706 Wahinepee St. Laie, HI 96762	(808)428-7342	
18 KAKA MATAIA	55-109 Poohaili St.	(808)489-0555	
19 DENNIS MATAIA	55-109 Poohaili St.	(808) 469-7135	
20 Kim Au	55081 Lanihulis Laie, Hi 96762	808-754-6132	

Mahalo for your support!

We, the undersigned, **are OPPOSED to Na Pua Makani's proposed plan to install more wind turbines in the Kahuku area**. We strongly oppose any and all future projects that place wind turbines within 1 mile of the existing residential community, Kahuku Elementary and Kahuku High Schools.

Name	Address	Email/Phone #	Comments
1 Olive Miller	55-502A Moana St. Laie, HI 96762	milirootsg@gmail.com	
2 Judith Adolpho	55-125 Poohaiwi St Laie HI 96762	(808) 293-5719 dawn.nozawa	
3 Dawn Nozawa	PO Box 26 Kaaawa 96730	@gmail.com	
4 Lea Domingo	95-406 Awiki St Mililani HI 96789		
5 Debra Yoshiw	PO Box 403 Waiawa, HI 96791		
6 RABECCA MAKEKAU	58 264 A Kam. Hwy HALEIWA, HI 96712		
7 Walter Santiago	56-412 Pahelehala Lp. Kahuku, HI 96731	wsantiago@hawaii.com	
8 AISA WILY	P.O. BOX 447 LAIE, HI 96762		
9 E. Aalona	P.O Box 462 Hauula Hi 96777		
10 DEVIN AUELUA	55-476 PALEKANA ST.	LAIE 96762	
11 Margaret Primacio	P.O. Box 92 Kahuku 96731	st1@bardmoo3@hawaii.m.com	none, no more 'aole
12 Liwa Garduque	PO Box 693	Fax liwavan-06@yahoo.com	
13 Anthony Pickard	PO Box 371 Kahuku HI	8082939440	
14 Laura L. Pickard	PO Box 371 Kahuku, HI	8082939440	
15 [illegible]	PO Box 307 Kahuku		
16 [illegible]	PO Box 307 Kahuku		
17 Delbert Pearl	PO Box 2 Laie HI 96762	808 74 1296	
18 DERMON AUELUA	55-692 Kam Hwy LAIE 96762	428-9288	
19 MICHELE AUELUA	" "	392-7542	
20 Lea Williams	54-028 Waikulama St. Hauula, Hi	372-8561	

Mahalo for your support!

We, the undersigned, **are OPPOSED to Na Pua Makani's proposed plan to install more wind turbines in the Kahuku area**. We strongly oppose any and all future projects that place wind turbines within 1 mile of the existing residential community, Kahuku Elementary and Kahuku High Schools.

Name	Address	Email/Phone #	Comments
1 Peter Williams	54-028 Waikulama St. Hauula 96717	389-7254	
2 Arnetia Tukuafu	56-331 Huehu St. Kahuku, HI 96731	218-3101	
3 Silivenusi Tukuafu Nusi Tukuafu	56331 Huehu St Kahuku, HI 96731	3452737	
4 Tony Moeai	55-628 Moana St Laie, HI 96762	294-6175	
5 Alice Enos	54-177 Kawaipuna Hauula 96717	381-7330	
6 Agnes Lauaki	56-332 Kekauoha Kahuku Hi. 96731	Pakanese @ Yahoo.com	
7 Lopaka Lauaki	56-332 Kekauoha Kahuku, Hi. 96731	"	
8 Kerry Moeai	56-401 Huehu Kahuku, Hi 96731		
9 Isopela Tauiliili-Moeai	56-401 Huehu St Kahuku Hi 96731		
10 Shyla Tangaro	56-169 Pualalea St Kahuku Hi. 96731	690-1521	
11 Gideon Guar	56-303 Kiu PL. Kahuku HI 96731	492-2992	
12 Kamoan Enos	54-177 Kawaipuna St Hauula Hi: 96717		
13 Ramond Brothers	56-112 Makaiau PL,		
14 Kimber Brothers	56-112 Makaiau Pl.		
15 Lyle Burkhart	56-104 Makaiau Pl		
16 De Ann Burkhart	56-104 Makaiau Pl		
17 Sauca Makaiau	56-134 Pualalea		against windmills
18 Ralph K. Makaiau	56-134 Pualalea		oppose
19 Anthony Calimlim	56-428 Pahelehala Loop Kahuku Hi 96731	258-2210	
20 Ramsey Calimlim	56-428 Pahelehala Lp Kahuku 96731	391-4114	

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We, the undersigned, **are OPPOSED to Na Pua Makani's proposed plan to install more wind turbines in the Kahuku area**. We strongly oppose any and all future projects that place wind turbines within 1 mile of the existing residential community, Kahuku Elementary and Kahuku High Schools.

Name	Address	Email/Phone #	Comments
1 Wanza Falevai	56-395 Pahelehala Lp Kahuku, HI 96731	808) 293-8746 falevaiw@byuh.edu	
2 Wilani A. Bell	56-395 (96731) Pahelehala Loop	808 364 0885	
3 Clifford Bell Jr.	56-395 Pahelehala Loop, Kahuku 96731	808-561 8931	
4 Fetuu Falevai	56-395 Pahelehala	808-799-9070	
5	Loop Kahuku Hi 96731	falevaif@polynesian.com	
6 CRIS CAMIT	56-115 MAKAIAU PL KAHUKU HI		
7 Nancy Camit	56-115 Makaiau Pl. Kahuku 96731		
8 CRIS CAMIT	56-115 MAKAIAU PL KAHUKU, HI 96731		
9	56-115 MAKAIAU PL KAHUKU, HI 96731		
10 Emerson Nahale	PO 215 ~~Makaiau Place~~ Kahuku, HI 96731		
11 Nohea Stibbard	P O BOX 215 Kahuku, HI 96731		
12	Kahuku, HI 96731 56-679 Kam. Hwy		
13	P.O. Box 5313		
14 JEFF COMPOC	P.O. BOX 861		
15 Mollie Bruhn	P.O. BOX 861 Kahuku, HI 96731		
16 KEOLA BRUHN	P.O BOX 861		
17 Christopher Kamoeafu	56461 Kah Hwy PO Box 261	(801 949 2517)	
18 SATEKI KAVA	56336 Huehu St. KAHUKU, HI	(808) 313-9373	
19 Kealoha Finau	56-318 Huehu St. Kahuku, HI 96731	808 781 5956	
20 HAROLD KUBO	25-25 DATE ST #1505 Honolulu, 96826	479-4737	

Mahalo for your support!

We, the undersigned, **are OPPOSED to Na Pua Makani's proposed plan to install more wind turbines in the Kahuku area**. We strongly oppose any and all future projects that place wind turbines within 1 mile of the existing residential community, Kahuku Elementary and Kahuku High Schools.

Name	Address	Email/Phone #	Comments
1 Dolores LAGUA Keeli Laqua	PO Box 113 Kahuku " "	96731 "	
2 Cawoli Anamtah Jesse Fonoimoana	P.O. Box 749 Kahuku 56406 Huehu St.	96731 96731 230-7713	
3 Kaiihilei Hookano	P.O. Box 731 Kahuku Hi 96731	393-7445	
4 [illegible]	P.O. Box 731 Kahuku, Hi 96731		
5 Barbara Hookano	P.O. Box 731 Kahuku, Hi 96731		
6 Taly Mundo	56-230 Leleuli St Kahuku	351-5058	
7 Josephine Mundo	56-230 Leleuli St. Kahuku	293-9011	
8 Jim Camit	P.O. Box 149 Kahuku Hi	293 5780 216-0281	
9 [illegible]	P.O. Box 140 Kahuku Hi		
10 SALLY YONG Sally Yong	Box 435 96731	293-0821	
11 [illegible]	524-D Olivea	6211911	
12 JoAnn Duenas [illegible]	55-080 Kam Hwy Hi 96762	(808)293-4127 (401)297-6163	
13 [illegible] Ferguson	57-101 Kailima Dr	96731	
14 Brandon Taca	56-408 Pahelehala Loop	(808)293-2474	
15 Sherive Brule	P.O. Box 484 Kahuku Hi	(808)492-6721	
16 Nguyen N.	P.O. Box 635	808 232-2323	
17 Hue Pham	P.O. Box 635	808 232 2323	
18 Ashley Petsdon	59 564 Pupukea Haleiwa, Hi 96712	282-8162	
19 ALEXANDRA LARSON	49-779 KAM Hwy	808-234-4836	
20 Amanda Monson			

Mahalo for your support!

, the undersigned, **are OPPOSED to Na Pua Makani's proposed plan to install more wind turbines in the Kahuku area**. We strongly oppose any and all future projects that place wind turbines within 1 mile of the existing residential community, Kahuku Elementary and Kahuku High Schools.

Name	Address	Email/Phone #	Comments
1 Inaipepa Kamauoha	56-132 Huehu Pl	293-9369	too close to the school + homes
2 Charlotte Kamauoha	56-132 Huehu Place, Kahuku	636-5040	I oppose additional wind turbines in Kahuku
3 Ellouise Reed	56-415 Huehu St Kahuku, HI 96731	224-0730	I oppose additional turbines in Kahuku
4 Hoku Wolfgramm	56-130 Huehu Pl Kahuku, HI 96731	724-4570	
5 Laura Lapenes	56-127 Huehu Pl Kahuku, HI 96731	255-1937	I oppose the windmills
6 Carlyn	Kahuku 96731	293-2359	
7 Hue	56-127 Huehu Pl Kahuku, HI 96731	293-2359	
8 Joseph NAPEAHI JR	56-109 Huehu Pl. Kahuku, HI. 96731	397-8894	AOLE WINDMILL
9 William Faleni	56-120 Huehu Place, Kahuku HI	285-2525	
10 Sophia Nawahine	56-113 Huehu Pl. Kahuku, HI 96731	389-8070	NO MORE WINDMILLS — ENOUGH —
11 Caleb Nawahine	56-113 Huehu Pl. Kahuku, HI 96731	590-1879	NO Windmills Bumbai.
12 JOSEPH NAPEAHI SR.	56-109 HUEHU PL. KAHUKU, HI 96731	293-0955	
13 JOANDA C. NAPEAHI	56-109 HUEHU PL. KAHUKU, HI 96731	293-0955	
14 JOSANDA NAPEAHI	56-109 HUEHU PL. KAHUKU, HI 96731	721-8260	
15 LAGI NAPEAHI	56-109 HUEHU PL KAHUKU, HI 96731	397-8894	
16 DAVID LEE	56-392 Huehu St Kahuku, HI 96731	293-8003	
17 UEDA CAROL	56-388 HUEHU ST	347-4401	
18 Jande Alo	56382 Huehu St. Kahuku, HI.	4295921	
19 Randy Malava	56382 Huehu St. Kahuku, HI.	6288585	
20 Ina Tara	56-473 Pahehanalani Kahuku, HI 96731	384-2434	I don't want wind mills at all!!

Mahalo for your support!

We, the undersigned, **are OPPOSED to Na Pua Makani's proposed plan to install more wind turbines in the Kahuku area**. We strongly oppose any and all future projects that place wind turbines within 1 mile of the existing residential community, Kahuku Elementary and Kahuku High Schools.

Name	Address	Email/Phone #	Comments
1 NIUE SUSCHNIGG	56-344 KEKAUOHA	niue@Hawaii.rr.com	ABSOLUTELY NONE
2 Rayjean Mapu	56344 Kekauoha St Kahuku, HI 96731	rimapu@yahoo.com	NO TURBINES !!
3 RAYMOND MAPU	56-345 KEKAUOHA ST Kahuku, HI 96731	rsmapu@HOTMAIL	Enough Please
4 Nina Mapu	56-345 Kekauoha St. Kahuku, HI 96731	nmc_09@hotmail.com	NO MORE TURBINES
5 GEORG SUSCHNIGG	56-344 Kekauoha	hp2x426@gmail.com	
6 Monica Johansen	56-363 Kekauoha st Kahuku	mjflyn@gmail.com	NO MORE
7 Lili Tani	56-371 Kekauoha St. Kahuku 96731		
8 James Tani	56-371 Kekauoha St. Kahuku 96731		
9 Kanani Wilkins	54-1230 Hauula Homestead Rd Hauula HI 96717	3917417@gmail.com	
10 Priscilla Tampon	56-375 Kekauoha St Kahuku 96731		
11 N. Tampon	56-375 "	"	
12 Billy DeSilva	56381 Kahuku 96731		
13 Larry Nihipali	56-366 Kekauoha 96731		
14 Peggy Nihipali	"	"	
15 [illegible] Jefferson	56-325 Kekauoha St 96731		NO MORE WIND TURBINES
16 Abraham Ueda	56-321 Kekauoha St 96731		"
17 [illegible]			
18 [illegible] Kauoka	56-299 Kekauoha st		
19 Ariel Acoba	56-291 Kekauoha st.		NO TURBINES !
Jerome Acoba	56-291 Kekauoha st.		

Mahalo for your support!

We, the undersigned, **are OPPOSED to Na Pua Makani's proposed plan to install more wind turbines in the Kahuku area**. We strongly oppose any and all future projects that place wind turbines within 1 mile of the existing residential community, Kahuku Elementary and Kahuku High Schools.

Name	Address	Email/Phone #	Comments
1 Claudia DelaCruz	Kahuku, Hi 96731 P.O. Box 476	# 293-4434	
2 ~~Etuini Akina~~ Etuini Akina	~~55-462 Tooep~~ 55-611 puala lapd	457-0274	
3 MAUHEMENA	54-173 Kamapono	861-3155	
4 LANISESE KAUVAKA	56-262 LELEULI ST.	343-9823	
5 Kaanoana	Kekauoha St.	428-3343	
6 Tejada	Box 347 Kahuku	7294610	
7 Lelepali	PO Box 122 Kahuku Hi	808-780-2391	
8 Erik Fullmer	56-423 leleuli	808-312-2139	
9 JASON RENAUD	55-750 Nalungpoe	220-3094	
10 Heidi Kotobalam	55-615 Amanast	801-810-2783	
11 Norm Thompson	53-050 Halai st.	808-386-1807	
12 BRADEN CRA	55-690 WAHINEPEEC	(808)490 0510	
13 Kaufusi Munpree	55-565 Nahuku LP Lale Hi 96762	808-780-8038	
14 Vicki Kaufusi	55-565 Nahuku LP Lale Hi 96762	808 589-0294	
15 Kerrianne Tuiono	54-125 Imua Pl. 96717	808-384-5635	
16 Shirley DeLaRosa	55-507 Moana St.	808-293-1764	
17 Jenifer Scully	59-562 Kam Hwy 96792	(808)777-7649	
18 Lupe Tupola		801-574-8788	
19 Sateki Mane			
20 Pate Tupola			

Mahalo for your support!

We, the undersigned, **are OPPOSED to Na Pua Makani's proposed plan to install more wind turbines in the Kahuku area**. We strongly oppose any and all future projects that place wind turbines within 1 mile of the existing residential community, Kahuku Elementary and Kahuku High Schools.

Name	Address	Email/Phone #	Comments
1 Kaki Kahawaii	54-251, 96917 Anaiki Pl. Hauulahi	tk42@hawaii	'A'ole windmill!
2 Pamela Sue	59-605 Ke IKIKI Haleiwa HI	352 360 5982	
3 Vasa Yaualo Joe Eale	56-423 Pahelehele Lp 55-706F	Vasa@me.com Wahinepee St	'A'ole Windmill! No windmills
4 Barbie Ili Beaver	55-706F Wahinepee St. Lake HI 96762	808 428-5815	"NO" Tear it down
5 Melia K Taylor	6304 Kaiwiki 405 Keolu dr	808-224-8781 702-513-8151	"solar"
6 MANE FUTO	58-306 KAUNALA	808-3985619	
7 Susan McCarthy	57-094 Lalo Kuilima Pl.	HWNGDS@cs.com Kahuku 293-1793	ENOUGH ALREADY
8 Nicole Daoang Bu SARDINHA	94-949 Awaiki St. 96739 Peawiri Pl.	nickki808@hotmail.com Brelaxin@yahoo.com	Hazardous to children. HAZARDOUS TO COMMUNITY AND UGLY
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Name	Address	Email/Phone #	Comments
1 RANDY NAVARES	PO BOX 357 LAIE H. 96762	410 937-4990	
2 Pam Hubbell	PO Box 451 Laie, HI 96762	808-256-2648	
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Name	Address	Email/Phone #	Comments
1 FABIAN H. IAEA	56473 PAHELEHALA KAHUKU HI 96731	391 4706	K
2 ELBERTA SOREN	56-399 PAHELEHALA LP. KAHUKU HI 96731		nuff already
3 SAMASONI FALEPAPALANGA	56-284 HUEHU ST KAHUKU HI 96731	(808) 989-7909	
4 Blossom Forest Kahuku Hi	Mtank 56-406 Huehu St	3829374 blossom forest	No personal comm benefits NO MORE WINDMILLS.
5 CRAIG NARAYAMA	56-404 HUEHU	2937182	
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Mahalo for your support!

We, the undersigned, **are OPPOSED to Na Pua Makani's proposed plan to install more wind turbines in the Kahuku area**. We strongly oppose any and all future projects that place wind turbines within 1 mile of the existing residential community, Kahuku Elementary and Kahuku High Schools.

Name	Address	Email/Phone #	Comments
1 Erin Keil	55-494 Kamehameha Laie 96762	erin_ravin@yahoo.com	
2 Hui-yu Chang	P.O.Box 745 Kahuku HI 96731		
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Mahalo for your support!

April 1, 2016

Kent Fonoimoana, President
Kahuku Community Association
Kent@trisland.com

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Fonoimoana:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter dated August 10, 2015, commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Draft Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment ORG-7.1*: Following the 2010 installation of Firstwind's 12 turbine 30 megawatt facility in Kahuku, KCA took a position to oppose any subsequent installation of industrial wind facilities within the Kahuku district. The Ko'olauloa Neighborhood Board, which represents several adjoining communities, voted unanimously to oppose Na Pua Makani's proposal.*

Response ORG-7.1: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge that the Kahuku Community Association (KCA) opposes the proposed Project. During the public comment period on the Draft EIS, many letters expressing support for the Project, as well as some opposing the Project, were received from community members within the KCA and outside of the KCA. Na Pua Makani Power Partners, LLC continues its involvement in the community. Chapter 7 of the Second Draft EIS includes an updated summary of Project outreach efforts.

The purpose and need for the proposed Project are described in Section 1.3.2 of the EIS. This includes providing clean, renewable wind energy for the island of Oahu, and assisting HECO in meeting Hawaii's Renewable Portfolio Standard requirements and the State's goal to reduce electricity costs. Hawaii's Clean Energy Initiative sets goals for the state to achieve 100 percent clean energy by 2045, coming from locally generated renewable sources. The proposed Project would replace a portion of the State's electricity that is currently generated by burning fossil fuels, thus reducing greenhouse gas emission and other forms of pollution that are detrimental to the environment and human health. This would eliminate the use of approximately 13.44 barrels of oil for every hour of operation, thereby contributing to a decrease in the State's dependency on fossil fuels. As discussed in Section 4.12 of the EIS, the Project would generate electricity at a cost that is approximately half the cost of generating electricity by burning fossil fuels and HECO has stated in filings with the PUC that the Project would save the ratepayers millions of dollars over the life of the Project.

Comment ORG-7.2*: Our community opposes this proposal due to the impacts on; human health and safety, property valuation, curtailment of roof top solar, endangered and protected species, depletion of usable agricultural land, visitor's impressions and intense visual impacts.*

Response ORG-7.2: The Second Draft EIS discloses the health and safety impacts on human in Section 4.6 – Noise and Section 4.18 – Public Health and Safety; property values and roof top solar in Section 4.12 – Socioeconomics; endangered and protected species in Section 4.11 – Threatened and Endangered Species; agricultural in Section 4.14 – Land Use and Section 4.22 – Agriculture (new expanded discussion); and visual impacts in Section 4.16 – Visual Resources. Where appropriate the EIS addresses the impacts of the proposed Project in relation to the Kahuku high school, Kahuku elementary school, Kahuku medical center, and residential areas, all of which are important locations within the community. Please see detailed responses to comments on these topics below.

Comment ORG-7.3*: The Kahuku community is a close knit community and we stand in unison to strongly oppose Na Pua Makani's project. Our opposition does not mean we oppose renewable energy. The vast majority of Kahuku's residents support renewable energy. However, we have done our share and we want to preserve our identity and our collective well-being.*

Response ORG-7.3: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge that there is opposition to the proposed Project. The Second Draft EIS includes letters from residents that live in Kahuku that support renewable energy in general, and support the proposed Project. It also includes letters expressing opposition to the Project, or concern over specific issues. All comment letters received from members of the Kahuku Community are included in Appendix M of the Second Draft EIS.

Comment ORG-7.4*: The Honolulu city council expressed this sentiment eloquently in their statement regarding land use policies "The council finds and declares that there is a significant public interest served in protecting and preserving the aesthetic beauty of the city. Further, the council finds that the indiscriminate and uncontrolled erection, location, and height of antennas (or similar structures) can be and are detrimental to the city's appearance and, therefore this can cause significant damage to the community's sense of well-being, particularly in residential areas, and can further harm the economy of the city with its tourist trade which relies heavily on the city's physical appearance."*

Response ORG-7.4: The consistency of the proposed Project with land use plans and policies is discussed in Chapter 5 of the EIS. Visual simulations of the proposed Project are included in Section 4.16 – Visual Resources. The Project would be most visible at viewpoints close to the wind farm site (within about 1 mile). Individuals most likely to experience visual impacts include recreation users, residents, and travelers on the highway. Although the visibility of the proposed Project is unavoidable, it would be compatible with nearby existing residential, commercial, public, and agricultural land uses. Additionally, the Project would co-exist on the landscape with existing commercial and residential developments and would not visually dominate the landscape character because there is already a substantial degree of landscape modification in most views, including the existing Kahuku Wind Farm that is directly adjacent to the proposed Project which has been in operation since 2011. Although the proposed Project is expected to have a visual impact, alternative energy sources such as wind are an integral part of meeting the State's and City and County of Honolulu's renewable energy goals.

Comment ORG-7.5*: Champlin Wind Energy is proposing a 45-90 megawatt wind turbine facility in Kahuku. This translates into 15-30 fifty story tall machines in addition to the 12 existing forty two story tall machines we already have. Portions of the project will be upwind and in very close proximity to Kahuku schools and community. The existing 30 megawatt facility coupled with this new proposal will effectively surround Kahuku on three sides which is unacceptatble and irresponsible siting policy.*

Response ORG-7.5: The proposed Project as described in the Draft EIS (see Section 1.2) consists of a wind energy facility with a generating capacity of up to approximately 25 MW, and originally included up to 10 wind turbines. In response to public comments on the Draft EIS related to visual impacts and a request to consider fewer turbines with larger generating capacities, Na Pua Makani Power Partners, LLC reevaluated the proposed turbine locations and turbine models considered under the Draft EIS Proposed Action with the goal of reducing the number of turbines. Through this effort, Na Pua Makani Power Partners, LLC was able to reduce the maximum number of turbines needed to meet the target generating capacity for the Project (approximately 25 MW) from 10 turbines to 9 turbines. This reduced turbine project is reflected in the Second Draft EIS as the Modified Proposed Action Option.

A number of screening criteria were considered during the selection of the proposed Project location, described in Section 2.1 of the EIS. They include but are not limited to the availability of a sufficient wind resource, access to adequate and available transmission capacity, availability of contiguous land that is designated to allow wind energy development, and site-specific conditions such as topography which influence construction feasibility and compliance with setback requirements. Alternatives that were considered but eliminated from detailed study, including greater setback distances and alternative project locations on Oahu, are described in Section 2.3 of the EIS. Alternative locations did not meet these criteria.

The proposed Project as designed is compliant with City and County of Honolulu setback requirements which are a distance equal to one foot for every foot of height of the wind turbine from the property line. The nearest proposed wind turbine location is 1,611 feet from the nearest zoned residential parcel, and is 1,654 feet from Kahuku elementary school and 1,737 feet from Kahuku high school (distance to the tax map key parcel boundary of the schools), which is approximately 2.5 times the required setback distance. Additionally, please note that the prevailing wind generally comes from the easterly direction and the proposed Project is downwind from the community and the Kahuku schools.

Comment ORG-7.6*: Health - There are independent studies that support the existence of adverse impacts on humans who live in close proximity to these machines. Sleeplessness or sleep deprivation caused by noise and vibration has had detrimental impacts on folks already living in close proximity to windmills. People across the nation and worldwide are suffering vertigo, headaches, irritability, and a host of other ailments that they attribute to large industrial windmills erected too close to their homes. The subsonic sound created is known as "Infra-sound" and is inaudible to most folks. The condition has been termed "Wind Turbine Syndrome" and is gaining credence as more and more folks are reporting ill effects.*

Placing these machines upwind from our schools, hospital and community may impact the health and wellbeing of our children, elderly and common residents.

Response ORG-7.6: Public health and safety are discussed in Section 4.18 of the EIS. Seventeen separate independent scientific reviews have been conducted both nationally and internationally to examine the relationship between wind turbines and possible human health effects associated with audible (the “whooshing” sound created by the rotating blades) and inaudible noise, vibration, shadow flicker (shadows cast by the moving turbine blades), and electromagnetic fields (EMF). To date, no scientific peer-reviewed study has demonstrated a direct link between people living in proximity to modern wind turbines and resulting physiological health effects.

The following are a sample of conclusions from the scientific studies that have been conducted:

- "After careful consideration and deliberation of the body of evidence, [the National Health and Medical Research Council] concludes that there is currently no consistent evidence that wind farms cause adverse health effects in humans." (NHMRC 2015)
- "Cross-sectional studies, despite their inherent limitations in assessing causal links, however, have consistently shown that some people living near wind turbines are more likely to report annoyance than those living farther away. These same studies have also shown that a person's likelihood of reporting annoyance is strongly related to their attitudes toward wind turbines, the visual aspect of the turbines, and whether they obtain economic benefit from the turbines. Our review suggests that these other risk factors play a more significant role than noise from wind turbines in people reporting annoyance." (McCunney et al. 2014)
- "while some people living near wind turbines report symptoms such as dizziness, headaches, and sleep disturbance, the scientific evidence available to date does not demonstrate a direct causal link between wind turbine noise and adverse health effects. The sound level from wind turbines at common residential setbacks is not sufficient to cause hearing impairment or other direct health effects, although some people may find it annoying." (UK Health Protection Agency 2010)
- "There is no evidence that the audible or sub-audible sounds emitted by wind turbines have any direct adverse physiological effects."(Colby 2009)
- "None of the... evidence reviewed suggests an association between noise from wind turbines and pain and stiffness, diabetes, high blood pressure, tinnitus, hearing impairment, cardiovascular disease, and headache/migraine." (MassDEP and MDPH 2012)
- "Although opposition to wind farms on aesthetic grounds is a legitimate point of view, opposition to wind farms on the basis of potential adverse health consequences is not justified by the evidence." (Chatham-Kent Public Health Unit 2011)
- "The electromagnetic fields produced by the generation and export of electricity from a wind farm do not pose a threat to public health..."(NHMRC 2010)

To assess potential Project shadow flicker impacts, a computerized simulation was conducted and is included in Appendix K of the EIS. There is no state or national standard that exist for frequency or duration of shadow flicker from wind turbines; however, a threshold of 30 hours per year has been widely used in the wind energy industry as a target value in the absence of formal guidelines. It should be noted that shadow flicker greater than this threshold does not necessarily create a nuisance and is still well below concerns for impacts to health such as triggering epileptic seizures. Based on the analysis, the proposed Project would have no shadow flicker impacts at Kahuku Elementary School, Kahuku High School, and Kahuku medical center (zero hours of shadow flicker during the year predicted).

Noise associated with operation of the proposed Project would be in compliance with all Department of Health noise standards. A noise modeling analysis, taking into account baseline noise levels collected through noise monitoring at the Kahuku High School and Kahuku Elementary School and other locations near the wind farm site, is included in Appendix D of the EIS. At most, sound levels during Project operation would be approximately 43 dBA, at Kahuku Elementary School and 42 dBA at the Kahuku High School, and 41 dBA at the Kahuku Medical center, roughly equivalent to the sound level in a quiet library. This is less than the 55 dBA daytime noise limit established in Hawaii's Community Noise Control regulation (HAR 11-46). The modeled noise levels represent an increase in noise of 3 to 4 dBA above baseline (existing) sound levels outdoors at these locations, a level which is just at the threshold of human perception. Indoor sound levels would be close to 10 dBA lower. So, while the operation of the Project may be audible at the schools and the medical center, the magnitude of the impact would be considered low, and it would not be sufficient to disrupt the educational function of the schools or the ability of the hospital to function as a health care provider.

Sources:

Chatham-Kent Public Health Unit. 2008. The Health Impact of Wind Turbines: A Review of the Current White, Grey, and Published Literature. Prepared for Chatham-Kent Municipal Council, Chatham Ontario. June 2008.

Colby, David W., M.D.; Robert Dobie, M.D.; Geoff Leventhall, Ph.D.; David M. Lipscomb, Ph.D.; Robert J. McCunney, M.D.; Michael T. Seilo, Ph.D.; and Bo Søndergaard, M.Sc. 2009. Wind Turbine Sound and Health Effects: An Expert Panel Review. Prepared for: American Wind Energy Association and Canadian Wind Energy Association. December 2009.

MassDEP and MDPH (Massachusetts Department of Public Health). 2012. Wind Turbine Health Impact Study: Report of Independent Expert Panel. January 2012. Available online at: http://www.mass.gov/eea/docs/dep/energy/wind/turbine-impact-study.pdf.

McCunney, R.J., K.A. Mundt, D. Colby, R. Dobie, K. Kaliski, and M. Blais. 2014. Wind Turbines and Health: A Critical Review of the Scientific Literature. Journal of Environmental and Occupational Medicine 56(11):e108-e130. Available online at: http://canwea.ca/comprehensive-scientific-literature-review-on-wind-turbines-and-human-health-now-published/

NHMRC (Australian Government National Health and Medical Research Council). 2015. NHMRC Statement: Evidence on Wind Farms and Human Health. February 2015.

NHMRC (Australian Government National Health and Medical Research Council). 2010. Wind Turbines and Health – A Rapid Review of Evidence. July 2010. http://www.nhmrc.gov.au/_files_nhmrc/publications/attachments/new0048_evidence_review_wind_turbines_and_health.pdf

UK Health Protection Agency. 2010. Health Effects of Exposure to Ultrasound and Infrasound. Report for the Ad Hoc Expert Group on Noise and Health by the Health Protection Agency. February 2010. http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1265028759369

Comment ORG-7.7*: Safety - Current safety buffer zones between these machines and occupied structures are woefully inadequate and the city has acknowledged this deficiency. Placing 500' tall machines with moving parts 1200' upwind and in close proximity to Kahuku schools and community creates an untenable safety hazard. It is not if, but when a major hurricane strikes Oahu, Kahuku residents will be unnecessarily endangered due to poor siting policy. These machines include three 150' blades at 300' diameter that are designed to be light and aerodynamic. Each of the three blades on a single turbine weigh in excess of 14,000 lbs. and could become windblown debris that would likely impact human life. To date, not one wind turbine worldwide has been subjected to an 'Iniki type event. To surround Kahuku community with these machines is unacceptable, irresponsible and may be a life altering disaster for some of us who live here.*

Response ORG-7.7: Wind turbine safety issues are discussed in EIS Section 4.18 – Public Health and Safety. Turbine collapse and blade throw are very rare occurrences and often linked to improper assembly or exceedance of design limits. Such incidents have been largely eliminated due to technological improvements and mandatory safety standards during turbine design, manufacturing, and installation. All turbines are designed with several levels of built-in safety and comply with the codes set forth by OSHA and American National Standards Institute standards.

Commercial scale wind turbines are designed to International Electrotechnical Commission standards (IEC 61400). Selection of a particular model takes into account site-specific wind conditions. The wind turbine models being considered for the Project are designed to operation in wind speeds of up to 55 miles per hour and withstand 50-year occurrence gusts of 94 miles per hour. They have a built-in cut-out speed, such that when wind speeds exceed 55 miles per hour, the wind turbine stops operating. Under extreme conditions, the rotor pitch can also be changed to a neutral position (facing into the wind with blades coming to a stop). These adjustments are made by the wind turbine controller (a computer system that runs self-diagnostic tests, starts and stops the turbine, and makes adjustments as wind speeds vary); however a built-in SCADA system allows 24/7 remote control of the

facility. This additional information regarding high winds/hurricanes and wind turbine safety has been added to Section 4.18 of the Second Draft EIS.

The selected turbine model would be designed specifically for the proposed Project's location taking into account the potential for hurricanes. It is important to note that the island of Oahu has never been directly hit by a hurricane. Nonetheless, the design of turbine would account for Project-specific conditions including weather patterns. Compliance with City and County of Honolulu setback requirements are discussed in the response to comment ORG-7.5.

Other safety issues addressed in Section 4.18 – Public Health and Safety include risk of fire and fuel spills, electromagnetic frequency (EMF), and stray voltage, which would be minimized by adherence to industry standards and implementation of a Site Safety Handbook and other Project plans (e.g., Fire Management Plan, Spill Prevention, Containment, and Countermeasures Plan, and Hazardous Waste Management Plan). These measures would ensure the safety of workers onsite, as well as the community, during construction and operation of the Project.

Comment ORG-7.8*: There is a significant impact on avian and bat species. The EIS of the First Wind project as well as this proposal failed to address all avian species as the impacts on 'Iwa or Frigate bird was not studied.*

Response ORG-7.8: The EIS includes a detailed discussion of potential impact to avian and bat species, including migratory birds, such as the frigate bird. Frigate birds are specifically addressed in EIS Section 3.8 under the Seabird subsection (see Section 3.8.2.2) and potential Project-related impacts to seabirds, including the frigate bird, are discussed in Section 4.10.

The wind farm site consists primarily of previously disturbed agricultural lands with little native vegetation; most of the wildlife species likely to breed or forage within the wind farm site are common, non-native, and widespread, and the habitats affected are abundant in the surrounding area. There is no breeding or foraging habitat within the wind farm site for any protected seabird, shorebirds, waterfowl, or wading bird species. Therefore, most avian species are likely to occur in the wind farm site while in transit. Potential impacts addressed in the EIS include direct mortality (i.e., collisions with Project structures such as wind turbines), habitat removal and alteration, and noise and disturbance.

Due to the potential for impacts to species listed under the Endangered Species Act including the Hawaiian hoary bat, Newell's shearwater, Hawaiian goose, Hawaiian duck, Hawaiian moorhen, Hawaiian stilt, and Hawaiian coot, Na Pua Makani Power Partners, LLC in collaboration with the U.S. Fish and Wildlife Service and Hawaii Division of Forestry and Wildlife has developed a Habitat Conservation Plan, as part of their application for an incidental take permit/incidental take license issued by these agencies, respectively. The Habitat Conservation Plan includes measures to avoid, minimize, and mitigate potential impacts to the covered species in association with construction and operation of the proposed Project. These measures will also benefit other avian species such as the frigate bird, that have the potential to transit through the wind farm site and/or that occur within the off-site mitigation areas. No population level impacts to any species are anticipated as a result of the proposed Project.

Comment ORG-7.9*: There is a robust colony of Wedge Tailed Shearwaters in close proximity to the proposed site.*

Response ORG-7.9: The presence of wedge-tailed shearwaters in the vicinity of the Project is disclosed in EIS sections 3.8 and 4.10. The Second Draft EIS has been clarified to note that there is a wedge-tailed shearwater colony near the wind farm site.

Comment ORG-7.10*: The FAA required flashing red night lights contribute to light pollution and reportedly attracts avian and bat species into the blades that are spinning at the rate of 150-180+ mph.*

Response ORG-7.10: Flashing red lights on the turbines would be visible from some locations within the community at night (see nighttime visual simulations in EIS Section 4.16 – Visual Resources). These lights have been shown to not be attractive to birds, and are required by both the Federal Aviation Administration and the Department of Defense to improve visibility of the turbine to pilots.

Comment ORG-7.11*: Installation of these facilities often require the removal of surface vegetation as well as the installation of unpaved roads. This practice adds to flooding, topsoil loss as well as increases in "brown water" runoff that may impact our flood prone community and near shore waters.*

Response ORG-7.11: Impacts from stormwater runoff to streams within the wind farm site and to downstream properties including nearshore waters are addressed in EIS Section 4.2 – Hydrology and Water Resources. The proposed Project has been designed to avoid all streams within the wind farm site. The proposed Project as currently designed would result in up to approximately 10.1 acres of impervious surfaces which includes 10 acres of gravel surfaces which would be considered semi-pervious. This increase in impervious surface is less than 0.1 percent of the watersheds within which the Project is located.

A Preliminary Drainage Study is included in Appendix H of the EIS. The net increase in stormwater runoff was estimated at 11.9 cubic feet per second for a 10 turbine project, or 10.9 cubic feet per second for a 9 turbine project. With the implementation of stormwater control measures, such as seepage pits, drywells, and/or retention/detention basins during construction and operations, as necessary, the Project would be designed to ensure that no net additional changes in drainage would occur off-site to downstream properties including streams and near shore waters.

Comment ORG-7.12: *Statistical studies show that wind farms placed in close proximity to residential homes has a detrimental impact on the value of private real property. Across the country, realtors have noted increased difficulty in selling homes that are near wind energy facilities. Also, it is more difficult to sell a home that is in close proximity to wind farms and many US municipalities now require the developer to place monies in an escrow account to cover losses suffered by private homeowners whose home values drop or can't be timely sold and if the homeowner choses to move away from wind farms due to adverse impacts.*

Response ORG-7.12: The EIS discusses potential impacts to the property values in Section 4.12 – Socioeconomics. Most of statistically-based studies that are available have found no evidence that the presence of an operating wind facility affected residential property values (Canning and Simmons 2010; Carter 2011; Hinman 2010; Laposa and Mueller 2010; Magnusson and Gittell 2012). One large-scale study identified some evidence that post-announcement reductions in price occurred prior to actual construction, but faded following the completion of construction (Hoen et al. 2011). One detailed study (Heintzelman and Tuttle 2012) found overall mixed results, with two of the three wind facilities studied affecting property values, while the other one did not. Where effects did exist, this study found that they tended to increase the closer a property was to the nearest wind turbine. One other study (Sunak and Madlener 2012) also found some support for negative effects in proximity to wind turbines, with effects varying based on relative location. Most of these studies concluded that more research is required to more fully understand the impacts of wind facility development on property values.

Sources:

Canning, G., and L.J. Simmons. 2010. Wind Energy Study – Effect on Real Estate Values in the Municipality of Chatham-Kent, Ontario. Prepared by Canning Consultants Inc. & John Simmons Realty Services Ltd. Prepared for Canadian Wind Energy Association. February, 2010.

Carter, J. 2011. The Effect of Wind Farms on Residential Property Values in Lee County, Illinois. Thesis Prepared for Master's Degree. Illinois State University.

Heintzelman, M. D. and Tuttle, C. 2012. Values in the Wind: A Hedonic Analysis of Wind Power Facilities. Land Economics. August 1, 2012. Vol. 88 No. 3, 571-588.

Hinman, J. L. 2010. Wind Farm Proximity and Property Values: A Pooled Hedonic Regression Analysis of Property Values in Central Illinois. Thesis Prepared for Master's Degree in Applied Economics. Illinois State University, Normal. May, 2010.

Hoen, B., Wiser, R., Cappers, P., Thayer, M. and Sethi, G. 2011. Wind Energy Facilities and Residential Properties: The Effect of Proximity and View on Sales Prices. Journal of Real Estate Research. 33(3): 279-316.

Laposa, S. P. and A. Mueller. 2010. Wind Farm Announcements and Rural Home Prices: Maxwell Ranch and Rural Northern Colorado. Journal of Sustainable Real Estate. 2(1).

Magnusson, M. and R. Gittell. 2012. Impact of the Lempster Wind Power Project on Local Residential Property Values. Whittemore School of Business & Economics, University of New Hampshire. January.

Sunak, Y. and R. Madlener. 2012. The Impact of Wind Farms on Property Values: A Geographically Weighted Hedonic Pricing Model. FCN Working Paper No. 03/2012 (revised March 2013).

Comment ORG-7.13*: Additionally, HECO has stated that Kahuku is at or beyond the saturation rate for renewable energy. The existing wind energy facility has usurped private consumer's options for photo-voltaic panel installation and the addition of another facility in Kahuku will more than likely severely limit or prevent private citizens options to utilize other renewables. According to HECO, should a homeowner desire to install PV, there may be a discriminatory fee involved for Kahuku consumers as well as other consumers who live near or downstream of a wind energy facility.*

Response ORG-7.13: The potential for Project-related impacts to residential rooftop photovoltaic (PV) system installation is discussed in EIS Section 4.12 – Socioeconomics. HECO confirmed in public meetings with the community and a letter to NPMPP dated June 5, 2014 that the Project is not expected to affect the ability of homeowners to install rooftop PV systems. This is the result of the fact that the existing wind projects on North Shore of Oahu and this Project connect to HECO's high-voltage transmission lines and residential homes connect to HECO's low-voltage distribution system, which are separate systems. HECO has now adopted the PV Circuit Hosting Capacity Analysis method that identifies distribution circuit capacity to safely and reliably interconnect Distributed Generation (DG) resources. According to HECO, PV Circuit Hosting Capacity provides information to all parties as to the amount of rooftop PV that may be added to each specific distribution circuit (R. Shiro, personal communication, 2015).

Comment ORG-7.14*: Also, the power delivered fluctuates greatly and there is a detrimental impact on privately owned electrical devices of nearby consumers.*

Response ORG-7.14: Power fluctuation and delivery of power to consumers are handled by HECO. These topics are outside of the scope of this EIS.

Comment ORG-7.15*: The State and Federal Government have initiated a policy to commit to renewable energy yet the vast majority of State and Federally owned buildings lack PV panels or any other renewable energy source.*

Response ORG-7.15: As you noted, the State recently set its Renewable Portfolio Standard to 100 percent from 70 percent. We are unaware of the percentage of state and federal buildings that have PV systems. This type of information is outside of the scope of this EIS.

Comment ORG-7.16*: The federal government prohibits the installation of wind mills in close proximity to the Kahuku Army training facility as well as the James Campbell Bird Refuge. The health and welfare of our avian friends are very important and deserve protections. Kahuku residents deserve the same.*

Response ORG-7.16: An analysis of effects of the Project on military operations within the Kahuku Training Area, Kawailoa Training Area, and A-311 Tactical Flight Training Area is included in Section 4.21 – Military Interests. Operation and maintenance of the Project would not directly impact any lands used by the military for training or other purposes. While the wind farm site abuts the Kahuku Training Area, the turbines are set back by at a distance at least equal to the turbine blade tip height above ground from the property boundary, such that no direct impact would occur to the Kahuku Training Area. The Project would be unlikely to interfere with military communications during training operations. Additionally, applying the FAA's obstruction clearance standards to the designated helicopter landing zones in the Kahuku Training Area indicates that none of the turbines would be considered an obstruction to takeoff and landing clearance for those landing zones.

Na Pua Makani Power Partners, LLC, the Department of the Army, and the Department of Defense are finalizing a Memorandum of Understanding which includes measures to ensure that the Project will not affect military activities. These measures include:

- Marking turbine blade tips and tower hubs to ensure visibility for aviation activities which must be visible while air crews are flying with night vision devices (e.g., "Glint" based adhesive tape and infrared capable lighting);
- Installing the electrical collection system underground to eliminate non-turbine physical obstacles as a hazard to aviation; and
- Installing infrared capable lighting on the permanent met tower.

There are no federal regulations requiring specific setbacks between wind energy facilities and wildlife refuges. However, because the proposed Project has the potential to impact threatened and endangered bird species, Na Pua Makani Power Partners, LLC, in collaboration with the U.S. Fish and Wildlife and Hawaii Division of Forestry and Wildlife, has developed a Habitat Conservation Plan, in accordance with Section 10(a)(1)(b) of the Federal Endangered Species Act and Section 195(d) of the Hawaii Endangered Species regulations. The Habitat Conservation Plan includes measures to avoid, minimize, and mitigate potential impacts to these species in association with construction and operation of the Project.

Comment ORG-7.17*: Kahuku community has done its share for Oahu and it's time for others to do the same. Oahu's rural communities to not want to bear the brunt of our island's energy needs.*

Response ORG-7.17: Please see the response to comment ORG-7.5 regarding Project siting.

Comment ORG-7.18*: Every month our Electric Bill is gotten higher and we have tried to minimize usage where we can by using the sun but it doesn't get any better. You putting up these additional windmills does NOT help us poor people on the country side. We would like to purchase other means to help lower our electric bills but due to your regulations now we are told we can not. Why? We would like to save some money that would benefit our families here on the North Shore. We work 2-3 jobs just to survive here in Hawaii why are you making harder for us.*

Response ORG-7.18: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service assume that this comment relates to the ability to install rooftop PV systems. Please see the response to comment ORG-7.13.

Comment ORG-7.19*: There are other area's in Hawaii far on the mountain side where it's not an eyesore and away from our children & schools. Please, Please Don't Do this…*

Response ORG-7.19: Please see the response to comment ORG-7.5 regarding Project siting.

Comment ORG-7.20*: My Kids go to Kahuku. The thought of having these close to them wouldn't be such a great idea. A friend did some resource of the wind mills and found the sounds can cause health problems. Why can't they put them where no kids will be around them. There are plenty of other places on this island beside here.*

Response ORG-7.20: Please see the responses to comments ORG-7.5 and ORG-7.6 regarding Project siting and public health, respectively.

Comment ORG-7.21*: Kahuku is home to enough wind turbines. We do not need anymore. Anybody who can remember what our beautiful Kahuku looked like before these ugly wind turbines came here can attest that these are just an eyesore. Adding more at this point in time is ridiculous. It can be seen from as far away as Ka'a'awa. When driving through the pineapple fields above Waialua, the turbines dot the landscape and in the evening, the flashing lights are a distraction. If I could undo the existing turbines, I would. These hideous creations have not reduced our energy costs yet were are burdened with hosting these monstrosities.*

Response ORG-7.21: Please see the responses to comments ORG-7.5 and ORG-7.4 regarding Project siting and the visual impacts of the proposed Project, respectively.

Regarding energy costs, based on the most recent, 2014 Renewable Portfolio Standard Status Report approximately 80 percent of Hawaii's energy is currently derived from fossil fuels and approximately 20 percent comes from renewable sources (Hawaiian Electric Company, Inc. et al. 2014). The cost of electricity for the consumers/residents of Hawaii is the blended average cost of all sources (e.g. oil, wind, solar, etc.) and current rates reflect that high cost from burning oil. Over time, as the proportion of energy coming from renewable sources increases, the average cost of electricity is expected to decrease. This information has been added to EIS Section 4.12 – Socioeconomics.

Source: Hawaiian Electric Company, Inc., Hawaiian Electric Light Company, Inc., and Maui Electric Company, Limited. 2014. 2014 Renewable Portfolio Standard Status Report.

Comment ORG-7.22*: A simple internet search on wind turbines yields tons of personal stories and studies. There are equal amounts of pros and cons. Pros are that the energy is supposedly less expensive and has the least impact on natural resources.*

Response ORG-7.22: The EIS discusses the benefits of the proposed Project in Section 1.3.2 which include reducing the import of foreign oil. The proposed Project would replace a portion of the State's electricity that is currently generated by burning fossil fuels, thus reducing greenhouse gas emission and other forms of pollution that are detrimental to the environment and human health.

Comment ORG-7.23*: In this particular case, the biggest con to building more turbines in Kahuku is the location. I already DO NOT agree with the existing turbines and adding more beyond my comprehension.*

Response ORG-7.23: Please see the response to comment ORG-7.5 regarding Project siting.

Comment ORG-7.24*: The State and the City are tasked with finding a balance between corporations and individuals. Over the years, it appears that politicians esire to please the money that comes from big*

corporations rather than caring for the citizens it purports to serve. Please find another location for these turbines.

Response ORG-7.24: Please see responses to comments ORG-7.1 and ORG-7.5 regarding the purpose and need for the proposed Project and Project siting, respectively.

***Comment ORG-7.25**: If Oahu's economy is based on tourism, tourist wants to see the natural beauty of the country and experiences that it brings. NOT huge blades that will ultimately effect the landscape and ecosystem of the windward side of the island.*

Response ORG-7.25: Please see responses to comments ORG-7.4 and ORG-7.5 regarding visual impacts of the proposed Project and Project siting, respectively. A moderate visual impact by itself does not necessarily translate to a significant adverse impact to tourism. Section 4.15 – Recreation and Tourism discuss impacts to these resources, taking into account the potential visibility of the turbines from various locations within the community. Although wind turbine would be visible from some recreation areas and tourist destinations, views would be co-dominated by the existing Kahuku Wind Farm turbines, and by vegetation, manmade structures and other features in the foreground. Despite the view of the turbines, users' attention is likely to be focused at the tourist recreational activity at hand or the destination, generally, the ocean and the shoreline. Therefore, it is unlikely that the Project would result in a perceptible change in recreational or tourism use at any recreation resource area.

***Comment ORG-7.26**: This is my home. I am concerned with negative repercussions these windmills will have on my community.*

Response ORG-7.26: The EIS discloses the impacts of the proposed Project on the human and natural environment. This includes a discussion of socioeconomic resources in Section 4.12, which focus on potential impacts to the Kahuku community itself, as well as the greater Koolau Loa District. Please see responses to comments ORG-7.5 and ORG-7.36 regarding Project siting and community benefits, respectively.

***Comment ORG-7.27**: It makes no sense to site these windmills so close to a residential area when they could easily be sited away from people.*

Response ORG-7.27: Please see the response to comment ORG-7.5 regarding Project siting and compliance with setback requirements.

***Comment ORG-7.28**: Wind technology is inefficient and not worth the money that it cost middle income tax payers to support.*

Response ORG-7.28: The proposed Project is not funded by taxpayers.

***Comment ORG-7.29**: For the safety and potential growth of the community, STOP the Champlin Wind Energy Project!*

Response ORG-7.29: Please see the response to comment ORG-7.7 regarding public safety. In regards to the potential for urban growth, the Koolau Loa Sustainable Plan that provides a long-term vision for the Koolauloa region designates the proposed Project site as agricultural, military, and rural residential use. The proposed Project facilities are located within the agricultural designation and are permitted as a conditional use according to the agricultural zoning district. No urban designation is envisioned for the proposed Project site.

***Comment ORG-7.30**: I don't like how close it is and could be to my community. We simply have enough.*

Response ORG-7.30: Please see the response to comment ORG-7.5 regarding Project siting and compliance with setback requirements.

Comment ORG-7.31*: The Kahuku/Laie area is my favorite part of the island because of the absence of big buildings, hotels and eyesores like the ones this wind energy project would bring. I support renewable energy but I also agree that the Kahuku/Laie community has done its part. KEEP THE COUNTRY COUNTRY!!!!*

Response ORG-7.31: Please see the response to comment ORG-7.5 regarding Project siting.

Comment ORG-7.32*: The Windmill we have now promised a savings in our energy; this has not been the case. The few we have now are an eye sore and adding more to the mix of it is unnecessary and wasteful. Please do not allow this to happen.*

Response ORG-7.32: Please see the responses to comments ORG-7.1 and ORG-7.21 regarding Project siting and the impacts of renewable energy on electricity costs, respectively.

Comment ORG-7.33*: Safety for school children*

Response ORG-7.33: Please see the response to comment ORG-7.6 regarding public health.

Comment ORG-7.34*: The ugliness of these structures which are destroying the ambience of our country districts far outweigh the small benefit that they provide in producing electric power.*

Response ORG-7.34: Please see the response to comment ORG-7.4 regarding the potential visual impacts of the proposed Project.

Comment ORG-7.35*: Although Hawaii can harness wind energy, the technology (excessively high, unsightly towers making noise at all hours of the day and night) is counter to the values that Hawaii should have toward the aina.*

Response ORG-7.35: The purpose and need for the proposed Project are described in Section 1.3.2 of the EIS. This includes providing clean, renewable wind energy for the island of Oahu, and assisting HECO in meeting Hawaii's Renewable Portfolio Standard requirements and the State's goal to reduce electricity costs. Hawaii's Clean Energy Initiative sets goals for the state to achieve 100 percent clean energy by 2045, coming from locally generated renewable sources. The EIS discloses visual impacts and operational noise in Sections 4.16 and 4.6, respectively. Noise associated with turbine operation would be in compliance with all Department of Health regulations; a noise analysis is included in Appendix D to the EIS. Please see the responses to comments ORG-7.4 and ORG-7.6 for additional discussion of these topics, respectively.

Comment ORG-7.36*: They are also not financially beneficial.*

Response ORG-7.36: Economic benefits associated with the proposed Project are described in Section 4.12 – Socioeconomics. Construction-related expenditures and spending by construction workers would result in a minor, beneficial impact to the local economy. These expenditures would also generate GET and use tax revenues. Operation of the Project would have similar, but much smaller impacts.

Production of wind-generated energy by the Project would replace a portion of the State's electricity that is currently generated by burning fossil fuels. This would eliminate the use of approximately 13.44 barrels of oil for every hour of operation, thereby contributing to a decrease in the State's dependency on fossil fuels. The proposed

Project would generate electricity at a cost that is approximately half the cost of generating electricity by burning fossil fuels and HECO has stated in filings with the PUC that the Project would save the ratepayers millions of dollars over the life of the Project.

Additionally, Na Pua Makani Power Partners, LLC, has committed to establishing a Community Benefit fund and is in discussion with Kahuku community members regarding the details of its administration. It is anticipated that Project funds ($10,000 per wind turbine per year) would be administered by a board of local community members who would make decisions as to the use of the proceeds and which activities, programs, groups, and events would be sponsored.

Comment ORG-7.37*: Because it affects hundreds of friends in Kahuku.*

Response ORG-7.37: Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service acknowledge that you are not in favor the proposed Project.

Comment ORG-7.38*: There better ways to produce power*

Response ORG-7.38: There are a number of other renewable energy sources that would produce power such as geothermal (on islands other than Oahu), biofuels, or solar which are all complementary to wind energy, and the proposed Project would not preclude other renewable energy projects from being developed. In order for the State of Hawaii to meet its Renewable Portfolio Standards goal of 100 percent renewable energy generation for the electric grid, all types of renewable energy technologies will need to be pursued including rooftop PV systems.

Comment ORG-7.39*: Because I agree whole heartedly with the adverse effects windmills have on people and communities.*

Response ORG-7.39: The EIS discloses the impacts of the proposed Project, both beneficial and adverse, on human and natural environment. Please see the responses to comments ORG-7.5, ORG-7.6, and ORG-7.7 regarding Project siting and compliance with setback requirements, public health, and wind turbine safety, respectively.

Comment ORG-7.40*: Kahuku is no place to have these monstrosities that benefit only the rich investors.*

Response ORG-7.40: Please see the response to comment ORG-7.5 regarding Project siting.

Comment ORG-7.41*: Wind turbines are counter-productive.*

Response ORG-7.41: Unfortunately, Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service do not understand this comment in order to respond adequately. Please see the response to comment ORG-7.1 regarding the purpose and need for the Project.

Comment ORG-7.42*: Future cost of energy and the ugly views.*

Response ORG-7.42: Please see the responses to comments ORG-7.21 and ORG-7.4 regarding energy costs and visual impacts of the Proposed project, respectively.

Comment ORG-7.43*: The children in Kololaulo area will be subjected to the same health and safety issues by their attendance at Kahuku Schools. The impact would be wide spread in our rural area. You would even consider allowing this to happen? Enough is enough.*

Response ORG-7.43: Please see the responses to comments ORG-7.5, ORG-7.6, and ORG-7.7 regarding project Siting and compliance with setback requirements, public health, and wind turbine safety, respectively.

Comment ORG-7.44*: These windmills only benefit the companies that make and sell these systems to include the politicians that are bought and supported by these companies.*

Response ORG-7.44: In regards to economic benefits, NPMPP will be selling the power generated by the proposed Project to Hawaiian Electric Company (HECO) for a set consistent price. This is different than the fluctuating price of oil that Hawaiian Electric Company pays. Additionally, the State of Hawaii Department of Land and Natural Resources and Malaekahana Hui West, LLC will be receiving lease payments from Na Pua Makani Power Partners, LLC for leasing a portion of the Project site. Please see the response to comment ORG-7.36 for further discussion of community benefits.

Comment ORG-7.45*: Unhealthy to live near these noisy unreliable sources for energy for humans and birds!*

Response ORG-7.45: Please see the responses to comments ORG-7.6 and ORG-7.8 regarding public health and impacts to birds and bats, respectively.

Comment ORG-7.46: *We already have enough windmills in our area and adding more will have a serious negative impact on the rural view planes of our mountains and surrounding landscape. Solar energy is less intrusive to our views since they mount almost flush to our rooftops*

Response ORG-7.46: Please see the responses to comments ORG-7.4 and ORG-7.38 regarding the visual impacts of the proposed Project and consideration of other forms of renewable energy, respectively.

Comment ORG-7.47*: …and benefit each family directly, whereas the windmills don't benefit our community financially at all.*

Response ORG-7.47: Please see the response to comment ORG-7.36 regarding financial benefits to the community.

Comment ORG-7.48*: Why not consider a solar farm on the now vacant shrimp farm land and disguise it with surrounding low growing plants instead?*

Response ORG-7.48: Please see the responses to comments ORG-7.5 and ORG-7.38 regarding Project siting and consideration of other forms of renewable energy.

Comment ORG-7.49*: too close to elementary school*

Response ORG-7.49: Please see the response to comment ORG-7.5 regarding Project siting and compliance with setback requirements.

Comment ORG-7.50*: Proposed windmills too close to houses and school.*

Response ORG-7.50: Please see the response to comment ORG-7.5 regarding Project siting and compliance with setback requirements.

Comment ORG-7.51*: The ecological footprint is too big. Studies show that solar is a more cost effective way.*

Response ORG-7.51: Please see the response to comment ORG-7.38 regarding consideration of other forms of renewable energy.

Comment ORG-7.52*: Not only is it an UGLY EYE SORE… but it DOESN'T do ANYTHING for our community…& we get NOTHING out of them.*

Response ORG-7.52: Please see responses to comments ORG-7.4 and ORG-7.36 regarding the visual impacts of the proposed Project and financial benefits to the community, respectively.

Comment ORG-7.53*: studies also show that it CAN BE HARMFUL over the years…& I'm not WILLING to take ANY CHANCEs…& volunteer OUR CHILDREN as LAB RATs! SHAME ON YOU!*

Response ORG-53: Please see the response to comment ORG-7.6 regarding public health.

Comment ORG-7.54*: Have a lot of family living in the area.*

Response ORG-7.54: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge that you are not in favor of the proposed Project because you have a lot of family living in the area.

Comment ORG-7.55*: Too close to the community.*

Response ORG-7.55: Please see the response to comment ORG-7.5 regarding Project siting and compliance with setback requirements.

Comment ORG-7.56*: This is important to me because I not only LIVE here in KAHUKU but also WORK at Kahuku ELEM. SCHOOL. It's SAFETY FIRST we always tell our students and then we have this soooooo close…too close…*

Response ORG-7.56: Please see the responses to comments ORG-7.5, ORG-7.6, and ORG-7.7 regarding Project siting, public health, and safety, respectively.

Comment ORG-7.57*: My families live there*

Response ORG-7.57: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge that you are not in favor of the proposed Project because you have family living in the area.

Comment ORG-7.58*: keeping our country county!!*

Response ORG-7.58: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge that you are not in favor of the proposed Project.

Comment ORG-7.59*: I was born in Kahuku and raised in the surrounding area and completely support this petition.*

Response ORG-7.59: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge that you are not in favor of the proposed Project.

Comment ORG-7.60*: Industrial wind energy facilities have been proven to be very inefficient and are only pursued because the developer stands to make a lot of money from tax incentives, government loans, subsidies, etc. paid for by the tax payer.*

Response ORG-7.60: Please see the response to comment ORG-7.38 regarding consideration of other forms of renewable energy. Please note that the proposed Project is not funded by taxpayers.

Comment ORG-7.61*: I live here in Kahuku and the windmills are too close to our homes and our Elem. School where I work at. There is NO guarantee that they can malfunction and damage our homes and us, residents.*

Response ORG-7.61: Please see the responses to comments ORG-7.5, ORG-7.6, and ORG-7.7 regarding Project siting and compliance with setback requirements, public health, and safety, respectively.

Comment ORG-7.62*: Our children attend Kahuku High and Intermediate School. The wind mills are not only an EYE SORE, they obstruct our view and damage our landscape.*

Response ORG-7.62: Please see the responses to comments ORG-7.4, ORG-7.5, ORG-7.6, and ORG-7.7 regarding visual impacts of the proposed Project, Project siting, public health, and safety, respectively.

Comment ORG-7.63*: They benefit a few of the wealthy while we, the community have to veiw the ugly mills on a daily basis.*

Response ORG-7.63: Please see the response to comment ORG-7.4 regarding the visual impacts of the Proposed Project.

Comment ORG-7.64*: I'm not against alternative sources of energy, I just don't think it's the right place. We have TOO MANY already!!!*

Response ORG-7.64: Please see the response to comment ORG-7.5 regarding Project siting.

Comment ORG-7.65*: I live underneath those eye-sore windmills and our beautiful scenery has lost its beauty.*

Response ORG-7.65: Please see the response to comment ORG-7.5 regarding Project siting.

Comment ORG-7.66*: plus I get random migraines when I am at home in comparison to when I am somewhere else.*

Response ORG-7.66: Please see the responses to comment ORG-7.6 regarding public health.

Comment ORG-7.67*: we don't want your windmills…we do not get cheap electricity…*

Response ORG-7.67: Please see the response to comment ORG-7.21 regarding the energy costs.

Comment ORG-7.68*: I support using natural alternative sources to crude oil imports and am one of the extremely lucky home owners in Kahuku to already have a PV system installed and hope that the gov't will make more of an effort to work on improvements with HECO's policies & infrastructure that will allow more of my community to be able to benefit from the PV system option.*

Response ORG-7.68: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your comment.

Comment ORG-7.69*: However, the existing wind farm in Kahuku is already too much of an eye sore and headache for those of us living under their ugly shadow.*

Response ORG-7.69: Please see the responses to comments ORG-7.4 and ORG-7.5 regarding visual impacts of the proposed Project and Project siting, respectively.

Comment ORG-7.70: *The residents putting up with the propellers whizzing overhead have not seen any improvement to our environment, ecology, or economy because of them.*

Response ORG-7.70: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your comment.

Comment ORG-7.71*: There is no guarantee Kahuku won't become the next South Point vista as these monstrosities break down, rust, and fall apart.*

Response ORG-7.71: The EIS discusses the anticipated Project Life and Decommissioning in Section 2.4.8. The anticipated life of the Project is 21 years. After that time, NPMPP will evaluate whether to continue operation or to decommission it. Should the Project operation be extended, the facility may also be upgraded and repowered and any necessary extensions of the Project permits and approvals would be obtained. If the Project was decommissioned, the site would return to a condition as close to its pre-construction state as possible within one year as contractually required in the land lease with Department of Land and Natural Resources and the Purchase Power Agreement with HECO.

Comment ORG-7.72*: Why not try installing wind mills in areas where the entire population of that community does not have to bear the brunt of the government's money making deals - say, like over your own roof and see how that works for you?*

Response ORG-7.72: Please see the response to comment ORG-7.5 regarding Project siting.

Comment ORG-7.73*: Why don't we just build high rises on the mountains, too? Enough! Time to put an end to this visual blight and locate windmills-if we really need them-in areas that are not scenic.*

Response ORG-7.73: Please see the responses to comments ORG-7.4 and ORG-7.5 regarding the visual impacts of the proposed Project and Project siting, respectively.

Comment ORG-7.74*: A visual blight. Take a drive down to South Point on the Big island to view and get a glimpse of rusting windmills.*

Response ORG-7.74: Please see the responses to comments ORG-7.4 and ORG-7.71 regarding the visual impacts of the proposed Project and Project decommissioning, respectively.

Comment ORG-7.75*: Put them in Hawaii Kai…nah just kidding…*

Response ORG-7.75: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your comment.

Comment ORG-7.76*: Because I was born and raised here. My kids as well. These windmills DO NOT server our area. The power they generate goes elsewhere BUT we have to deal with their "side effects."*

Response ORG-7.76: Please see the response to comment ORG-7.5 regarding Project siting.

Comment ORG-7.77*: We live by the dangerous windmills.*

Response ORG-7.77: Please see the response to comment ORG-7.7 regarding wind turbine safety.

Comment ORG-7.78*: First off its sacred land.*

Response ORG-7.78: A Cultural Impact Assessment was conducted for the proposed Project and is included as Appendix G to the EIS. Based upon the ethnographic interviews conducted as part of the CIA there does not appear to be a need for traditional access to the wind farm site for the collection of natural resources or for performing traditional cultural practices and no traditional activities were identified within the wind farm site. The Cultural Impact Assessment concludes that the Project would have no effect to traditional cultural uses and practices.

Comment ORG-7.79*: Secondly, nothing of this magnitude should be that close our children's school. Safety above all.*

Response ORG-7.79: Please see the responses to comments ORG-7.5, ORG-7.6, and ORG-7.7 regarding Project siting and compliance with setback requirements, public health, and wind turbine safety, respectively.

Comment ORG-7.80*: I don't want to pay thousands of dollars to go to paradise and look at wind mills covering my view of this beautiful place.*

Response ORG-7.80: Please see the responses to comments ORG-7.4 and ORG-7.25 regarding visual impacts of the proposed Project and effects to tourism, respectively.

Comment ORG-7.81*: I understand in the desert but why ruin the beauty and possibly the tourism… that will cost the state and the people…bad idea*

Response ORG-7.81: Please see the responses to comments ORG-7.4 and ORG-7.25 regarding visual impacts of the proposed Project and effects to tourism, respectively.

Comment ORG-7.82*: I am a 18-yr vet about to retire and return home after serving my country. There are things from my childhood that have kept me serving so that I know I did my part to protect my country. I cannot in good conscience protect our country with disregard for protecting my childhood home.*

Response ORG-7.82: Thank you for your service and protection of our country. Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service acknowledge your opposition to the proposed Project.

Comment ORG-7.83*: we should allocate an area not around the schools and community of northshore/Laie/kahuku.*

Response ORG-7.83: Please see the response to comment ORG-7.5 regarding Project siting.

Comment ORG-7.84*: Don't know health implications but imagine it is horrible.b*

Response ORG-7.84: Please see the responses to comments ORG-7.5, ORG-7.6, and ORG-7.7 regarding Project siting and compliance with setback requirements, public health, and wind turbine safety, respectively.

Comment ORG-7.85*: Kahuku is my Alma mater. I have family who work and attend there. These wind turbines are a safety hazard and a distraction to the community.*

Response ORG-7.85: Please see the responses to comments ORG-7.5, ORG-7.6, and ORG-7.7 regarding Project siting and compliance with setback requirements, public health, and wind turbine safety, respectively.

Comment ORG-7.86*: They can be placed somewhere else. There are other places.*

Response ORG-7.86: Please see the response to comment ORG-7.5 regarding Project siting.

Comment ORG-7.87*: I LIVE HERE.*

Response ORG-7.87: Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service acknowledge your opposition to the proposed Project.

Comment ORG-7.88*: Things are ugly*

Response ORG-7.88: Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service acknowledge your opposition to the proposed Project.

Comment ORG-7.89*: and the electricity bill is only going up… not helping any locals around here*

Response ORG-7.89: Please see the responses to comments ORG-7.21 and ORG-7.36 regarding energy costs and community benefits, respectively.

Comment ORG-7.90*: Build it in town, its already ugly over there!*

Response ORG-7.90: Please see the response to comment ORG-7.5 regarding Project siting.

Comment ORG-7.91*: To protect our school and children*

Response ORG-7.91: Please see the responses to comments ORG-7.5, ORG-7.6, and ORG-7.7 regarding Project siting and compliance with setback requirements, public health, and wind turbine safety, respectively.

Comment ORG-7.92*: to keep the beauty of our aina*

Response ORG-7.92: Please see the response to comment ORG-7.4 regarding the visual impacts of the proposed Project.

Comment ORG-7.93*: don't put cronism and lining your pockets with lobbiest money before the comfort and well being of the good citizens of this state, and great citizens of kahuku.*

Response ORG-7.93: Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service acknowledge your opposition to the proposed Project.

Comment ORG-7.94*: As a former resident of Laie I have driven the road from Kajuku to Sunset hundreds of times. I fear the beauty of that drive will be gone when I return to the area. The "North Shore" is world famous. It is the one place I steer all who ask where they should go when they visit Hawaii. Don't ruin it for the visitors upon whom Hawaii relies.*

Response ORG-7.94: Please see the response to comment ORG-7.4 regarding the visual impacts of the proposed Project.

Comment ORG-7.95*: I have children with special needs who have sensory integration issues and are adversely impacted by the current wind turbines in Kahuku. I do not want to think about the impact that the additional wind turbines with their proposed placements will do to children and people with sensory issues.*

Response ORG-7.95: Please see the responses to comments ORG-7.5 and ORG-7.6 regarding Project siting and public health, respectively. With regard to effects to people who have sensory integration issues, hypersensitivity to sound is frequently reported in many autistic patients (Kellerman et al. 2005); however, there is a lack of research into health effects on different population groups, including those with autism, living near sources of noise from power facilities such as wind turbines (Howell et al. 2015). Despite this lack of research, the Project is not expected to have disproportionate effects to people with autism or others with noise sensitivity because the predicted increase in audible noise associated with Project operation would be very minor, and in most cases imperceptible. This information has been added to the Second Draft EIS in Section 4.18 – Public Health and Safety.

Comment ORG-7.96*: Kahuku has done its part in housing the current turbines with very little to no benefit to our community.*

Response ORG-7.96: Please see responses to comments ORG-7.5 and ORG-7.36 regarding Project siting and community benefits, respectively.

Comment ORG-7.97*: If you must have wind turbines, put it elsewhere.*

Response ORG-7.97: Please see responses to comments ORG-7.5 regarding Project siting and compliance with setback requirements.

Comment ORG-7.98*: This windmill project will place 450-500 foot tall industrial wind turbines within a half a mile from where my 6 children go to school. Completely irresponsible placement.*

Response ORG-7.98: Please see the response to comment ORG-7.5 regarding Project siting and compliance with setback requirements.

Comment ORG-7.99*: Life of the members of the community.*

Response ORG-7.99: Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service acknowledge your opposition to the proposed Project.

Comment ORG-7.100*: When I am in Waimea Valley the sounds of the windmills on the hill above disturb the quiet of the valley. I do not want the same for the students and residences in Kahuku.*

Response ORG-7.100: A noise assessment is included in Appendix D to the EIS. Based on current (baseline) noise levels and predicted levels of wind turbine noise, the Project would be in compliance with Department of Health Noise standards during operation. See the response to comment ORG-7.6 regarding noise.

Comment ORG-7.101*: It is dangerous to birds,*

Response ORG-7.101: Please see the response to comment ORG-7.8 regarding impacts to birds.

Comment ORG-7.102*: …humans*

Response ORG-7.102: Please see the responses to comments ORG-7.5, ORG-7.6, and ORG-7.7 regarding Project siting, public health, and wind turbine safety, respectively.

Comment ORG-7.103*: …it's effectiveness is negligible.*

Response ORG-7.103: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your comment.

Comment ORG-7.104*: I don't want to see Kahuku surrounded by industrial sized windmills.*

Response ORG-7.104: Please see the response to comment ORG-7.5 regarding Project siting.

Comment ORG-7.105*: Totally counter-productive. It doesn't benefit the community at all.*

Response ORG-7.105: Please see the response to comment ORG-7.36 regarding community benefits.

Comment ORG-7.106*: ENOUGH ALREADY!!!!!! There has been windmills in the past and there are windmills now and what has that brought our community????*

Response ORG-7.106: Please see the responses to comments ORG-7.5 and ORG-7.36 regarding Project siting and community benefits, respectively.

Comment ORG-7.107*: Nothing but noise pollution*

Response ORG-7.107: Please see the response to comment ORG-100 regarding Project noise.

Comment ORG-7.108*: …eye sores*

Response ORG-7.108: Please see the response to comment ORG-7.4 regarding the visual impacts of the proposed Project.

Comment ORG-7.109*: …unforeseen effects (that I'm sure will surface in time)…. Please no more!!!!*

Response ORG-7.109: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the Project.

Comment ORG-7.110*: It is important to us a residence of the north shore to assure that our children will live in a environment that is beneficial to the health and safety of our children.*

Response ORG-7.110: Please see the responses to comments ORG-7.5, ORG-7.6, and ORG-7.7 regarding Project siting and compliance with setback requirements, public health, and wind turbine safety, respectively.

Comment ORG-7.111*: These wind mills pollutes the overall atmosphere of Kahuku and takes away from the beauty that we once new as young children growing up. Keep country COUNTRY and keep those wind mills out.*

Response ORG-7.111: Please see the response to comment ORG-7.5 regarding Project siting.

Comment ORG-7.112*: More cost effective ways to produce electricity.*

Response ORG-7.112: Please see the response to comment ORG-7.38 regarding consideration of other forms of renewable energy.

Comment ORG-7.113*: Keep da country country. Stop littering our neighborhoods.*

Response ORG-7.113: Please see the response to comment ORG-7.5 regarding Project siting.

Comment ORG-7.114*: NO WINDMILLS*

Response ORG-7.114: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the Project.

Comment ORG-7.115*: …GMO CROPPING FOR THE ISLAND OF OAHU (END OF STORY)*

Response ORG-7.115: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your comment. Please note that this Project is a renewable energy project and not related to GMO.

Comment ORG-7.116*: 1.The people who have to see agricultural land go towards something that may have long term effects do not see the benefit of these cost savings.*

Response ORG-7.116: Please see the response to comment ORG-7.21 regarding energy costs. The Project would be compatible with the existing agricultural uses within the wind farm site. Existing agricultural activities and uses would continue to occur during Project operation and there would be no net loss of active agricultural lands (i.e., lands currently used for crop production). An expanded discussion of agriculture has been added to the Second Draft EIS in sections 3.20 (existing conditions) and 4.22 (effects to agriculture).

Comment ORG-7.117*: 2. The potential health risks have not been shared with our community.*

Response ORG-7.117: Please see the response to comment ORG-7.6 regarding public health. Community outreach efforts for the proposed Project began in 2013. Please note that on January 15, 2014, Na Pua Makani Power Partners, LLC hosted a talk story session at the Kahuku Community Center specifically to address community concerns about wind turbines and health impacts. The invited speaker was Dr. Robert McCunney, a research scientist at the Massachusetts Institute of Technology and a recognized expert in wind turbine sound and health effects. Other invited attendees included representatives from the State Office of Energy and the Department of Health.

Comment ORG-7.118*: 3. The whole rush it through process most of the times have real negative consequences and ends up hurting in the end.*

Response ORG-7.118: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your comment regarding the process. The Environmental Impact Statement (EIS) process started with the publication of the federal Notice of Intent on November 5, 2013, and the state EIS Preparation Notice on December 23, 2013. The EIS process allows for the community and agencies to provide comments on the EIS. Also, Na Pua Makani Power Partners, LLC has held several community meetings regarding the Project, both formally as required by the EIS process and informally to address community questions and comments.

Comment ORG-7.119*: stop the destruction and genocide of our aina and sovereign kingdom nation*

Response ORG-7.119: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the Project.

Comment ORG-7.120*: Set it where it's not visible,*

Response ORG-7.120: Please see the response to comment ORG-7.5 regarding Project siting and compliance with setback requirements.

Comment ORG-7.121*: ...besides health problems*

Response ORG-7.121: Please see the response to comment ORG-7.6 regarding public health.

Comment ORG-7.122*: ...if its in our backyard shouldn't we be compensated*

Response ORG-7.122: Please see the response to comment ORG-7.36 regarding community benefits.

Comment ORG-7.123*: …due to these dangers if there is a hurricane are we safe from those blades?*

Response ORG-7.123: Please see the response to comment ORG-7.7 regarding wind turbine safety.

Comment ORG-7.124*: Why we take the risk and the island gets the discount, more so HECO controls everything. I'm in the process of getting solar but was told our area has already reached our max. Capacity if this is true why have the windmill.*

Response ORG-7.124: Please see the response to comment ORG-7.13 regarding rooftop PV systems and grid capacity.

Comment ORG-7.125*: I feel the sun is more effective then the wind. The sunshines everyday the wind blows maybe 70-80 per. Of the time.*

Response ORG-7.125: Please see the response to comment ORG-7.38 regarding consideration of other forms of renewable energy.

Comment ORG-7.126*: Stop the land grabs.*

Response ORG-7.126: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the Project.

Comment ORG-7.127*: Kahuku has done more than its part for the state to produce an alternative source of energy.*

Response ORG-7.127: Please see the response to comment ORG-7.5 regarding Project siting and compliance with setback requirements.

Comment ORG-7.128*: Now it worries me that this is so close to home.*

Response ORG-7.128: Please see the response to comment ORG-7.5 regarding Project siting and compliance with setback requirements.

Comment ORG-7.129*: health & safety of the community I live and work in*

Response ORG-7.129: Please see the responses to comments ORG-7.5, ORG-7.6, and ORG-7.7 regarding Project siting and compliance with setback requirements, public health, and wind turbine safety, respectively.

Comment ORG-7.130*: Additional windmills in Kahuku will endanger the health and wealth of all nearby. Please do not allow any additions and focus on keeping the existing 12 windmills operational and efficient. Mahalo.*

Response ORG-7.130: Please see the responses to comments ORG-7.5, ORG-7.6, and ORG-7.7 regarding Project siting and compliance with setback requirements, public health, and wind turbine safety, respectively.

Comment ORG-7.131*: Its simply getting out of hand. Electricity is far from affordable for many, so explain to us why we should put up with this?*

Response ORG-7.131: Please see the response to comment ORG-7.21 regarding energy costs.

Comment ORG-7.132*: While wind turbines have been around for a while, there has not been much study or investigation on their negative health effects on people, animals, and environment. What factual information there is also has not been adequately dispersed. There are some real concerns about the cost-benefit ratio of what we give up for what we get.*

Response ORG-7.132: Please see the responses to comments ORG-7.6 and ORG-7.21 regarding public health and energy costs, respectively.

Comment ORG-7.133*: This Windmill Project is way too close to our schools, Kahuku Intermediate & High and Kahuku Elementary, and its way too close to homes in our Community.*

Response ORG-7.133: Please see the response to comment ORG-7.5 regarding Project siting and compliance with setback requirements.

Comment ORG-7.134*: There are health, sound and safety concerns*

Response ORG-7.134: Please see the responses to comments ORG-7.6 and ORG-7.7 regarding public health and wind turbine safety, respectively.

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Comment ORG-7.135*: …let alone quality of life issues, with such huge towers blocks our views in such a scenic area.*

Response ORG-7.135: Please see the response to comment ORG-7.4 regarding visual impacts of the proposed Project.

Comment ORG-7.136*: 1) wind farms do not provide enough electricity unless in mass*

Response ORG-7.136: Please see the response to comment ORG-7.21 regarding energy costs and the proposed Projects provision of a source of renewable energy on Oahu.

Comment ORG-7.137*: 2) install these farms are an eye sore and do nothing in support of visitors who now would rather vacation on the outer islands*

Response ORG-7.137: Please see the responses to comments ORG-7.4 and ORG-7.25 regarding visual impacts of the proposed Project and tourism, respectively.

Comment ORG-7.138*: 3) the big island shut down there wind farm on south point - hmmmmmm wonder why I never saw more than two or three operating at any one time.*

Response ORG-7.138: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your comment. As noted in your comment the South Point wind farm ceased operation in 2006.

Comment ORG-7.139*: 4) Finally, why should I pay more to support HECO CEO and state/C&C taxes*

Response ORG-7.139: The power generated by the Project would be sold to HECO under a long-term, fixed-price contract with fixed annual escalation providing long-term price stability for consumers as compared to fluctuating oil prices. The cost of the Project's electricity is one the lowest prices in recent history of renewable energy projects for HECO.

Comment ORG-7.140*: This is important to me because I love the north shore and value the views there. Existing windmills are already very noticeable and detract from the natural beauty.*

Response ORG-7.140: Please see the response to comment ORG-7.4 regarding visual impacts of the proposed Project.

Comment ORG-7.141*: Then there are the reasons cited in the petition, all of which I agree with.*

Response ORG-7.141: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the Project.

Comment ORG-7.142*: Benefits don't justify the expense and the windmills are unsightly.*

Response ORG-7.142: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your comment. Please see the response to comment ORG-7.4 regarding visual impacts of the proposed Project.

Comment ORG-7.143*: Our energy and environmental policies should be science-based. Wind energy is not. See Energypresentation.info*

Response ORG-7.143: Thank you for providing this website. The purpose of an EIS is to disclose the potential impacts from the Project, based on the best available science. The EIS discloses the impacts to natural, physical, and socio-economic resources.

***Comment ORG-7.144**: First and foremost it's ugly and invasive to our natural environment*

Response ORG-7.144: Please see the response to comment ORG-7.4 regarding visual impacts of the proposed Project.

***Comment ORG-7.145**: …there are other ways to create energy without ruining the environment.*

Response ORG-7.145: Please see the response to comment ORG-7.38 regarding the consideration of other forms of renewable energy.

***Comment ORG-7.146**: Wind energy is very costly to produce.*

Response ORG-7.146: Please see the response to comment ORG-7.139 regarding energy prices.

***Comment ORG-7.147**: When the windmills rust, corrode and stop spinning they are too expensive to remove and will end being reminders of stupid investments gone bad.*

Response ORG-7.147: Please see the response to comment ORG-7.71 regarding Project decommissioning.

***Comment ORG-7.148**: I lived in Hawaii previously and this is an eyesore.*

Response ORG-7.148: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your comment. Please see the response to comment ORG-7.4 regarding the visual impacts of the proposed Project.

***Comment ORG-7.149**: There would be better use of the money and personal energy to provide solar panels for all houses rather than these windmills.*

Response ORG-7.149: Please see the response to comment ORG-7.38 regarding the consideration of other forms of renewable energy.

***Comment ORG-7.150**: We put our utility lines underground so we don't have to look at telephone poles. The visual impact of windmills mars the landscape and does not add to the beauty of our island.*

Response ORG-7.150: Please see the response to comment ORG-7.4 regarding the visual impacts of the proposed Project.

***Comment ORG-7.151**: I live here too*

Response ORG-7.151: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your comment.

***Comment ORG-7.152**: The wind mills are destroying the beauty of the country. They are loud, intrusive and end up costing us more in energy.*

Response ORG-7.152: Please see the response to comment ORG-7.1, ORG-7.4, ORG-7.6, and ORG-7.139 regarding purpose and need for the proposed Project, the visual impacts of the proposed Project, noise impacts, and energy prices, respectively.

Comment ORG-7.153*: We have been visiting the north shore, every year, for the past 7 years. The introduction of these windfarms have taken away from the beauty and nature we have come to love about the North shore. They are an ugly blight on Kahuku.*

Response ORG-7.153: Please see the response to comment ORG-7.4 regarding the visual impacts of the proposed Project.

Comment ORG-7.154*: Because of safety and health issues.*

Response ORG-7.154: Please see the responses to comments ORG-7.6 and ORG-7.7 regarding public health and wind turbine safety, respectively.

Comment ORG-7.155*: A former resident of Kahuku, I am a supporter of alternative energy sources but proper siting of windmills is of the greatest importance. This community should not be surrounded on three sides by windmills. I'm sure there are other sites that will impact humans far less.*

Response ORG-7.155: Please see the response to comment ORG-7.5 regarding Project siting and compliance with setback requirements.

Comment ORG-7.156*: Where is the benefit to the people who have to live with these eyesore monstrosities 24/7? This is ridiculous!*

Response ORG-7.156: Please see the responses to comments ORG-7.1 and ORG-7.36 regarding the purpose and need for the proposed Project and community benefits, respectively.

Comment ORG-7.157*: Destroying our mountains no can.*

Response ORG-7.157: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the proposed Project.

Comment ORG-7.158*: Wind is a FREE renewable source of energy. It's far better than destroying the Earth for natural resources that are not.*

Response ORG-7.158: Please see the responses to comments ORG-7.1 regarding the purpose and need for the proposed Project.

Comment ORG-7.159*: The windmills are a scam and I'm against that. Solar energy is a more intelligent and practical solution for Hawaii.*

Response ORG-7.159: Please see the response to comment ORG-7.38 regarding consideration of other forms of renewable energy.

Comment ORG-7.160*: I'm signing this petition because I agree with the concerns regarding the health and safety of the community*

Response ORG-7.160: Please see the responses to comments ORG-7.6 and ORG-7.7 regarding public health and wind turbine safety, respectively.

Comment ORG-7.161*: …significant impact on the already stressed environment of this island*
Response ORG-7.161: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your comment.

Comment ORG-7.162*: …financially, the financial impact on this agrarian community*

Response ORG-7.162: An expanded discussion of agriculture has been added to the Second Draft EIS in sections 3.20 and 4.22. Construction of the Project would result in a minor amount of disturbance to active agricultural lands within the wind farm site (areas in crop production). It is anticipated that there may also be temporary access restrictions along existing roads to ensure the safety of farmers within the wind farm site or to irrigation water. To avoid impacts to individual farmers for potential lost agricultural productivity during construction, either due to direct impacts to crops or indirectly through reduced access along roads or to irrigation water, where possible Na Pua Makani Power Partners, LLC will coordinate construction activities such that the impacts on crops would be minimized. If impacts associated with agricultural productivity cannot be avoided during construction, Na Pua Makani Power Partners, LLC will compensate farmers within the wind farm site for the season's lost crops.

During operation, existing agricultural activities and uses within the wind farm site would continue. To ensure that there is no net loss of active agricultural activities during Project operation, Na Pua Makani Power Partners, LLC would work with Malaekahana Hui West, LLC to identify suitable agricultural land within each of the three parcels leased by farmers from Malaekahana Hui West, LLC where active agricultural activities would be impacted over the long-term by the Project (totaling 4.6 acres among 3 farmers). Within each of these lease areas, only a portion of the area identified in Real Property Tax Assessment reports as agricultural use is actively farmed, leaving remaining acreage that could be converted to actively farmed lands. Na Pua Makani Power Partners, LLC would work with Malaekahana Hui West, LLC to assist farmers in preparing this non-farmed lands for agricultural production so that there would be no net loss in active agriculture.

Comment ORG-7.163*: Sustainability does not mean more stress on the environment; it's about protecting and helping the environment to thrive.*

Response ORG-7.163: The EIS discloses the impacts on natural, physical, and socio-economic resources. The proposed Project would help the State in meeting its sustainability goals and contribute to the State's goal of 100 percent renewable electric energy by 2045. The Project would produce clean, renewable energy from the local natural wind resource, reducing the need to import fossil fuels. In doing so, the proposed Project would increase energy security for the State and reduce greenhouse gas emissions. For additional discussion of the purpose and need for the Project please see the response to comment ORG-7.1.

Comment ORG-7.164*: I am opposed to more windmills in Kahuku. We already have windmills that take away from our beautiful mountains.*

Response ORG-7.164: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your comment. Please see the response to comment ORG-7.4 regarding the visual impacts of the proposed Project.

Comment ORG-7.165*: Having them there is no benefit to us*

Response ORG-7.165: Please see the responses to comments ORG-7.1 and ORG-7.36 for a discussion of the purpose and need for the proposed Project and community benefits, respectively.

Comment ORG-7.166*: I am more concerned about the affect of having windmills so close to homes and schools. We don't need any more.*
Response ORG-7.166: Please see the responses to comments ORG-7.5, ORG-7.6, and ORG-7.7 regarding Project siting and compliance with setback requirements, public health, and wind turbine safety, respectively.

Comment ORG-7.167*: I'm a Kahuku alum and don't want the beauty of the area to be spoiled by ridiculous windmills!!!*

Response ORG-7.167: Please see the responses to comments ORG-7.1 and ORG-7.4 for a discussion of the purpose and need for the proposed Project and visual impacts, respectively.

Comment ORG-7.168*: my family lives in kahuku and surrounding areas. I come home to visit often and fear for the health concerns that will come with these machines.*

Response ORG-7.168: Please see the responses to comments ORG-7.5, ORG-7.6, and ORG-7.7 regarding Project siting and compliance with setback requirements, public health, and wind turbine safety, respectively.

Comment ORG-7.169*: Along with the loss of land*

Response ORG-7.169: The proposed Project would permanently impact approximately 60 acres of land (up to 10 turbine project), or approximately 56 acres if a 9 turbine project is constructed, in association with the installation of Project facilities (access roads, turbine pads, operations and maintenance building). The current use of land within the wind farm site is a mixture of active and fallow agricultural land. Agricultural uses and activities would continue during Project operation and there would be no net loss of active agricultural land. Please see the response to comment ORG-7.162 for additional discussion of impacts to agriculture.

Comment ORG-7.170*: environmental hazards to the native species and unsightly looks to the beautiful landscape of our land.*

Response ORG-7.170: Please see the responses to comments ORG-7.8 and ORG-7.4 regarding impacts to avian and bat species and the visual impacts of the proposed Project, respectively.

Comment ORG-7.171*: Put them on Diamond Head instead, it has more wind.*

Response ORG-7.171: Please see the response to comment ORG-7.5 regarding Project siting.

Comment ORG-7.172*: the negative consequences of these windmills trump any energy gains*

Response ORG-7.172: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your comment. Please see the response to comments ORG-7.1 regarding the purpose and need for the proposed Project.

Comment ORG-7.173*: go solar!*

Response ORG-7.173: Please see the response to comment ORG-7.38 regarding consideration of other forms of renewable energy.

Comment ORG-7.174*: This is not helping Hawaii people.*

Response ORG-7.174: Please see the response to comments ORG-7.1 regarding the purpose and need for the proposed Project.
Comment ORG-7.175*: It hasn't made any difference for our electric bills*

Response ORG-7.175: Please see the response to comment ORG-7.139 regarding energy costs.

Comment ORG-7.176*: …another thing is they are ugly.*

Response ORG-7.176: Please see the response to comment ORG-7.4 regarding the visual impacts of the proposed Project.

Comment ORG-7.177*: Im tired of these eye sore windmills in our mountains.*

Response ORG-7.177: Please see the response to comment ORG-7.5 regarding Project siting.

Comment ORG-7.178*: KEEP THE COUNTRY… COUNTRY, it's the only side to get away… on this island!*

Response ORG-7.178: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the proposed Project. Please see the response to comments ORG-7.5 regarding the Project siting.

Comment ORG-7.179*: Sorry we couldn't be there to oppose more windmills in Kahuku, but I am thinking of you as I graciously sign to "NO MORE WINDMILLS"!!!*

Response ORG-7.179: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the proposed Project. Please see the response to comments ORG-7.5 regarding the Project siting.

Comment ORG-7.180*: it's my right*

Response ORG-7.180: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the proposed Project. Please see the response to comments ORG-7.5 regarding the Project siting.

Comment ORG-7.181*: I'm signing because I am a Kahuku resident who is directly affected by the existing windmill phase and who will be affected by the additional phase. I am for energy renewal and so is this community, but I believe we have done our part in stewarding the lands that currently hold Kahuku and Waimea's windmill farm.*

Response ORG-7.181: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the proposed Project. Please see the response to comments ORG-7.5 regarding the Project siting.

Comment ORG-7.182*: I am a mother of two children and I am concerned about their health with a near by wind farm and the health effects that have been noted from other wind farms.*

Response ORG-7.182: Please see the responses to comments ORG-7.6 and ORG-7.7 regarding public health and wind turbine safety, respectively.

***Comment ORG-7.183**: It is too close to the Elementary and High School and the hospital*

Response ORG-7.183: Please see the response to comment ORG-7.5 regarding Project siting and compliance with setback requirements.

***Comment ORG-7.184**: Also, as a property owner, these wind farms will bring down my real estate value.*

Response ORG-7.184: Please see the response to comment ORG-7.12 regarding property values.

***Comment ORG-7.185**: Please stop this project and move it somewhere else.*

Response ORG-7.185: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the proposed Project. Please see the response to comments ORG-7.5 regarding the Project siting.

***Comment ORG-7.186**: These Giant Turbines are aesthetic blight to the beauty of Kahuku Village a place that is dear to many people hearts.*

Response ORG-7.186: Please see the response to comment ORG-7.4 regarding the visual impacts of the proposed Project.

***Comment ORG-7.187**: The turbines are also harmful to birds and other Kahuku wildlife.*

Response ORG-7.187: Please see the response to comment ORG-7.8 regarding impacts to birds and bats.

***Comment ORG-7.188**: But Kahuku Villagers are mostly not rich or powerful, they need everyones' help!*

Response ORG-7.188: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the proposed Project.

***Comment ORG-7.189**: I have Family and dear friends that live in Kahuku. I'm opposed to more wind turbines in a community that does not want it and is not sound for the nearby community to have.*

Response ORG-7.189: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the proposed Project.

***Comment ORG-7.190**: Born and raise in Kahuku, I am proud to be a hawaiian and will always want to remember the way it is.*

Response ORG-7.190: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the proposed Project.

***Comment ORG-7.191**: I agree, no more turbines near the housing.*

Response ORG-7.191: Please see the response to comment ORG-7.5 regarding Project siting and compliance with setback requirements.

***Comment ORG-7.192**: There is quite the amount of turbines located near the housing that are an eye soar.*

Response ORG-7.192: Please see the responses to comments ORG-7.5 and ORG-7.4 regarding Project siting and the visual impacts of the proposed Project, respectively.
Comment ORG-7.193*: Does the community benefit from this energy?*

Response ORG-7.193: Please see the response to comment ORG-7.36 regarding community benefits.

Comment ORG-7.194*: What is the longevity of these windmills? Nothing last that long in direct salt air and who is going to repair these mills when they are rusted and ready to collapse.*

Response ORG-7.194: The EIS discusses the anticipated Project life and decommissioning in Section 2.4.8. The anticipated life of the Project is 21 years. After that time, Na Pua Makani Power Partners, LLC will evaluate whether to continue operation or to decommission it. Should the Project operation be extended, the facility may also be upgraded and repowered and any necessary extensions of the Project permits and approvals would be obtained. Please see the response to comment ORG-7.71 for additional discussion of Project decommissioning.

Comment ORG-7.195*: I think this windmill will definitely bring down the value of homes in Kahuku. Who wants to live in a Turbine Farm?*

Response ORG-7.195: Please see the response to comment ORG-7.12 regarding property values.

Comment ORG-7.196*: Is the goal really to create natural energy from these big turbines or to drive the value of the north shore so far down paving the way for investors to come through and snatch up whatever land is left and develop ridiculous resorts. This sounds like a big industry scam. It is heart breaking to watch my home be victimized of big industry persuasion. I miss home the way it was.*

Response ORG-7.196: Please see the responses to comments ORG-7.1, ORG-7.5, and ORG-7.12 regarding the purpose and need for the proposed Project, Project siting considerations, and property values, respectively.

Comment ORG-7.197*: I think that we have enough turbines in Kahuku as is! The many that we do already have are hardly ever working. It seems like no one cares to maintain them. Why add more?*

Response ORG-7.197: Please see the responses to comments ORG-7.1 and ORG-7.5 regarding the purpose and need for the proposed Project and Project siting, respectively.

Comment ORG-7.198*: …so close to our schools? My children go to Kahuku Elementary and I would hate to see this as the back drop.*

Response ORG-7.198: Please see the response to comment ORG-7.5 regarding Project siting and compliance with setback requirements.

Comment ORG-7.199*: Distribute them to vacant land elsewhere on the island. Why so many on Kahuku land? Don't do it!*

Response ORG-7.199: Please see the response to comment ORG-7.5 regarding Project siting and compliance with setback requirements.

Comment ORG-7.200*: We don't need windmills all over koolauloa, put in waikiki, kahui, halawea, aiea, pearly city, waipahu, eva, kapolei, malakilo, koolina.*

Response ORG-7.200: Please see the response to comment ORG-7.5 regarding Project siting and compliance with setback requirements.

Comment ORG-7.201*: Aloha Mayor Caldwell, Please consider adopting more stringent safety zone requirements that prevent industrial wind turbines from negatively impacting residential neighborhoods. Due to past catastrophic events involving large wind turbines or systems associated with this technology, a moratorium on issuing permits may be in order until such a time where all prudent safety and proximity issues have been adequately studied and sufficiently addressed.*

Response ORG-7.201: Please see the response to comment ORG-7.5 regarding Project siting and compliance with setback requirements.

Comment ORG-7.202*: WELL VERY IMPORTANT ARE THE PEOPLE AND COMMUNITY LEADERS. STATE LEADERS NEED THINK ABOUT THEIR COMMUNITY, FAMILIES, FRIENDS, ETC.. WE THE PEOPLE MUST HAVE SAFE ISLAND NOT LIVED BUT TRUST THAT THINGS MAKE BETTER PLACE WE CAN TREASURE THE BLESSING WITH OUR CHILDRENS EVERYONE JOY NEED WELL DESERVED. MAHALO!*

Response ORG-7.202: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the proposed Project.

Comment ORG-7.203*: the north shore windmill project is very very corrupt & should be stopped there are already about 50 not in use just sitting & creating huge visual pollution*

Response ORG-7.203: Please see the response to comment ORG-7.4 regarding the visual impacts of the proposed Project.

Comment ORG-7.204*: ...not to mention no extraction plan*

Response ORG-7.204: Please see the response to comment ORG-7.71 regarding Project decommissioning.

Comment ORG-7.205*: …lies about amt of electricity produced!*

Response ORG-7.205: The proposed Project is anticipated to produce up to approximately 25 MW of electric generation.

Comment ORG-7.206*: The wind turbines at Waimea are a visual blight and the developers should be forced to relocate them.*

Response ORG-7.206: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your comment regarding another wind farm located near Waimea. Please see the response to comment ORG-7.4 regarding the visual impacts of the proposed Project.

Comment ORG-7.207*: We should proceed with caution. Firstly there needs to be a reasonable setback from homes.*

Response ORG-7.207: Please see the response to comment ORG-7.5 regarding Project siting and compliance with setback requirements.

Comment ORG-7.208*: Second - the existing windmills have a poor record of producing electricity - we should make them prove their efficacy before approving more.*

Response ORG-7.208: The proposed Project is anticipated to produce up to approximately 25 MW of electric generation.

Comment ORG-7.209*: Born and raised near there and agree with their stand point.*

Response ORG-7.209: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the Project.

Comment ORG-7.210*: Let's keep Hawaii, Hawaii*

Response ORG-7.210: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your comment. Please see the response to comment ORG-7.1 regarding the purpose and need for the proposed Project.

Comment ORG-7.211*: I am train to work on large Wind Generators*

Response ORG-7.211: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your comment.

Comment ORG-7.212*: If it is what the community and those who will be living nearby want…I support listening to these people as they are the ones who will be greatly affected should these turbines go up and problems arises…listen to the people…those whom the Mayor, the county and your local politician are supposed to be serving*

Response ORG-7.212: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge. Na Pua Makani Power Partners, LLC continues its involvement in the community. Chapter 7 of the Second Draft EIS will include an updated summary of Project outreach efforts.

Comment ORG-7.213*: supporting my wife and she is from this area*

Response ORG-7.213: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the Project.

Comment ORG-7.214*: Relatives on Oahu*

Response ORG-7.214: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the Project.

Comment ORG-7.215*: Friends and Family are close to one of these building sites!*

Response ORG-7.215: Please see the response to comment ORG-7.5 regarding Project siting and compliance with setback requirements.

Comment ORG-7.216*: No only is it an "Eye sore" to the beauty of the land or area*

Response ORG-7.216: Please see the response to comment ORG-7.4 regarding the visual impacts of the proposed Project.

Comment ORG-7.217*: ...I sure we can find other ways to produce energy.*
Response ORG-7.217: Please see the response to comment ORG-7.38 regarding consideration of other forms of renewable energy.

Comment ORG-7.218*: it could potentially destroy beautiful countryside near a good friend's home. Leave it as it is please!*

Response ORG-7.218: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the Project. Please see the response to comment ORG-7.4 regarding the visual impacts of the proposed Project.
Comment ORG-7.219*: Keep the country country!!! No more land development without properly educated and environmentally friendly decision making.*

Response ORG-7.219: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the Project.

Comment ORG-7.220*: Stop making monetary decisions, start making smart decisions that support local, sustainable, ecosystem friendly community based needs. Look for needs not greed!*

Response ORG-7.220: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the Project. Please see the responses to comments ORG-7.1 and ORG-7.36 regarding the purpose and need for the proposed Project and community benefits, respectively.

Comment ORG-7.221*: This is important to me because I have lived in Kahuku for 30 years and still live there today. These windmills will harm not only our children but all that live in the area. Health issues will arise and they always do!!! TAKE YOUR WINDMILLS SOME WHERE ELSE CAUSE WE DON'T NEED IT AND DON'T WANT IT!!!!!!!!!!*

Response ORG-7.221: Please see the responses to comments ORG-7.5, ORG-7.6, and ORG-7.7 regarding Project siting, public health, and wind turbine safety, respectively.

Comment ORG-7.222*: Because I live in Kahuku and I don't want these wind mills here!*

Response ORG-7.222: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the Project.

Comment ORG-7.223*: This is important because my family and I live in this community, the keiki of Ko'olauloa attend Kahuku High & Intermediate School, and we are the ones that will have to face the ramifications of such construction. The negative health effects and safety hazards need to be the main, if not the only, primacy regarding this issue.*

Response ORG-7.223: Please see the responses to comments ORG-7.5, ORG-7.6, and ORG-7.7 regarding Project siting, public health, and wind turbine safety, respectively.

Comment ORG-7.224*: Environmental racism: "the geographic relationship between environmental degradation and low-income or minority communities"*

Response ORG-7.224: The communities of Kahuku and Laie were identified in the Draft EIS as minority environmental justice populations based on the disproportionate concentration of Native Hawaiians and Other

Pacific Islanders in these areas relative to Oahu as a whole (30 percent and 35 percent of the population, respectively, versus 9 percent for Honolulu County as a whole). However, it is important to note that in Hawaii, as well as within Honolulu County, a majority of the population (78 percent and 81 percent, respectively) consists of a non-white, minority group (Asian, Native American or other Pacific Islander, and Hispanic or Latino; see Section 3.17 of the EIS for additional information). Potential adverse effects to residents living in the communities in the vicinity of the Project relate to noise, socioeconomics, cultural resources, visual resources, and public health and safety, none of which were determined to be high and adverse. Moreover, the Project would result in short- and long-term socioeconomic benefits to the community through the creation of jobs and generation of tax revenues. Na Pua Makani Power Partners, LLC has incorporated input from the surrounding communities in development of the Project design, which has resulted in a number of significant design changes. Additionally, they are working with community leaders to establish a multi-million dollar community benefits fund which will contribute to the local Kahuku community for the life of the Project (please see the response to comment ORG-7.36). For these reasons, Native Hawaiians and other Pacific Islanders are not anticipated to experience a disproportionate share of effects.

Comment ORG-7.225*: Close proximity causes health issues, especially for the elderly and young children. See Journal of Laryngology & Otology. Dr. Nin Pierpoint's book on Turbine Syndrome give details on the effects.*

Response ORG-7.225: Please see the response to comment ORG-7.6 regarding public health.

Comment ORG-7.226*: Beware-the federal money wind developers get are huge enough to turn them into community bullies. Even people in the media are being paid off to make fun of people complaining but when you talk to those affected, they aren't laughing.*

Response ORG-7.226: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the Project.

Comment ORG-7.227*: Mainland farmers have abandoned family farms after agreeing to having a turbine on their property because of health issues. Consider the vibration affect when driving with car windows open on only 1 side.*

Response ORG-7.227: Please see the response to comment ORG-7.6 regarding public health.

Comment ORG-7.228*: People are being paid off via community "gifts" and even personal money bribes to look the other way by wind companies, and officials being backed by them. Some are being threatened politically, etc.*

Response ORG-7.228: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the Project.

Comment ORG-7.229*: To those who want to make the big bucks from federal incentives and fatter bottom line profits…spend the money on building the reinforced roads further away in areas where they won't be seen, heard or felt. Then pay the extra money to help offset affects to our public roadways. It's the cost of you doing your business and it should not be paid by any of us. If you don't want to spend the money to do your business without harming or negatively affecting others...do something else. Once they are up, they are ours to look at, hear and feel forever. Let's teach these self-serving folks that our Aloha for one another is not for sale! Force them to put the turbines further away where they won't hurt us or desecrate sacred lands. If they won't, ask them to leave!*

Response ORG-7.229: Please see responses to comments ORG-7.1, ORG-7.5, and ORG-7.78 regarding the purpose and need of the proposed Project, Project siting, and cultural resources, respectively.

Comment ORG-7.230*: Political leaders are elected to protect those they represent instead of getting in bed with industrial interests who have no concern for the health or safety of communities impacted by their disregard and indifference for families living next to wind turbines. Where are our leaders and when are they going to stand up and protect our community?*

Response ORG-7.230: Please see the response to comment ORG-7.6 and ORG-7.7 regarding public health and wind turbine safety, respectively.

Comment ORG-7.231*: Safety should always be the number 1 concern*

Response ORG-7.231: Please see the response to comment ORG-7.7 regarding wind turbine safety.

Comment ORG-7.232*: …it ruins our islands landscape. Laie will always be home for me.*

Response ORG-7.232: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the Project.

Comment ORG-7.233*: Safety concerns*

Response ORG-7.233: Please see the response to comment ORG-7.7 regarding wind turbine safety.

Comment ORG-7.234*: …keep the country country, eye sore*

Response ORG-7.234: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the Project.

Comment ORG-7.235*: Nothing but useless eyesores*

Response ORG-7.235: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the Project. Please see the response to comment ORG-7.1 regarding the purpose and need for the proposed Project.

Comment ORG-7.236*: How about fixing the ones that are already there before bringing in more?*

Response ORG-7.236: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the Project. Please see the response to comment ORG-7.1 regarding the purpose and need for the proposed Project.

Comment ORG-7.237*: because it is destroying the environment*

Response ORG-7.237: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your comment. Please see the responses to comments ORG-7.1 and ORG-7.5 regarding the purpose and need for the proposed Project and Project siting, respectively.

Comment ORG-7.238*: First and foremost this is a safety issue. A proactive participation by industry and government official working with the community is imperative. Mahalo to all concerns*

Response ORG-7.238: Please see the response to comment ORG-7.7 regarding wind turbine safety. Chapter 7 of the EIS lists the community outreach efforts conducted to date.
Comment ORG-7.239*: I have to agree with the safety issue, the setbacks do need to be further than the blade height.*

Response ORG-7.239: Please see the responses to comments ORG-7.5 and ORG-7.7 regarding Project siting and compliance with setback requirements and wind turbine safety, respectively.

Comment ORG-7.240*: I am also in agreement on the locality considering proximity to existing development.*

Response ORG-7.240: Please see the response to comment ORG-7.5 regarding Project siting and compliance with setback requirements.

Comment ORG-7.241*: Unsightly*

Response ORG-7.241: Please see the response to comment ORG-7.4 regarding the visual impacts of the proposed Project.

Comment ORG-7.242*: Noisy*

Response ORG-7.242: Please see the response to comment ORG-7.6 regarding public health impacts, including noise.

Comment ORG-7.243*: Kills birds*

Response ORG-7.243: Please see the response to comment ORG-7.8 regarding impacts to birds.

Comment ORG-7.244*: coal is much more energy efficient*

Response ORG-7.244: As described in Section 1.3 of the EIS, the proposed Project would provide a clean, source of renewable energy and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals which increased from 70 to 100 percent clean energy after publication of the Draft EIS. Coal will no longer be used to generate electricity after 2045 according to the Renewable Portfolio Standard requirement.

Comment ORG-7.245*: The beauty of Waimea Valley has been forever changed by these hideous turbines…so out of place to the beauty of what should be pristine and protected. Who in gods name allowed these things to be put there!?! It's unbelievable! To add insult to injury these eyesores in Kahuku haven't even been working, for almost a year now. Who is responsible for this debacle? Of course I'll sign a petition to have more stringent protections surrounding these monstrosities. They should NEVER have been put in sight of Waimea or Kahuku. They should have been put further into the interior and hidden from view.*

Response ORG-7.245: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your comment regarding the Waimea Valley. Please see the response to comments ORG-7.5 and ORG-7.4 regarding Project siting and the visual impacts of the proposed Project, respectively.

Comment ORG-7.246*: For aesthetic*

Response ORG-7.246: Please see the response to comment ORG-7.4 regarding the visual impacts of the proposed Project.

Comment ORG-7.247*: safety*

Response ORG-7.247: Please see the response to comment ORG-7.7 regarding wind turbine safety.

Comment ORG-7.248*: rural serenity purposes*

Response ORG-7.248: As stated in EIS Section 4.14 – Land Use the proposed Project is compatible with existing and surrounding state and county land use plans and regulations. The wind farm is a permitted use on State Agricultural Districts and County Agricultural Zoning District as a conditional use that can be approved with the issuance of a Conditional Use Permit Minor.

Comment ORG-7.249*: Ridiculous visual blight*

Response ORG-7.249: Please see the response to comment ORG-7.4 regarding the visual impacts of the proposed Project.

Comment ORG-7.250*: solar power more cost effective*

Response ORG-7.250: Please see the response to comment ORG-7.38 regarding consideration of other forms of renewable energy.

Comment ORG-7.251*: For the reason Kent gives.*

Response ORG-7.251: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the Project.

Comment ORG-7.252*: Because that's my home where I grew up and went to school. My roots are planted there.*

Response ORG-7.252: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the Project.

Comment ORG-7.253*: It's an eyesore.*

Response ORG-7.253: Please see the response to comment ORG-7.4 regarding the visual impacts of the proposed Project.

Comment ORG-7.254*: Although I do support alternative energy as we strive to use less and less fossil fuels, we must ensure that this is done in a responsible manner and does not come at the cost of safety for the surrounding communities.*

Response ORG-7.254: Please see the response to comment ORG-7.7 regarding wind turbine safety.

Comment ORG-7.255*: This petition/resolution cites clearly the concerns with the current and proposed wind turbine farm surrounding the Kahuku neighborhood. I wholly support this petition/resolution and urge you to do the same.*

Response ORG-7.255: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the Project.

Comment ORG-7.256*: OUR LANDSCAPE WILL NOT LOOK LIKE PARADISE!*

Response ORG-7.256: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the Project.

Comment ORG-7.257*: If the wind turbines are going to be built on our aina, let them be built only far within proven safe and effective parameters; and mandate that they be competently managed, maintained, and operated safely and efficiently.*

Response ORG-7.257: Please see the responses to comments ORG-7.5 and ORG-7.7 regarding Project siting and wind turbine safety, respectively.

Comment ORG-7.258*: Finally, if at any time in the future, it is determined that they are no longer useful or effective in producing their intended energy levels and/or meeting the community's needs, those who own or otherwise oversee their maintenance will be responsible for their breakdown and complete removal so that the natural beauty of Kahuku's skyline is once again restored.*

Response ORG-7.258: Please see the response to comment ORG-7.71 regarding Project decommissioning.

Comment ORG-7.259*: I used to live there in the late seventies and eighties and still return there quite often*

Response ORG-7.259: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your comment.

Comment ORG-7.260*: Per Kent's reasons*

Response ORG-7.260: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the Project.

Comment ORG-7.261*: Do not permit the placement of industrial wind turbines within 1 mile of schools, hospitals or Police and Fire Stations. Although it may be prudent that our island state transition to increasing our reliance on renewables, the transition to renewable energy should be done in a responsible and well planned manner. Poor planning in the rush to implement renewable wind energy and the associated tax credits can lead to poor policies and unintended consequences that will impact communities for 20+ years. The placement of industrial size wind turbines (some in excess of 500' tall) in close proximity to schools, hospitals, first responder facilities and residential communities is questionable planning while placing them as far away from populated areas would be more sensible. Like many other communities in Honolulu County, the vast majority of Kahuku community members support renewable energy. But an even larger majority strongly oppose placing more industrial wind turbines in close proximity to Kahuku schools, Kahuku Hospital, Kahuku Police and Fire Stations and our neighborhood. The Kahuku Community Association and the Ko'olauloa Neighborhood Board have collectively voted 19-1 to oppose placing wind turbines in close proximity to Kahuku entities.*

Response ORG-7.261: Please see the response to comment ORG-7.5 regarding Project siting and compliance with setback requirements.

Comment ORG-7.262*: Shame on you for terrorizing a small community like this. Build it next to your kids school!*

Response ORG-7.262: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the Project. Please see the response to comment ORG-7.5 regarding Project siting and compliance with setback requirements.

Comment ORG-7.263*: There are enough towers in Kahuku!!!*

Response ORG-7.263: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the Project. Please see the response to comment ORG-7.5 regarding Project siting.

Comment ORG-7.264*: I oppose putting turbines near our schools and homes…*

Response ORG-7.264: Please see the response to comment ORG-7.5 regarding Project siting and compliance with setback requirements.

Comment ORG-7.265*: I too oppose of turbines being built close to our schools, homes n businesses.*

Response ORG-7.265: Please see the response to comment ORG-7.5 regarding Project siting and compliance with setback requirements.

Comment ORG-7.266*: I don't believe wind turbines should be place in close proximity to Kahuku schools or anywhere else.*

Response ORG-7.266: Please see the response to comment ORG-7.5 regarding Project siting and compliance with setback requirements.

Comment ORG-7.267*: There are better, less expensive, and less obtrusive options than these windmills. Why don't you try wind turbines, or best yet, Vortex Bladeless. They may be a startup, but they are the best option environmentally and economically. Please stop making poor choices in a wise industry.*

Response ORG-7.267: The wind turbine models being considered for the Na Pua Makani wind farm site are those most appropriate for site-specific wind conditions and terrain as well as economic and energy production considerations. Bladeless technologies are still in the research and development stage and are not yet commercially viable or available. Therefore, they are not considered for the Project.

Comment ORG-7.268*: There are too many Windfarm applications where councils not conducting appropriate due diligence and lack of care to the communities. I am strongly opposed to any Industrial Scale Wind turbines being within close proximities to existing residential or community properties.*

Response ORG-7.268: Please see the response to comment ORG-7.5 regarding Project siting and compliance with setback requirements.

Comment ORG-7.269*: I do not want those turbines in or near Kahuku town. Put them pineapple fields in Wahiawa or Kunia. Better yet, put all da windmills on Kahoolawe.*

Response ORG-7.269: Please see the response to comment ORG-7.5 regarding Project siting and compliance with setback requirements.

Comment ORG-7.270*: Wind turbines, nuclear power plants and High voltage PowerLine should be placed in 0 population areas. Put businesses there like bars, strip clubs, and other adult voluntary activities. Not schools, hospitals, homes, and HPD/HFD units. Put the wind mills around the state capitol and city hall. If it must go in neighborhoods put them in HECO's board of directors, CEO, COO, CFO, neighborhood.*

Response ORG-7.270: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the Project.

Comment ORG-7.271*: I am in opposition of any more windmills being built in Kahuku.*

Response ORG-7.271: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the Project.

Comment ORG-7.272*: to keep wind turbines away from schools and residential properties and populated areas.*

Response ORG-7.272: Please see the response to comment ORG-7.5 regarding Project siting.

Comment ORG-7.273*: These windmills are supposed to bring us energy and make our electric bills cheaper. I have not seen any decrease in my electric.*

Response ORG-7.273: Please see the response to comment ORG-7.21 and ORG-7.139 regarding energy costs.

Comment ORG-7.274*: I'm signing because I'm tired of being bullied by big businesses who think they can just go to communities and payoff politicians and destroy lives.*

Response ORG-7.274: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the Project.

Comment ORG-7.275*: The reads I find I am not comfortable with like the Cotaminating of water etc.*

Response ORG-7.275: Effects to water quality is discussed in EIS Section 4.4 – Hydrology and Water Resources. Project-related impacts to water quality would be minimized through the implementation of standard best management practices and design features to manage stormwater runoff. Please see the response to comment ORG-7.11 for additional discussion of impacts to waters resources.

Comment ORG-7.276*: I'm signing because I work. At the kahuku Elem. School Special needs children that have difficulties focusing from loud sounds if too close n the spinning is distracting …they'll rather look at. The mills than learn focus whats at hand… they are loud with a very irritating screeching sound when too close because a student of ours lives right below up in mountain and needed a ride home and I gave him a ride...the sound was like someone scratching on a blackboard slowly...that's my personal experience...how can our students n teachers deal with that!!! Love the idea of renewable energy but please Back it up! Waaaay Back!!! Thank you...*

Response ORG-7.276: Please see the responses to comments ORG-7.5 and ORG-7.6 regarding Project siting and compliance with setback requirements and noise, respectively.

Comment ORG-7.277*: They are soooooooo huge, unsightly, visually disturbing*

Response ORG-7.277: Please see the response to comment ORG-7.4 regarding the visual impacts of the proposed Project.

Comment ORG-7.278*: …particularly to those with visual/perceptive challenges, they are a threat to our birds*
Response ORG-7.278: Please see the responses to comments ORG-7.4 and ORG-7 regarding the visual impacts of the proposed Project and birds, respectively.

Comment ORG-7.279*: …And we on the North Shore have yet to benefit from these obtrusive structures-still no answer to our transportation needs, from improved bus service to improved roads!!*

Response ORG-7.279: The proposed Project does not include permanent changes to road conditions or bus service.

Comment ORG-7.280*: Why don't u put the next set on the hills around Lanikai or Hawaii Kai??*

Response ORG-7.280: Please see the response to comment ORG-7.5 regarding Project siting.

Comment ORG-7.281*: I'm signing because I grew up here and my grandchildren are growing up here too. I don't what them to have any safety or health issues down the line because they're too close to the school they attend or even to their home.*

Response ORG-7.281: Please see the response to comments ORG-7.6 and ORG-7.7 regarding public health and wind turbine safety, respectively.

Comment ORG-7.282*: It's a hazard for the community. It shouldn't go ahead.*

Response ORG-7.282: Please see the response to comments ORG-7.6 and ORG-7.7 regarding public health and wind turbine safety, respectively.

Comment ORG-7.283*: I want my children & family to be safe! Responsible sustainability is our kuleana!*

Response ORG-7.283: Please see the response to comments ORG-7.6 and ORG-7.7 regarding public health and wind turbine safety, respectively.

Comment ORG-7.284*: Kahuku has ample windmills close to the residential areas. Additional windmills will affect the serenity and beauty of this rural area.*

Response ORG-7.284: As stated in EIS Section 4.14 – Land Use the proposed Project is compatible with existing and surrounding state and county land use plans and regulations. The wind farm is a permitted use on State Agricultural Districts and County Agricultural Zoning District as a conditional use that can be approved with the issuance of a Conditional Use Permit Minor. Please see the response to comment ORG-7.5 regarding Project siting and compliance with setback requirements.

Comment ORG-7.285*: Move them further away from housing and school areas*

Response ORG-7.285: Please see the response to comment ORG-7.5 regarding Project siting and compliance with setback requirements.

Comment ORG-7.286*: …replace with another form of alternative energy.*

Response ORG-7.286: Please see the response to comment ORG-7.38 regarding consideration of other forms of renewable energy.

Comment ORG-7.287*: These people are here to make money!!! They are poisoning our lands…there are no more room for this crap!!!!! Take it with you and go back to the mainland…the beauty of our lands are disappiring.*

Response ORG-7.287: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the Project. Please see the response to comment ORG-7.1 regarding the purpose and need for the proposed Project.

Comment ORG-7.288*: We need homes for our local people that are really are local…that's rite I said locals only…not all these people from outside…I want to buy a home but it just got more expensive…That's my view…So if your not from here then go back where you came from and make your home town a better place to live...*

Response ORG-7.288: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your comment.

Comment ORG-7.289*: Slow down. Technology is upgrading and outdating these old wind turbines. Lets see what the future hold in capturing wind energy.*

Response ORG-7.289: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your comment.

Comment ORG-7.290*: I don't want the near schools. Study of long term effects should be done before placing near schools.*

Response ORG-7.290: Please see the responses to comments ORG-7.5 and ORG-7.6 regarding Project siting and compliance with setback requirements and public health, respectively.

Comment ORG-7.291*: Enough already, land in Oklahoma is being damaged by windmills! Don't want that in our little country town. Aloha!*

Response ORG-7.291: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the Project.

Comment ORG-7.292*: I oppose the new proposal to build more turbines in the country!!*

Response ORG-7.292: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the Project.

Comment ORG-7.293*: The only people that want more turbines in Kahuku are those that stand to make a profit. The residents that will be affected are against this. Loud and clear, NO MORE WINDMILLS IN KAHUKU!!*

Response ORG-7.293: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the Project.

Comment ORG-7.294*: Its the pono thing to do*

Response ORG-7.294: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the Project.

Comment ORG-7.295*: Windmills are a lie & a con the people are being tricked - do not support windmills!!*
Response ORG-7.295: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the Project.

Comment ORG-7.296*: I'm signing because our beautiful Hawaii becomes more and more unrecognizable. We don't need anymore wind turbines on our land out there. Nuff already.*

Response ORG-7.296: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the Project. Please see the responses to comments ORG-7.1 and ORG-7.5 regarding the purpose and need of the proposed Project and Project siting, respectively.

Comment ORG-7.297*: I'm signing because I don't want these windmills so close to our schools & homes*

Response ORG-7.297: Please see the response to comment ORG-7.5 regarding Project siting and compliance with setback requirements.

Comment ORG-7.298*: These windmills do not even service us. There are other more efficient & responsible renewable energy, and not at our health or safety expense!*

Response ORG-7.298: Please see the response to comment ORG-7.38 regarding consideration of other forms of renewable energy.

Comment ORG-7.299*:* preserve our schools!!

Response ORG-7.299: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the Project.

Comment ORG-7.300*: I agree with the goals of this petition.*

Response ORG-7.300: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the Project.

Comment ORG-7.301*: This is a place I call home, well being and safety of the people are the utmost important. I support clean energy but not at the risk of the people's safety. Build these else where! We have those windmills here in California but no where near residential areas!*

Response ORG-7.301: Please see the responses to comments ORG-7.5, ORG-7.6, and ORG-7.7 regarding Project siting, public health, and wind turbine safety, respectively.

Comment ORG-7.302*: agreed. These things are useless*

Response ORG-7.302: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the Project.

Comment ORG-7.303*: Why don't they put PV instead of big windmills?*

Response ORG-7.303: Please see the response to comment ORG-7.38 regarding consideration of other forms of renewable energy.

Comment ORG-7.304*: Aloha Mayor Caldwell, Please consider adopting more stringent safety zone requirements that prevent industrial wind turbines from negatively impacting residential neighborhoods. Due to past catastrophic events involving large wind turbines or systems associated with this technology, a moratorium on issuing permits may be in order until such a time where all prudent safety and proximity issues have been adequately studied and sufficiently addressed.*

Response ORG-7.304: Please see the response to comment ORG-7.5 regarding Project siting and compliance with setback requirements.

Comment ORG-7.305*: We the undersigned oppose SB2526 in that the set back distance of 1000 feet is too short and we recommend the distance from residential dwellings be 1/2 mile or greater.*

Response ORG-7.305: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your comment.

Comment ORG-7.306*: We, the undersigned, are OPPOSED to Na Pua Makani's proposed plan to install more wind turbines in the Kahuku area.*

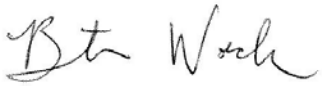
Response ORG-7.306: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the Project.

Comment ORG-7.307*: We, the undersigned, are OPPOSED to Na Pua Makani's proposed plan to install more wind turbines in the Kahuku area. We strongly oppose any and all future projects that place wind turbines within 1 mile of the existing residential community, Kahuku Elementary and Kahuku High Schools.*

Response ORG-7.307: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the Project. Please see the response to comment ORG-7.5 regarding Project siting and compliance with setback requirements.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

State Letters and Responses

DAVID Y. IGE
GOVERNOR OF HAWAII

VIRGINIA PRESSLER, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HI 96801-3378

In reply, please refer to:
DOH/CWB

06036PNN.15

ST-1

June 19, 2015

Ms. Kristi Young
Field Supervisor
Pacific Island Fish and Wildlife Office
U.S. Fish and Wildlife Service
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawaii 96850

Dear Ms. Young:

SUBJECT: Comments on the Draft Environmental Impact Statement and Draft Habitat Conservation Plan for the Proposed Na Pua Makani Wind Project Kahuku, Island of Oahu, Hawaii

1 The Department of Health (DOH), Clean Water Branch (CWB), has reviewed the subject document and has no comments at this time. The DOH-CWB provided comments on the Environmental Impact Statement Preparation Notice (EISPN) for this project (Letter No. 12076PCTM.13, dated December 26, 2013).

2 Please note that our review is based solely on the information provided in the subject document and its compliance with Hawaii Administrative Rules (HAR), Chapters 11-54 and 11-55. You may be responsible for fulfilling additional requirements related to our program. We recommend that you also read our standard comments on our website at: http://health.hawaii.gov/epo/files/2013/05/CWB-standardcomment.pdf.

If you have any questions, please visit our website at: http://health.hawaii.gov/cwb, or contact the Engineering Section, CWB, at (808) 586-4309.

Sincerely,

ALEC WONG, P.E., CHIEF
Clean Water Branch

NN:ay
c: Ms. Brita Woeck, Tetra Tech, Inc. [via e-mail brita.woeck@tetratech.com only]

TETRA TECH

April 4, 2016

Alec Wong, P.E., Chief, Clean Water Branch
State of Hawaii
Department of Health
PO Box 3378
Honolulu HI 96801-3378

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)
DOH/CWB 06036PNN.15

Dear Mr. Wong:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter dated June 19, 2015 regarding the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Draft Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We appreciate your taking the time to provide feedback about the Project.

While your letter indicated that you have no comments on the Draft EIS, we will include a copy of your letter in the Second Draft EIS as part of the public comment record for the Project. We have reviewed the Clean Water Branch standard comments as recommended to ensure the Project is in compliance with all applicable regulations.

If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

DAVID Y. IGE
GOVERNOR OF HAWAII

RECEIVED
JUN 26 2015
U.S. FISH & WILDLIFE SVC
PACIFIC ISLANDS FWD
HONOLULU, HI 96850

VIRGINIA PRESSLER, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HI 96801-3378

In reply, please refer to:
File:

EPO 15-133

June 17, 2015

ST-2

Ms. Kristi Young
Field Supervisor
Pacific Island Fish and Wildlife Office
U.S. Fish and Wildlife Service
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawaii 96850
Via Email: NaPuaMakanihcp@fws.gov

Dear Ms. Young:

SUBJECT: Draft Environmental Impact Statement (DEIS) for the Proposed Na Pua Makani Wind Project and Draft Habitat Conservation Plan, Kahuku, Koolauloa, Oahu
TMK: (1) 5-6-005:018 (portion), (1) 5-6-006:018, 047, 051, 055, and (1) 5-6-008:006 (portion)

The Department of Health (DOH), Environmental Planning Office (EPO), acknowledges receipt of your DEIS to our office on June 8, 2015. Thank you for allowing us to review and comment on the proposed project. The DEIS was routed to the Clean Air, Clean Water, and Indoor & Radiological Health Branch. They will provide specific comments to you if necessary. EPO recommends that you review the standard comments and available strategies to support sustainable and healthy design provided at: http://health.hawaii.gov/epo/home/landuse-planning-review-program. Projects are required to adhere to all applicable standard comments. 1

We encourage you to examine and utilize the Hawaii Environmental Health Portal. The portal provides links to our e-Permitting Portal, Environmental Health Warehouse, Groundwater Contamination Viewer, Hawaii Emergency Response Exchange, Hawaii State and Local Emission Inventory System, Water Pollution Control Viewer, Water Quality Data, Warnings, Advisories and Postings. The Portal is continually updated. Please visit it regularly at: https://eha-cloud.doh.hawaii.gov 2

You may also wish to review the revised Water Quality Standards Maps that have been updated for all islands. The Water Quality Standards Maps can be found at: http://health.hawaii.gov/cwb/site-map/clean-water-branch-home-page/water-quality-standards 3

We request that you utilize all of this information on your proposed project to increase sustainable, innovative, inspirational, transparent and healthy design.

Mahalo nui loa,

Laura Leialoha Phillips McIntyre, AICP
Program Manager, Environmental Planning Office

c: Robyn Thorson, U.S. Fish and Wildlife Service, Pacific Region
Jodi Charrier, Pacific Islands Fish and Wildlife Service
Suzanne Case, Hawaii Department of Land and Natural Resources
Russell Tsuji, Hawaii Department of Land and Natural Resources
CAB, CWB, & IRHB (via email only)

April 4, 2016

Laura Lealoha Phillips McIntyre, AICP, Program Manager, Environmental Planning Office
State of Hawaii
Department of Health
PO Box 3378
Honolulu HI 96801-3378

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)
EPO 15-133

Dear Ms. McIntyre:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter dated June 17, 2015 regarding the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Draft Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We appreciate your taking the time to provide feedback about the Project.

While your letter indicated that you have no specific comments on the Draft EIS, we provide the following responses to your general comments.

Comment ST-2.1*: EPO recommends that you review the standard comments and available strategies to support sustainable and healthy design provided at: http://health.hawaii.gov/epo/home/landuse-planning-review-program. Projects are required to adhere to all applicable standard comments.*

Response ST-2.1: As recommended, we have reviewed the department's standard comments. Responses to the standard comments that are applicable to the Project are provided in Attachment 1.

Comment ST-2.2: *We encourage you to examine and utilize the Hawaii Environmental Health Portal. The portal provides links to our e-Permitting Portal, Environmental Health Warehouse, Groundwater Contamination Viewer, Hawaii Emergency Response Exchange, Hawaii State and Local Emission Inventory System, Water Pollution Control Viewer, Water Quality Data, Warnings, Advisories and Postings. The Portal is continually updated. Please visit it regularly at: https://eha-cloud.doh.hawaii.gov.*

Response ST-2.2: Thank you for your recommendation to examine and use the Hawaii Environmental Health Portal.

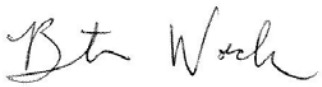
Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

Comment ST-2.3*: You may also wish to review the revised Water Quality Standards Maps that have been updated for all islands. The Water Quality Standards Maps can be found at: http://health.hawaii.gov/cwb/site-map/clean-water-branch-home-page/water-quality-standards.*

Response ST-2.3: Thank you for the reference to the water quality standards maps. Since the publication of the Draft EIS, the Project design has been refined to ensure that Keaaulu, Malaekahana, and Ohia streams can be avoided, and that there would be no placement of dredge or fill material, either temporarily or permanently, below the ordinary high water marks of these streams. Implementation of a Project Storm Water Pollution Prevention Plan, Temporary Erosion and Sediment Control Plan, and other best management practices will ensure that the Project would avoid or minimize impacts to surface or ground water quality.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Attachment 1
Department of Health General Comments and Responses

Comment Clean Air Branch 1: A significant potential for fugitive dust emissions exists during all phases of construction and operations. Proposed activities that occur in proximity to existing residences, businesses, public areas or thoroughfares, exacerbate potential dust problems. It is recommended that a dust control management plan be developed which identifies and addresses all activities that have a potential to generate fugitive dust. The plan, which does not require DOH approval, would help with recognizing and minimizing the dust problems from the proposed project.

Activities must comply with the provisions of Hawaii Administrative Rules, §11-60.1-33 on Fugitive Dust. In addition, for cases involving mixed land use, we strongly recommend that buffer zones be established, wherever possible, in order to alleviate potential nuisance problems.

Response: The Project would be constructed in compliance with the provisions of Hawaii Administrative Rules, §11-60.1-33 on Fugitive Dust. As described in Section 2.6, during Project construction, wind erosion would be minimized by using common dust suppression techniques, such as regularly watering exposed soils, stockpiling soils, and stabilizing soils. As noted in Section 4.5 – Air Quality and Climate Change of the EIS fugitive dust emissions would be localized and temporary and would occur at relatively low levels compared to the State and Federal ambient air quality standards.

Comment Clean Water Branch 1: Any project and its potential impacts to State waters must meet the State's:

1) Antidegradation policy, which requires that the existing uses and the level of water quality necessary to protect the existing uses of the receiving State water be maintained and protected;
2) Designated uses, as determined by the classification of the receiving State waters; and
3) Water quality criteria [Hawaii Administrative Rules (HAR), Chapter 11-54].

Response: The Project would not directly impact State waters. As described in Section 4.2 – Hydrology and Water Resources, the Project design has been refined since the publication of the Draft EIS to ensure that it avoids all waterbodies. There would be no discharge of dredge or fill material into any waterbody; therefore a Federal Section 404 Water Quality Permit will not be required. Standard best management practices, listed in Table 2.6 of the EIS, would be implemented to avoid and minimize impacts to surface and ground water quality and quantity associated with Project construction and operation.

Comment Clean Water Branch 2: A Section 401 Water Quality Certification (WQC) is required if your project/activity:
- Requires a federal permit, license, certificate, approval, registration, or statutory exemption; and
- May result in a discharge into State waters. The term "discharge" is defined in Clean Water Act, Subsections 502(16), 502(12), and 502(6). Examples of "discharge" include, but are not limited to, allowing the following pollutants to enter State waters from the surface or in-water: solid waste, rock/sand/dirt, heat, sewage, construction debris, any underwater work, chemicals, fugitive dust/spray paint, agricultural wastes, biological materials, industrial wastes, concrete/sealant/epoxy, and washing/cleaning effluent.

Response: The Project would not directly impact State waters and there would be no discharge of dredge or fill material into any waterbody; therefore a Section 401 Water Quality Certification will not be required for the Project.

Comment Clean Water Branch 3: National Pollutant Discharge Elimination System (NPDES) permit coverage is required for:

- Storm water associated with construction activities for land disturbances of one (1) acre or more. Land disturbance includes, but is not limited to, clearing, grading, grubbing, excavation, demolition, uprooting of vegetation, equipment staging, and storage areas.
- Storm water associated with industrial activities for facilities with Standard Industrial Classification Codes regulated in 40 CFR 122.26(b)(14)(i) through (ix) and (xi).
- Storm water and certain non-storm water from a small Municipal Separate Storm Sewer System.
- Discharges of water pollutants into State surface waters. Examples of these discharges include, but are not limited to, cooling water, hydrotesting waters, dewatering effluent, and process wastewater.
- Discharges from the application of pesticides (including insecticides, herbicides, fungicides, rodenticides, and various other substances to control pest) to State waters.

Response: A NPDES permit will be obtained for the Project.

Comment Clean Water Branch 4: According to State law, all discharges related to the project construction or operation activities, whether or not NPDES permit coverage and/or Section 401 WQC are required, must comply with the State's Water Quality Standards.

Response: As noted in EIS Section 4.4 – Hydrology and Water Resources, impacts to surface water quality from increased erosion, sedimentation, stormwater runoff and/or pollutants would occur as a result of the Project would be minor due to implementation of design measures and standard best management practices. Negligible effects to groundwater quality or quantity are anticipated.

Comment Hazard Evaluation and Emergency Response 1: A Phase I Environmental Site Assessment (ESA) should be conducted for developments or redevelopments. If the investigation shows that a release of petroleum, hazardous substance, pollutants or contaminants occurred at the site, the site should be properly characterized through an approved Hawaii State Department of Health (DOH)/Hazard Evaluation and Emergency Response Office (HEER) soil and or groundwater sampling plan. If the site is found to be contaminated, then all removal and remedial actions to clean up hazardous substance or oil releases by past and present owners/tenants must comply with chapter 128D, Environmental Response Law, HRS, and Title 11, Chapter 451, HAR, State Contingency Plan.

Response: As discussed in EIS Section 4.7 – Hazardous and Regulated Materials and Wastes, a Phase I Environmental Site Assessment of the wind farm site was performed in 2014 to assess the potential presence of hazardous materials on the site. The Phase I was conducted in accordance with ASTM International Standard E1527-13, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process. The Phase I assessment did not find evidence that hazardous materials, solid waste, or petroleum products have been released to the environment in or around the wind farm site. There was no evidence of the presence of storage of hazardous materials; improper disposal of hazardous wastes, dumping, or landfilling; or wastewater such as pits, ponds, or lagoons. There were no solid waste dumpsters or waste staging areas at the wind farm site. No evidence of the presence of underground storage tanks (USTs) was observed.

Comment Indoor and Radiological Health Branch 1: Project activities shall comply with the Administrative Rules of the Department of Health:

- Chapter 11-39 Air Conditioning and Ventilating.
- Chapter 11-45 Radiation Control.
- Chapter 11-46 Community Noise Control.

- Chapter 11-501 Asbestos Requirements.
- Chapter 11-502 Asbestos-Containing Materials in Schools.
- Chapter 11-503 Fees for Asbestos Removal and Certification
- Chapter 11-504 Asbestos Abatement Certification Program

Response: As described in Section 4.4 – Noise of the EIS modeling of operational sound levels indicate that the Project will be incompliance with Chapter 11-46 Community Noise Control. Construction activities would likely require a permit, obtained from the DOH, to allow the operation of construction equipment that result in exceedances of the maximum permissible noise level at property line locations. None of the other Administrative Rules noted above apply to the Project.

Comment Solid and Hazardous Wastes Branch 1: The state regulations for hazardous waste are in Chapters 11-260 to 11-280, Hawaii Administrative Rules (HAR). These rules apply to the identification, handling, transportation, storage and disposal of regulated hazardous waste. Generators, transporters and treatment, storage and disposal facilities of hazardous waste must adhere to these requirements or be subject to fines and penalties.

Response: Na Pua Makani Power Partners, LLC would prepare and implement a Hazardous Materials and Wastes Management Plan that details proper procedures for storing and using hazardous materials and storing and disposing of hazardous waste. Section 4.7 of the EIS presents a list of pollutants that could be used during construction, a brief description of their storage and use, and a brief description of control measures that would be implemented to ensure they are properly stored.

Comment Solid and Hazardous Wastes Branch 2: Generators of solid waste are required to ensure that their wastes are properly delivered to permitted solid waste management facilities. Managers of construction and demolition projects should require their waste contractors to submit disposal receipts and invoices to ensure proper disposal of wastes.

Response: Waste generated by the Project may include scrap metal, wood, plastic and cardboard from shipping of turbine components, and incidental waste from construction workers (e.g. food and beverage containers). Solid wastes generated during construction and operation of the Project would be taken to the City and County of Honolulu's Waimanalo Gulch landfill or the H-power facility in Kapolei. Alternatively, construction wastes could be taken to the privately-owned PVT landfill, which is authorized specifically to receive construction and demolition waste.

Comment Solid and Hazardous Wastes Branch 3: HRS Chapter 342G encourages the reduction of waste generation, reuse of discarded materials, and the recycling of solid waste. Businesses, property managers and developers, and government entities are highly encouraged to develop solid waste management plans to ensure proper handling of wastes.

Response: As noted in EIS Section 4.18 – Public Infrastructure, construction and other wastes will be recycled to the extent practicable to limit the impacts to existing landfills.

DAVID Y. IGE
Governor

SHAN S. TSUTSUI
Lt. Governor

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawaii 96814-2512
Phone: (808) 973-9600 FAX: (808) 973-9613

SCOTT E. ENRIGHT
Chairperson, Board of Agriculture

PHYLLIS SHIMABUKURO-GEISER
Deputy to the Chairperson

RECEIVED
JUL 24 2015
U.S. FISH & WILDLIFE SVC
PACIFIC ISLANDS FWD
HONOLULU, HI 96850

July 22, 2015

ST-3

Pacific Island Fish and Wildlife Office
U.S. Fish and Wildlife Service
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawaii 96850

Attention: Ms. Kristi Young, Field Supervisor

Dear Ms. Young:

Subject: Draft Environmental Impact Statement for the Proposed Na Pua Makani Wind Project and Draft Habitat Conservation Plan located at Kahuku, Koolauloa, Hawaii, TMKs (1) 5-6-005:018 (portion); (1) 5-6-006:018, 047, 051, 055; and (1) 5-0-008:006 (portion)

Thank you for the opportunity to review the subject document. The Department of Agriculture offers the following comments and concerns.

The northwestern portion of the wind farm site abuts our 225-acre, 24-lot Kahuku Agricultural Park (KAP). It appears that permanent access to this northwest portion is being proposed for both Alternatives 2 (8-10 turbines) and 3 (up to 12 turbines) through our existing primary access road from Kamehameha Highway, through the 226-acre Kahuku Farmer's Association (KFA) Non-Agricultural Park lot, and to the abutting KAP (page 1-2; Figure 1-2 on page 1-4, Section 2.2.2 on page 2-3). Both of these properties are managed by the Department's Agricultural Resource Management Division (ARMD), Agricultural Park Program and Non-Agricultural Park Program.

Island Fresh

There are several issues related to the proposed wind project that the Draft Environmental Impact Statement (DEIS) needs to discuss. These issues include, but are not limited to the following:

1 1. 3.15.1.3 – Transportation – The use of the State-owned Kahuku Agricultural Park interior roadways needs to be expanded to explain that agreements for the long-term use, on-going maintenance, mitigation and/or modification of said roadway for delivery of turbine components needs to be negotiated.

2 2. The access roadway has a number of turns and bends that may preclude its use for delivery of turbine components. This is particularly evident near the groundwater well pump house and Lot 6051 and further delineated in drawings C300 to C310, dated July 6, 2015.

3. Further examination is required to study proposed travel path and blade swing potentials while transporting along the KAP interior roadways.

3 4. 3.16.1.1 – Turbine Collapse and Blade Throw – There appears to be sufficient physical separation for 3 of the 5 turbines proposed on land adjacent to the KAP lots. The clearance for the two northernmost turbines will need further review by ARMD.

4 5. 3.18.1.3 – Water – Location of the KAP Water Well in Figure 3.18-1 (page 3-117) is incorrect. Location needs to be amended.

5 6. 4.3.3, Alternative 2 and 4.3.4, Alternative 3 – Construction Impacts; Drainage. Inclusion of potential flooding impacts to the adjacent KAP lands should be discussed in the Final EIS and associated mitigation measures to be addressed in the final design plans.

6 7. 4.8.3.3 – Mitigation of Unavoidable Impacts – Please provide a copy of the Site Safety Handbook prepared for construction and O & M to ARMD. Said Handbook should include the names of appropriate personnel and emergency contact information in case of emergencies.

7

8. 6.7 Unresolved Issues – In accordance with HAR 11-200-17.N – Discussion of issues that remain unresolved at the time of publication of the EIS, along with ***"a discussion of how such issues will be resolved prior to commencement of the action, or what overriding reasons there are for preceding without resolving the problems."*** ARMD believes issuance of a long-term easement, requiring Board of Agriculture prior written approval to provide initial construction access and on-going O & M access is significant enough to warrant appropriate discussion and as cited by the Hawaii Administrative Rule above.

Should you have any questions, please contact me or Mr. Brian Kau, Administrator, Agricultural Resource Management Division, at (808) 973-9473.

Sincerely,

Phyllis Shimabukuro-Geiger

for Scott E. Enright
Chairperson, Board of Agriculture

c: Champlin Hawaii Wind Holdings, LLC
2020 Alameda Padre Serra, Suite 105
Santa Barbara, CA 93103

Honorable Suzanne D. Case
Chairperson, Board of Land and
Natural Resources
Kalanimoku Building
1151 Punchbowl Street
Honolulu, Hawaii 96813

Tetra Tech, Inc.
737 Bishop Street, Suite 2340
Pacific Guardian Center, Mauka Tower
Honolulu, Hawaii 96813

TETRA TECH

April 4, 2016

Scott Enright, Chairperson, Board of Agriculture
State of Hawaii
Department of Agriculture
1428 South King Street
Honolulu HI 96814-2512

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Enright:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter dated July 22, 2015, commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Draft Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment ST-3.1*: 3.15.1.3 – Transportation – The use of the State-owned Kahuku Agricultural Park interior roadways needs to be expanded to explain that agreements for the long-term use, on-going maintenance, mitigation and/or modification of said roadway for the delivery of turbine components needs to be negotiated.*

Response ST-3.1: On October 27, 2015, the Hawaii Department of Agriculture (DOA) Board of Agriculture (Board) approved an issuance of a Non-Exclusive Term Easement for the use of the interior roadway of the Kahuku Agricultural Park as an access road to the Project components located on the DLNR parcel. The Second Draft EIS discussion of the use of State-owned roadways has been updated to include this information.

Comment ST-3.2*: The access roadway has a number of turns and bends that may preclude its use for delivery of turbine components. This is particularly evident near the groundwater well pump house and Lot 6051 and further delineated in drawings C300 to C310, dated July 6, 2015. Further examination is required to study proposed travel path and blade swing potentials while transporting along the KAP interior roadways.*

Response ST-3.2: Na Pua Makani Power Partners, LLC, has provided the DOA) additional information about the Kahuku Agriculture Park roadway. This information is included in the supporting materials for their long-term lease agreement, which was approved in October 2015.

Comment ST-3.3*: 3.16.1.1 – Turbine Collapse and Blade Throw – There appears to be sufficient physical separation for 3 of the 5 turbines proposed on land adjacent to the KAP lots. The clearance for the two northernmost turbines will need further review by ARMD.*

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

Response ST-3.3: The Project has been designed to meet City and County of Honolulu setback requirements. The minimum required setback distance is one foot for every foot of height measured from the tip blade to the finish grade from all property lines. The turbine locations for the Project meet these requirements, the closest being over 700 feet from the property line adjacent to the Kahuku Agriculture Park.

Comment ST-3.4*: 3.18.1.3 – Water – Location of the KAP Water Well in Figure 3.18-1 (page 3-117) is incorrect. Location needs to be amended.*

Response ST-3.4: The location of the KAP water well in Figure 3.18-1 has been corrected in the Second Draft EIS.

Comment ST-3.5*: 4.3.3, Alternative 2 and 4.3.4, Alternative 3 – Construction Impacts; Drainage. Inclusion of potential flooding impacts to the adjacent KAP lands should be discussed in the Second Draft EIS and associated mitigation measures to be addressed in the final design plans.*

Response ST-3.5: During the detailed design phase of the Project, the construction contractor will confirm stormwater runoff requirements and will implement stormwater control measures such as seepage pits, drywells, and/or detention basins (see Section 4.3.3). Best management practices such as ditches and culverts to capture and convey stormwater runoff would also be implemented to reduce the risk of flooding. With implementation of these measures, the very minor increase in impervious surface and volume of stormwater associated with the Project is expected to have a negligible effect on the volume of stormwater runoff leaving the wind farm site. Section 4.18 describes flooding risk in more detail. No flooding impacts are anticipated to any areas adjacent to the Project. Additional discussion has been added to the Second Draft EIS related to the potential for flooding in the adjacent Kahuku Agriculture Park lands.

Comment ST-3.6*: 4.8.3.3 – Mitigation of Unavoidable Impacts – Please provide a copy of the Site Safety Handbook prepared for construction and O & M to ARMD. Said Handbook should include the names of appropriate personnel and emergency contact information in case of emergencies.*

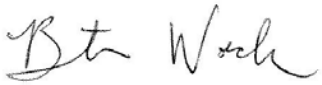
Response ST-3.6: A copy of the Site Safety Handbook will be sent under separate cover to ARMD. The handbook will include emergency contact information.

Comment ST-3.7*: 6.7 Unresolved Issues – In accordance with HAR 11-200-17.N – Discussion of issues that remain unresolved at the time of publication of the EIS, along with "a discussion of how such issues will be resolved prior to commencement of the action, or what overriding reasons there are for preceding without resolving the problems." ARMD believes issuance of a long-term easement, requirement Board of Agriculture prior written approval to provide initial construction access and on-going O & M access is significant enough to warrant appropriate discussion and as cited by the Hawaii Administrative Rule above.*

Response ST-3.7: On October 27, 2015, the Hawaii DOA Board approved an issuance of a Non-Exclusive Term Easement for the use of the interior roadway of the Kahuku Agricultural Park as an access road to the Project components located on the DLNR parcel. The easement covers construction and operation of the wind farm for a term of 20 years. Since the Easement has been approved, no revisions to the Unresolved Issues were made in relation to the DOA easement.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

OFFICE OF PLANNING
STATE OF HAWAII

235 South Beretania Street, 6th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

DAVID Y. IGE
GOVERNOR

LEO R. ASUNCION
ACTING DIRECTOR
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Ref. No. P-14843

ST-4

August 6, 2015

RECEIVED
AUG 10 2015
U.S. FISH & WILDLIFE SVC
PACIFIC ISLANDS FWD
HONOLULU, HI 96850

Ms. Kristi Young
Field Supervisor
Pacific Island Fish and Wildlife Office
U.S. Fish and Wildlife Service
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawaii 96850

Dear Ms. Young:

Subject: Draft Environmental Impact Statement for the Na Pua Makani Wind Project and Habitat Conservation Plan, Kahuku, Koolauloa District, Oahu; Tax Map Keys: (1) 5-6-8:018; 5-6-6:018; 47, 51, 55 (por); and 5-6-5:018 (por)

Thank you for the opportunity to provide comments on the Draft Environmental Impact Statement (Draft EIS) for the proposed Na Pua Makani Wind Project and Habitat Conservation Plan.

We understand this project proposes the construction and operation of a new wind farm on State and federal lands adjacent to the existing Kahuku Wind Farm site. The project will consist of permanent facilities that include an underground electrical system, an onsite substation, an operations and maintenance center, access roads, a Hawaiian Electric Company (HECO) owned 0.9 mile transmission line, and a meteorological tower.

The Draft EIS examined three alternatives: a No Action option, an Alternative #2 (the preferred action) of eight to 10 wind turbines, and an Alternative #3 which called for a larger generation wind project of up to 12 wind turbines.

This wind farm will provide renewable wind energy to the island of Oahu. The generating capacity of the turbines (up to 10 wind turbines) is up to 25 megawatts of electrical power. The power generated by the wind farm will be sold to HECO under a long-term base price contract, thus providing greater price stability for Oahu consumers. The energy delivered would help HECO meet its renewable portfolio standard established in Hawaii Revised Statutes (HRS) Chapter 269-92 and the state's goal of increasing energy independence.

The Draft EIS was prepared pursuant to the National Environmental Policy Act, 40 Code of Federal Regulations, 1500-1508, Engineer Regulations 200-2-2, and the Hawaii Environmental Policy Act, HRS Chapter 343.

The Office of Planning (OP) has reviewed the Draft EIS and provides the following comments:

1 1. In Section 2.3.3, page 2-6, the Draft EIS notes that based on community scoping comments received, the number of turbines has been reduced and setbacks increased. The EIS should quantify the currently proposed setbacks and specify how much greater setbacks were provided from residences from the project that was originally presented.

2 Furthermore, is there a potential for using wind turbines with higher generating capacity to achieve the same level of generation with a reduced number of turbines? This could achieve greater setbacks.

3 2. The Draft EIS addresses many of our comments made in a previous letter dated December 1, 2014 (Reference No., P-14590) in regards to the HRS § 205A-2, Coastal Zone Management Act objectives and policies and includes a detailed analysis of environmental consequences from stormwater impact in Section 4.4 – Hydrology and Surface Water Resources, pages 4-19 to 4-30. Additionally, the Draft EIS contains an analysis on soil types and erosion hazard risks in Section 4.3, pages 4-11 to 4-19.

Section 4.4.3.3, pages 4-25 and 4-26, lists the mitigation strategies that will be followed to control sediment and soil erosion on coastal waters. These include installing of permanent stormwater control structures, restoring the natural contours and drainage patterns of the area, establishing retention basins near streams and flood prone areas to collect sediment, and the use of ditches and culverts to capture the energy of stormwater and control erosion.

4 3. Section 4.12.4.2 on page 4-126 discusses Effects of the HCP Conservation Measures. This section should elaborate on and summarize the apparently significant economic benefits of mitigation detailed in HCP Appendix, Table F-1 Estimated Mitigation Funding Matrix, which total approximately $4.3 million.

5 4. Section 4.16 on page 4-173 et seq. regarding Visual Resources presents the viewshed analysis conducted. Inasmuch as the community sensitivities to the wind farm are the visual impacts and proximity to residences, the visual analysis should present views from the nearest affected residences.

6 5. The Draft EIS, Section 5.2.4, page 5-7, includes an analysis on the Hawaii State Plan's objectives and policies for HRS § 226-18 (Facility Systems – Energy). Because this project deals directly with renewable energy, the Final Environmental Impact Statement (Final EIS) would benefit from an analysis on this projects compatibility with the principles on sustainability.

HRS § 226-108(2) – the priority guideline on sustainability, encourages planning that respects and promotes living within the natural resources and limits of the State. The Hawaii State Plan analysis in Section 5.2.4 of the Draft EIS, should contain an examination on the proposed project's ability to meet the goals of sustainable development. The increase of renewable energy options for the residents of Oahu could meet these standards if this project is approved and becomes operational. Na Pua Makani Wind Partners and the approving agencies should consider the project's contribution to creating a high quality of life and mutually supportive balance among environmental, economic, and social equity concerns enumerated in HRS § 226-108.

This new wind farm represents expanded capacity for renewable energy opportunities on Oahu, and enhances energy diversification and self-sufficiency for the State of Hawaii. Renewable wind-power/green energy is consistent with the principles on sustainability. The Final EIS should include an analysis on this project's consistency with the priority guideline on sustainability. The examination on sustainability should be joined with the current discussion on the Hawaii State Plan found in Section 5.2.4, page 5-7.

7 6. As stated in our earlier comment letter referenced above, the national Coastal Zone Management Act requires direct federal activities and development projects to be consistent with approved state coastal programs to the maximum extent practicable. If this project requires a U.S. Army Corps of Engineers Clean Water Act Section 401, 402, and 404 permit, then this wind farm project may need to be evaluated against Federal Consistency requirements. OP will be the lead State agency to conduct this evaluation.

If you have any questions regarding this comment letter, please contact Mr. Josh Hekekia of our office at 587-2845.

Sincerely,

Leo R. Asuncion
Acting Director

cc: Luis P. Salaveria, Director, DBEDT
Suzanne Case, Chairperson, DLNR
Russel Tsuji, Administrator, DLNR Land Division
Na Pua Makani Power Partners, LLC
Brita Woeck, Tetra Tech, Inc.

TETRA TECH

April 4, 2016

Leo R. Asuncion, Acting Director
State of Hawaii
Office of Planning
235 South Beretania Street, 6th Floor
Honolulu HI 96813

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)
Ref. No. P-14843

Dear Mr. Asuncion:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter dated August 6, 2015, commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Draft Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment ST-4.1*: In Section 2.3.3, page 2-6, the Draft EIS notes that based on community scoping comments received, the number of turbines has been reduced and setbacks increased. The EIS should quantify the currently proposed setbacks and specify how much greater setbacks were provided from residences from the project that was originally presented.*

Response ST-4.1: The minimum City and County of Honolulu required setback distance is one foot for every foot of height measured from the tip blade to the finish grade from all property lines. For the tallest turbine models currently being considered the required setback is 656 feet (200 meters) from the wind farm TMK parcel boundaries. The closest distance between a proposed wind turbine location and a residential property (i.e., zoned residential) is 1,611 feet (491 meters; distance between the farthest north turbine on the Malaekahana side of the wind farm site and residential parcel to the north).

Community outreach efforts began in spring 2013, prior to the initiation of formal public scoping. At this time, Na Pua Makani Power Partners, LLC, had been evaluating turbine locations on Cross Hill (the closest being approximately 1,000 feet from the nearest zoned residential areas) and various locations on the private land portion of the wind farm site. Turbine locations were eliminated based on community input to maintain setback requirements, reduce visual impacts, and increase the distance between the Project and the community. An up to 14 turbine project was presented during the public scoping period. In response to public comments many of which related to visual impacts, the number of turbines was further reduced and a project of up to 10 turbines was presented in the Draft EIS. Section 2.1 of the EIS provides additional discussion of the constraints that make a smaller project or a project located farther mauka/inland not feasible.

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

Comment ST-4.2*: Furthermore, is there a potential for using wind turbines with higher generating capacity to achieve the same level of generation with a reduced number of turbines? This could achieve greater setbacks.*

Response ST-4.2: In response to this comment, the Second Draft EIS now includes a Modified Proposed Action Option which evaluates a wind project of up to 9 turbines (one less that the Draft EIS Proposed Action) with a larger per turbine generating capacity (up to 3.45 MW) for a total of 25 MW of generating capacity. These taller wind turbines, would provide a comparable level of energy generation with fewer turbines. If the largest turbine models being considered were selected, only 8 turbines would be needed to meet the total 25 MW generating capacity

Comment ST-4.3*: The Draft EIS addresses many of our comments made in a previous letter dated December 1, 2014 (Reference No., P-14590) in regards to the HRS § 205A-2, Coastal Zone Management Act objectives and policies and includes a detailed analysis of environmental consequences from stormwater impact in Section 4.4-Hydrology and Surface Water Resources, pages 4-19 to 4-30. Additionally, the Draft EIS contains an analysis on soil types and erosion hazard risks in Section 4.3, pages 4-11 to 4-19. Section 4.4.3.3, pages 4-25 and 4-26, lists the mitigation strategies that will be followed to control sediment and soil erosion on coastal waters. These include installing of permanent stormwater control structures, restoring the natural contours and drainage patters of the area, establishing retention basins near streams and flood prone areas to collect sediment, and the use of ditches and culverts to capture the energy of stormwater and control erosion.*

Response ST-4.3: Thank you for the confirmation that the Draft EIS addressed these earlier comments.

Comment ST-4.4*: Section 4.12.4.2 on page 4-126 discusses Effects of the HCP Conservation Measures. This section should elaborate on and summarize the apparently significant economic benefits of mitigation detailed in HCP Appendix, Table F-1 Estimate Mitigation Funding Matrix, which total approximately $4.3 million.*

Response ST-4.4: Additional discussion of the economic benefits of HCP mitigation have been added to the Second Draft EIS. The HCP funding matrix covers anticipated expenditures over the 21-year HCP permit term including post-construction mortality monitoring at the wind farm site and mitigation for incidental take of listed species. Thus, funding will be spent periodically over the course of the permit term.

Comment ST-4.5*: Section 4.16 on page 4-173 et seq. regarding Visual Resources presents the viewshed analysis conducted. Inasmuch as the community sensitivities to the wind farm are the visual impacts and proximity to residences, the visual analysis should present views from the nearest affected residences.*

Response ST-4.5: Visual simulations typically focus on public vantage points rather than individual residences because these locations are used by or provide views experienced by the community at large. They are publicly accessible and are expected to be of concern to local residents, businesses and visitors. They are also representative of views from other nearby locations and inform the larger visual impact assessment which evaluates the contrast of the Project in relation to the surrounding landscape. Although Na Pua Makani Power Partners, LLC understands the intent of your comment, visual simulations from the nearest residences have not been added to the Second Draft EIS as the selection of residences based on proximity alone does not guarantee that the Project would be visible or representative of visual impacts to the larger community. Nonetheless, Na Pua Makani Power Partners, LLC believes the visual simulations provides views that would be similar for the residences.

Comment ST-4.6*: The Draft EIS, Section 5.2.4, page 5-7, includes an analysis on the Hawaii State Plan's objectives and policies for HRS § 226-18 (Facility Systems – Energy). Because this project deals directly with renewable energy, the Second Draft Environmental Impact Statement (Second Draft EIS) would benefit from analysis on this projects compatibility with the principles on sustainability. HRS § 226-108(2) – the priority guideline on sustainability, encourages planning that respects and promotes living within the natural resources and limits of the State. The Hawaii State Plan analysis in Section 5.2.4 of the Draft EIS, should contain an examination on the proposed project's ability to meet the goals of sustainable development. The increase of renewable energy options for the residents of Oahu could meet these standards if this project is approved and becomes operational. Na Pua Makani Wind Partners and the approving agencies should consider the project's contribution to creating a high quality of life and mutually supporting balance among environmental, economic, and social equity concerns enumerated in HRS § 226-108. This new wind farm represents expanded capacity for renewable energy opportunities on Oahu, and enhances energy diversification and self-sufficiency for the State of Hawaii. Renewable wind-power/green energy is consistent with the principles on sustainability. The Second Draft EIS should include an analysis on this project's consistency with the priority guideline on sustainability. The examination on sustainability should be joined with the current discussion on the Hawaii State Plan found in Section 5.2.4, page 5-7.*

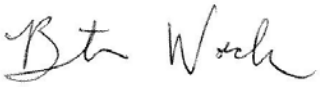
Response ST-4.6: A discussion of the Project's consistency with the priority guideline on sustainability for the State of Hawaii has been added to the Second Draft EIS as recommended.

Comment ST-4.7*: As stated in our earlier comment letter referenced above, the national Coastal Zone Management Act requires direct federal activities and development projects to be consistent with approved state coastal programs to the maximum extent practicable. If this project requires a U.S. Army Corps of Engineers Clean Water Act Section 401, 402, and 404 permit, then this wind farm project may need to be evaluated against Federal Consistency requirements. OP will be the lead State agency to conduct this evaluation.*

Response ST-4.7: Since the publication of the Draft EIS, a preliminary jurisdictional determination has been made for this Project (April 6, 2015). The Project design has also been refined to ensure that Keaaulu, Malaekahana, and Ohia streams can be avoided, and that there would be no placement of dredge or fill material, either temporarily or permanently, below the ordinary high water marks of these streams. Na Pua Makani Power Partners, LLC is currently coordinating with the U.S. Army Corp or Engineers on Section 404 compliance. Updated information on this consultation has been added to the Section 3.2 of the Second Draft EIS.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE
MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

ST-5

July 23, 2015

Pacific Island Fish and Wildlife Office
Attn: Kristi Young, Field Supervisor
U. S. Fish and Wildlife Service
300 Ala Moana Boulevard, Room 3-122
Honolulu, HI 96850

via email: NaPuaMakanihcp@fws.gov

Dear Ms. Young,

SUBJECT: Draft Environmental Impact Statement (DEIS) for the Proposed Na Pua Makani Wind Project and Draft Habitat Conservation Plan

Thank you for the opportunity to review and comment on the subject matter. The Department of Land and Natural Resources' (DLNR) Land Division distributed or made available a copy of your report pertaining to the subject matter to DLNR Divisions for their review and comments.

At this time, enclosed are comments from (1) Land Division – Oahu District; (2) Office of Conservation & Coastal Lands; (3) Division of Aquatic Resources; (4) Division of State Parks; and (5) Engineering Division. No other comments were received as of our suspense date. Should you have any questions, please feel free to call Supervising Land Agent Steve Molmen at 587-0439. Thank you.

Sincerely,

Russell Y. Tsuji
Land Administrator

Enclosure(s)

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

June 8, 2015

MEMORANDUM

TO: **DLNR Agencies:**
X Div. of Aquatic Resources
__Div. of Boating & Ocean Recreation
X Engineering Division
X Div. of Forestry & Wildlife
X Div. of State Parks
X Commission on Water Resource Management
X Office of Conservation & Coastal Lands
X Land Division – Oahu District ; Jaos ? Malama Minn.
X Historic Preservation

FROM: Russell Y. Tsuji, Land Administrator
SUBJECT: Draft Environmental Impact Statement (DEIS) for the Proposed Na Pua Makani Wind Project and Draft Habitat Conservation Plan
LOCATION: Kahuku, Koolauloa, Hawaii, TMKs (1) 5-6-005:018 (portion); (1) 5-6-006:018, 047, 051, 055; and (1) 5-6-008:006 (portion)
APPLICANT: Na Pua Makani Power Partners, LLC by its consultant Tetra Tech, Inc.

Transmitted for your review and comment on the above-referenced document. We would appreciate your comments on this document which can be found here:

1. Go to: https://sp01.ld.dlnr.hawaii.gov/LD
2. Login: Username: LD\Visitor Password: 0pa$$word0 (first and last characters are zeros)
3. Click on: Requests for Comments
4. Click on the subject file "Draft Environmental Impact Statement (DEIS) for the Proposed Na Pua Makani Wind Project and Draft Habitat Conservation Plan", then click on "Files" and "Download a copy". (Any issues accessing the document should be directed to Linda Kawakami at (808) 587-0371 or Linda.Kawakami@hawaii.gov)

Please submit any comments by July 21, 2015. If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact Supervising Land Agent Steve Molmen at (808) 587-0439. Thank you.

Attachments

( ) We have no objections.
( ) We have no comments.
(✓) Comments are attached.

Signed: Barry Cheung
Print Name: BARRY CHEUNG
Date: 6/25/15

1

We understand the applicant is in the process of obtaining a lease from the Land Board, which is contingent upon the outcome of ~~all due~~ the Ch. 343 compliance

DAVID Y. IGE
GOVERNOR OF HAWAII

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DEPT. OF LAND & NATURAL RESOURCES
STATE OF HAWAII

Conservation ?

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

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STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

June 8, 2015

MEMORANDUM

TO: **DLNR Agencies:**
X Div. of Aquatic Resources
__Div. of Boating & Ocean Recreation
X Engineering Division
X Div. of Forestry & Wildlife
X Div. of State Parks
X Commission on Water Resource Management
X Office of Conservation & Coastal Lands
X Land Division – Oahu District ; Jan ? Malama Moon.
X Historic Preservation

FROM: Russell Y. Tsuji, Land Administrator
SUBJECT: Draft Environmental Impact Statement (DEIS) for the Proposed Na Pua Makani Wind Project and Draft Habitat Conservation Plan
LOCATION: Kahuku, Koolauloa, Hawaii, TMKs (1) 5-6-005:018 (portion); (1) 5-6-006:018, 047, 051, 055; and (1) 5-6-008:006 (portion)
APPLICANT: Na Pua Makani Power Partners, LLC by its consultant Tetra Tech, Inc.

Transmitted for your review and comment on the above-referenced document. We would appreciate your comments on this document which can be found here:

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Please submit any comments by July 21, 2015. If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact Supervising Land Agent Steve Molmen at (808) 587-0439. Thank you.

Attachments

( ) We have no objections.
2 (✓) We have no comments. - not in Conservation District
( ) Comments are attached.

Signed: [signature]
Print Name: Lauren Yasaka
Date: 6/17/15

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

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DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

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HONOLULU, HAWAII 96809

June 8, 2015

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DEPT. OF LAND & NATURAL RESOURCES
STATE OF HAWAII

MEMORANDUM

TO: **DLNR Agencies:**
X Div. of Aquatic Resources
__Div. of Boating & Ocean Recreation
X Engineering Division
X Div. of Forestry & Wildlife
X Div. of State Parks
X Commission on Water Resource Management
X Office of Conservation & Coastal Lands
X Land Division – Oahu District ; Iaos ? Malama Mann.
X Historic Preservation

PM

FROM: Russell Y. Tsuji, Land Administrator
SUBJECT: Draft Environmental Impact Statement (DEIS) for the Proposed Na Pua Makani Wind Project and Draft Habitat Conservation Plan
LOCATION: Kahuku, Koolauloa, Hawaii, TMKs (1) 5-6-005:018 (portion); (1) 5-6-006:018, 047, 051, 055; and (1) 5-6-008:006 (portion)
APPLICANT: Na Pua Makani Power Partners, LLC by its consultant Tetra Tech, Inc.

Transmitted for your review and comment on the above-referenced document. We would appreciate your comments on this document which can be found here:

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Please submit any comments by July 21, 2015. If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact Supervising Land Agent Steve Molmen at (808) 587-0439. Thank you.

Attachments

( ) We have no objections.
3 (X) We have no comments. PM
( ) Comments are attached. BM

Signed: Alton Miyasaka
Print Name: Alton Miyasaka, Acting DAR Administrator
Date: 6-15-15

56634

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

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STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

DEPT OF LAND &
NATURAL RESOURCES

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

June 8, 2015

MEMORANDUM

TO: **DLNR Agencies:**
X Div. of Aquatic Resources
__Div. of Boating & Ocean Recreation
X Engineering Division
X Div. of Forestry & Wildlife
X Div. of State Parks
X Commission on Water Resource Management
X Office of Conservation & Coastal Lands
X Land Division – Oahu District ; Ian ? Malama Moon.
X Historic Preservation

RECEIVED
LAND DIVISION
2015 JUN 19 PM 3:00
DEPT. OF LAND & NATURAL RESOURCES
STATE OF HAWAII

FROM: Russell Y. Tsuji, Land Administrator
SUBJECT: Draft Environmental Impact Statement (DEIS) for the Proposed Na Pua Makani Wind Project and Draft Habitat Conservation Plan
LOCATION: Kahuku, Koolauloa, Hawaii, TMKs (1) 5-6-005:018 (portion); (1) 5-6-006:018, 047, 051, 055; and (1) 5-6-008:006 (portion)
APPLICANT: Na Pua Makani Power Partners, LLC by its consultant Tetra Tech, Inc.

Transmitted for your review and comment on the above-referenced document. We would appreciate your comments on this document which can be found here:

1. Go to: https://sp01.ld.dlnr.hawaii.gov/LD
2. Login: Username: LD\Visitor Password: 0pa$$word0 (first and last characters are zeros)
3. Click on: Requests for Comments
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Please submit any comments by July 21, 2015. If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact Supervising Land Agent Steve Molmen at (808) 587-0439. Thank you.

Attachments

( ) We have no objections.
4 (✓) We have no comments.
( ) Comments are attached.

Signed: [signature]
Print Name: Daniel S. Quinn
Date: 6/18/15

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

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STATE OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

June 8, 2015

MEMORANDUM

'15 JUN 9 AM 10:29 ENGINEERING

~~TO:~~ FR:

DLNR Agencies:
X Div. of Aquatic Resources
__ Div. of Boating & Ocean Recreation
X Engineering Division
X Div. of Forestry & Wildlife
X Div. of State Parks
X Commission on Water Resource Management
X Office of Conservation & Coastal Lands
X Land Division – Oahu District ; Iaos ? Malama Mann.
X Historic Preservation

TO:

FROM: Russell Y. Tsuji, Land Administrator
SUBJECT: Draft Environmental Impact Statement (DEIS) for the Proposed Na Pua Makani Wind Project and Draft Habitat Conservation Plan
LOCATION: Kahuku, Koolauloa, Hawaii, TMKs (1) 5-6-005:018 (portion); (1) 5-6-006:018, 047, 051, 055; and (1) 5-6-008:006 (portion)
APPLICANT: Na Pua Makani Power Partners, LLC by its consultant Tetra Tech, Inc.

Transmitted for your review and comment on the above-referenced document. We would appreciate your comments on this document which can be found here:

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Please submit any comments by July 21, 2015. If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact Supervising Land Agent Steve Molmen at (808) 587-0439. Thank you.

Attachments

5

( ) We have no objections.
(✓) We have no additional comments.
( ) Comments are attached.

Signed: [signature]
Print Name: Corty S. Chang, Chief Engineer
Date: 7/21/15

TETRA TECH

April 4, 2016

Russell Y. Tsuji, Land Administrator
State of Hawaii
Department of Land and Natural Resources, Land Division
PO Box 621
Honolulu HI 96809

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Tsuji:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter dated July 23, 2015 regarding the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Draft Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We appreciate your taking the time to gather feedback about the Project.

Your letter indicated that the Office of Conservation & Coastal Lands, Division of Aquatic Resources, Division of State Parks, and the Engineering Division all had no comments on the Draft EIS. The Land Division – Oahu District, noted that the Project is in the process of obtaining a lease from the Land Board, contingent upon the outcome of Chapter 343 compliance. We understand that the lease will go before the board concurrently with or immediately following the acceptance of Second Draft EIS.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

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U.S. FISH & WILDLIFE SVC
PACIFIC ISLANDS FWD
HONOLULU, HI 96850

KIRK CALDWELL, MAYOR

DUANE R. MIYASHIRO, Chair
ADAM C. WONG, Vice Chair
THERESIA C. McMURDO
DAVID C. HULIHEE
KAPUA SPROAT

ROSS S. SASAMURA, Ex-Officio
FORD N. FUCHIGAMI, Ex-Officio

ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

ELLEN E. KITAMURA, P.E.
Deputy Manager and Chief Engineer

ST-6

September 1, 2015

Ms. Kristi Young, Field Supervisor
Pacific Island and Wildlife Office
U.S. Fish and Wildlife Services
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawaii 96850

Dear Ms. Young:

Subject: The Letter Dated June 3, 2015 on the Draft Environmental Impact Statement for the Proposed Na Pua Makani Wind Farm Project and Draft Habitat Conservation Plan – Tax Map Key: 5-6-005: 018

1 The construction drawings should be submitted to the Board of Water Supply for review.

2 The on-site fire protection requirements should be coordinated with the Fire Prevention Bureau of the Honolulu Fire Department.

If you have any questions, please contact Robert Chun, Project Review Branch of our Water Resources Division at 748-5443.

Very truly yours,

ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

TETRA TECH

April 4, 2016

Ernest Y.W. Lau, P.E., Manager and Chief Engineer
City and County of Honolulu, Board of Water Supply
630 South Beretania Street
Honolulu HI 96843

Subject: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Lau:

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for your letter dated September 1, 2015, commenting on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Draft Environmental Impact Statement (EIS). Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment ST-6.1*: The construction drawings should be submitted to the Board of Water Supply for review.*

Response ST-6.1: Project construction drawings will be submitted to the Board of Water Supply for review, should water service from the Board of Water Supply be required.

Comment ST-6.2*: The on-site fire protection requirements should be coordinated with the Fire Prevention Bureau of the Honolulu Fire Department.*

Response ST-6.2: Na Pua Makani Power Partners, LLC, will coordinate all on-site fire protection requirements and procedures directly with the Fire Prevention Bureau of the Honolulu Fire Department prior to construction. The project is being designed to meet all Fire Department requirements.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

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Public Meeting Transcript and Responses to Speakers

STATE OF HAWAII

In re: NA PUA MAKANI WIND ENERGY PROJECT	))))))))

DRAFT EIS PUBLIC MEETING
ORAL STATEMENTS

Kahuku Community Center
56-576 Kamehameha Highway
Kahuku, O`ahu, Hawai`i 96731

Tuesday, June 23, 2015, 6:00 p.m.

Reported by Joy C. Tahara RPR, CSR 408

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ORAL STATEMENTS

TRANS-1

1. SANDY BUDLONG

(Address: 56-444 Pahelehale, Loop.)

1.1

I'm pretty concerned with the fact there's no benefit for the little people in Kahuku, that's the low income people, that we won't benefit anything by these windmills, maybe forever. It certainly is inconsistent to our Hawai`i atmosphere to see something like that.

1.2

The cul-de-sac there, where that one is all night long, you hear the *whoosh-whoosh*. So that's a new thing that people have to get used to is, besides the site, is that noise is constant as long as the windmills are turning. And they say, well, it's very low. Well, it is very low, but it's like having a train going behind your house. You hear it. You get used to it, period. It's definitely a disturbance in your well-being.

1.3

The sight of them, they're not unsightly, but that's not what you want to look at. You want to look at topography of the trees, the beauty of Hawai`i. If they put the windmills where they're out of sight, which can happen so easily in this particular hillside, I think very few people will complain.

1.4

The other thing is when we had the meltdown, the batteries melted down, they were melting down for weeks and went into months. That was cadmium. We were very concerned with the pollution that could have taken place. We have well water up there.

17:47:01 1 The people they had test for pollution were people who
1.5
17:47:06 2 worked for that battery company. That doesn't seem very bright.
17:47:14 3 It's just not the thing to do. You get unconcerned parties to
17:47:18 4 do that kind of testing.
17:47:22 5 All in all, I'm for alternative energy, but I don't
1.6
17:47:27 6 think it has to be pushed into just certain people's faces which
17:47:31 7 is what's happening here in Hawai`i. When they first put them
17:47:37 8 up there, oh, isn't that cute. It's like I keep thinking it was
17:47:42 9 shadows of my mind, but. And then they started planting them
17:47:48 10 and I realized this is not what Hawai`i supposed to look like.
17:47:53 11 I'm concerned also with the fact that it could have an
1.7
17:47:58 12 overall influence of the birds and any other animals as their
17:48:06 13 habitat. And I've read things about the cows and stuff
17:48:11 14 underneath electrical lines -- not here, but in the State of
17:48:15 15 Washington -- in places they have to go for energy, and they
17:48:21 16 have done that already.
17:48:22 17 I just think it's unsightly. I don't think it should
1.8
17:48:26 18 be part of our horizon and I don't think it should be part of
17:48:31 19 what we have to gaze out of.
17:48:33 20 When I sit on my porch, that's what I see and that's
1.9
17:48:39 21 what I hear, and I've only been here since '96, but I love
17:48:44 22 Hawai`i and I don't like the change that has taken place and it
17:48:50 23 doesn't seem that the people are having much of a voice.
17:48:53 24 I did read where they were gonna tuck them away in the
1.10
17:48:58 25 hillside. I thought, oh, that's good. I can live with that.

17:49:00 But from what I saw from the latest maps, that's been scuffled.
17:49:08 They're not gonna do that anymore. They're gonna put them right
17:49:11 all together in a bunch where everyone can see them.
17:49:14 The children are there, right there at the Kahuku
17:49:18 school, and it's just something we need to realize it's gonna
17:49:23 change everybody forever.
17:49:26 It's an unsightly thing and we're supposed to be in
1.11
17:49:33 paradise and they can't conserve paradise and still have the
17:49:33 windmills.
17:49:39 But be more considerate with the little people who
1.12
17:49:42 live all around there. And these are the little people. These
17:49:47 are people with low income. The whole housing community was
17:49:51 built for low income housing and I guess whoever these people
17:49:55 who are throwing those in there think we have no voice, and it's
17:50:00 true. We have no voice.

18:00:56 TRANS-2 2. BRYNN ALLEN

18:01:02 (P.O. Box 702, Kahuku, Hawai`i 96731)

2.1
18:01:15 I oppose the windmill. I believe there's better ways
18:01:25 of creating energy than windmills. They have a 20-year lifespan
2.2
18:01:33 and they just don't make economic sense. I'd like to know how
18:01:41 this is being funded. I'd like to know if my tax dollars are
18:01:46 funding this project through the federal government and, again,
2.3
18:01:53 I oppose the windmills.

18:16:17 TRANS-3 3. CHARLOTTE KAMAUOHA (Part 1)

18:16:30 I am actually a Kahuku resident. So it's 56-132 Huehu

18:16:41 1 Place.

3.1

18:16:41 2 I am absolutely against it and it's not because we
18:17:21 3 don't like the way it looks, although we have already done our
18:17:25 4 share of having these wind turbines.

3.2

18:17:30 5 But I'm also a parent of children with special needs
18:17:33 6 with sensory processing issues. So even though they may say
18:17:38 7 that it is safe -- I already have a family; they're moving
18:17:44 8 because their child is actually affected by it, you know, and
18:17:48 9 they don't get much sleep ever since the windmills have been
18:17:53 10 here. They've been one of the original Kahuku owners of the
18:17:57 11 homes here and they didn't have problems with their child
18:18:00 12 sleeping until the windmills came. So even more so for me, it
18:18:06 13 may not be evidence in whatever way they want to call evidence,
18:18:10 14 but I believe them.
18:18:14 15 My own youngest kid is affected by something there too
18:18:18 16 so I am absolutely against it.

3.3

18:18:22 17 I know that the community associations have been
18:18:28 18 against it and they have written their own statements against
18:18:32 19 it. But Na Pua Makani seems to think that most of the majority
18:18:37 20 of the community is for it. I don't know very many Kahuku
18:18:42 21 residents who are for it except for one or two. That's it. So
18:18:46 22 I don't know they say majority of the people are for it, if
18:18:49 23 they're just looking island-wide.

3.4

18:18:51 24 But it's not that we're against clean energy. I just
18:18:59 25 don't think this is clean. Like if it can hurt people and if it

18:19:00 1 can hurt animals, how clean is it? For me, it's not clean.

18:19:06 2 So like solar, we haven't heard any problems with

3.5

18:19:09 3 solar or kids reacting to that or people getting sick by that or

18:19:12 4 those who are medically fragile, you know, being affected by it.

18:19:18 5 But I'm really appalled at how some companies have

3.6

18:19:23 6 moved forward even if there is obvious objection by the

18:19:27 7 community. And it is for their gain. Because if they were

18:19:32 8 really looking at it, there is more safer technologies that are

18:19:35 9 coming out, safer renewable energy sources, and they're just

18:19:45 10 wanting to move forward with it and I think it's just their

18:19:47 11 financial motivation. It has nothing to do with being

18:19:51 12 responsible or responsive to the community.

18:19:55 13 We've also asked Na Pua Makani -- me and another

3.7

18:19:59 14 person who's against it -- 'cause I have even asked Mike

18:20:05 15 Cutbirth, the person for Champlin, I said how are you moving

18:20:10 16 forward when the community is opposed to it? And he told me

18:20:14 17 that he was told that the community, the majority of the people

18:20:18 18 here, are for it.

18:20:20 19 And so we asked him for signatures of these people and

18:20:23 20 I want the addresses to make sure they're people from Kahuku.

18:20:27 21 We haven't seen anything. It shouldn't be hard if the majority

18:20:31 22 is for it.

18:20:32 23 But at every meeting that we've been that's discussed

18:20:36 24 Na Pua Makani and additional turbines, people who have stood up

18:20:41 25 and talked about it have been against it. So I'm not sure where

18:20:44 he's getting his information from, but it sounds really wrong.

18:20:49 And if people are really for it and it's the majority,

18:20:53 it's a very silent majority if we're not hearing about it. So,

18:20:56 like, we want to know who they are. You know?

18:21:00 And if there is most people in Kahuku that are for it,

3.8

18:21:04 maybe I won't be much against it. I'll still be against it for

18:21:08 health reasons.

18:21:09 But I'm not convinced that there is a majority when

3.9

18:21:12 all I see and hear are people who are against it. So I think Na

18:21:20 Pua Makani, for all what they're saying and trying to be

18:21:22 community and getting people from Koolauloa to be their PR, you

18:21:27 know, I mean, yeah, that's a good ploy. But these people don't

18:21:32 live in Kahuku. We do.

18:21:38 And it's not just that. It's not just the Kahuku

3.10

18:21:41 residents, although we are affected by it every day. We have

18:21:45 kids going to school. If they don't have it far enough away,

18:21:49 we've got kids who are medically fragile who can be affected by

18:21:53 it when they are in school. This is the one feeder school for

18:21:57 five elementaries. So it's not just Kahuku that's going to be

18:22:01 affected.

18:22:03 So yes, I am very, very against it and I don't like

3.11

18:22:07 the low-ball dirty tactics that Na Pua Makani has been using.

18:22:14 So that's even more a reason why we won't want them anyway.

18:22:23 That's all I can think of right now, I mean.

18:22:25 Oh, yeah, and another thing too. With the birds.

3.12

18:22:29 Like if they want to do the environmental on that part with
18:22:32 birds, you know, it's like they don't put much value to the
18:22:38 cultural aspect of it. Because, like, for some of us, we have
18:22:42 `aumakua, owls who are our `aumakua. So it's not just about a
18:22:46 bird. There's connection to that. It's a spiritual. It's a
18:22:50 deeper connection. And even if I may not practice that Hawaiian
18:22:55 religious beliefs, it's always been a connection to my own
18:23:01 family `aumakua. So for other people with that same thing.

3.13

18:23:07 These aren't just birds and bats and owls that are
18:23:10 just be killed. It means more. And if that can mean more to
18:23:16 me, then you can imagine how children's health means more to me
18:23:21 and I just think it's irresponsible of Na Pua Makani to just
18:23:27 move forward when there is obvious objection.

3.14

18:23:30 And then I was told too that the person who first kind
18:23:35 of made way for Na Pua Makani or whoever it was -- the agent --
18:23:39 had said if the community objects, they wouldn't do it. Well,
18:23:43 the community has objected. They have even written objected
18:23:47 through the community association. The Koolauloa board has
18:23:51 objected, but they're still going through. So somebody dirty
18:23:55 lied. Some cheat lied to just to get some money and they're
18:24:00 pulling forward so they're just like financially motivated.
18:24:04 That's just wrong.

TRANS-4

18:24:04 4. ART

18:24:04 (Declined to provide last name and address.)

4.1

18:24:37 My name is Art. I live in Kahuku. My wife gave birth

18:24:59 1 to our children in Kahuku Hospital and my children have gone to
18:25:02 2 Kahuku High School. I do business in Kahuku. I run a church in
18:25:04 3 Kahuku.
18:25:05 4 My thing is this. As a member of this community, this
4.2
18:25:08 5 is what we're fighting regarding the windmills. It's not about
18:25:12 6 the benefit. It's not about the value. It's not about the
18:25:14 7 safety. It's not about the health. It's not about any of that,
18:25:18 8 although those areas are of tremendous concern.
18:25:20 9 It's about placement. Why have they placed them in
18:25:26 10 eye view of the people here in the community which takes away
18:25:28 11 from the beauty of this God-given land? Why are they doing it?
18:25:33 12 I am so disturbed that this company has come in and
4.3
18:25:35 13 they're putting them, for example, in Waimea Valley, which takes
18:25:40 14 away the beauty of our land. And not only that, if you're a
18:25:43 15 homeowner, you're going to sell your home in Kahuku, it lessens
4.4
18:25:47 16 the value of your home.
18:25:50 17 And it seems to me that this company and others
4.5
18:25:54 18 involved, they really don't care about the people in this
18:25:57 19 community because: They don't live here. They don't work in
18:26:01 20 this community. They don't do to church in this community.
18:26:02 21 They don't raise their children in this community.
18:26:05 22 These are outside people coming into this community
18:26:08 23 and telling us this is what's going to happen.
18:26:09 24 I just talked with a man from La`ie who's for the
18:26:12 25 windmills in Kahuku. And said to him, "Who are you to come from

18:26:17 La`ie, to come into Kahuku to tell us that this is okay?"

18:26:25 And this company has hired people like Keoki -- I
4.6
18:26:28 forget his last name -- Scott Brawshaw, people from outside the
18:26:31 community of Kahuku, people who have nothing to do with Kahuku.
18:26:36 Yet they speak as though they represent us. They don't live
18:26:40 here, but we have to wake up every single morning and go to bed
18:26:44 every night with those windmills, and to me, that is wrong.

18:26:48 That's inconsiderate of the people that live here. As
18:26:53 far as I'm concerned, they can take those windmills and go put
4.7
18:26:57 them someplace over that mountain, some other place. But I know
18:27:05 they won't do that because it cost too much money to provide the
18:27:10 needed support for those windmills. So for less cost for them,
18:27:16 it's easier to do because the infrastructure and the roads are
18:27:19 close by, right?

18:27:21 If you go to Maui and you fly over Maui, those
4.8
18:27:25 windmills are on the other side of the mountains, and I don't
18:27:30 know why we can't do that here.

18:27:31 And I know why they're doing it like that. I feel and
4.9
18:27:34 many other people because this is a community of Filipinos and
18:27:39 Polynesians and there's a lot of aloha spirit and we allow these
18:27:42 kind of things, to just allow them to happen and without saying
18:27:47 or doing anything about it. We just allow it to happen.

18:27:51 Well, not so anymore. We don't mind them. We're not
18:27:57 talking about the value and the benefit again. It's about
4.10
18:27:59 placement. We don't want to see them. We want to see the palm

18:28:03 trees, the coconut trees, and not these windmills. That's very
18:28:08 inconsiderate of that company or anyone else that would suggest
18:28:11 that the best place for those windmills is in our community
18:28:15 among the living, and that is wrong.

18:29:46 TRANS-5 5. LEILANI AUNA

18:30:02 (54-232 Kaipapau, Loop, Hauula, Hawai`i.)

5.1
18:30:02 I'm from the Koolauloa area.

18:30:16 The concern that I have is it looks wonderful, you
5.2
18:30:27 know. But I feel like Kahuku or the Koolauloa area is not
18:30:31 getting, I mean, the benefits. I haven't seen anything on my
18:30:35 bill go down, to tell you the truth.

18:30:38 They say that, oh, it's going to help a lot of people.
18:30:39 I don't see that. I want to know what's the direct benefits. I
18:30:42 hear that they're going to give so much money, but I think the
18:30:47 Koolauloa area should have more than the whole State of Hawai`i
18:30:51 because it's our backyard.

18:30:53 It's kinda like if we were to put this in Waikiki or
5.3
18:31:00 by Hawai`i Kai area, I don't think they will like that. I mean,
18:31:05 don't you think? I mean, if we did that, would you like that in
18:31:07 yours, no. If you're not a direct benefit over here, I mean,
18:31:12 it's not in your backyard, you don't care.

18:31:14 Don't get me wrong. I like the alternative energy.
5.4
18:31:18 But I wish they would compensate somehow the Koolauloa area,
18:31:22 like give something to the Kahuku High School or Kahuku
18:31:28 Hospital, or you know what I mean? Because we're, like, hurting

18:31:31 out here, and then they're going to put that in our backyard? I
18:31:36 mean, looks kind of nasty. I guess if it's way in the back,
18:31:39 it's fine.

18:31:40 The other concern I have is for the birds. It's a lot
5.5
18:31:46 of those big things out there. I can just see as all of them
18:31:51 turn, the birds, they're flying, they're going get hit.

18:31:56 Yeah, so that's just my concern. I would like to know
5.6
18:31:59 if they could give more moneys to the Koolauloa area, especially
18:32:04 Kahuku High School or Kahuku High School area.

18:32:10 Like I said, I'm not against it. I just want to know
18:32:14 where the money is going.

18:37:55 TRANS-6 6. PATRICIA BEEKMAN

18:38:01 (Declined to provide address.)

18:38:01 I live in Aiea, but I'm very concerned about what's
6.1
18:38:10 happening here. That's really disturbing to see what's
18:38:13 happening to the scenery.

18:38:16 I believe that we do have an environmental and energy
6.2
18:38:20 issue and I do believe that technical matters such as the wind
18:38:28 turbines should be solved using real science. I think most
18:38:34 people would agree that using real science makes sense, but some
18:38:38 people might say, well, what is real science?

18:38:42 Science is a process. The core process is the
18:38:47 scientific method. The scientific method consists of a
18:38:51 hypothesis, in other words, that wind energy is equivalent to
18:38:55 our conventional power sources being subjected to four things:

18:39:01 1 1) comprehensive; 2) independent or objective; 3) transparent;
18:39:07 2 and 4) empirical based on assessment or empirical based
18:39:12 3 assessment. The fact is that this has not been done for wind
18:39:16 4 energy.
18:39:21 5 Let's look at an example that puts this situation into
18:39:25 6 perspective. Let's say the some entrepreneur stepped forward
18:39:28 7 and present us with a big box that they claim holds part of the
18:39:32 8 solution to these energy and environmental issues. Would we
18:39:36 9 just say great? Who do we make out the billion-dollar check to?
18:39:41 10 I don't think so. I think most people or thoughtful
18:39:45 11 people would say something like: Thanks for coming forward.
18:39:49 12 What you say about your product sounds good. However, before we
18:39:52 13 have taxpayers and ratepayers pay for this, we need to see
18:39:56 14 scientific proof that your product will be a net societal
18:40:01 15 benefit.
18:40:02 16 Due to aggressive lobbyists pushing for their
6.3
18:40:06 17 multinational conglomerate clients, none of this has been done
18:40:08 18 for industrial wind energy. Are we being unreasonable to ask
18:40:13 19 for real scientific proof that this is a net benefit?
18:40:24 20 People may ask if we are going to do a scientific
18:40:27 21 assessment of wind energy, exactly what is the comprehensive
18:40:32 22 part? It's fairly simple. Any new alternative source of energy
18:40:36 23 needs to have a thorough technical, economic, and environmental
18:40:40 24 assessment provided by the proponents. This way we can
18:40:45 25 objectively know whether this new source is at least equal to

18:40:48 1 our current electricity sources. If it is not, then we should
18:40:53 2 not be wasting citizens' resources on it.
18:40:56 3 To find out more about this process, go to
18:40:59 4 energypresentation.info where an independent scientist explains
18:41:03 5 it all.
18:41:08 6 TRANS-7 7. JEFFREY PETERSON
18:41:08 7 (Declined to provide address.)
18:41:34 8 I live in Hauula, Hawai`i. I'm a business owner in
7.1
18:41:38 9 that community.
18:41:39 10 I am against the wind project as it appears to be just
7.2
18:41:46 11 another business opportunity and not benefitting the people in
18:41:51 12 the community.
18:41:53 13 Wind projects have come and gone in Hawai`i and many
7.3
18:41:58 14 have proved to be unsustainable, especially due to their
18:42:03 15 connection to a business model instead of sustaining a
18:42:08 16 community.
18:42:09 17 Traditionally, windmills have been built adjacent to
7.4
18:42:13 18 communities that didn't have power or resources to other power
18:42:17 19 sources and they powered that community. Hawai`i is in that
18:42:21 20 situation due to dependency on fossil fuels and I would like to
18:42:28 21 just express my concerns about a business model-type wind energy
18:42:37 22 in the community.
18:42:40 23 The visual blight is also a bit of a concern. There
7.5
18:42:43 24 are other areas to hide these things.
18:42:47 25 The effects on health are not widely conclusive. Many
7.6

18:42:53 1 studies are inconclusive of what the health effects are and it's
18:43:00 2 not a good thing to just be putting them up willy-nilly without
18:43:05 3 really knowing what's going on.
18:43:06 4 In closing, aloha, and we'd appreciate it if you
7.7
18:43:11 5 considered not putting these up.
18:43:52 6 TRANS-8 8. JOHN KELIILIKI
18:43:58 7 (La`ie; declined to provide address.)
8.1
18:43:58 8 I'm for clean energy and I'm seeing what this is all
18:44:19 9 about. By being here, I see a lot of questions are being
18:44:23 10 answered concerning noise, concerning community.
18:44:30 11 But I hear some of the people, one of the big thing is
8.2
18:44:35 12 the location of this windmill, and I say I think they did their
18:44:40 13 research and that's probably what they have available to them.
18:44:44 14 So I guess you're got going to get 100 percent
18:44:50 15 satisfaction. But I assume that they did the research and what
18:44:58 16 they got, maybe they're lucky they got what they got. And I
18:45:04 17 understand if they go further -- some people say, well, put them
18:45:08 18 behind the mountains, but then who owns the mountains behind
18:45:13 19 there? I don't know. Maybe it's the military or others.
18:45:17 20 But I'm for renewable energy, clean energy. And I'm
8.3
18:45:23 21 sure if it cut the cost, that's good for people. It's a good
18:45:29 22 benefit. That's all.
18:45:29 23 TRANS-9 9. MELISSA PRIMACIO
18:51:02 24 My name is Melissa Primacio. I live in the plantation
18:51:21 25 area, so 102 Main Camp, Kahuku, Hawai`i 96731, so I am a

9.1
18:51:30 1 longtime resident of Kahuku.

18:51:35 2 I am in support of the windmills. I am in support of
9.2
18:51:38 3 renewable energy and I feel that I am grateful that our
18:51:45 4 community can help achieve the goal that our state has addressed
18:51:52 5 with our energy being renewable, 100 percent by 2000 -- what is
18:52:00 6 it? '50, '40, '45?

18:52:04 7 Well, I'm just glad that we're able to help meet the
9.3
18:52:08 8 state's requirement because electric is very expensive. So
18:52:14 9 without using so much oil, hopefully our electric bills can
18:52:19 10 start to simmer down with renewable energy. And that's it.

18:52:19 11 TRANS-10 10. VASALOLOA TAUALII

19:01:11 12 (P.O. Box 306, Kahuku)

19:01:16 13 I've got it down here already and under cultural,
10.1
19:01:22 14 archeological, and historic resources, I just put wind turbines
19:01:27 15 do not support Hawai`i culture or history. It devalues it by
19:01:35 16 the sight and the sound.

19:01:41 17 The hazardous and regulated materials and waste. What
10.2
19:01:45 18 are the plans to dispose of toxic materials and debris from the
19:01:50 19 project?

19:01:51 20 Under noise, wind turbines have negative health impact
10.3
19:01:58 21 physically and emotionally on those living in close proximity to
19:02:04 22 the wind turbines, especially for children in their hearing. It
19:02:09 23 affects their hearing.

19:02:11 24 People come to Hawai`i for beauty. The windmill
10.4
19:02:16 25 detracts and takes away from this beauty.

19:02:20 1 Under other, what are the hard actual costs of each
10.5
19:02:27 2 turbine? The impact on reducing the current utility cost. When
19:02:33 3 and how much reduction do consumers actually receive? How does
19:02:40 4 the windmill company deal with damage to our Hawaii's birds and
10.6
19:02:45 5 other environmental surroundings in installing the wind turbines
10.7
19:02:52 6 and maintaining them? There's a certain amount of construction
19:03:02 7 and change in the environment in order to accommodate the
19:03:08 8 windmill installation.
19:03:10 9 And my last is when and how do consumers benefit in
10.8
19:03:20 10 the long run when the initial and continuing costs are more than
19:03:24 11 the current rates?
19:03:26 12 And the other thing is that who benefits? In my
10.9
19:03:32 13 opinion, the manufacturers. The production that's made with the
19:03:37 14 fuel that they use is not energy-energy.
10.10
19:03:43 15 The contractors. They also benefit, but they all get
10.11
19:03:49 16 their money up-front. The government subsidizes them. They all
19:03:53 17 get their money up-front. So when do the consumers get this
19:03:59 18 reduction and how is that possible when the cost of the overall
19:04:04 19 cost of the windmill is more than the current cost? How is that
19:04:09 20 going to reduce our current electricity bill?
19:09:46 21 TRANS-11 11. LOKONA LOGAN
19:09:46 22 (Declined to provide address)
19:09:59 23 I'm here for the Hawaiian culture to see if they build
11.1
19:10:05 24 this, do we still can go gather for the la`au lapa`au, the
19:10:08 25 medicine, for gathering rights?

19:10:20 As for the project and everything, I'm just here so
19:10:21 that way I can just go gather what la`au lapa`au plants and
19:10:26 everything that I need. That's all, to get access without any
19:10:30 confrontation or questioning from them what I'm over here.
19:10:36 That's all I want to say. You know what I mean. Just
19:10:41 for my gathering rights 'cause I'm Hawaiian, 'cause I'm kanaka
19:10:44 maoli. That's all.

19:18:08 TRANS-12 11. MITCH DMOHOWSKI

19:18:21 I live in Kaka`ako. 1288 Ala Moana Boulevard, Unit
12.1
19:18:33 15G, Honolulu, Hawai`i 96814.

19:18:40 I'm in support of the project. The wind turbines are
12.2
19:18:46 a clean proven form of technology for generating electricity and
19:18:52 safe and this project, it's at a lower price than oil so it
19:19:01 actually benefits the community as well.

12.3
19:19:04 And wind farms are good neighbors, in my opinion. If
12.4
19:19:12 it was a coal plant, I would be against it, or, like, an oil
19:19:20 plant. But this is clean energy and it's using the natural
19:19:26 resource here.

12.5
19:19:29 And personally, I think they're beautiful. That's it.

18:16:17 TRANS-3 12. CHARLOTTE KAMAUOHA (Part 2)

19:29:41 So now that I've seen what they have, I am even more
3.15
19:29:43 appalled. For one, they have the health. They're saying how
19:29:50 everything is safe and the studies do not link the wind turbines
19:29:55 to certain health conditions, but their studies sound skewed.
19:30:00 They have no answers as to the control group that was

19:30:05 1 used and the group that was actually tested or experimented on.
19:30:08 2 And, of course, it would be unethical to use the very population
19:30:13 3 that it affects the most and that would be people with medically
19:30:17 4 fragile sensory processing issues, children, those kinds of
19:30:21 5 things. So I don't know what their evidence or data is based on
19:30:27 6 that, and I think their studies are skewed anyway. Just for
19:30:31 7 those very same reasons, the very same people that are going to
19:30:35 8 be affected the most are probably not included in the studies.
19:30:39 9 So their comments are pretty misleading anyway, and it
19:30:45 10 doesn't take place of the actual life experience. Because we
19:30:52 11 are two families who are leaving; not just the one that I had
19:30:54 12 said, but there's two now, I found out, that are leaving because
19:30:57 13 it's affecting their child. And, of course, that's not going to
19:31:05 14 make those studies. That's just a very small teeny, teeny part
19:31:08 15 of the population. That, of course, is not going to exposed to
19:31:12 16 that type of testing anyway.
19:31:14 17 And then I saw the thing about the $25,000 to the
3.16
19:31:20 18 endangered species fund for pueo. And for me, that's not
19:31:26 19 enough. They said their take is four, four pueo for $25,000,
19:31:31 20 when that's like a family `aumakua. That's not enough. That's
19:31:36 21 insulting. You know. I don't think you can put a value on
19:31:41 22 that. I mean, you can't put a value on your cultural beliefs
19:31:46 23 and values, and you can't put a money value on the health of
19:31:51 24 people either. And certainly I would like to see them try.
19:32:02 25 Also where they going to put the proposed placements
3.17

19:32:05 1 of even just behind the school areas? They really are not
19:32:11 2 listening to the community because that has been a main point of
19:32:13 3 contention.
19:32:14 4 It's just no to them even more. It's wrong. It's not
3.18
19:32:22 5 pono. They're a disgusting company. You can put that down and
19:32:30 6 definitely I will keep saying that. What they're doing is
19:32:35 7 wrong.
8 (The oral statements concluded at 7:32 p.m.)
9
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25

C E R T I F I C A T E

STATE OF HAWAI`I)
) ss.
CITY AND COUNTY OF HONOLULU)

I, JOY C. TAHARA, RPR, CSR 408, State of Hawai`i, hereby certify:

That I am neither counsel for any of the parties herein nor interested in any way in the outcome of this action;

That the oral statements, pages 3 through 21, herein was by me taken down in machine shorthand and thereafter reduced to print via computer-aided transcription; that the foregoing represents, to the best of my ability, a complete and accurate transcript of said oral statements to the Na Pua Makani Wind Energy Project: Draft EIS Public Meeting.

DATED: Honolulu, Hawai`i July 13, 2015.

JOY C. TAHARA, RPR, CSR
State of Hawai`i

April 4, 2016

Sandy Budlong
56-44 Pahelehale Loop

RE: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Sandy Budlong,

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for providing comments on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS) during the public the public meeting at Kahuku Community Center on June 23, 2015. Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment TRANS-1.1: *I'm pretty concerned with the fact there's no benefit for the little people in Kahuku, that's the low income people, that we won't benefit anything by these windmills, maybe forever. It certainly is inconsistent to our Hawai`i atmosphere to see something like that.*

Response TRANS-1.1: Na Pua Makani Power Partners, LLC, (NPMPP) has committed to establishing a Community Benefit fund and is in discussion with Kahuku community members regarding the details of its administration. It is anticipated that a 501 C3 Non-profit corporation will be formed and that Project funds ($10,000 per wind turbine per year) would go to the Non-profit. It is anticipated that the Non-profit would be governed and administered by a board of local community members who would make decisions as to the use of the proceeds and which activities, programs, groups, and events would be sponsored. To date, NPMPP has provided support to a number of local groups including Kahuku.org School to Work program, Kahuku High School Project Grad, Kahuku Elementary School May Day, Kahuku High School rugby, basketball, volleyball, and soccer teams, as well as providing food for families in need.

Comment TRANS-1.2: *The cul-de-sac there, where that one is all night long, you hear the whoosh-whoosh. So that's a new thing that people have to get used to is, besides the site, is that noise is constant as long as the windmills are turning. And they say, well, it's very low. Well, it is very low, but it's like having a train going behind your house. You hear it. You get used to it, period. It's definitely a disturbance in your well-being.*

Response TRANS-1.2: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your comment about the existing Kahuku Wind Farm.

Comment TRANS-1.3: *The sight of them, they're not unsightly, but that's not what you want to look at. You want to look at topography of the trees, the beauty of Hawai`i. If they put the windmills where they're out of sight, which can happen so easily in this particular hillside, I think very few people will complain.*

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Response TRANS-1.3: A number of screening criteria were considered during the selection of the proposed Project location, described in Section 2.1 of the EIS. They include but are not limited to the availability of a sufficient wind resource, access to adequate and available transmission capacity, availability of contiguous land that is designated to allow wind energy development, and site-specific conditions such as topography which influence construction feasibility and compliance with setback requirements. Alternatives that were considered but eliminated from detailed study, including greater setback distances and alternative project locations on Oahu, are described in Section 2.3 of the EIS. Alternative locations did not meet these criteria.

Visual simulations of the proposed Project are included in Section 4.16 – Visual Resources. The Project would be most visible at viewpoints close to the wind farm site (within about 1 mile). Individuals most likely to experience visual impacts include recreation users, residents, and travelers on the highway. Although the visibility of the proposed Project is unavoidable, it would be compatible with nearby existing residential, commercial, public, and agricultural land uses. Additionally, the Project would co-exist on the landscape with existing commercial and residential developments and would not visually dominate the landscape character because there is already a substantial degree of landscape modification in most views, including the existing Kahuku Wind Farm that is directly adjacent to the proposed Project which has been in operation since 2011. Although the proposed Project is expected to have a visual impact, alternative energy sources such as wind are an integral part of meeting the State's and City and County of Honolulu's renewable energy g.

Comment TRANS-1.4: *The other thing is when we had the meltdown, the batteries melted down, they were melting down for weeks and went into months. That was cadmium. We were very concerned with the pollution that could have taken place. We have well water up there.*

Response TRANS-1.4: The proposed Project does not include a battery component.

Comment TRANS-1.5: *The people they had test for pollution were people who worked for that battery company. That doesn't seem very bright. It's just not the thing to do. You get unconcerned parties to do that kind of testing.*

Response TRANS-1.5: See the response to comment TRANS-1.4.

Comment TRANS-1.6: *All in all, I'm for alternative energy, but I don't think it has to be pushed into just certain people's faces which is what's happening here in Hawai`i. When they first put them up there, oh, isn't that cute. It's like I keep thinking it was shadows of my mind, but. And then they started planting them and I realized this is not what Hawai`i supposed to look like.*

Response TRANS-1.6: See the response to comment TRANS-1.3.

Comment TRANS-1.7: *I'm concerned also with the fact that it could have an overall influence of the birds and any other animals as their habitat. And I've read things about the cows and stuff underneath electrical lines -- not here, but in the State of Washington -- in places they have to go for energy, and they have done that already.*

Response TRANS-1.7: When electrical systems are grounded some current flows through the earth and a small voltage develops at each point where the system is grounded. Stray voltage can occur if unbalanced neutral currents flow in the earth through ground rods, pipes, or other conducting objects in a facility (AWEA 2008). Stray voltage may come from damaged or poorly connected wiring systems, corrosion on either end of the wires, or weak or damaged insulation materials on the "hot" wire. Construction of the above ground portions of the transmission line would follow standard industry procedures including structure assembly and erection, ground wire, and conductor stringing. Operation activities would include routine monitoring, inspection, and maintenance

by qualified personnel. This would minimize any chance of wildlife coming in contact with “hot” wires. The electrical collection system that would run between the turbines would be buried and therefore would not pose this risk. To minimize the risk of birds colliding with the above ground transition line, line marking devices would be installed along the line to improve its visibility.

Comment TRANS-1.8: *I just think it's unsightly. I don't think it should be part of our horizon and I don't think it should be part of what we have to gaze out of.*

Response TRANS-1.8: See response to TRANS-1.3.

Comment TRANS-1.9: *When I sit on my porch, that's what I see and that's what I hear, and I've only been here since '96, but I love Hawai`i and I don't like the change that has taken place and it doesn't seem that the people are having much of a voice.*

Response TRANS-1.9: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your comment about the existing Kahuku Wind Farm.

Comment TRANS-1.10: *I did read where they were gonna tuck them away in the hillside. I thought, oh, that's good. I can live with that. But from what I saw from the latest maps, that's been scuffled. They're not gonna do that anymore. They're gonna put them right all together in a bunch where everyone can see them. The children are there, right there at the Kahuku school, and it's just something we need to realize it's gonna change everybody forever.*

Response TRANS-1.10: See response to TRANS-1.3.

The proposed Project as designed is compliant with City and County of Honolulu setback requirements which are a distance equal to one foot for every foot of height of the wind turbine from the property line. The nearest proposed wind turbine location is 1,611 feet from the nearest zoned residential parcel, and is 1,654 feet from Kahuku elementary school and 1,737 feet from Kahuku high school (distance to the tax map key parcel boundary of the schools), which is approximately 2.5 times the required setback distance. Additionally, please note that the prevailing wind generally comes from the easterly direction and the proposed Project is downwind from the community and the Kahuku schools.

Comment TRANS-1.11: *It's an unsightly thing and we're supposed to be in paradise and they can't conserve paradise and still have the windmills.*

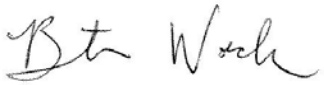
Response TRANS-1.11: See response to TRANS-1.3.

Comment TRANS-1.12: *But be more considerate with the little people who live all around there. And these are the little people. These are people with low income. The whole housing community was built for low income housing and I guess whoever these people who are throwing those in there think we have no voice, and it's true. We have no voice.*

Response TRANS-1.12: See response to TRANS-1.9.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

April 4, 2016

Brynn Allen
P.O. Box 702
Kahuku, Hawaii 96731

RE: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Allen,

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for providing comments on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS) during the public the public meeting at Kahuku Community Center on June 23, 2015. Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment TRANS-2.1: *I oppose the windmill.*

Response TRANS-2.1: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the proposed Project.

Comment TRANS-2.2: *I believe there's better ways of creating energy than windmills. They have a 20-year lifespan and they just don't make economic sense. I'd like to know how this is being funded. I'd like to know if my tax dollars are funding this project through the federal government.*

Response TRANS-2.2: There are a number of other renewable energy sources that would produce power such as geothermal (on islands other than Oahu), biofuels, or solar which are all complementary to wind energy, and the proposed Project would not preclude other renewable energy projects from being developed. In order for the State of Hawaii to meet its Renewable Portfolio Standards goal of 100 percent renewable energy generation for the electric grid, all types of renewable energy technologies will need to be pursued including rooftop PV systems. The proposed Project is not funded by taxpayers.

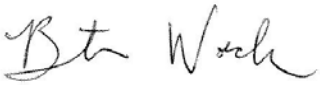
Comment TRANS-2.3: *I oppose the windmills.*

Response TRANS-2.3: See response to TRANS-2.1.

Tetra Tech, Inc.
1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

April 4, 2016

Charlotte Kamauoha
[No Address given]

RE: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Charlotte Kamauoha,

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for providing comments on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS) during the public the public meeting at Kahuku Community Center on June 23, 2015. Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment TRANS-3.1: *I am absolutely against it and it's not because we don't like the way it looks, although we have already done our share of having these wind turbines.*

Response TRANS-3.1: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the proposed Project.

A number of screening criteria were considered during the selection of the proposed Project location, described in Section 2.1 of the EIS. They include but are not limited to the availability of a sufficient wind resource, access to adequate and available transmission capacity, availability of contiguous land that is designated to allow wind energy development, and site-specific conditions such as topography which influence construction feasibility and compliance with setback requirements. Alternatives that were considered but eliminated from detailed study, including greater setback distances and alternative project locations on Oahu, are described in Section 2.3 of the EIS. Alternative locations did not meet these criteria.

The proposed Project as designed is compliant with City and County of Honolulu setback requirements which are a distance equal to one foot for every foot of height of the wind turbine from the property line. The nearest proposed wind turbine location is 1,611 feet from the nearest zoned residential parcel, and is 1,654 feet from Kahuku elementary school and 1,737 feet from Kahuku high school (distance to the tax map key parcel boundary of the schools), which is approximately 2.5 times the required setback distance.

Comment TRANS-3.2: *But I'm also a parent of children with special needs with sensory processing issues. So even though they may say that it is safe -- I already have a family; they're moving because their child is actually affected by it, you know, and they don't get much sleep ever since the windmills have been here. They've been one of the original Kahuku owners of the homes here and they didn't have problems with their child sleeping until the*

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windmills came. So even more so for me, it may not be evidence in whatever way they want to call evidence, but I believe them. My own youngest kid is affected by something there too so I am absolutely against it.

Response TRANS-3.2: With regard to effects to people who have sensory integration issues, hypersensitivity to sound is frequently reported in many autistic patients (Kellerman et al. 2005); however, there is a lack of research into health effects on different population groups, including those with autism, living near sources of noise from power facilities such as wind turbines (Howell et al. 2015). Despite this lack of research, the Project is not expected to have disproportionate effects to people with autism or others with noise sensitivity because the predicted increase in audible noise associated with Project operation would be very minor, and in most cases imperceptible. This information has been added to the Second Draft EIS in Section 4.18 – Public Health and Safety.

Comment TRANS-3.3: *I know that the community associations have been against it and they have written their own statements against it. But Na Pua Makani seems to think that most of the majority of the community is for it. I don't know very many Kahuku residents who are for it except for one or two. That's it. So I don't know they say majority of the people are for it, if they're just looking island-wide.*

Response TRANS-3.3: The Second Draft EIS includes letters from residents that live in Kahuku that support renewable energy in general, and support the proposed Project. It also includes letters expressing opposition to the Project, or concern over specific issues. All comment letters received from members of the Kahuku Community are included in Appendix M of the Second Draft EIS.

Comment TRANS-3.4: *But it's not that we're against clean energy. I just don't think this is clean. Like if it can hurt people and if it can hurt animals, how clean is it? For me, it's not clean.*

Response TRANS-3.4: Public health and safety are discussed in Section 4.18 of the EIS. Seventeen separate independent scientific reviews have been conducted both nationally and internationally to examine the relationship between wind turbines and possible human health effects associated with audible (the "whooshing" sound created by the rotating blades) and inaudible noise, vibration, shadow flicker (shadows cast by the moving turbine blades), and electromagnetic fields (EMF). To date, no scientific peer-reviewed study has demonstrated a direct link between people living in proximity to modern wind turbines and resulting physiological health effects.

The following are a sample of conclusions from the scientific studies that have been conducted:

- "After careful consideration and deliberation of the body of evidence, [the National Health and Medical Research Council] concludes that there is currently no consistent evidence that wind farms cause adverse health effects in humans." (NHMRC 2015)
- "Cross-sectional studies, despite their inherent limitations in assessing causal links, however, have consistently shown that some people living near wind turbines are more likely to report annoyance than those living farther away. These same studies have also shown that a person's likelihood of reporting annoyance is strongly related to their attitudes toward wind turbines, the visual aspect of the turbines, and whether they obtain economic benefit from the turbines. Our review suggests that these other risk factors play a more significant role than noise from wind turbines in people reporting annoyance." (McCunney et al. 2014)
- "while some people living near wind turbines report symptoms such as dizziness, headaches, and sleep disturbance, the scientific evidence available to date does not demonstrate a direct causal link between wind turbine noise and adverse health effects. The sound level from wind turbines at common residential setbacks is not sufficient to cause hearing impairment or other direct health effects, although some people may find it annoying." (UK Health Protection Agency 2010)

- "There is no evidence that the audible or sub-audible sounds emitted by wind turbines have any direct adverse physiological effects."(Colby 2009)
- "None of the... evidence reviewed suggests an association between noise from wind turbines and pain and stiffness, diabetes, high blood pressure, tinnitus, hearing impairment, cardiovascular disease, and headache/migraine." (MassDEP and MDPH 2012)
- "Although opposition to wind farms on aesthetic grounds is a legitimate point of view, opposition to wind farms on the basis of potential adverse health consequences is not justified by the evidence." (Chatham-Kent Public Health Unit 2011)
- "The electromagnetic fields produced by the generation and export of electricity from a wind farm do not pose a threat to public health..."(NHMRC 2010)

With respect to impacts to animals, due to the potential for impacts to species listed under the Endangered Species Act, Na Pua Makani Power Partners, LLC in collaboration with the U.S. Fish and Wildlife Service and Hawaii Division of Forestry and Wildlife has developed a Habitat Conservation Plan, as part of their application for an incidental take permit/incidental take license issued by these agencies, respectively. The Habitat Conservation Plan includes measures to avoid, minimize, and mitigate potential impacts to the listed species in association with construction and operation of the proposed Project. These measures will also benefit other bird species that may transit through the wind farm site and/or that occur within the off-site mitigation areas.

Sources:

Chatham-Kent Public Health Unit. 2008. The Health Impact of Wind Turbines: A Review of the Current White, Grey, and Published Literature. Prepared for Chatham-Kent Municipal Council, Chatham Ontario. June 2008.

Colby, David W., M.D.; Robert Dobie, M.D.; Geoff Leventhall, Ph.D.; David M. Lipscomb, Ph.D.; Robert J. McCunney, M.D.; Michael T. Seilo, Ph.D.; and Bo Søndergaard, M.Sc. 2009. Wind Turbine Sound and Health Effects: An Expert Panel Review. Prepared for: American Wind Energy Association and Canadian Wind Energy Association. December 2009.

MassDEP and MDPH (Massachusetts Department of Public Health). 2012. Wind Turbine Health Impact Study: Report of Independent Expert Panel. January 2012. Available online at: http://www.mass.gov/eea/docs/dep/energy/wind/turbine-impact-study.pdf.

McCunney, R.J., K.A. Mundt, D. Colby, R. Dobie, K. Kaliski, and M. Blais. 2014. Wind Turbines and Health: A Critical Review of the Scientific Literature. Journal of Environmental and Occupational Medicine 56(11):e108-e130. Available online at: http://canwea.ca/comprehensive-scientific-literature-review-on-wind-turbines-and-human-health-now-published/

NHMRC (Australian Government National Health and Medical Research Council). 2015. NHMRC Statement: Evidence on Wind Farms and Human Health. February 2015.

NHMRC (Australian Government National Health and Medical Research Council). 2010. Wind Turbines and Health – A Rapid Review of Evidence. July 2010. http://www.nhmrc.gov.au/_files_nhmrc/publications/attachments/new0048_evidence_review_wind_turbines_and_health.pdf

UK Health Protection Agency. 2010. Health Effects of Exposure to Ultrasound and Infrasound. Report for the Ad Hoc Expert Group on Noise and Health by the Health Protection Agency. February 2010. http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1265028759369

Comment TRANS-3.5: *So like solar, we haven't heard any problems with solar or kids reacting to that or people getting sick by that or those who are medically fragile, you know, being affected by it.*

Response: TRANS-3.5: There are a number of other renewable energy sources that would produce power such as solar, geothermal (on islands other than Oahu), or biofuels which are all complementary to wind energy, and the

proposed Project would not preclude other renewable energy projects from being developed. In order for the State of Hawaii to meet its Renewable Portfolio Standards goal of 100 percent renewable energy generation for the electric grid, all types of renewable energy technologies will need to be pursued including solar.

Comment TRANS-3.6: *But I'm really appalled at how some companies have moved forward even if there is obvious objection by the community. And it is for their gain. Because if they were really looking at it, there is more safer technologies that are coming out, safer renewable energy sources, and they're just wanting to move forward with it and I think it's just their financial motivation. It has nothing to do with being responsible or responsive to the community.*

Response TRANS-3.6: The purpose and need for the proposed Project are described in Section 1.3.2 of the EIS. This includes providing clean, renewable wind energy for the island of Oahu, and assisting HECO in meeting Hawaii's Renewable Portfolio Standard requirements and the State's goal to reduce electricity costs. Hawaii's Clean Energy Initiative sets goals for the state to achieve 100 percent clean energy by 2045, coming from locally generated renewable sources. The proposed Project would replace a portion of the State's electricity that is currently generated by burning fossil fuels, thus reducing greenhouse gas emission and other forms of pollution that are detrimental to the environment and human health.

Additionally, Na Pua Makani Power Partners, LLC, has committed to establishing a Community Benefit fund and is in discussion with Kahuku community members regarding the details of its administration. It is anticipated that Project funds ($10,000 per wind turbine per year) would be administered by a board of local community members who would make decisions as to the use of the proceeds and which activities, programs, groups, and events would be sponsored.

Comment TRANS-3.7: *We've also asked Na Pua Makani -- me and another person who's against it -- 'cause I have even asked Mike Cutbirth, the person for Champlin, I said how are you moving forward when the community is opposed to it? And he told me that he was told that the community, the majority of the people here, are for it. And so we asked him for signatures of these people and I want the addresses to make sure they're people from Kahuku. We haven't seen anything. It shouldn't be hard if the majority is for it. But at every meeting that we've been that's discussed Na Pua Makani and additional turbines, people who have stood up and talked about it have been against it. So I'm not sure where he's getting his information from, but it sounds really wrong. And if people are really for it and it's the majority, it's a very silent majority if we're not hearing about it. So, like, we want to know who they are. You know?*

Response TRANS-3.7: Please see the response to comment TRANS-3.3 regarding public comments on the proposed Project.

Comment TRANS-3.8: *And if there is most people in Kahuku that are for it, maybe I won't be much against it. I'll still be against it for health reasons.*

Response TRANS-3.8: Please see the response to comments TRANS-3.3 and TRANS-3.4 regarding public comments on the proposed Project and public health, respectively.

Comment TRANS-3.9: *But I'm not convinced that there is a majority when all I see and hear are people who are against it. So I think Na Pua Makani, for all what they're saying and trying to be community and getting people from Koolauloa to be their PR, you know, I mean, yeah, that's a good ploy. But these people don't live in Kahuku. We do.*

Response TRANS-3.9: Please see the response to comment TRANS-3.3 regarding public comments on the proposed Project.

Comment TRANS-3.10: *And it's not just that. It's not just the Kahuku residents, although we are affected by it every day. We have kids going to school. If they don't have it far enough away, we've got kids who are medically fragile who can be affected by it when they are in school. This is the one feeder school for five elementaries. So it's not just Kahuku that's going to be affected.*

Response TRANS-3.10: Please see the response to comments TRANS-3.3 and TRANS-3.4 regarding public comments on the proposed Project and public health, respectively.

Comment TRANS-3.11: *So yes, I am very, very against it and I don't like the low-ball dirty tactics that Na Pua Makani has been using. So that's even more a reason why we won't want them anyway.*

Response TRANS-3.11: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the proposed Project.

Comment TRANS-3.12: *Oh, yeah, and another thing too. With the birds. Like if they want to do the environmental on that part with birds, you know, it's like they don't put much value to the cultural aspect of it. Because, like, for some of us, we have `aumakua, owls who are our `aumakua. So it's not just about a bird. There's connection to that. It's a spiritual. It's a deeper connection. And even if I may not practice that Hawaiian religious beliefs, it's always been a connection to my own family `aumakua. So for other people with that same thing.*

Response TRANS-3.12: A Cultural Impact Assessment was conducted for the proposed Project and is included as Appendix G to the EIS. The results of this assessment indicate that many species of birds and bats that occur in the vicinity of the Project are recognized as culturally important. The cultural importance of these species is described in Section 3.11, and impacts of the project on these species are described in Section 4.11 of the EIS. There is the potential for individual birds and bats to collide with Project structures. The Project HCP includes measures to avoid, minimize, and mitigate for these impacts (see Chapter 2 for a description). These measures would reduce the risk of Project-related impacts to culturally significant species.

Comment TRANS-3.13: *These aren't just birds and bats and owls that are just be killed. It means more. And if that can mean more to me, then you can imagine how children's health means more to me and I just think it's irresponsible of Na Pua Makani to just move forward when there is obvious objection.*

Response TRANS-3.13: Please see response to TRANS-3.12 and TRANS-3.4.

Comment TRANS-3.14: *And then I was told too that the person who first kind of made way for Na Pua Makani or whoever it was -- the agent -- had said if the community objects, they wouldn't do it. Well, the community has objected. They have even written objected through the community association. The Koolauloa board has objected, but they're still going through. So somebody dirty lied. Some cheat lied to just to get some money and they're pulling forward so they're just like financially motivated. That's just wrong.*

Response TRANS-3.14: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your comment. Na Pua Makani Power Partners, LLC did purchase the proposed Project from another developer.

Comment TRANS-3.15: *So now that I've seen what they have, I am even more appalled. For one, they have the health. They're saying how everything is safe and the studies do not link the wind turbines to certain health conditions, but their studies sound skewed. They have no answers as to the control group that was used and the*

group that was actually tested or experimented on. And, of course, it would be unethical to use the very population that it affects the most and that would be people with medically fragile sensory processing issues, children, those kinds of things. So I don't know what their evidence or data is based on that, and I think their studies are skewed anyway. Just for those very same reasons, the very same people that are going to be affected the most are probably not included in the studies. So their comments are pretty misleading anyway, and it doesn't take place of the actual life experience. Because we are two families who are leaving; not just the one that I had said, but there's two now, I found out, that are leaving because it's affecting their child. And, of course, that's not going to make those studies. That's just a very small teeny, teeny part of the population. That, of course, is not going to exposed to that type of testing anyway.

Response TRANS-3.15: Please see response to TRANS-3.4.

Comment TRANS-3.16: *And then I saw the thing about the $25,000 to the endangered species fund for pueo. And for me, that's not enough. They said their take is four, four pueo for $25,000, when that's like a family `aumakua. That's not enough. That's insulting. You know. I don't think you can put a value on that. I mean, you can't put a value on your cultural beliefs and values, and you can't put a money value on the health of people either. And certainly I would like to see them try.*

Response TRANS-3.16: Mitigation measures included in the Habitat Conservation Plan have been developed with input from the U.S. Fish and Service and Hawaii Division of Forestry and Wildlife and are consistent with other Hawaii wind farm habitat conservation plans.

Comment TRANS-3.17: *Also where they going to put the proposed placements of even just behind the school areas? They really are not listening to the community because that has been a main point of contention.*

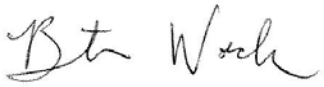
Response TRANS-3.17: Please see response to TRANS-3.1 regarding Project siting and compliance with setback requirements.

Comment TRANS-3.18: *It's just no to them even more. It's wrong. It's not pono. They're a disgusting company. You can put that down and definitely I will keep saying that. What they're doing is wrong.*

Response TRANS-3.18: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your comment.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

April 4, 2016

Art
[No Address given]

RE: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Art,

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for providing comments on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS) during the public the public meeting at Kahuku Community Center on June 23, 2015. Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment TRANS-4.1: *My name is Art. I live in Kahuku. My wife gave birth to our children in Kahuku Hospital and my children have gone to Kahuku High School. I do business in Kahuku. I run a church in Kahuku.*

Response TRANS-4.1: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your comment.

Comment TRANS-4.2: *My thing is this. As a member of this community, this is what we're fighting regarding the windmills. It's not about the benefit. It's not about the value. It's not about the safety. It's not about the health. It's not about any of that, although those areas are of tremendous concern. It's about placement. Why have they placed them in eye view of the people here in the community which takes away from the beauty of this God-given land? Why are they doing it?*

Response TRANS-4.2: A number of screening criteria were considered during the selection of the proposed Project location, described in Section 2.1 of the EIS. They include but are not limited to the availability of a sufficient wind resource, access to adequate and available transmission capacity, availability of contiguous land that is designated to allow wind energy development, and site-specific conditions such as topography which influence construction feasibility and compliance with setback requirements. Alternatives that were considered but eliminated from detailed study, including greater setback distances and alternative project locations on Oahu, are described in Section 2.3 of the EIS. Alternative locations did not meet these criteria.

Comment TRANS-4.3: *I am so disturbed that this company has come in and they're putting them, for example, in Waimea Valley, which takes away the beauty of our land.*

Response TRANS-4.3: Na Pua Makani Power Partners, LLC has not installed any turbines in the past.

Tetra Tech, Inc.
1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

Comment TRANS-4.4: *And not only that, if you're a homeowner, you're going to sell your home in Kahuku, it lessens the value of your home.*

Response TRANS-4.4: The EIS discusses potential impacts to the property values in Section 4.12 – Socioeconomics. Most of statistically-based studies that are available have found no evidence that the presence of an operating wind facility affected residential property values (Canning and Simmons 2010; Carter 2011; Hinman 2010; Laposa and Mueller 2010; Magnusson and Gittell 2012). One large-scale study identified some evidence that post-announcement reductions in price occurred prior to actual construction, but faded following the completion of construction (Hoen et al. 2011). One detailed study (Heintzelman and Tuttle 2012) found overall mixed results, with two of the three wind facilities studied affecting property values, while the other one did not. Where effects did exist, this study found that they tended to increase the closer a property was to the nearest wind turbine. One other study (Sunak and Madlener 2012) also found some support for negative effects in proximity to wind turbines, with effects varying based on relative location. Most of these studies concluded that more research is required to more fully understand the impacts of wind facility development on property values.

Sources:

Canning, G., and L.J. Simmons. 2010. Wind Energy Study – Effect on Real Estate Values in the Municipality of Chatham-Kent, Ontario. Prepared by Canning Consultants Inc. & John Simmons Realty Services Ltd. Prepared for Canadian Wind Energy Association. February, 2010.

Carter, J. 2011. The Effect of Wind Farms on Residential Property Values in Lee County, Illinois. Thesis Prepared for Master's Degree. Illinois State University.

Heintzelman, M. D. and Tuttle, C. 2012. Values in the Wind: A Hedonic Analysis of Wind Power Facilities. Land Economics. August 1, 2012. Vol. 88 No. 3, 571-588.

Hinman, J. L. 2010. Wind Farm Proximity and Property Values: A Pooled Hedonic Regression Analysis of Property Values in Central Illinois. Thesis Prepared for Master's Degree in Applied Economics. Illinois State University, Normal. May, 2010.

Hoen, B., Wiser, R., Cappers, P., Thayer, M. and Sethi, G. 2011. Wind Energy Facilities and Residential Properties: The Effect of Proximity and View on Sales Prices. Journal of Real Estate Research. 33(3): 279-316.

Laposa, S. P. and A. Mueller. 2010. Wind Farm Announcements and Rural Home Prices: Maxwell Ranch and Rural Northern Colorado. Journal of Sustainable Real Estate. 2(1).

Magnusson, M. and R. Gittell. 2012. Impact of the Lempster Wind Power Project on Local Residential Property Values. Whittemore School of Business & Economics, University of New Hampshire. January.

Sunak, Y. and R. Madlener. 2012. The Impact of Wind Farms on Property Values: A Geographically Weighted Hedonic Pricing Model. FCN Working Paper No. 03/2012 (revised March 2013).

Comment TRANS-4.5: *And it seems to me that this company and others involved, they really don't care about the people in this community because: They don't live here. They don't work in this community. They don't do to church in this community. They don't raise their children in this community. These are outside people coming into this community and telling us this is what's going to happen. I just talked with a man from La`ie who's for the windmills in Kahuku. And said to him, "Who are you to come from La`ie, to come into Kahuku to tell us that this is okay?"*

Response TRANS-4.5: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge that there is opposition to the proposed Project. The Second Draft EIS includes letters from residents that live in Kahuku that support renewable energy in general, and support the proposed Project. It also includes letters expressing opposition to the Project, or concern over specific issues. All comment letters received from members of the Kahuku Community are included in Appendix M of the Second Draft EIS.

Comment TRANS-4.6: *And this company has hired people like Keoki – I forget his last name -- Scott Brawshaw, people from outside the community of Kahuku, people who have nothing to do with Kahuku. Yet they speak as though they represent us. They don't live here, but we have to wake up every single morning and go to bed every night with those windmills, and to me, that is wrong. That's inconsiderate of the people that live here.*

Response TRANS-4.6: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your comment.

Comment TRANS-4.7: *As far as I'm concerned, they can take those windmills and go put them someplace over that mountain, some other place. But I know they won't do that because it cost too much money to provide the needed support for those windmills. So for less cost for them, it's easier to do because the infrastructure and the roads are close by, right?*

Response TRANS-4.7: See the response to comment TRANS-4.2 regarding Project siting.

Comment TRANS-4.8: *If you go to Maui and you fly over Maui, those windmills are on the other side of the mountains, and I don't know why we can't do that here.*

Response TRANS-4.8: See the response to comment TRANS-4.2 regarding Project siting.

Comment TRANS-4.9: *And I know why they're doing it like that. I feel and many other people because this is a community of Filipinos and Polynesians and there's a lot of aloha spirit and we allow these kind of things, to just allow them to happen and without saying or doing anything about it. We just allow it to happen. Well, not so anymore.*

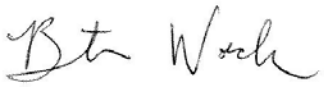
Response TRANS-4.9: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your comment.

Comment TRANS-4.10: *We don't mind them. We're not talking about the value and the benefit again. It's about placement. We don't want to see them. We want to see the palm trees, the coconut trees, and not these windmills. That's very inconsiderate of that company or anyone else that would suggest that the best place for those windmills is in our community among the living, and that is wrong.*

Response TRANS-4.10: Please see the response to comment TRANS-4.2 regarding Project siting.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

April 4, 2016

Leilani Auna
54-232 Kaipapau Loop,
Hauula, Hawaii

RE: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Auna,

On behalf of Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service thank you for providing comments on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS) during the public the public meeting at Kahuku Community Center on June 23, 2015. Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment TRANS-5.1: *I'm from the Koolauloa area.*

Response TRANS-5.1: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your comment.

Comment TRANS-5.2: *The concern that I have is it looks wonderful, you know. But I feel like Kahuku or the Koolauloa area is not getting, I mean, the benefits. I haven't seen anything on my bill go down, to tell you the truth. They say that, oh, it's going to help a lot of people. I don't see that. I want to know what's the direct benefits. I hear that they're going to give so much money, but I think the Koolauloa area should have more than the whole State of Hawai`i because it's our backyard.*

Response TRANS-5.2: Na Pua Makani Power Partners, LLC has committed to establishing a Community Benefit fund and is in discussion with Kahuku community members regarding the details of its administration. It is anticipated that a 501 C3 Non-profit corporation will be formed and that Project funds ($10,000 per wind turbine per year) would go to the Non-profit. It is anticipated that the Non-profit would be governed and administered by a board of local community members who would make decisions as to the use of the proceeds and which activities, programs, groups, and events would be sponsored. To date, NPMPP has provided support to a number of local groups including Kahuku.org School to Work program, Kahuku High School Project Grad, Kahuku Elementary School May Day, Kahuku High School rugby, basketball, volleyball, and soccer teams, as well as providing food for families in need.

Comment TRANS-5.3: *It's kinda like if we were to put this in Waikiki or by Hawai`i Kai area, I don't think they will like that. I mean, don't you think? I mean, if we did that, would you like that in yours, no. If you're not a direct benefit over here, I mean, it's not in your backyard, you don't care.*

Tetra Tech, Inc.
1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

Response TRANS-5.3: A number of screening criteria were considered during the selection of the proposed Project location, described in Section 2.1 of the EIS. They include but are not limited to the availability of a sufficient wind resource, access to adequate and available transmission capacity, availability of contiguous land that is designated to allow wind energy development, and site-specific conditions such as topography which influence construction feasibility and compliance with setback requirements. Alternatives that were considered but eliminated from detailed study, including greater setback distances and alternative project locations on Oahu, are described in Section 2.3 of the EIS. Alternative locations did not meet these criteria. Please see also the response to comment TRANS-5.2 regarding community benefits.

Comment TRANS-5.4: *Don't get me wrong. I like the alternative energy. But I wish they would compensate somehow the Koolauloa area, like give something to the Kahuku High School or Kahuku Hospital, or you know what I mean? Because we're, like, hurting out here, and then they're going to put that in our backyard? I mean, looks kind of nasty. I guess if it's way in the back, it's fine.*

Response TRANS-5.4: Please see the responses to comments TRANS-5.2 and TRANS-5.3 regarding community benefits and Project siting, respectively.

Comment TRANS-5.5: *The other concern I have is for the birds. It's a lot of those big things out there. I can just see as all of them turn, the birds, they're flying, they're going get hit.*

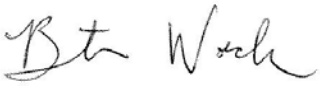
Response TRANS-5.5: The Project habitat conservation plan includes measures for avoiding and minimizing impacts to birds. These measures include installation of marking devises on the above ground transmission line to increase its visibility, installing lighting that will note attract birds at night, and other measures. During operation a post-construction monitoring program will also be implemented to monitor for and document impacts to birds and bats, as required by the U.S. Fish and Wildlife Service and Hawaii Division of Forestry and Wildlife.

Comment TRANS-5.6: *Yeah, so that's just my concern. I would like to know if they could give more moneys to the Koolauloa area, especially Kahuku High School or Kahuku High School area. Like I said, I'm not against it. I just want to know where the money is going.*

Response TRANS-5.6: Please see response to comment TRANS-5.2 regarding community benefits.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

April 4, 2016

Patricia Beekman
[No Address given]

RE: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Patricia Beekman,

On behalf of Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service thank you for providing comments on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS) during the public the public meeting at Kahuku Community Center on June 23, 2015. Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment TRANS-6.1: *I live in Aiea, but I'm very concerned about what's happening here. That's really disturbing to see what's happening to the scenery.*

Response TRANS-6.1: Na Pua Makani Power Partners, LLC and the U.S. Fish and Service acknowledge your comment. Visual simulations of the proposed Project are included in EIS Section 4.16 – Visual Resources. The Project would be most visible at viewpoints close to the wind farm site (within about 1 mile). Although the visibility of the proposed Project is unavoidable, it would be compatible with nearby existing residential, commercial, public, and agricultural land uses. Additionally, the Project would co-exist on the landscape with existing commercial and residential developments and would not visually dominate the landscape character because there is already a substantial degree of landscape modification in most views, including the existing Kahuku Wind Farm that is directly adjacent to the proposed Project which has been in operation since 2011.

Comment TRANS-6.2: *I believe that we do have an environmental and energy issue and I do believe that technical matters such as the wind turbines should be solved using real science. I think most people would agree that using real science makes sense, but some people might say, well, what is real science? Science is a process. The core process is the scientific method. The scientific method consists of a hypothesis, in other words, that wind energy is equivalent to our conventional power sources being subjected to four things: 1) comprehensive; 2) independent or objective; 3) transparent; and 4) empirical based on assessment or empirical based assessment. The fact is that this has not been done for wind energy. Let's look at an example that puts this situation into perspective. Let's say the some entrepreneur stepped forward and present us with a big box that they claim holds part of the solution to these energy and environmental issues. Would we just say great? Who do we make out the billion-dollar check to? I don't think so. I think most people or thoughtful people would say something like: Thanks for coming forward. What you say about your product sounds good. However, before we have taxpayers and ratepayers pay for this, we need to see scientific proof that your product will be a net societal benefit.*

Tetra Tech, Inc.
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Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

Response TRANS-6.2: The purpose and need for the proposed Project are described in Section 1.3.2 of the EIS. This includes providing clean, renewable wind energy for the island of Oahu, and assisting HECO in meeting Hawaii's Renewable Portfolio Standard requirements and the State's goal to reduce electricity costs. Hawaii's Clean Energy Initiative sets goals for the state to achieve 100 percent clean energy by 2045, coming from locally generated renewable sources. The proposed Project would replace a portion of the State's electricity that is currently generated by burning fossil fuels, thus reducing greenhouse gas emission and other forms of pollution that are detrimental to the environment and human health. This would eliminate the use of approximately 13.44 barrels of oil for every hour of operation, thereby contributing to a decrease in the State's dependency on fossil fuels. As discussed in Section 4.12 of the EIS, the Project would generate electricity at a cost that is approximately half the cost of generating electricity by burning fossil fuels and HECO has stated in filings with the PUC that the Project would save the ratepayers millions of dollars over the life of the Project.

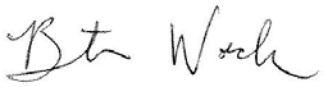
In terms of benefits, based on the most recent, 2014 Renewable Portfolio Standard Status Report approximately 80 percent of Hawaii's energy is currently derived from fossil fuels and approximately 20 percent comes from renewable sources (Hawaiian Electric Company, Inc. et al. 2014). The cost of electricity for the consumers/residents of Hawaii is the blended average cost of all sources (e.g. oil, wind, solar, etc.) and current rates reflect that high cost from burning oil. Over time, as the proportion of energy coming from renewable sources increases, the average cost of electricity is expected to decrease. This information has been added to EIS Section 4.12 – Socioeconomics.

Comment TRANS-6.3: *Due to aggressive lobbyists pushing for their multinational conglomerate clients, none of this has been done for industrial wind energy. Are we being unreasonable to ask for real scientific proof that this is a net benefit? People may ask if we are going to do a scientific assessment of wind energy, exactly what is the comprehensive part? It's fairly simple. Any new alternative source of energy needs to have a thorough technical, economic, and environmental assessment provided by the proponents. This way we can objectively know whether this new source is at least equal to our current electricity sources. If it is not, then we should not be wasting citizens' resources on it. To find out more about this process, go to energypresentation.info where an independent scientist explains it all.*

Response TRANS-6.3: Please see the response to comment TRANS-6.2 regarding the purpose and need for the proposed Project and energy costs.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

April 4, 2016

Jeffrey Peterson
[No Address given]

RE: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Jeffery Peterson,

On behalf of Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service thank you for providing comments on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS) during the public the public meeting at Kahuku Community Center on June 23, 2015. Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment TRANS-7.1: *I live in Hauula, Hawai`i. I'm a business owner in that community.*

Response TRANS-7.1: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your comment.

Comment TRANS-7.2: *I am against the wind project as it appears to be just another business opportunity and not benefitting the people in the community.*

Response TRANS-7.2: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your opposition to the proposed Project.

As described in Section 1.3 of the EIS, the proposed Project would provide a clean, source of renewable energy and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals which have increased from 70 to 100 percent clean energy since the publication of the Draft EIS. Generation and integration of wind energy into the electric grid decreases fossil fuel import and consumption, resulting in benefits to the environment such as reduced greenhouse gas emissions, particulate-related health effects, and other forms of pollution associated with coal or diesel fuel electric generation.

Besides the benefits cited above, Na Pua Makani Power Partners, LLC has committed to establishing a Community Benefit fund and is in discussion with Kahuku community members regarding the details of its administration. It is anticipated that a 501 C3 Non-profit corporation will be formed and that Project funds ($10,000 per wind turbine per year) would go to the Non-profit. It is anticipated that the Non-profit would be governed and administered by a board of local community members who would make decisions as to the use of the proceeds and which activities, programs, groups, and events would be sponsored. To date, NPMPP has provided support to a number of local groups including Kahuku.org School to Work program, Kahuku High

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School Project Grad, Kahuku Elementary School May Day, Kahuku High School rugby, basketball, volleyball, and soccer teams, as well as providing food for families in need.

Comment TRANS-7.3: *Wind projects have come and gone in Hawai`i and many have proved to be unsustainable, especially due to their connection to a business model instead of sustaining a community.*

Response TRANS-7.3: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your comment regarding past wind projects.

Comment TRANS-7.4: *Traditionally, windmills have been built adjacent to communities that didn't have power or resources to other power sources and they powered that community. Hawai`i is in that situation due to dependency on fossil fuels and I would like to just express my concerns about a business model-type wind energy in the community.*

Response TRANS-7.4: A number of screening criteria were considered during the selection of the proposed Project location, described in Section 2.1 of the EIS. They include but are not limited to the availability of a sufficient wind resource, access to adequate and available transmission capacity, availability of contiguous land that is designated to allow wind energy development, and site-specific conditions such as topography which influence construction feasibility and compliance with setback requirements. Alternatives that were considered but eliminated from detailed study, including greater setback distances and alternative project locations on Oahu, are described in Section 2.3 of the EIS. Alternative locations did not meet these criteria.

Comment TRANS-7.5: *The visual blight is also a bit of a concern. There are other areas to hide these things.*

Response TRANS-7.5: Visual simulations of the proposed Project are included in Section 4.16 – Visual Resources. The Project would be most visible at viewpoints close to the wind farm site (within about 1 mile). Although the visibility of the proposed Project is unavoidable, it would be compatible with nearby existing residential, commercial, public, and agricultural land uses. Additionally, the Project would co-exist on the landscape with existing commercial and residential developments and would not visually dominate the landscape character because there is already a substantial degree of landscape modification in most views, including the existing Kahuku Wind Farm that is directly adjacent to the proposed Project which has been in operation since 2011.

Comment TRANS-7.6: *The effects on health are not widely conclusive. Many studies are inconclusive of what the health effects are and it's not a good thing to just be putting them up willy-nilly without really knowing what's going on.*

Response TRANS-7.6: Public health and safety are discussed in Section 4.18 of the EIS. Seventeen separate independent scientific reviews have been conducted both nationally and internationally to examine the relationship between wind turbines and possible human health effects associated with audible (the “whooshing” sound created by the rotating blades) and inaudible noise, vibration, shadow flicker, and electromagnetic fields (EMF). To date, no scientific peer-reviewed study has demonstrated a direct link between people living in proximity to modern wind turbines and resulting physiological health effects.

The following are a sample of conclusions from the scientific studies that have been conducted:

- “After careful consideration and deliberation of the body of evidence, [the National Health and Medical Research Council] concludes that there is currently no consistent evidence that wind farms cause adverse health effects in humans.” (NHMRC 2015)

- "Cross-sectional studies, despite their inherent limitations in assessing causal links, however, have consistently shown that some people living near wind turbines are more likely to report annoyance than those living farther away. These same studies have also shown that a person's likelihood of reporting annoyance is strongly related to their attitudes toward wind turbines, the visual aspect of the turbines, and whether they obtain economic benefit from the turbines. Our review suggests that these other risk factors play a more significant role than noise from wind turbines in people reporting annoyance." (McCunney et al. 2014)
- "while some people living near wind turbines report symptoms such as dizziness, headaches, and sleep disturbance, the scientific evidence available to date does not demonstrate a direct causal link between wind turbine noise and adverse health effects. The sound level from wind turbines at common residential setbacks is not sufficient to cause hearing impairment or other direct health effects, although some people may find it annoying." (UK Health Protection Agency 2010)
- "There is no evidence that the audible or sub-audible sounds emitted by wind turbines have any direct adverse physiological effects."(Colby 2009)
- "None of the... evidence reviewed suggests an association between noise from wind turbines and pain and stiffness, diabetes, high blood pressure, tinnitus, hearing impairment, cardiovascular disease, and headache/migraine." (MassDEP and MDPH 2012)
- "Although opposition to wind farms on aesthetic grounds is a legitimate point of view, opposition to wind farms on the basis of potential adverse health consequences is not justified by the evidence." (Chatham-Kent Public Health Unit 2011)
- "The electromagnetic fields produced by the generation and export of electricity from a wind farm do not pose a threat to public health..."(NHMRC 2010)

Sources:

Chatham-Kent Public Health Unit. 2008. The Health Impact of Wind Turbines: A Review of the Current White, Grey, and Published Literature. Prepared for Chatham-Kent Municipal Council, Chatham Ontario. June 2008.

Colby, David W., M.D.; Robert Dobie, M.D.; Geoff Leventhall, Ph.D.; David M. Lipscomb, Ph.D.; Robert J. McCunney, M.D.; Michael T. Seilo, Ph.D.; and Bo Søndergaard, M.Sc. 2009. Wind Turbine Sound and Health Effects: An Expert Panel Review. Prepared for: American Wind Energy Association and Canadian Wind Energy Association. December 2009.

MassDEP and MDPH (Massachusetts Department of Public Health). 2012. Wind Turbine Health Impact Study: Report of Independent Expert Panel. January 2012. Available online at: http://www.mass.gov/eea/docs/dep/energy/wind/turbine-impact-study.pdf.

McCunney, R.J., K.A. Mundt, D. Colby, R. Dobie, K. Kaliski, and M. Blais. 2014. Wind Turbines and Health: A Critical Review of the Scientific Literature. Journal of Environmental and Occupational Medicine 56(11):e108-e130. Available online at: http://canwea.ca/comprehensive-scientific-literature-review-on-wind-turbines-and-human-health-now-published/

NHMRC (Australian Government National Health and Medical Research Council). 2015. NHMRC Statement: Evidence on Wind Farms and Human Health. February 2015.

NHMRC (Australian Government National Health and Medical Research Council). 2010. Wind Turbines and Health – A Rapid Review of Evidence. July 2010. http://www.nhmrc.gov.au/_files_nhmrc/publications/attachments/new0048_evidence_review_wind_turbines_and_health.pdf

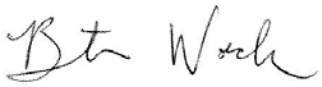
UK Health Protection Agency. 2010. Health Effects of Exposure to Ultrasound and Infrasound. Report for the Ad Hoc Expert Group on Noise and Health by the Health Protection Agency. February 2010. http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1265028759369

Comment TRANS-7.7: *In closing, aloha, and we'd appreciate it if you considered not putting these up.*

Response TRANS-7.7: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your comment. Please see the response to comment TRANS-7.4 regarding Project siting.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

April 4, 2016

John Keliiliki
Laie, HI

RE: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear John Keliiliki,

On behalf of Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service thank you for providing comments on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS) during the public the public meeting at Kahuku Community Center on June 23, 2015. Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment TRANS-8.1: *I'm for clean energy and I'm seeing what this is all about. By being here, I see a lot of questions are being answered concerning noise, concerning community.*

Response TRANS-8.1: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your comment regarding information on the topics evaluated in the EIS.

Comment TRANS-8.2: *But I hear some of the people, one of the big thing is the location of this windmill, and I say I think they did their research and that's probably what they have available to them. So I guess you're got going to get 100 percent satisfaction. But I assume that they did the research and what they got, maybe they're lucky they got what they got. And I understand if they go further -- some people say, well, put them behind the mountains, but then who owns the mountains behind there? I don't know. Maybe it's the military or others.*

Response TRANS-8.2: A number of screening criteria were considered during the selection of the proposed Project location, described in Section 2.1 of the EIS. They include but are not limited to the availability of a sufficient wind resource, access to adequate and available transmission capacity, availability of contiguous land that is designated to allow wind energy development, and site-specific conditions such as topography which influence construction feasibility and compliance with setback requirements. Alternatives that were considered but eliminated from detailed study, including greater setback distances and alternative project locations on Oahu, are described in Section 2.3 of the EIS. Alternative locations did not meet these criteria.

Comment TRANS-8.3: *But I'm for renewable energy, clean energy. And I'm sure if it cut the cost, that's good for people. It's a good benefit. That's all.*

Response TRANS-8.3: As described in Section 1.3 of the Draft EIS, the proposed Project would provide a clean, source of renewable energy and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's

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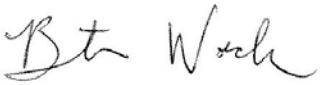
Clean Energy Initiative goals. Subsequent to publication of the Draft EIS, Hawaii has signed into law a requirement for 100 percent of electricity from renewable sources over the next 25 years. Based on the recent 2014 Renewable Portfolio Standard Status Report approximately 80 percent of Hawaii's energy is currently derived from fossil fuels and approximately 20 percent comes from renewable sources (Hawaiian Electric Company, Inc. et al. 2014). The cost of electricity for the consumers / residents of Hawaii is the blended average cost of all sources (e.g. oil, wind, solar, etc.) and current rates reflect that high cost from burning oil. Over time, as the proportion of energy coming from renewable sources increases, the average cost of electricity is expected to decrease.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

April 4, 2016

Melissa Primacio
102 Main Camp
Kahuku, HI 96731

RE: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Primacio,

On behalf of Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service thank you for providing comments on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS) during the public the public meeting at Kahuku Community Center on June 23, 2015. Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment TRANS-9.1: *My name is Melissa Primacio. I live in the plantation area, so 102 Main Camp, Kahuku, Hawai`i 96731, so I am a longtime resident of Kahuku.*

Response TRANS-9.1: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your comment on your residency.

Comment TRANS-9.2: *I am in support of the windmills. I am in support of renewable energy and I feel that I am grateful that our community can help achieve the goal that our state has addressed with our energy being renewable, 100 percent by 2000 -- what is it? '50, '40, '45?*

Response TRANS-9.2: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledges your support of the proposed Project. As described in Section 1.3 of the Draft EIS, the proposed Project would provide a clean, source of renewable energy and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals. Hawaii has signed into law a requirement for 100 percent of electricity from renewable sources by 2045.

Comment TRANS-9.3: *Well, I'm just glad that we're able to help meet the state's requirement because electric is very expensive. So without using so much oil, hopefully our electric bills can start to simmer down with renewable energy. And that's it.*

Response TRANS-9.3: based on the most recent, 2014 Renewable Portfolio Standard Status Report approximately 80 percent of Hawaii's energy is currently derived from fossil fuels and approximately 20 percent comes from renewable sources (Hawaiian Electric Company, Inc. et al. 2014). The cost of electricity for the consumers/residents of Hawaii is the blended average cost of all sources (e.g. oil, wind, solar, etc.) and current

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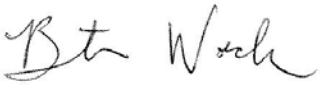
rates reflect that high cost from burning oil. Over time, as the proportion of energy coming from renewable sources increases, the average cost of electricity is expected to decrease. This information has been added to EIS Section 4.12 – Socioeconomics.

Production of wind-generated energy by the Project would replace a portion of the State's electricity that is currently generated by burning fossil fuels. This would eliminate the use of approximately 13.44 barrels of oil for every hour of operation, thereby contributing to a decrease in the State's dependency on fossil fuels. As discussed in Section 4.12 of the EIS, the Project would generate electricity at a cost that is approximately half the cost of generating electricity by burning fossil fuels and HECO has stated in filings with the PUC that the Project would save the ratepayers millions of dollars over the life of the Project.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

April 4, 2016

Vasaloloa Taualii
P.O. Box 306
Kahuku, HI

RE: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Taualii,

On behalf of Na Pua Makani Power Partners, LLC (NPMPP), and the U.S. Fish and Wildlife Service, thank you for providing comments on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS) during the public the public meeting at Kahuku Community Center on June 23, 2015. Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment TRANS-10.1: *I've got it down here already and under cultural, archeological, and historic resources, I just put wind turbines do not support Hawai`i culture or history. It devalues it by the sight and the sound.*

Response TRANS-10.1: A Cultural Impact Assessment was conducted for the proposed Project and is included as Appendix G to the EIS. Based upon the ethnographic interviews conducted as part of the CIA there does not appear to be a need for traditional access to the wind farm site for the collection of natural resources or for performing traditional cultural practices and no traditional activities were identified within the wind farm site. The Cultural Impact Assessment concludes that the Project would have no effect to traditional cultural uses and practices.

The purpose and need for the proposed Project are described in Section 1.3.2 of the EIS. This includes providing clean, renewable wind energy for the island of Oahu, and assisting HECO in meeting Hawaii's Renewable Portfolio Standard requirements and the State's goal to reduce electricity costs. Hawaii's Clean Energy Initiative sets goals for the state to achieve 100 percent clean energy by 2045, coming from locally generated renewable sources. The proposed Project would replace a portion of the State's electricity that is currently generated by burning fossil fuels, thus reducing greenhouse gas emission and other forms of pollution that are detrimental to the environment and human health.

Comment TRANS-10.2: *The hazardous and regulated materials and waste. What are the plans to dispose of toxic materials and debris from the project?*

Response TRANS-10.2: Section 4.7 of the EIS describes the storage and handling of hazardous materials and wastes during construction and operation of the proposed Project. Waste generated during Project construction would include construction debris, concrete wash water, used oil, and other vehicle fluids, and restroom waste.

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Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

Used oil from the turbines would be the primary waste generated during Project operation. Used oil would temporarily be stored in the on-site operations and maintenance building. All waste, including non-hazardous waste, would be disposed of off-site at an appropriately permitted facility which include the City and County of Honolulu's Waimanalo Gulch landfill, the H-power facility in Kapolei, or to the privately-owned PVT landfill (construction wastes only), which is authorized specifically to receive construction and demolition waste. The Project will have a Hazardous Materials and Wastes Management Plan which will detail proper waste storage and disposal procedures.

Section 2.4.8 of the EIS describes the process of Project decommissioning, the goal of which would be to remove the power generation equipment and return the site to a condition as close to its pre-construction state as possible within one year as contractually required. All decommissioning- and restoration-related waste would be handled and disposed of or recycled, as appropriate, in accordance with county, State, and Federal laws and permit requirements.

Comment TRANS-10.3: *Under noise, wind turbines have negative health impact physically and emotionally on those living in close proximity to the wind turbines, especially for children in their hearing. It affects their hearing.*

Response TRANS-10.3: Public health and safety are discussed in Section 4.18 of the EIS. Seventeen separate independent scientific reviews have been conducted both nationally and internationally to examine the relationship between wind turbines and possible human health effects associated with audible (the "whooshing" sound created by the rotating blades) and inaudible noise, vibration, shadow flicker, and electromagnetic fields (EMF). To date, no scientific peer-reviewed study has demonstrated a direct link between people living in proximity to modern wind turbines and resulting physiological health effects. The following are a sample of conclusions from the scientific studies that have been conducted:

- "After careful consideration and deliberation of the body of evidence, [the National Health and Medical Research Council] concludes that there is currently no consistent evidence that wind farms cause adverse health effects in humans." (NHMRC 2015)
- "Cross-sectional studies, despite their inherent limitations in assessing causal links, however, have consistently shown that some people living near wind turbines are more likely to report annoyance than those living farther away. These same studies have also shown that a person's likelihood of reporting annoyance is strongly related to their attitudes toward wind turbines, the visual aspect of the turbines, and whether they obtain economic benefit from the turbines. Our review suggests that these other risk factors play a more significant role than noise from wind turbines in people reporting annoyance." (McCunney et al. 2014)
- "while some people living near wind turbines report symptoms such as dizziness, headaches, and sleep disturbance, the scientific evidence available to date does not demonstrate a direct causal link between wind turbine noise and adverse health effects. The sound level from wind turbines at common residential setbacks is not sufficient to cause hearing impairment or other direct health effects, although some people may find it annoying." (UK Health Protection Agency 2010)
- "There is no evidence that the audible or sub-audible sounds emitted by wind turbines have any direct adverse physiological effects."(Colby 2009)
- "None of the... evidence reviewed suggests an association between noise from wind turbines and pain and stiffness, diabetes, high blood pressure, tinnitus, hearing impairment, cardiovascular disease, and headache/migraine." (MassDEP and MDPH 2012)
- "Although opposition to wind farms on aesthetic grounds is a legitimate point of view, opposition to wind farms on the basis of potential adverse health consequences is not justified by the evidence." (Chatham-Kent Public Health Unit 2011)

- "The electromagnetic fields produced by the generation and export of electricity from a wind farm do not pose a threat to public health..."(NHMRC 2010)

Additional summary information on the available wind turbine health studies has been added to the Second Draft EIS.

Sources:

Chatham-Kent Public Health Unit. 2008. The Health Impact of Wind Turbines: A Review of the Current White, Grey, and Published Literature. Prepared for Chatham-Kent Municipal Council, Chatham Ontario. June 2008.

Colby, David W., M.D.; Robert Dobie, M.D.; Geoff Leventhall, Ph.D.; David M. Lipscomb, Ph.D.; Robert J. McCunney, M.D.; Michael T. Seilo, Ph.D.; and Bo Søndergaard, M.Sc. 2009. Wind Turbine Sound and Health Effects: An Expert Panel Review. Prepared for: American Wind Energy Association and Canadian Wind Energy Association. December 2009.

MassDEP and MDPH (Massachusetts Department of Public Health). 2012. Wind Turbine Health Impact Study: Report of Independent Expert Panel. January 2012. Available online at: http://www.mass.gov/eea/docs/dep/energy/wind/turbine-impact-study.pdf.

McCunney, R.J., K.A. Mundt, D. Colby, R. Dobie, K. Kaliski, and M. Blais. 2014. Wind Turbines and Health: A Critical Review of the Scientific Literature. Journal of Environmental and Occupational Medicine 56(11):e108-e130. Available online at: http://canwea.ca/comprehensive-scientific-literature-review-on-wind-turbines-and-human-health-now-published/

NHMRC (Australian Government National Health and Medical Research Council). 2015. NHMRC Statement: Evidence on Wind Farms and Human Health. February 2015.

NHMRC (Australian Government National Health and Medical Research Council). 2010. Wind Turbines and Health – A Rapid Review of Evidence. July 2010. http://www.nhmrc.gov.au/_files_nhmrc/publications/attachments/new0048_evidence_review_wind_turbines_and_health.pdf

UK Health Protection Agency. 2010. Health Effects of Exposure to Ultrasound and Infrasound. Report for the Ad Hoc Expert Group on Noise and Health by the Health Protection Agency. February 2010. http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1265028759369

Comment TRANS-10.4: *People come to Hawai`i for beauty. The windmill detracts and takes away from this beauty.*

Response TRANS-10.4: Section 4.12 of the EIS provides assessment of the anticipated visual impacts of the proposed Project, including a comparison of existing conditions to the computer simulated view of the turbines from five key observation locations in the community. As noted in the EIS, the Project will be most visible form the locations within one mile from the wind farm site. Although the visibility of the Project is unavoidable, the proposed Project would be compatible with nearby existing residential, commercial, public, and agricultural land uses. It is important to note that the existing Kahuku Wind Farm that is directly adjacent to the proposed Project has co-existed in the Kahuku community since 2011.

Comment TRANS-10.5: *Under other, what are the hard actual costs of each turbine? The impact on reducing the current utility cost. When and how much reduction do consumers actually receive?*

Response TRANS-10.5: Costs associated with the proposed Project area discussed in Section 4.12 of the EIS. The Project would have a total expected installed cost of approximately $97 million, including equipment costs (turbines, blades, towers), balance of materials (concrete, rebar, transformers, electrical connection equipment), construction labor, and other development costs (engineering, financing, and legal services, easement costs) based

on filings made with the Public Utilities Commission (PUC). Equipment costs are the largest estimated cost component accounting for about 70 percent of the estimated total.

The proposed Project would contribute to the goals outlined in Hawaii's Renewable Portfolio Standard and the Hawaii Clean energy initiative by increasing the percentage of the state's energy that is derived from clean, renewable sources. Hawaii has signed into law a requirement for 100 percent of electricity from renewable sources over the next 25 years and as the percentage of renewables increases, the average cost of electricity will decrease.

Regarding energy costs, based on the most recent, 2014 Renewable Portfolio Standard Status Report approximately 80 percent of Hawaii's energy is currently derived from fossil fuels and approximately 20 percent comes from renewable sources (Hawaiian Electric Company, Inc. et al. 2014). The cost of electricity for the consumers/residents of Hawaii is the blended average cost of all sources (e.g. oil, wind, solar, etc.) and current rates reflect that high cost from burning oil. Over time, as the proportion of energy coming from renewable sources increases, the average cost of electricity is expected to decrease. This information has been added to EIS Section 4.12 – Socioeconomics.

Comment TRANS-10.6: *How does the windmill company deal with damage to our Hawaii's birds?*

Response TRANS-10.6: The EIS discloses the potential for the Project to impact birds and bats, transiting through the wind farm site (see Section 4.10 and 4.11 of the EIS). Because of the potential for these impacts Na Pua Makani Power Partners, LLC has worked in conjunction with the U.S. Fish and Wildlife Service and Hawaii Division of Forestry and Wildlife to develop a Habitat Conservation Plan. The Habitat Conservation Plan incorporates measures to avoid and minimize impacts to these species, as well as mitigation for unavoidable impacts. These include measures such as the use of shielded on-site lighting, selection of un-guyed met towers, and transmission line marking to minimize attraction and collision by birds, avoiding vegetation removal during the bat pupping season, and implementing low wind speed curtailment to reduce operational the risk of collision for bats. The Habitat Conservation Plan also includes mitigation for unavoidable impacts.

Comment TRANS-10.7: *[How does the windmill company deal with damage to] other environmental surroundings in installing the wind turbines and maintaining them? There's a certain amount of construction and change in the environment in order to accommodate the windmill installation.*

Response TRANS-10.7: Following construction, disturbed areas would be restored to pre-existing grades and all disturbed areas where permanent gravel or aggregate is required would be revegetated with non-invasive resident plant species. These measures would reduce the potential for erosion and adverse effects on drainage patterns.

Comment TRANS-10.8: *And my last is when and how do consumers benefit in the long run when the initial and continuing costs are more than the current rates?*

Response TRANS-10.8: Please see response to TRANS-10.5 regarding consumer benefits.

Comment TRANS-10.9: *And the other thing is that who benefits? In my opinion, the manufacturers.*

Response TRANS-10.9: The purpose of the proposed Project is to provide clean, renewable wind energy for the island of Oahu, and to assist HECO in meeting Hawaii's Renewable Portfolio Standard (RPS) requirements and the State's goal to reduce electricity costs. The power generated by the Project would be sold to HECO pursuant to the RPS under a long-term, fixed-price contract with fixed annual escalation providing long-term price stability

for consumers. As noted above, as the proportion of energy coming from renewable sources increases in Hawaii and on Oahu, the average cost of electricity is expected to decrease.

Na Pua Makani Power Partners, LLC has also committed to establishing a Community Benefit fund and is in discussion with Kahuku community members regarding the details of its administration. It is anticipated that a 501 C3 Non-profit corporation will be formed and that Project funds ($10,000 per wind turbine per year) would go to the Non-profit. It is anticipated that the Non-profit would be governed and administered by a board of local community members who would make decisions as to the use of the proceeds and which activities, programs, groups, and events would be sponsored. To date, NPMPP has provided support to a number of local groups including Kahuku.org School to Work program, Kahuku High School Project Grad, Kahuku Elementary School May Day, Kahuku High School rugby, basketball, volleyball, and soccer teams, as well as providing food for families in need.

Comment TRANS-10.10: *The production that's made with the fuel that they use is not energy-energy.*

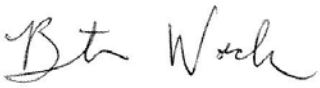
Response TRANS-10.10: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service do not understand your comment and are unable to respond appropriately.

Comment TRANS-10.11: *The contractors. They also benefit, but they all get their money up-front. The government subsidizes them. They all get their money up-front. So when do the consumers get this reduction and how is that possible when the cost of the overall cost of the windmill is more than the current cost? How is that going to reduce our current electricity bill?*

Response TRANS-10.11: Please see the responses to comments TRANS-10.5 and TRANS-10.9 regarding costs associated with developing the proposed Project and energy costs, respectively.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

TETRA TECH

April 4, 2016

Lokona Logan
[No Address given]

RE: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Logan,

On behalf of Na Pua Makani Power Partners, LLC, and the U.S. Fish and Wildlife Service, thank you for providing comments on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS) during the public the public meeting at Kahuku Community Center on June 23, 2015. Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment TRANS-11.1: *I'm here for the Hawaiian culture to see if they build this, do we still can go gather for the la`au lapa`au, the medicine, for gathering rights? As for the project and everything, I'm just here so that way I can just go gather what la`au lapa`au plants and everything that I need. That's all, to get access without any confrontation or questioning from them what I'm over here. That's all I want to say. You know what I mean. Just for my gathering rights 'cause I'm Hawaiian, 'cause I'm kanaka maoli. That's all.*

Response TRANS-11.1: A Cultural Impact Assessment was conducted for the proposed Project and is included as Appendix G to the EIS. Based upon the ethnographic interviews conducted as part of the CIA there does not appear to be a need for traditional access to the wind farm site for the collection of natural resources or for performing traditional cultural practices and no traditional activities were identified within the wind farm site. The Cultural Impact Assessment concludes that the Project would have no effect to traditional cultural uses and practices and that there would be no change in mauka/makai access through the proposed wind farm site.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

April 4, 2016

Mitch Dmohowski
1288 Ala Moana Boulevard, Unit 15G
Honolulu, HI 96814

RE: Proposed Na Pua Makani wind project and Habitat Conservation Plan Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Dmohowski,

On behalf of Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service thank you for providing comments on the proposed Na Pua Makani wind project (Project) and Habitat Conservation Plan Environmental Impact Statement (EIS) during the public the public meeting at Kahuku Community Center on June 23, 2015. Due to Project design changes and Hawaii Environmental Policy Act (HEPA) procedural requirements we are currently preparing a Second Draft EIS for public review under HEPA. In the Second Draft EIS any comments that were submitted on the original Draft EIS will be addressed. We provide the following information in response to your comments.

Comment TRANS-12.1: *I live in Kaka`ako. 1288 Ala Moana Boulevard, Unit 15G, Honolulu, Hawai`i 96814.*

Response TRANS-12.1: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your comment regarding residency.

Comment TRANS-12.2: *I'm in support of the project. The wind turbines are a clean proven form of technology for generating electricity and safe.*

Response TRANS-12.2: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your support of the proposed Project.

Comment TRANS-12.3: *This project, it's at a lower price than oil so it actually benefits the community as well.*

Response TRANS-12.3: As described in Section 1.3 of the Second Draft EIS, and noted in your comment, the proposed Project would provide a clean, source of renewable energy and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals. Hawaii has signed into law a requirement for 100 percent of electricity from renewable sources over the next 25 years. The cost of electricity for the consumers / residents of Hawaii is the blended average cost of all sources (e.g. oil, wind, solar, etc.) and current rates reflect that high cost from burning oil. Over time, as the proportion of energy coming from renewable sources increases, the average cost of electricity is expected to decrease.

Production of wind-generated energy by the Project would replace a portion of the State's electricity that is currently generated by burning fossil fuels. This would eliminate the use of approximately 13.44 barrels of oil for every hour of operation, thereby contributing to a decrease in the State's dependency on fossil fuels. The Project

Tetra Tech, Inc.
1750 Harbor Way, Suite 400, Portland, OR 97201
Tel 503.221.8636 Fax 503.227.1287 www.tetratech.com

would generate electricity at a cost that is approximately half the cost of generating electricity by burning fossil fuels and HECO has stated in filings with the PUC that the Project would save the ratepayers millions of dollars over the life of the Project.

Comment TRANS-12.4: *And wind farms are good neighbors, in my opinion. If it was a coal plant, I would be against it, or, like, an oil plant. But this is clean energy and it's using the natural resource here.*

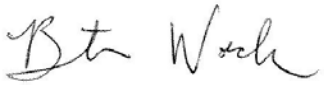
Response TRANS-12.4: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your comment regarding compatibility of the proposed Project with surrounding uses.

Comment TRANS-12.5: *And personally, I think they're beautiful. That's it.*

Response TRANS-12.5: Na Pua Makani Power Partners, LLC and the U.S. Fish and Wildlife Service acknowledge your comment regarding the visual aspects of wind turbines.

We appreciate the input provided and will include a copy of your letter in the Second Draft EIS for the Project. If you have any questions, please do not hesitate to contact me at 425.482.7645 or Brita.Woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: U.S. Fish and Wildlife Service
Na Pua Makani Power Partners, LLC

Public Comments and Responses on the Second Draft EIS

County Letters and Responses

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

May 17, 2016

KIRK CALDWELL, MAYOR

DUANE R. MIYASHIRO, Chair
ADAM C. WONG, Vice Chair
DAVID C. HULIHEE
KAPUA SPROAT
BRYAN P. ANDAYA

ROSS S. SASAMURA, Ex-Officio
FORD N. FUCHIGAMI, Ex-Officio

ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

ELLEN E. KITAMURA, P.E.
Deputy Manager and Chief Engineer

CO-7

Mr. Mike Cutbirth
Tetra Tech, Inc.
737 Bishop Street, Suite 2340
Mauka Tower
Honolulu, Hawaii 96813

Dear Mr. Cutbirth:

Subject: Your Letter Dated April 19, 2016 Requesting Comments on the Second Draft Environmental Impact Statement for the Proposed Na Pua Makani Wind Project Located at Kahuku
Tax Map Key: 5-6-006: 018, 047, 051, 055 and 5-6-008: 006

Thank you for the opportunity to comment on the proposed project.

1 The construction drawings should be submitted to the Board of Water Supply for review.

2 The on-site fire protection should be coordinated with the Fire Prevention Bureau of the Honolulu Fire Department.

If you have any questions, please contact Robert Chun, Project Review Branch of our Water Resources Division at 748-5443.

Very truly yours,

ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

June 26, 2016

Mr. Ernest Y.W. Lau, P.E.
Manager and Chief Engineer
City and County of Honolulu, Board of Water Supply
630 South Beretania Street
Honolulu, HI 96843

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Lau:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment CO-7.1*: The construction drawings should be submitted to the Board of Water Supply for review.*

Response CO-7.1: Project construction drawings will be submitted to the Board of Water Supply for review, should water service from the Board of Water Supply be required.

Comment CO-7.2*: The on-site fire protection should be coordinated with the Fire Prevention Bureau of the Honolulu Fire Department.*

Response CO-7.2: Na Pua Makani Power Partners, LLC, will coordinate all on-site fire protection requirements and procedures directly with the Fire Prevention Bureau of the Honolulu Fire Department prior to construction. The project is being designed to meet all Fire Department requirements.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

cc: Na Pua Makani Power Partners, LLC

POLICE DEPARTMENT

CITY AND COUNTY OF HONOLULU

801 SOUTH BERETANIA STREET · HONOLULU, HAWAII 96813
TELEPHONE: (808) 529-3111 · INTERNET: www.honolulupd.org

KIRK CALDWELL
MAYOR

LOUIS M. KEALOHA
CHIEF

MARIE A. McCAULEY
CARY OKIMOTO
DEPUTY CHIEFS

OUR REFERENCE MT-DK

May 2, 2016

CO-8

Mr. Mike Cutbirth
c/o Tetra Tech, Inc.
Mauka Tower
737 Bishop Street, Suite 2340
Honolulu, Hawaii 96813

Dear Mr. Cutbirth:

This is in response to a letter from Brita Woeck of Tetra Tech, Inc., (dated April 19, 2016) requesting comments on the Second Draft Environmental Impact Statement for the proposed Na Pua Makani Wind Project located in Koolauloa, near Kahuku.

1 The Honolulu Police Department (HPD) has reviewed this project and has concerns regarding the safe flow of vehicular traffic in vicinity of the project area.

We recommend that the project coordinator obtain the proper permits for oversized and/or overweight load vehicles. Having special duty officers to assist with the traffic flow of large vehicles transporting materials and equipment traveling from Kalaeloa to Kahuku would be prudent. This will prevent potential traffic issues where the conveyance of construction vehicles and equipment may span onto or over the line of the road lanes. The HPD also recommends that the developer implement traffic controls and management (e.g., flagmen, special duty officers, signs, cones, etc.) in the sector and around the project site to ensure a safe means of ingress/egress for large construction vehicles, motorists, and pedestrians in the vicinity.

If there are any questions, please call Major Gordon Gomes of District 4 (Kailua-Kaneohe-Kahuku) at 723-8639.

Thank you for the opportunity to review this project.

Sincerely,

LOUIS M. KEALOHA
Chief of Police

By
MARK TSUYEMURA
Management Analyst VI
Office of the Chief

June 26, 2016

Mr. Louis M. Kealoha
Chief of Police
City and County of Honolulu Police Department
801 South Beretania Street
Honolulu, HI 96813

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Kealoha:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment CO-8.1*: The Honolulu Police Department (HPD) has reviewed this project and has concerns regarding the safe flow of vehicular traffic in the vicinity of the project area.*

We recommend that the project coordinator obtain the proper permits for oversized and/or overweight load vehicles. Having special duty officers to assist with the traffic flow of large vehicles transporting materials and equipment traveling from Kalaeloa to Kahuku would be prudent. This will prevent potential traffic issues where the conveyance of construction vehicles and equipment may span onto or over the line of the road lanes. The HPD also recommends that the developer implement traffic controls and management (e.g., flagmen, special duty officers, signs, cones, etc.) in the sector and around the project site to ensure a safe means of ingress/egress for large construction vehicles, motorists, and pedestrians in the vicinity.

Response CO-8.1: Na Pua Makani Partners, LLC, is coordinating with the Hawaii Department of Transportation (HDOT) to ensure compliance with applicable HDOT regulations regarding the transport of turbines to the proposed wind farm site. This includes oversize and/or overweight load permit requirements. Section 4.17.3.1 of the Second Draft EIS identifies the following measures, consistent with HPD's comments, for construction traffic management that are anticipated to be required as part of these permits:

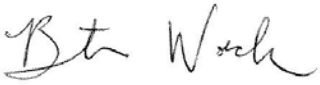
- Roundtrips between Kalaeloa Harbor and the wind farm site in Kahuku must be performed Monday through Saturday between the hours of 9:00 p.m. and 5:00 a.m.
- No oversized loads are allowed to be transported on Sundays or holidays.
- A minimum of four police escorts per load are required to help the oversized load navigate turns.
- Police escorts and/or flagpersons must provide traffic direction at the entrance to the Project Site on Kamehameha Highway during construction.

The Traffic Assessment Report in Appendix B provides additional information on specific intersections that would require police escorts to control traffic in order for the oversize loads to make the turns.

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

HONOLULU FIRE DEPARTMENT

CITY AND COUNTY OF HONOLULU

636 South Street
Honolulu, Hawaii 96813-5007
Phone: 808-723-7139 Fax: 808-723-7111 Internet: www.honolulu.gov/hfd

KIRK CALDWELL
MAYOR

MANUEL P. NEVES
FIRE CHIEF

LIONEL CAMARA JR.
DEPUTY FIRE CHIEF

May 12, 2016

CO-9

Mr. Mike Cutbirth
Tetra Tech, Inc.
737 Bishop Street, Suite 2340
Mauka Tower
Honolulu, Hawaii 96813

Dear Mr. Cutbirth:

Subject: Second Draft Environmental Impact Statement (DEIS) for the Proposed Na Pua Makani Wind Project
Kahuku, Hawaii
Tax Map Keys: 5-6-005: 018(portion)
5-6-006: 018, 047, 051, 055
5-6-008: 006(portion)

In response to your letter dated April 19, 2016, regarding the above-mentioned subject, the Honolulu Fire Department (HFD) requires that the following be complied with:

1

1. Fire department access roads shall be provided such that any portion of the facility or any portion of an exterior wall of the first story of the building is located not more than 150 feet from fire department access roads as measured by an approved route around the exterior of the building or facility. (National Fire Protection Association [NFPA] 1; Uniform Fire Code [UFC]™, 2012 Edition, Sections 18.2.3.2.2, 18.2.3.2.2.1.)

   A fire department access road shall extend to within 50 feet of at least one exterior door that can be opened from the outside and that provides access to the interior of the building. (NFPA 1; UFC™, 2012 Edition, Section 18.2.3.2.1.)

2

2. A water supply approved by the county, capable of supplying the required fire flow for fire protection, shall be provided to all premises upon which facilities or buildings, or portions thereof, are hereafter constructed, or moved into or within the county. When any portion of the facility or building is in excess of 150 feet from a water supply on a

fire apparatus access road, as measured by an approved route around the exterior of the facility or building, on-site fire hydrants and mains capable of supplying the required fire flow shall be provided when required by the AHJ [Authority Having Jurisdiction]. (NFPA 1; UFC™, 2012 Edition, Section 18.3.1, as amended.)

3 3. The unobstructed width and unobstructed vertical clearance of a fire apparatus access road shall meet county requirements. (NFPA 1; UFC™, 2012 Edition, Section 18.2.3.4.1.1 and 18.2.3.4.1.2, as amended.)

4 4. Submit civil drawings to the HFD for review and approval.

5 In addition, please comply with the requirements of the Fire Code, NFPA 1 2012 Edition, including the storage of battery systems.

Should you have questions, please contact Battalion Chief Terry Seelig of our Fire Prevention Bureau at 723-7151 or tseelig@honolulu.gov.

Sincerely,

SOCRATES D. BRATAKOS
Assistant Chief

SDB/SY:bh

June 26, 2016

Mr. Socrates D. Bratakos
Assistant Chief
City and County of Honolulu Fire Department
636 South Street
Honolulu, HI 96813-5007

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Bratakos:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment CO-9.1*: Fire department access roads shall be provided such that any portion of the facility or any portion of an exterior wall of the first story of the building is located not more than 150 feet from fire department access roads as measured by an approved route around the exterior of the building or facility. (National Fire Protection Association [NFPA] 1; Uniform Fire Code [UFC]™, 2012 Edition, Sections 18.2.3.2.2, 18.2.3.2.2.1.)*

A fire department access road shall extend to within 50 feet of at least one exterior door that can be opened from the outside and that provides access to the interior of the building. (NFPA 1; UFC™, 2012 Edition, Section 18.2.3.2.1.)

Response CO-9.1: The Project will be designed in compliance with Fire Department access road requirements. Access roads will be extended to within 50 feet of an exterior door of any proposed building or facility

Comment CO-9.2*: A water supply approved by the county, capable of supplying the required fire flow for fire protection, shall be provided to all premises upon which facilities or building, or portions thereof, are hereafter constructed, or moved into or within the county. When any portion of the facility or building is in excess of 150 feet from a water supply on a fire apparatus access road, as measured by an approved route around the exterior of the facility or building, on-site fire hydrants and mains capable of supplying the required fire flow shall be provided when required by the AHJ [Authority Having Jurisdiction]. (NFPA 1; UFC™, 2012 Edition, Section 18.3.1, as amended.)*

Response CO-9.2: The Project will be designed for compliance with water supply requirements. Adequate water supply will be provided to a fire hydrant adjacent to the facilities and building, as required. If required, an approved flow rate will be determined once building plans are completed.

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

Comment CO-9.3*: The unobstructed width and unobstructed vertical clearance of a fire apparatus access road shall meet county requirements. (NFPA 1; UFC™, 2012 Edition, Section 18.2.3.4.1.1 and 18.2.3.4.1.2, as amended.)*

Response CO-9.3: The Project will be designed to facilitate access by fire equipment. Requirements for access road width, turn around, and vertical clearance will be met by the Project.

Comment CO-9.4*: Submit civil drawings to the HFD for review and approval.*

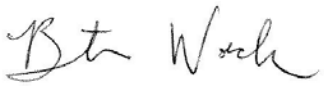
Response CO-9.4: Drawings will be submitted to the HFD for approval. This will occur after publication of the Final EIS.

Comment CO-9.5*: In addition, please comply with the requirements for the Fire Code, NFPA 1; 2012 Edition, including the storage of battery systems.*

Response CO-9.5: The Project will be designed to be for compliance with the Fire Code and Na Pua Makani Power Partners, LLC, will coordinate with the HFD regarding this topic. Please note that the proposed Project does not include a battery storage system.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

DEPARTMENT OF TRANSPORTATION SERVICES
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, THIRD FLOOR
HONOLULU, HAWAII 96813
Phone: (808) 768-8305 • Fax: (808) 768-4730 • Internet: www.honolulu.gov

KIRK CALDWELL
MAYOR

MICHAEL D. FORMBY
DIRECTOR

MARK N. GARRITY, AICP
DEPUTY DIRECTOR

TP4/16-612469R

May 27, 2016

CO-10

Mr. Mike Cutbirth
c/o Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Mauka Tower
Honolulu, Hawaii 96813

Dear Mr. Cutbirth:

SUBJECT: Second Draft Environmental Impact Statement, Proposed Na Pua Makani Wind Project, Kahuku, Oahu, Hawaii

In response to a letter that we received from Ms. Brita Woeck, from Tetra Tech, Inc., dated April 19, 2016, we have the following comments:

1 1. The area Neighborhood Board, as well as the area residents, businesses, emergency personnel (fire, ambulance and police), Oahu Transit Services, Inc. (TheBus), etc., should continue to be kept apprised of the details of the propose project and the impacts that the project may have on the adjoining local street area network during delivery of materials and equipment and during construction.

2 2. A street usage permit from the City's Department of Transportation Services should be obtained for any construction-related work and/or material and equipment delivery that may require the temporary closure of any traffic lane on a City street.

Thank you for the opportunity to review this matter. Should you have any questions, please contact Renee Yamasaki of my staff at 768-8383.

Very truly yours,

Michael D. Formby
Director

June 30, 2016

Michael D. Formby
Director
City and County of Honolulu, Department of Transportation Services
650 South King Street, Third Floor
Honolulu, HI 96813

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Formby:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment CO-10.1*: The area Neighborhood Board, as well as the area residents, businesses, emergency personnel (fire, ambulance and police), Oahu Transit Services, Inc. (TheBus), etc., should continue to be kept apprised of the details of the propose project and the impacts that the project may have on the adjoining local street area network during delivery of materials and equipment and during construction.*

Response CO-10.1: Community notifications, timing restrictions, including the delivery of superloads at night, and other measures would be implemented to avoid traffic impacts (see EIS Section 4.17 – Transportation for additional information). Specific measure for avoiding and minimizing traffic impacts will be developed in coordination with the Hawaii Department of Transportation and City and County of Honolulu Department of Transportation Services, and incorporated under the respective permits.

Comment CO-10.2*: A street usage permit from the City's Department of Transportation Services should be obtained for any construction-related work and/or material and equipment delivery that may require the temporary closure of any traffic lane on a City street.*

Response CO-10.2: Thank you for confirming the need for a street usage permit. Na Pua Makani Power Partners, LLC will coordinate directly with the City and County of Honolulu Department of Transportation Services to make sure all permit requirements are met.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

DEPARTMENT OF FACILITY MAINTENANCE

CITY AND COUNTY OF HONOLULU

1000 Ulu`ohia Street, Suite 215, Kapolei, Hawaii 96707
Phone: (808) 768-3343 • Fax: (808) 768-3381
Website: www.honolulu.gov

KIRK CALDWELL
MAYOR

ROSS S. SASAMURA, P.E.
DIRECTOR AND CHIEF ENGINEER

EDUARDO P. MANGLALLAN
DEPUTY DIRECTOR

IN REPLY REFER TO:
DRM 16-433

June 3, 2016

CO-11

Mr. Mike Cutbirth
C/O Tetra Tech, Incorporated
737 Bishop Street, Suite 2340, Mauka Tower
Honolulu, Hawaii 96813

Dear Mr. Cutbirth:

SUBJECT: Second Draft Environmental Impact Statement for the Proposed Na Pua Makani Wind Project located at Kahuku, Koolauloa, Hawaii, TMKs (1) 5-6-005:018 (portion); (1) 5-6-006:018, 047, 051, 055; and (1) 5-6-008:006 (portion)

Thank you for the opportunity to review and comment on your letter dated April 19, 2016, on the above subject.

1 We have no comments, as we do not have any facilities or easements on the subject property.

If you have any questions, please call Mr. Kyle Oyasato of the Division of Road Maintenance at 768-3697.

Sincerely,

Ross Sasamura, P.E.
Director and Chief Engineer

June 26, 2016

Mr. Ross Sasamura, P.E.
Director and Chief Engineer
City and County of Honolulu, Department of Facility Maintenance
1000 Ulu'ohia Street, Suite 215
Kapolei, HI 96707

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Sasamura:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We appreciate your confirmation that no City and County of Honolulu facilities or easements are on the Project property.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

Individual Letters and Responses

IND-70

5/8/16

Ms. Suzanne Case, Chairperson
Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

Dear Ms. Case:

My comments are about the Na Pua Makani wind project and their revised draft environmental impact statement.

1 The Na Pua Makani wind project is important to our north shore community. It is a clean energy project that protects our aina and helps the state become more energy independent. We have to get away from burning oil and coal, and even garbage for our electricity.

2 The developer has worked closely with the community and partnered with us. He has offered a generous community benefits package for his project, which will help us address some of the many needs in Kahuku. He has also been very open and honest with our community and has worked hard to address our concerns. One recent change for the better is that he will be utilizing newer, more efficient technology with bigger blades which reduces the number of wind turbines for less visual impact.

For these reasons, I support the Na Pua Makani wind project that will help lower electricity bills for Oahu, while keeping our environment clean.

Sincerely,

Sterling Carvalho

Sterling Carvalho

June 30, 2016

Mr. Sterling Carvalho
No address provided

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Carvalho:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment IND-70.1*: The Na Pua Makani wind project is important to our north shore community. It is a clean energy project that protects our aina and helps the state become more energy independent. We have to get away from burning oil and coal, and even garbage for our electricity.*

Response IND-70.1: As noted in your comment the proposed Project would provide a clean source of renewable energy and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals. The Project would also contribute to reducing the cost of electricity and would reduce greenhouse gas emissions and other forms of pollution associated with coal or diesel fuel electric generation.

Comment IND-70.2: *The developer has worked closely with the community and partnered with us. He has offered a generous community benefits package for his project, which will help us address some of the many needs in Kahuku. He has also been very open and honest with our community and has worked hard to address our concerns. One recent change for the better is that he will be utilizing newer, more efficient technology with bigger blades which reduces the number of wind turbines for less visual impact.*

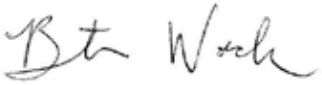
Response IND-70.2: As noted in your comment, Na Pua Makani Power Partners, LLC, has committed to establishing a Community Benefit fund and is in discussion with Kahuku community members regarding the details of its administration. It is anticipated that Project funds ($10,000 per wind turbine per year) would be administered by a board of local community members who would make decisions as to the use of the proceeds and which activities, programs, groups, and events would be sponsored.

As noted in your comment, and described in Section 2.1 of the EIS, the Project design has been modified several times in response to community input. Visual simulations showing the proposed Project with fewer, but taller wind turbines are included in Section 4.16 of the EIS.

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

Ind-71

May 20, 2016

Ms. Suzanne Case
State Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

Dear Board Chair:

1 The Na Pua Makani wind project is a clean energy project that helps Hawaii become more energy independent and move away from burning fossil fuels for electricity.

2 The developer has offered us a generous community benefits package, which would help us *address some of the many needs in Kahuku.*

3 The project will create permanent jobs that are badly needed. And, he is now reducing the amount of wind towers he will install, so that is less visual impacts.

Mahalo,

Bob Comeau

Bob Comeau
P. O. Box 77
Ka'a'awa, Hawaii 96730

June 30, 2016

Mr. Bob Comeau
PO Box 77
Ka'a'awa, HI 96730

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Comeau:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment IND-71.1*: The Na Pua Makani wind project is a clean energy project that helps Hawaii become more energy independent and move away from burning fossil fuels for electricity.*

Response IND-71.1: As noted in your comment the proposed Project would provide a clean source of renewable energy and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals. The Project would also contribute to reducing the cost of electricity and would reduce greenhouse gas emissions and other forms of pollution associated with coal or diesel fuel electric generation.

Comment IND-71.2*: The developer has offered us a generous community benefits package, which would help us address some of the many needs in Kahuku.*

Response IND-71.2: As noted in your comment, Na Pua Makani Power Partners, LLC, has committed to establishing a Community Benefit fund and is in discussion with Kahuku community members regarding the details of its administration. It is anticipated that Project funds ($10,000 per wind turbine per year) would be administered by a board of local community members who would make decisions as to the use of the proceeds and which activities, programs, groups, and events would be sponsored.

Comment IND-71.3*: The project will create permanent jobs that are badly needed. And, he is now reducing the amount of wind towers he will install, so that is less visual impacts.*

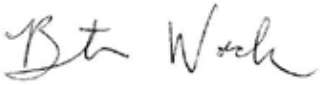
Response IND-71.3: Section 4.12 of the EIS describes socioeconomic impacts. The Project would have both short-term and long-term economic benefits. Direct employment of 43 full-time equivalent jobs during construction as well as construction-related expenditures and spending by construction workers would benefit the local economy. Operation of the Project would have similar, but smaller impacts.

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

As noted in your comment, and described in Section 2.1 of the EIS, the Project design has been modified several times in response to community input. Visual simulations showing the proposed Project with fewer, but taller wind turbines are included in Section 4.16 of the EIS.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

Ind-72

Ms. Suzanne Case, Chairperson
Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

Dear Chairperson,

1

I support the Na Pua Makani wind project, and am glad to hear that the developer can reduce number of wind turbines going in.

This shows that the developer has listened to the community's concerns and is now building less, not more wind turbines.

This is an improvement, and we should be supporting, not discouraging future green energy projects like this.

Sincerely,

Bob Ueda

Bob Ueda
56-388 Huehu Street
Kahuku, Hawaii 96731

June 30, 2016

Mr. Bob Ueda
56-388 Huehu Street
Kahuku, HI 96731

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Ueda:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment IND-72.1*: I support the Na Pua Makani wind project, and am glad to hear that the developer can reduce number of wind turbines going in.*

This shows that the developer has listened to the community's concerns and is now building less, not more wind turbines.

This is an improvement, and we should be supporting, not discouraging future green energy projects like this.

Response IND-72.1: As noted in your comment, and described in Section 2.1 of the EIS, the Project design has been modified several times in response to community input. Visual simulations showing the proposed Project with fewer, but taller wind turbines are included in Section 4.16 of the EIS.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

NĀ PUA MAKANI
Clean Energy Powering Hawai'i's Future

IND-73

Na Pua Makani Wind Project
Second Draft Environmental Impact Statement
Public Comment Form

For more information visit: **http://oeqc.doh.hawaii.gov/Shared%20Documents/Environmental_Notice/2016-04-23%20TEN.pdf**

Comments can be submitted by email to **brita.woeck@tetratech.com**, or by U.S. Mail addressed to:

Mike Cutbirth
C/O Tetra Tech, Inc.
737 Bishop St., Suite 2340, Mauka Tower
Honolulu, HI 96813
*All comments should be submitted/postmarked by **June 7, 2016.**

Background:

The original Draft EIS for the Na Pua Makani Wind Project (Project) was published on June 8, 2015. In response to public comments on the original Draft EIS related to visual impacts, Na Pua Makani reevaluated the proposed turbine locations and turbine models considered in the original Draft EIS. Through this effort, Na Pua Makani was able to reduce the maximum number of turbines needed to meet the target generating capacity for the Project from 10 to 9 wind turbines, and potentially 8 wind turbines depending on the model ultimately selected. This modification takes advantage of recent technological advancements that have resulted in the availability of uprated versions of turbine models that have increased generating capacity, are more efficient, and are better suited for the existing wind conditions of the wind farm site than previous models. **This Second Draft EIS incorporates a Modified Proposed Action Option, consisting of 9 larger wind turbines with greater generating capacities.**

**The purpose of this Second Draft EIS is to inform stakeholders of modifications to the proposed Project since the publication of the original Draft EIS; we are seeking comments related to these Project design changes only.

**Comments previously provided on the Project have been incorporated into the Second Draft EIS; therefore, there is no need to resubmit comments provided during the previous public comment periods.

Name: Charlene Keliiliki

Address: 55-087 B Lanihuili St. Laie, HI 96762

Email:

Comments: I support this project because it will be good for the environment

1

June 30, 2016

Ms. Charlene Keliiliki
55-087B Lanihuili St.
Laie, HI 96762

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Keliiliki,

On behalf of Na Pua Makani Power Partners, LLC, thank you for the submittal of your comments on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment IND-73.1*: I support this project because it will be good for the environment.*

Response IND-73.1: Na Pua Makani Power Partners, LLC, acknowledges your support for the proposed Project.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

IND-74

Ms. Suzanne Case, Chairperson
Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

May 20, 2016

Dear Ms. Case,

1

All of us support renewable energy and understand the value of reducing the amount of imported oil to Hawaii. We now have a law for 100% renewable energy in the next 30 years, so Hawaii can be independent of imported oil and our state can be healthier and cleaner.

With the approval of this wind project, Na Pua Makani, the state will continue to move in the right direction for a cleaner, greener aina. Having the developer agree to using new technology and building less structures is also a plus for our community.

Mahalo,

Dino Vendiola
56-270 Huehu St.
Kahuku, HI 96731

June 30, 2016

Mr. Dino Vendiola
56-270 Huehu St.
Kahuku, HI 96731

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Vendiola:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment IND-74.1*: All of us support renewable energy and understand the value of reducing the amount of imported oil to Hawaii. We now have a law for 100% renewable energy in the next 30 years, so Hawaii can be independent of imported oil and our state can be healthier and cleaner.*

With the approval of this wind project, Na Pua Makani, the state will continue to move in the right direction for a cleaner, greener aina. Having the developer agree to using new technology and less structures is also a plus for our community.

Response IND-74.1: As noted in your comment the proposed Project would provide a clean source of renewable energy and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals. The Project would also contribute to reducing the cost of electricity and would reduce greenhouse gas emissions and other forms of pollution associated with coal or diesel fuel electric generation.

The factors taken into account in designing the proposed Project are described in Section 2.1 of the EIS. The Project design has been modified several times in response to community input, and as your comment notes now includes newer turbine technology which are more efficient. Visual simulations showing the proposed Project with fewer, but taller wind turbines are included in Section 4.16 of the EIS.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

IND-75

Ms. Suzanne Case, Chair
Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

Dear Chair Case,

My letter is regarding the second draft of the environmental impact statement for the Na Pua Makani wind project.

1 This new wind farm project planned for our Kahuku area will have lots of benefits and a lot of community people, not only me support it. Other than green energy, cheaper electricity and a nice community benefits package, the project would provide more jobs in our area.

2 From the beginning, the developer has always been very open and talks to us, and has taken the time to answer a lot of our questions and concerns. He has had good communication with our community and explained how the project will benefit our community and the island by providing renewable energy in a safe, clean and cost-effective way.

Mahalo,

5/12/16

Jacob Primacio
PO BOX 158
Kahuku, HI 96731

June 30, 2016

Mr. Jacob Primacio
P.O. Box 158
Kahuku, HI 96731

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Primacio:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment IND-75.1*: This new wind farm project planned for our Kahuku area will have lots of benefits and a lot of community people, not only me support it. Other than green energy, cheaper electricity and a nice community benefits package, the project would provide more jobs in our area.*

Response IND-75.1: As noted in your comment and described in Section 1.3 of the EIS, the proposed Project would provide a clean source of renewable energy. The proposed Project would contribute to reducing the cost of electricity and provide short- and long-term jobs. These topics are described in Sections 4.5 and 4.12 of the EIS.

Comment IND-75.2*: From the beginning, the developer has always been very open and talks to us, and has taken the time to answer a lot of our questions and concerns. He has had good communication with our community and explained how the project will benefit our community and the island by providing renewable energy in a safe, clean and cost-effective way.*

Response IND-75.2: Na Pua Makani Power Partners, LLC continues its involvement in the community. Since publication of the original Draft EIS in June 2015, representatives of the proposed Project have attended neighborhood board meetings and met individually with members of the community to keep them informed about updates in the Project design.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

NĀ PUA MAKANI
Clean Energy Powering Hawai'i's Future

IND-76

Na Pua Makani Wind Project
Second Draft Environmental Impact Statement
Public Comment Form

For more information visit: **http://oeqc.doh.hawaii.gov/Shared%20Documents/Environmental_Notice/2016-04-23%20TEN.pdf**

Comments can be submitted by email to **brita.woeck@tetratech.com**, or by U.S. Mail addressed to:

Mike Cutbirth
C/O Tetra Tech, Inc.
737 Bishop St., Suite 2340, Mauka Tower
Honolulu, HI 96813
*All comments should be submitted/postmarked by **June 7, 2016.**

Background:

The original Draft EIS for the Na Pua Makani Wind Project (Project) was published on June 8, 2015. In response to public comments on the original Draft EIS related to visual impacts, Na Pua Makani reevaluated the proposed turbine locations and turbine models considered in the original Draft EIS. Through this effort, Na Pua Makani was able to reduce the maximum number of turbines needed to meet the target generating capacity for the Project from 10 to 9 wind turbines, and potentially 8 wind turbines depending on the model ultimately selected. This modification takes advantage of recent technological advancements that have resulted in the availability of uprated versions of turbine models that have increased generating capacity, are more efficient, and are better suited for the existing wind conditions of the wind farm site than previous models. **This Second Draft EIS incorporates a Modified Proposed Action Option, consisting of 9 larger wind turbines with greater generating capacities.**

**The purpose of this Second Draft EIS is to inform stakeholders of modifications to the proposed Project since the publication of the original Draft EIS; we are seeking comments related to these Project design changes only.

**Comments previously provided on the Project have been incorporated into the Second Draft EIS; therefore, there is no need to resubmit comments provided during the previous public comment periods.

Name: John Keliiliki

Address: 55-087 B Lanihuli St.
Laie, HI 96762

Email:

Comments:

1 I support the proposed increase in turbine height as it will make them ~~the~~ more effective

June 30, 2016

Mr. John Keliiliki
55-087B Lanihuli St.
Laie, HI 96762

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Keliiliki:

On behalf of Na Pua Makani Power Partners, LLC, thank you for the submittal of your comments on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment IND-76.1*: I support the proposed increase in turbine height as it will make them more effective.*

Response IND-76.1: Na Pua Makani Power Partners, LLC, acknowledges your support for the proposed Project. More information on the changes in the proposed Project is included in Chapter 2 of the EIS.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

IND-77

May 21, 2016

Ms. Suzanne Case, Chairwoman
State of Hawaii
Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

Chairwoman Case,

1 I understand that the Na Pua Makani developer is reducing the number of wind turbines he plans to build. This is a good example of his willingness to listen to the community.

2 He has taken the time and spent the money to do a complete environmental review to bring out the facts and refute the myths out here in the community.

Nothing is perfect, but a wind farm is better than building more power plants and burning more coal, oil and even trash to provide our homes with electricity.

Sincerely,

Joseph Kalili

Joseph Kalili
P.O. Box 71
Hau'ula, Hawaii 96717

June 30, 2016

Mr. Joseph Kalili
P.O. Box 71
Hau'ula, HI 96717

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Kalili:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment IND-77.1*: I understand that the Na Pua Makani developer is reducing the number of wind turbines he plans to build. This is a good example of his willingness to listen to the community.*

Response IND-77.1: As noted in your comment, and described in Section 2.1 of the EIS, the Project design has been modified several times in response to community input. Visual simulations showing the proposed Project with fewer, but taller wind turbines are included in Section 4.16 of the EIS.

Comment IND-77.2*: He has taken the time and spent the money to do a complete environmental review to bring out the facts and refute the myths out here in the community.*

Nothing is perfect, but a wind farm is better than building more power plants and burning more coal, oil and even trash to provide our homes with electricity.

Response IND-77.2: Na Pua Makani Power Partners, LLC continues its involvement in the community. Since publication of the original Draft EIS in June 2015, representatives of the proposed Project have attended neighborhood board meetings and met individually with members of the community to keep them informed about updates in the Project design. The purpose and need for the proposed Project, which is to provide a clean, renewable source of energy to Oahu is discussed in Section 2.1 of the EIS.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

IND-78

Ms. Suzanne Case
Chairman
State Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

May 20, 2016

Dear Chair Case:

1

The developer of the Na Pua Makani Wind Project has been a good neighbor and has contributed to the welfare of our community.

He has helped our athletic clubs so they can participate in tournaments on the neighbor islands and the mainland. He has also set up a community benefits endowment to assist the community in the long term.

2

He redesigned his project so there are now going to be less structures built. And the wind farm will be more renewable energy for Hawaii.

Sounds like a win-win situation for the public.

Aloha,

Junior

Junior Primacio
P. O. Box 278
Hau'ula, HI 96717

June 30, 2016

Mr. Junior Primacio
P.O. Box 278
Hau'ula, HI 96717

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Primacio:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment IND-78.1*: The developer of the Na Pua Makani Wind Project has been a good neighbor and has contributed to the welfare of our community.*

He has helped our athletic clubs so they can participate in tournaments on the neighbor islands and the mainland. He has also set up a community benefits endowment to assist the community in the long term.

Response IND-78.1: As noted in your comment, Na Pua Makani Power Partners, LLC, has committed to honor the commitments of the original developer and establish a Community Benefit fund for the community. It is anticipated that Project funds ($10,000 per wind turbine per year) would be paid to a non-profit corporation to be administered by a board of local community members who would make decisions as to the use of the proceeds and which activities, programs, groups, and events would be sponsored.

Comment IND-78.2*: He redesigned his project so there are now going to be less structures built. And the wind farm will be more renewable energy for Hawaii.*

Response IND-78.2: The Project design has been modified several times in response to community input. The most recent updates to the proposed Project are described in Section 2.1 of the EIS. Visual simulations showing the proposed Project with fewer, but taller wind turbines are included in Section 4.16 of the EIS.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural

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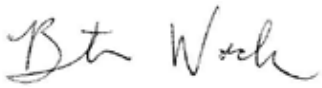
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

IND-79

Ms. Suzanne Case, Chair
Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

Dear Chair Case,

My letter is in reference to the second draft of the environmental impact statement for the Na Pua Makani wind project.

1 This new wind farm project planned for our north shore area will have many benefits and many community members including myself support it. Besides green energy, lower cost electricity and a generous community benefits package, the project would provide much needed jobs in our area.

2 From day one, the developer has always been very open and accessible to us, and has taken the time to address all of our questions and concerns. He has had good communication with our community and explained how the project will benefit our community and the island by providing renewable energy in a safe, clean and cost-effective way.

Mahalo,

Lee Hup

55-133 KULANUI ST B
LAIE, HI 96762

June 30, 2016

Mr. Lee Harp
55-133 Kulanui St. B
Laie, HI 96762

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Harp:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment IND-79.1*: This new wind farm project planned for our north shore area will have many benefits and many community members including myself support it. Besides green energy, lower cost electricity and a generous community benefits package, the project would provide much needed jobs in our area.*

Response IND-79.1: As noted in your comment the proposed Project would provide a clean source of renewable energy and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals. The Project would also contribute to reducing the cost of electricity, provide short- and long-term jobs, and would reduce greenhouse gas emissions and other forms of pollution associated with coal or diesel fuel electric generation.

Comment IND-79.2*: From day one, the developer has always been very open and accessible to us, and has taken the time to address all of our questions and concerns. He has had good communication with our community and explained how the project will benefit our community and the island by providing renewable energy in a safe and cost-effective way.*

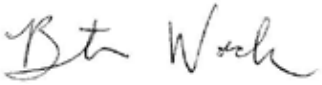
Response IND-79.2: Na Pua Makani Power Partners, LLC continues its involvement in the community. Since publication of the original Draft EIS in June 2015, representatives of the proposed Project have attended neighborhood board meetings and met individually with members of the community to keep them informed about updates in the Project design.

The Project design has been modified several times in response to community input. The most recent updates to the proposed Project are described in Section 2.1 of the EIS. Visual simulations showing the proposed Project with fewer, but taller wind turbines are included in Section 4.16 of the EIS.

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

IND-80

([redacted]) 5/21/16

Ms. Suzanne Case
Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

Dear Chair Case,

I am sending you my comments on the second draft environmental impact statement for the Na Pua Makani wind project.

I am sure everyone agrees that global warming is a real threat to our island state, and we all have to work together to reduce our carbon footprint.

1 The Kahuku Na Pua Makani wind farm is a move in the right direction to help us get away from burning fossil fuels for electricity.

I congratulate the state for setting the goal of 100% clean energy by 2045. But to do so, we have to approve and build green energy projects like this. Clean energy is the only way to go.

Thank you for the opportunity to provide you with comments on the Na Pua Makani wind energy project.

Mahalo,

55-133 KULANUI ST B
LAIE, HI 96762

June 30, 2016

Ms. Mibi Harp
55-133 Kulanui St. B
Laie, HI 96762

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Harp:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment IND-80.1*: I am sure everyone agrees that global warming is a real threat to our island state, and we all have to work together to reduce our carbon footprint.*

The Kahuku Na Pua Makani wind farm is a move in the right direction to help us get away from burning fossil fuels for electricity.

I congratulate the state for setting the goal of 100% clean energy by 2045. But to do so, we have to approve and build green energy projects like this. Clean energy is the only way to go.

Response IND-80.1: As noted in your comment the proposed Project would provide a clean source of renewable energy and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals. The Project would also contribute to reducing the cost of electricity and would reduce greenhouse gas emissions and other forms of pollution associated with coal or diesel fuel electric generation. The purpose and need for the proposed Project are described in Section 1.4 of the EIS.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

NĀ PUA MAKANI
Clean Energy Powering Hawai'i's Future

IND-81

Na Pua Makani Wind Project
Second Draft Environmental Impact Statement
Public Comment Form

For more information visit: **http://oeqc.doh.hawaii.gov/Shared%20Documents/Environmental_Notice/2016-04-23%20TEN.pdf**

Comments can be submitted by email to **brita.woeck@tetratech.com**, or by U.S. Mail addressed to:

Mike Cutbirth
C/O Tetra Tech, Inc.
737 Bishop St., Suite 2340, Mauka Tower
Honolulu, HI 96813
*All comments should be submitted/postmarked by **June 7, 2016.**

Background:

The original Draft EIS for the Na Pua Makani Wind Project (Project) was published on June 8, 2015. In response to public comments on the original Draft EIS related to visual impacts, Na Pua Makani reevaluated the proposed turbine locations and turbine models considered in the original Draft EIS. Through this effort, Na Pua Makani was able to reduce the maximum number of turbines needed to meet the target generating capacity for the Project from 10 to 9 wind turbines, and potentially 8 wind turbines depending on the model ultimately selected. This modification takes advantage of recent technological advancements that have resulted in the availability of uprated versions of turbine models that have increased generating capacity, are more efficient, and are better suited for the existing wind conditions of the wind farm site than previous models. **This Second Draft EIS incorporates a Modified Proposed Action Option, consisting of 9 larger wind turbines with greater generating capacities.**

**The purpose of this Second Draft EIS is to inform stakeholders of modifications to the proposed Project since the publication of the original Draft EIS; we are seeking comments related to these Project design changes only.

**Comments previously provided on the Project have been incorporated into the Second Draft EIS; therefore, there is no need to resubmit comments provided during the previous public comment periods.

Name: Mibi Harp

Address: 55-133A Kulanui St.
Laie, HI 96762

Email:

Comments: I support this project because I believe
1 in renewable energy & this will help us
as a state & community

June 30, 2016

Ms. Mibi Harp
55-133A Kulanui St.
Laie, HI 96762

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Harp:

On behalf of Na Pua Makani Power Partners, LLC, thank you for the submittal of your comments on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment IND-81.1*: I support this project because I believe in renewable energy and this will help us as a state and community.*

Response IND-81.1: Na Pua Makani Power Partners, LLC, acknowledges your support of the proposed Project.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

IND-82

May 12, 16

Ms. Suzanne Case, Chairperson
Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

Dear Chairperson Case and board members,

RE: Comments to Na Pua Makani Revised Draft Environmental Impact Statement

I am writing you to comment on the Na Pua Makani wind project.

1 I believe that the developer has done a good job in explaining all the facts and answering the questions in the community about visual impacts, health concerns and other issues that have been brought up. I know this developer has worked hard to revise his project to address many of our issues.

2 One very promising change is that he plans to use newer technology, which means less visual impact with fewer turbines even though the blade tips are a little taller. No one is going to notice this from their homes or the highway. We will not see as much structures.

For these reasons, I am supportive of their project and speak for myself as a residing community member.

Sincerely,

Melissa Primacio

June 30, 2016

Ms. Melissa Primacio
No address provided

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Primacio:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment IND-82.1*: I believe that the developer has done a good job in explaining all the facts and answering the questions in the community about visual impacts, health concerns and other issues that have been brought up. I know this developer has worked hard to revise his project to address many of our issues.*

Response IND-82.1: Na Pua Makani Power Partners, LLC continues its involvement in the community. Since publication of the original Draft EIS in June 2015, representatives of the proposed Project have attended neighborhood board meetings and met individually with members of the community to keep them informed about updates in the Project design.

Comment IND-82.2*: One very promising change is that he plans to use newer technology, which means less visual impact with fewer turbines even though the blade tips are a little taller. No one is going to notice this from their homes or the highway. We will not see as much structures.*

For these reasons, I am supportive of their project and speak for myself as a residing community member.

Response IND-82.2: The Project design has been modified several times in response to community input. The recent updates to the proposed Project area described in Section 2.1 of the EIS. While the wind turbines would be visible from vantage points in the community, the newer "uprated" turbine models would not result in additional visual impact compared to the original turbine models considered. From some viewpoints, fewer turbines would be visible. Visual simulations showing the proposed Project with fewer, but taller wind turbines are included in Section 4.16 of the EIS.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural

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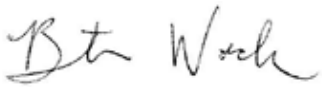
Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

IND-83 5/14/16

Ms. Suzanne Case, Chairperson
Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

Dear Chairperson Case and board members,

RE: Comments to Na Pua Makani Revised Draft Environmental Impact Statement

I am writing you to comment on the Na Pua Makani wind project.

1 I think the developer has done a good job explaining all the facts and answering all the questions in the community about visual impacts, health concerns and other issues that have been brought up. I know this developer has worked hard to revise his project to address many of our issues.

2 One very promising change is that he plans to use newer technology, which means less visual impact with fewer turbines even though the blade tips are a little taller. No one is going to notice this from their homes or the highway. But they will see less structures.

For these reasons, I am satisfied with their project.

Sincerely,

Jane Calley
55-133 Kulanui St A
Laie, Hi 96762

June 30, 2016

Ms. Sara Calley
55-133 Kulanui St. A
Laie, HI 96762

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Calley:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment IND-83.1*: I think the developer has done a good job explaining all the facts and answering all the questions in the community about visual impacts, health concerns and other issues that have been brought up. I know this developer has worked hard to revise his project to address many of our issues.*

Response IND-83.1: Na Pua Makani Power Partners, LLC continues its involvement in the community. Since publication of the original Draft EIS in June 2015, representatives of the proposed Project have attended neighborhood board meetings and met individually with members of the community to keep them informed about updates in the Project design.

Comment IND-83.2*: One very promising change is that he plans to use newer technology, which means less visual impact with fewer turbines even though the blade tips are a little taller. No one is going to notice this from their homes or the highway. But they will see less structures.*

Response IND-83.2: The Project design has been modified several times in response to community input. The recent updates to the proposed Project area described in Section 2.1 of the EIS. While the wind turbines would be visible from vantage points in the community, the newer "uprated" turbine models would not result in additional visual impact compared to the original turbine models considered. From some viewpoints, fewer turbines would be visible. Visual simulations showing the proposed Project with fewer, but taller wind turbines are included in Section 4.16 of the EIS.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural

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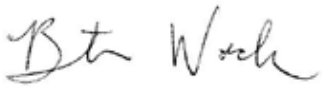
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

IND-84

May 19, 2016

Ms. Suzanne Case, Chairperson
Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

Dear Chairwoman Case,

1 Na Pua Makani wind project in Kahuku plans to reduce the number of wind turbines they erect, from 13 to 10 and maybe even less. That's a plus for anyone concerned about visual impacts.

2 Maybe more importantly, the wind project will help us move away from importing fossil fuels for our energy needs. Electricity bills fluctuate with the cost of a barrel of oil and we can bring *down the cost of electricity by using more renewable sources like wind, solar and bio-fuel. It's* better for our environment, and the way to move forward.

Mahalo,

Sim Caban

Sim Caban
P.O. Box 125
Kahuku, Hawaii 96731

June 30, 2016

Mr. Simplicio Caban
P.O. Box 125
Kahuku, HI 96731

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Caban:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment IND-84.1*: Na Pua Makani wind project in Kahuku plans to reduce the number of wind turbines they erect, from 13 to 10 and maybe even less. That's a plus for anyone concerned about visual impacts.*

Response IND-84.1: The Project design has been modified several times in response to community input. The recent updates to the proposed Project area described in Section 2.1 of the EIS. While the wind turbines would be visible from vantage points in the community, the newer "uprated" turbine models would not result in additional visual impact compared to the original turbine models considered. From some viewpoints, fewer turbines would be visible. Visual simulations showing the proposed Project with fewer, but taller wind turbines are included in Section 4.16 of the EIS.

Comment IND-84.2*: Maybe more importantly, the wind project will help us move away from importing fossil fuels for our energy needs. Electricity bills fluctuate with the cost of a barrel of oil and we can bring down the cost of electricity by using more renewable sources like wind, solar and bio-fuel. It's better for our environment, and the way to move forward.*

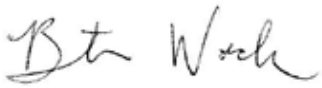
Response IND-84.2: As noted in your comment the proposed Project would provide a clean source of renewable energy and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals. The Project would also contribute to reducing the cost of electricity and would reduce greenhouse gas emissions and other forms of pollution associated with coal or diesel fuel electric generation.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

IND-85

5/9/2016

Ms. Suzanne Case
Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

Dear Chair Case,

I am sending you my comments on the second draft environmental impact statement for the Na Pua Makani wind project.

1 I think the developer has done a good job explaining all the facts and answering all the questions in the community about visual impacts, health concerns and other issues that have been brought up. I know this developer has worked hard to revise his project to address many of our issues.

2 The developer has worked closely with the community and partnered with us. He has offered a generous community benefits package for his project, which will help us address some of the many needs in Kahuku. He has also been very open and honest with our community and has worked hard to address our concerns.

3 For these reasons, I support the Na Pua Makani wind project that will help lower electricity bills for Oahu, while keeping our environment clean.

Sincerely,

Victoria Tito

June 30, 2016

Ms. Victoria Tito
No address provided

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Tito:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment IND-85.1*: I think the developer has done a good job explaining all the facts and answering all the questions in the community about visual impacts, health concerns and other issues that have been brought up. I know this developer has worked hard to revise his project to address many of our issues.*

Response IND-85.1: Na Pua Makani Power Partners, LLC continues its involvement in the community. Since publication of the original Draft EIS in June 2015, representatives of the proposed Project have attended neighborhood board meetings and met individually with members of the community to keep them informed about updates in the Project design.

Comment IND-85.2*: The developer has worked closely with the community and partnered with us. He has offered a generous community benefits package for his project, which will help us address some of the many needs in Kahuku. He has also been very open and honest with our community and has worked hard to address our concerns.*

Response IND-85.2: As noted in your comment, Na Pua Makani Power Partners, LLC, has committed to establishing a Community Benefit fund and is in discussion with Kahuku community members regarding the details of its administration. It is anticipated that Project funds ($10,000 per wind turbine per year) would be administered by a board of local community members who would make decisions as to the use of the proceeds and which activities, programs, groups, and events would be sponsored.

As noted in your comment, and described in Section 2.1 of the EIS, the Project design has been modified several times in response to community input. Visual simulations showing the proposed Project with fewer, but taller wind turbines are included in Section 4.16 of the EIS.

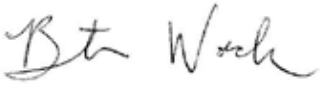
Comment IND-85.3*: For these reasons, I support the Na Pua Makani wind project that will help lower electricity bills for Oahu, while keeping our environment clean.*

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

Response IND-85.3: Na Pua Makani Power Partners, LLC, acknowledges your support for the proposed Project. The purpose and need for the proposed Project are described in Section 1.4 of the EIS, which include providing a clean, renewable source of energy for Oahu.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

IND-86

Ms. Suzanne Case, Chairperson
Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

Chair Woman Case:

1 I am in support of the Na Pua Makani wind farm project because clean energy is the right thing to do for our kupuna, our keiki and our future generations. Renewable energy is less polluting and its way better for our environment to help keep our air and ocean water clean.

2 With newer technology, Na Pua Makani is going to reduce the number of wind turbines from 13 to 10 or less. They may be higher than the previous structures, but from the highway, no one will notice the difference in height and less turbines will mean less visual impacts.

Sincerely,

Aka Wily

55-510 Iosepa st.
LAIE, HI
96762

June 30, 2016

Mr. Aisa Wily
55-510 Iosepa St.
Laie, HI 96762

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Wily:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment IND-86.1*: I am in support of the Na Pua Makani wind farm project because clean energy is the right thing to do for our kupuna, our keiki and our future generations. Renewable energy is less polluting and its way better for our environment to help keep our air and ocean water clean.*

Response IND-86.1: Na Pua Makani Power Partners, LLC acknowledges your support for the proposed Project.

Comment IND-86.2*: With newer technology, Na Pua Makani is going to reduce the number of wind turbines from 13 to 10 or less. They may be higher than the previous structures, but from the highway, no one will notice the difference in height and less turbines will mean less visual impacts.*

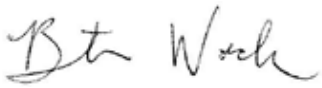
Response IND-86.2: The Project design has been modified several times in response to community input. The recent updates to the proposed Project area described in Section 2.1 of the EIS. While the wind turbines would be visible from vantage points in the community, the newer "uprated" turbine models would not result in additional visual impact compared to the original turbine models considered. From some viewpoints, fewer turbines would be visible. Visual simulations showing the proposed Project with fewer, but taller wind turbines are included in Section 4.16 of the EIS.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

IND-87

Ms. Suzanne Case, Chairperson
Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

Dear Ms. Case:

1 Champlin Wind, the developer for Na Pua Makani wind project has done a good job explaining all the facts and answering questions in the community that have been brought up.

2 What's more, they are now reducing the number of structures down from the original plan. That means less visual impact. I am satisfied with their report and support their project.

S

Sincerely,

Steve Foth
PO. BOX 979 KAHUKU
96731

June 30, 2016

Mr. Sione Fotu
P.O. Box 979
Kahuku, HI 96731

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Fotu:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment IND-87.1*: Champlin Wind, the developer for Na Pua Makani wind project has done a good job explaining all the facts and answering questions in the community that have been brought up.*

Response IND-87.1: Na Pua Makani Power Partners, LLC continues its involvement in the community. Since publication of the original Draft EIS in June 2015, representatives of the proposed Project have attended neighborhood board meetings and met individually with members of the community to keep them informed about updates in the Project design.

Comment IND-87.2*: What's more, they are now reducing the number of structures down from the original plan. That means less visual impact. I am satisfied with their report and support their project.*

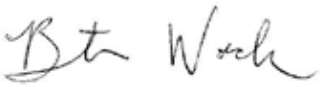
Response IND-87.2: The Project design has been modified several times in response to community input. The recent updates to the proposed Project area described in Section 2.1 of the EIS. While the wind turbines would be visible from vantage points in the community, the newer "uprated" turbine models would not result in additional visual impact compared to the original turbine models considered. From some viewpoints, fewer turbines would be visible.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

IND-88

Ms. Suzanne Case, Chairperson
Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

Dear Chairwoman,

1 The Na Pua Makani wind project was originally planned with 13 turbines three years ago. But the developer says that he can now reduce the number of turbines to 10 or less, depending on the technology and the turbine model selected.

2 The leeward coast has the HECO power plants that burn foreign oil and coal. But on the north shore, there's lots of wind. Everyone needs to support clean energy, and since Kahuku is the best place for windmills, we should do our part for the environment.

Mahalo,

Spencer Colburn

645 A Alexander Rd
Kahuku, Hi, 96731

June 30, 2016

Mr. Spencer Colburn
645 A Alexander Rd
Kahuku, HI 96731

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Colburn:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment IND-88.1*: The Na Pua Makani wind project was originally planned with 13 turbines three years ago. But the developer says that he can now reduce the number of turbines to 10 or less, depending on the technology and the turbine model selected.*

Response IND-88.1: The Project design has been modified several times in response to community input. The recent updates to the proposed Project area described in Section 2.1 of the EIS. While the wind turbines would be visible from vantage points in the community, the newer "uprated" turbine models would not result in additional visual impact compared to the original turbine models considered. From some viewpoints, fewer turbines would be visible. Visual simulations showing the proposed Project with fewer, but taller wind turbines are included in Section 4.16 of the EIS.

Comment IND-88.2*: The leeward coast has the HECO power plants that burn foreign oil and coal. But on the north shore, there's lots of wind. Everyone needs to support clean energy, and since Kahuku is the best place for windmills, we should do our part for the environment.*

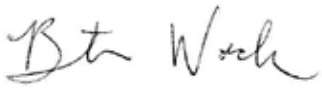
Response IND-88.2: Thank you for your comment regarding support of renewable energy.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

IND-89

Ms. Suzanne Case, Chair
Board of Land and Natural Resources
1151 Punchbowl Street, Kalanimoku Bldg.
Honolulu, Hawaii 96813

Dear Chair Case,

1 The state has set a 100% renewable energy goal by 2045. If we want to reach that goal, we need start producing more of our energy from clean sources like the sun, wind and ocean. We can reduce the need for more power plants if we start building more solar and wind energy projects.

This wind project is a step in the right direction, and I'm all for it.

Mahalo,

Kamalei Pasa
Kamalei pasa
426 Walkerville Rd.
Kahuku Hi 96731

June 30, 2016

Ms. Kamalei Pasa
426 Walkerville Rd
Kahuku, HI 96731

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Pasa:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment IND-89.1*: The state has set a 100% renewable energy goal by 2045. If we want to reach that goal, we need to start producing more of our energy from clean sources like the sun, wind and ocean. We can reduce the need for more power plants if we start building more solar and wind energy projects.*

This wind project is a step in the right direction, and I'm all for it.

Response IND-89.1: As noted in your comment the proposed Project would provide a clean source of renewable energy and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals. The Project would also contribute to reducing the cost of electricity and would reduce greenhouse gas emissions and other forms of pollution associated with coal or diesel fuel electric generation.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

Woeck, Brita

From:	IND-90	Steve Hoag <trialsbiker9@gmail.com>
Sent:		Monday, June 06, 2016 6:04 PM
To:		Woeck, Brita
Cc:		Heather Hoag; dlnr@hawaii.gov; oeqchawaii@doh.hawaii.gov
Subject:		Comments in Opposition - 2nd Draft EIS, Na Pua Makani Industrial Wind Project - April 23, 2016 OEQC Bulletin
Categories:		Green Category

Aloha and thank you for the opportunity to submit comments in opposition to the above-referenced project on behalf of our family.

1 We have lived in Laie for nearly 20 years; our family of six opposes this project as it will have significant, detrimental impacts on our local communities. We have yet to meet anyone from Laie or Kahuku that is in favor of placing more industrial wind turbines in our region, which is rural residential.

Detrimental Viewplane Impacts

2 The project calls for nearly a dozen industrial wind turbines with rotor diameters of over 400 feet, at a height of up to 656 feet in the air! These extremely tall, spinning blades will be in close proximity to existing homes, farms, Kahuku High & Intermediate School, and Kahuku Elementary School. (Our children have attended both schools, including one still at Kahuku High.)

As shown in the EIS Simulated Conditions graphics, these spinning skyscrapers will be visible in the area's scenic viewplanes during the day for miles around, and their blinking red lights at night.

Placing six-story structures in our rural residential community is absurd and lacking in common sense. The community already bears the burden of an existing industrial wind turbine project too close to homes and schools.

Detrimental Health/Safety Impacts

3 We understand that industrial wind turbines placed near residential communities and schools have, not surprisingly, raised real concerns about noise, shadow flicker, stress, insomnia, headaches, tinnitus, vertigo and nausea. These negative health effects have reportedly been experienced by residents after wind turbine projects are placed in or near residential communities.

4 Our region is a rural, residential community, not an industrial zone. Would you want these skyscraper-sized structures in the same community and close to where you live and your children go to school?

5 There have been no public hearings held by City, State or Federal agencies to solicit community input and comment.

Please, we respectfully request that this industrial wind turbine project not be allowed to proceed and the Second Draft EIS found to be insufficient. This project should not be approved.

Mahalo,

Steve & Heather Hoag

Laie, Hawaii

June 30, 2016

Mr. Steve Hoag
Laie, HI
Trialsbiker9@gmail.com

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Hoag:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment IND-90.1*: We have lived in Laie for nearly 20 years; our family of six opposes this project as it will have significant, detrimental impacts on our local communities. We have yet to meet anyone from Laie or Kahuku that is in favor of placing more industrial wind turbines in our region, which is rural residential.*

Response IND-90.1: Na Pua Makani Power Partners, LLC acknowledges your opposition to the proposed Project.

Comment IND-90.2*: The project calls for nearly a dozen industrial wind turbines with rotor diameters of over 400 feet, at a height of up to 656 feet in the air! These extremely tall, spinning blades will be in close proximity to existing homes, farms, Kahuku High & Intermediate School, and Kahuku Elementary School. (Our children have attended both schools, including one still in Kahuku High.)*

As shown in the EIS Simulated Conditions graphics, these spinning skyscrapers will be visible in the area's scenic viewplanes during the day for miles around, and their blinking red lights at night.

Placing six-story structures in our rural residential community is absurd and lacking in common sense. The community already bears the burden of an existing industrial wind turbine project too close to homes and schools.

Response IND-90.2: The Project design has been modified several times in response to community input. The recent updates to the proposed Project area described in Section 2.1 of the EIS. While the wind turbines would be visible from vantage points in the community, the newer "uprated" turbine models would not result in additional visual impact compared to the original turbine models considered. From some viewpoints, fewer turbines would be visible.

City and County of Honolulu zoning regulations address wind turbine setbacks, specifying that wind machines must be set back from all property lines one foot for each foot of height, measured from the highest vertical extension of the system. The proposed Project, as designed, exceeds these safety setback requirements.

Comment IND-90.3*: We understand that industrial wind turbines placed near residential communities and schools have, not surprisingly, raised real concerns about noise, shadow flicker, stress, insomnia, headaches, tinnitus, vertigo and nausea. These negative health effects have reportedly been experienced by residents after wind turbine projects are placed in or near residential communities.*

Response IND-90.3: Public health and safety are common topics brought up in relation to proposed wind energy Projects. These issues are discussed in Section 4.18 of the EIS. Seventeen separate independent scientific reviews have been conducted both nationally and internationally to examine the relationship between wind turbines and possible human health effects associated with audible (the "whooshing" sound created by the rotating blades) and inaudible noise, vibration, shadow flicker, and electromagnetic fields (EMF). To date, no scientific peer-reviewed study has demonstrated a direct link between people living in proximity to modern wind turbines and resulting physiological health effects. The following are a sample of conclusions from the scientific studies that have been conducted:

- "After careful consideration and deliberation of the body of evidence, [the National Health and Medical Research Council] concludes that there is currently no consistent evidence that wind farms cause adverse health effects in humans." (NHMRC 2015)
- "Cross-sectional studies, despite their inherent limitations in assessing causal links, however, have consistently shown that some people living near wind turbines are more likely to report annoyance than those living farther away. These same studies have also shown that a person's likelihood of reporting annoyance is strongly related to their attitudes toward wind turbines, the visual aspect of the turbines, and whether they obtain economic benefit from the turbines. Our review suggests that these other risk factors play a more significant role than noise from wind turbines in people reporting annoyance." (McCunney et al. 2014)
- "while some people living near wind turbines report symptoms such as dizziness, headaches, and sleep disturbance, the scientific evidence available to date does not demonstrate a direct causal link between wind turbine noise and adverse health effects. The sound level from wind turbines at common residential setbacks is not sufficient to cause hearing impairment or other direct health effects, although some people may find it annoying." (UK Health Protection Agency 2010)
- "There is no evidence that the audible or sub-audible sounds emitted by wind turbines have any direct adverse physiological effects."(Colby 2009)
- "None of the... evidence reviewed suggests an association between noise from wind turbines and pain and stiffness, diabetes, high blood pressure, tinnitus, hearing impairment, cardiovascular disease, and headache/migraine." (MassDEP and MDPH 2012)
- "Although opposition to wind farms on aesthetic grounds is a legitimate point of view, opposition to wind farms on the basis of potential adverse health consequences is not justified by the evidence." (Chatham-Kent Public Health Unit 2011)
- "The electromagnetic fields produced by the generation and export of electricity from a wind farm do not pose a threat to public health..."(NHMRC 2010)

Sources:

Chatham-Kent Public Health Unit. 2008. The Health Impact of Wind Turbines: A Review of the Current White, Grey, and Published Literature. Prepared for Chatham-Kent Municipal Council, Chatham Ontario. June 2008.

Colby, David W., M.D.; Robert Dobie, M.D.; Geoff Leventhall, Ph.D.; David M. Lipscomb, Ph.D.; Robert J. McCunney, M.D.; Michael T. Seilo, Ph.D.; and Bo Søndergaard, M.Sc. 2009. Wind Turbine Sound and Health Effects: An Expert Panel Review. Prepared for: American Wind Energy Association and Canadian Wind Energy Association. December 2009.

MassDEP and MDPH (Massachusetts Department of Public Health). 2012. Wind Turbine Health Impact Study: Report of Independent Expert Panel. January 2012. Available online at: http://www.mass.gov/eea/docs/dep/energy/wind/turbine-impact-study.pdf.

McCunney, R.J., K.A. Mundt, D. Colby, R. Dobie, K. Kaliski, and M. Blais. 2014. Wind Turbines and Health: A Critical Review of the Scientific Literature. Journal of Environmental and Occupational Medicine 56(11):e108-e130. Available online at: http://canwea.ca/comprehensive-scientific-literature-review-on-wind-turbines-and-human-health-now-published/

NHMRC (Australian Government National Health and Medical Research Council). 2015. NHMRC Statement: Evidence on Wind Farms and Human Health. February 2015.

NHMRC (Australian Government National Health and Medical Research Council). 2010. Wind Turbines and Health – A Rapid Review of Evidence. July 2010. http://www.nhmrc.gov.au/_files_nhmrc/publications/attachments/new0048_evidence_review_wind_turbines_and_health.pdf

UK Health Protection Agency. 2010. Health Effects of Exposure to Ultrasound and Infrasound. Report for the Ad Hoc Expert Group on Noise and Health by the Health Protection Agency. February 2010. http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1265028759369

Comment IND-90.4*: Our region is a rural, residential community, not an industrial zone. Would you want these skyscraper-sized structures in the same community and close to where you live and your children go to school?*

Response IND-90.4: In the State of Hawaii, county zoning code lists the permitted uses within each zone, and also the required development standards, such as setbacks, height limits, and other controls. Wind machines are addressed in Chapter 21 (Land Use Ordinance) of the Revised Ordinances of the City and County of Honolulu 1990. The proposed wind farm site is zoned AG-2 General Agricultural and AG-1 Restricted Agricultural by the City and County of Honolulu, where wind farms are an allowable use with a Conditional Use Permit.

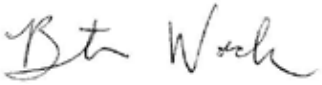
Comment IND-90.5*: There have been no public hearings held by City, State or Federal agencies to solicit community input and comment.*

Response IND-90.5: Five public meetings have been held for the EIS environmental review process on behalf of the U.S. Fish and Wildlife Service and the Department of Land and Natural Resources (DLNR), the two lead agencies for the Project EIS. These meetings were held during three 30-day public scoping periods, a 45-day state public comment period and federal 60-day public comment period on the original Draft EIS (concurrent public meeting), and a second state 45-day public comment period on the Second Draft EIS.

These meetings have provided an opportunity to inform the public about the Project and the Habitat Conservation Plan, present the results of the environmental analysis, and obtain public input in both written form and through spoken testimony provided to a court reporter. Both Na Pua Makani Power Partners, LLC, their community outreach team, and Tetra Tech, Inc. have been available at the meetings to answer questions. An additional public hearing was held in Kahuku, hosted by the DLNR Division of Forestry and Wildlife on the Project Habitat Conservation Plan. Forthcoming public hearings will be held by the Board of Land and Natural Resources on the Final EIS and Final Habitat Conservation Plan.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

Woeck, Brita

From: Keoki Wallace <keokiemail@gmail.com>
IND-91
Sent: Tuesday, June 07, 2016 10:10 PM
To: Woeck, Brita
Subject: Support for Na Pua Makani

To whom it concerns;

1 I am writing in support of the Na Pua Makani wind project in Kahuku, Hawaii. I am also writing in favor of the Environmental Impact Statement that has been prepared.

2 I have worked for many years with Kahuku High School. My daughter went there. One of the saddest things to watch is what happens after graduation. There are precious few opportunities locally for the graduates, so many end up moving to the mainland for work. One of the elements that causes there to be so few local opportunities is the price of electricity, which is significantly higher than the cost on the mainland. Since all businesses, manufacturing, services, etc., rely on electricity, the costs of doing anything locally are significantly higher, making it impossible to compete.

Harvesting power from the plentiful wind at Kahuku could make an impact. The costs to HECO of the electricity it will receive from Na Pua Makani is lower than other sources. Utilizing these lower cost resources will help HECO be able to reduce the cost of electricity, which will help make Hawaii competitive with the mainland. It is for this purpose I began working with Na Pua Makani several years ago.

3 I'm also in support of fewer, but higher towers. I've looked carefully at the visual simulations. From the distances these turbines will be seen by the public, the additional height is hardly distinguishable from the previous proposed height. I like the idea of being able to use the newer, more efficient towers, which will reduce the total number needed, which in turn will reduce the visual overall impact.

4 For these reasons, and more, I believe this project makes sense and should be approved. After carefully reading the Environmental Impact Statement, I'm impressed with the scope and feel all issues were adequately covered.

Very truly yours,

Keoki

Keoki Wallace
P.O. Box 807
Hau'ula, Hawai'I 96717

June 30, 2016

Mr. Keoki Wallace
PO Box 807
Hau'ula, HI 96717

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Wallace:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment IND-91.1*: I am writing in support of the Na Pua Makani wind project in Kahuku, Hawaii. I am also writing in favor of the Environmental Impact Statement that has been prepared.*

Response IND-91.1: Na Pua Makani Power Partners, LLC acknowledges your support for the proposed Project.

Comment IND-91.2*: I have worked for many years with Kahuku High School. My daughter went there. One of the saddest things to watch is what happens after graduation. There are precious few opportunities locally for the graduates, so many end up moving to the mainland for work. One of the elements that causes there to be so few local opportunities is the price of electricity, which is significantly higher than the cost on the mainland. Since all businesses, manufacturing, services, etc., rely on electricity, the costs of doing anything locally are significantly higher, making it impossible to compete.*

Harvesting power from the plentiful wind at Kahuku could make an impact. The costs to HECO of the electricity it will receive from Na Pua Makani is lower than other sources. Utilizing these lower cost resources will help HECO be able to reduce the cost of electricity, which will help make Hawaii competitive with the mainland. It is for this purpose I began working with Na Pua Makani several years ago.

Response IND-91.2: As noted in your comment, production of wind-generated energy by the proposed Project would replace a portion of the State's electricity that is currently generated by burning fossil fuels. Based on the most recent 2014 Renewable Portfolio Standard Status Report approximately 80 percent of Hawaii's energy is currently derived from fossil fuels and approximately 20 percent comes from renewable sources (Hawaiian Electric Company, Inc. et al. 2014). The cost of electricity for the consumers/residents of Hawaii is the blended average cost of all sources (e.g. oil, wind, solar, etc.) and current rates reflect that high cost from burning oil. Over time, as the proportion of energy coming from renewable sources increases, the average cost of electricity is expected to decrease.

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Comment IND-91.3*: I'm also in support of fewer, but higher towers. I've looked carefully at the visual simulations. From the distances these turbines will be seen by the public, the additional height is hardly distinguishable from the previous proposed height. I like the idea of being able to use the newer, more efficient towers, which will reduce the total number needed, which in turn will reduce the visual overall impact.*

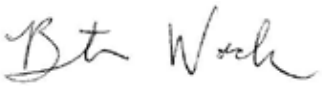
Response IND-91.3: The Project design has been modified several times in response to community input. While, as you note, the wind turbines would be visible from vantage points in the community, the newer "uprated" turbine models would not result in additional visual impact compared to the original turbine models considered. From some viewpoints, fewer turbines would be visible.

Comment IND-91.4*: For these reasons, and more, I believe this project makes sense and should be approved. After carefully reading the Environmental Impact Statement, I'm impressed with the scope and feel all issues were adequately covered.*

Response IND-91.4: Thank you, again, for your comments and review of the Second Draft EIS.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

The Senate

STATE CAPITOL
HONOLULU, HAWAII 96813

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WILL ESPERO
VICE PRESIDENT

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TWENTY-FOURTH DISTRICT
JILL N. TOKUDA

TWENTY-FIFTH DISTRICT
LAURA H. THIELEN

CHIEF CLERK
CAROL TANIGUCHI

IND-92

June 6, 2016

Chair Suzanne Case
DLNR
1151 Punchbowl St.
Honolulu, HI 96813

RE: Na Pua Makani Wind Project Second DEIS

To whom it may concern:

I have read the Second Draft Environmental Impact Statement for the proposed new wind project, Na Pua Makani, and have the following questions and comments. References to the existing wind turbines relate to the First Wind / Sun Edison Project in Kahuku.

QUESTIONS

1 1. The proposed blade length is substantially longer than the blades of the existing wind farm in Kahuku. It is my understanding there was some difficulty delivering the blades along the narrow Kamehameha Highway in areas such as Waimea. Has a survey been conducted along the entire route to ensure that a truck can physically navigate the proposed blades around all bends in the road without requiring extended road closures?

2 2. What is the calculated delivery time for each blade from storage to project site?

3 3. How long will traffic be impeded along the various choke points during blade deliveries?

4 4. What is the velocity of the blade tip and how does this compare to the existing wind turbine blade tips?

5. If the velocity of the blade tips is faster than the existing wind turbine blade tips, how does this affect the calculations for potential take of bats and other wildlife?

5 6. It appears that calculations for potential takings are based on the number of towers, yet the proposed towers are substantially larger than the existing wind turbines. The rotor sweep is 13,300 sq. meters compared to 8000 sq. meters on the existing wind turbine. How does the much larger sweep affect calculations for potential environmental taking?

7. Even with fewer turbines, the total sweep of the proposed blades (Option 2a) is greater than the original proposed blades (Option 2), yet the estimated takings and environmental impacts are "similar." Is this accurate? Should additional explanation be added to the report to clarify why there is no difference?

6 8. The existing wind project (420 ft.) is very large and dominating on the landscape. In comparison, the proposed turbines are significantly more gigantic (565 ft.). What aesthetic criteria are used to determine when wind turbines are too big for a location? Can a project be too big for a location? If so, please describe.

7 9. "Environmental justice is the right of every person in Hawai`i to live in a clean and healthy environment, <u>to be treated fairly, and to have meaningful involvement in decisions that affect their environment and health</u>." What meaningful involvement in the decision making process do the residents of Kahuku really have? If the impacted community does not want this project, what authority does it have to prevent it from being developed?

8 10. "Environmental justice in Hawai`i recognizes that <u>no one segment of the population or geographic area should be disproportionately burdened</u> with environmental and/or health impacts resulting from development, construction, operations and/or use of natural resources." Kahuku residents already live below the 420 ft. towers. Other wind projects in Hawaii are more distant from residential communities. Please explain how the proposed 565 ft. towers would not disproportionately burden the population of this geographic area?

9 11. To support bat habitat, tree trimming will be restricted during certain months. How is the habitat maintained if trees are trimmed in some months but not others? Will the recommended minimum heights and densities be maintained during the unrestricted months?

10 12. Fig 4.6-1 and 4.6-3 show the calculated noise levels. Is it accurate that the noise levels near the proposed towers will be lower with the taller towers and that the noise levels at various distances are essentially the same?

11 13. It is my understanding that in order to qualify for Federal Production Tax Credits, wind projects needed to be substantially under development and equipment secured by a certain date. If so, what are those deadlines and when did this project meet them? If so, when was the relevant equipment secured? If the relevant equipment was secured and substantial progress requirements were met, how can changing out the equipment now maintain that qualification for the tax credits?

12 14. What long range bond or security will ensure financial capacity to deconstruct and decommission the project if it is not continued beyond the 20-year term?

COMMENTS

13 The proposed turbines are much too big for this location. The tower closest to the residences and schools should not be built there. These are gargantuan structures, much larger than any buildings in Hawaii. They must not be placed so close to Kahuku Town. The proposed turbines

are so much larger than the existing wind project that I must object on the grounds of environmental justice. Why must the residents of Kahuku uniquely endure such impacts?

14 The simulations do not truly represent what a person will observe. The existing wind turbines are very large and noticeable today, yet they appear to be tiny poles in the lower right corner of some images. This may be technically factual, but deceiving nonetheless as that is not how we perceive our surroundings in real life.

The sun shines regularly in Malaekahana and Kahuku. Hiding the simulated towers in the mist and clouds is unacceptable. New photos with clear skies should be taken and the simulations should be redone.

15 We must not have extended road closures if something goes wrong during delivery of the wind turbines. In this case, standard phrases and generalities about delivery plans are inadequate. Detailed analysis of the route and potential impediments and solutions must be considered now. Mistakes that close our highway for extended periods of time must not occur.

Thank you for allowing me this opportunity to ask questions and provide comments.

Sincerely,

Gil Riviere

Gil Riviere
Senator, District 23
Oahu's North and Windward Shores
808.586.7330
SenRiviere@capitol.hawaii.gov

✓cc: Tetra Tech Inc.

June 30, 2016

State of Hawaii
Senator Gil Riviere
State Capitol
415 South Beretania Street, Room 217
Honolulu, HI 96813

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Senator Riviere:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment IND-92.1*: The proposed blade length is substantially longer than the blades of the existing wind farm in Kahuku. It is my understanding there was some difficulty delivery the blades along the narrow Kamehameha Highway in areas such as Waimea. Has a survey been conducted along the entire route to ensure that a truck can physically navigate the proposed blades around all bends in the road without requiring extended road closures?*

Response IND-92.1: A detailed transportation route survey for the proposed Project has been conducted by ATS, Inc. (ATS, Inc. 2016) which formed the basis of the Transportation Assessment included in Appendix B of the EIS. The proposed transportation plan for the Project involves the turbines being off-loaded directly from the ship in Kalaeloa Barbers Point Harbor and transported via existing paved public roads to the proposed wind farm site in Kahuku. The Transportation Assessment identifies areas along the transportation route which would require the use of civilian and police escorts, vegetation trimming, traffic signal and roadway sign relocation, guardrail relocation, overhead utility line adjustments, and asphalt curb removal to facilitate the transport of wind turbine components. Community notifications, timing restrictions, including the delivery of superloads at night, and other measures would be implemented to avoid traffic impacts (see Section 4.17 – Transportation for additional information).

As noted in your comment, Kalaeloa Barbers Point Harbor and the roads of Oahu's North Shore have already supported the logistics for the construction of two wind projects, requiring the delivery of 42 wind turbines in total. The proposed Project would require the delivery of 8 to 9 wind turbines. Na Pua Makani Power Partners, LLC will work closely with the Hawaii Department of Transportation (HDOT) and City and County of Honolulu Department of Transportation Services regarding special transportation requirements along the proposed transportation route to ensure all requirements are met.

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Comment IND-92.2*: What is the calculated delivery time for each blade from storage to project site?*

Response IND-92.2: Delivery of the major turbine components, which include the blade, tower, nacelle, and electrical transformer, is anticipated to occur between 9 p.m. and 5 a.m., outside of peak traffic times (exact times will be based on requirements under HDOT and City and County of Honolulu permits). The Modified Proposed Action Option, described in the Second Draft EIS, would require approximately 108 nighttime round trips occurring over approximately 22 days (see the Traffic Assessment report in Appendix B of the EIS). Estimated transit times between Kalaeloa Harbor and the proposed wind farm site have not been determined (ATS, Inc. 2016).

Comment IND-92.3*: How long will traffic be impeded along the various choke points during blade deliveries?*

Response IND-92.3: Although traffic impacts will be minimized through the measures described under the response to comment IND-92.1, the traffic route survey identified two points along the transportation route where traffic delays may occur during the delivery of turbine components. These include the junction of H1 Exit 8C at Kamehameha Highway (anticipated to take 30 minutes for the superload trucks to navigate this curve) and the turn from Kamananui Road onto Kamehameha Highway where the trucks would need to cross the oncoming lane of traffic (ATS, Inc. 2016).

Comment IND-92.4*: What is the velocity of the blade tip and how does this compare to the existing wind turbine blade tips? If the velocity of the blade tips is faster than the existing wind turbine blade tips, how does this affect the calculations for potential take of bats and other wildlife?*

Response IND-92.4: Based on the rotor diameter and maximum rotor speed, the maximum blade time speed is estimated to be approximately 243 miles per hour and 192 miles per hour for the largest turbine models considered in the original Draft EIS and Second Draft EIS, respectively. As noted in your comment, the taller turbines would have different blade tip speeds which could influence collision risk. However, the effect of wind turbine characteristics on bird and bat collision fatalities remains uncertain. There are conflicting results on whether bird or bat fatalities increase with turbine size and rotor swept area (Barclay and Baerwald 2009, Barclay et al. 2007, Strickland et al. 2011, Arnett and Baerwald 2013, Loss et al. 2013). Additionally, analyzing the effects of blade tip speed alone is difficult as it is typically correlated with other features that may influence collision risk such as turbine size, tower height and rotor diameter. Moreover, collision risk may decrease through the use of larger turbines because fewer are required to produce the same amount of energy (AWWI 2014).

The risk of bird and bat collisions with wind turbines is driven by a combination of factors including the characteristics of individual species (morphology, sensorial perception, phenology, behavior or abundance), wind farm site characteristics (landscape, bird flight paths, food availability, wind regime, and weather) and features of the wind farm (wind turbine type, number, configuration, and lighting; Marques et al. 2014). Thus, although wind turbine features may play an important role in bird and bat collision risk, risk is driven by a complex suite of factors and it is not possible to partition this risk according to individual wind turbine features (AWWI 2014, Marques et al. 2014). Because these relationships are unknown, conservative assumptions were used in estimating take of bird and bat species addressed in the Project HCP (the Covered Species) to account for the uncertainty associated with turbine size and number. This has been clarified in Section 2.5 of the EIS and is discussed in more detail below.

For the Newell's shearwater and Hawaiian goose, estimated per turbine fatality rates were so low, the net effect of the increased turbine size and removal of one turbine had no influence on the "rounded up" take estimate or the requested take authorization, which was conservatively increased to account for uncertainty (see Tables 4.11-4, 5,

6, 7, 8, and 9 in the EIS). The decrease in estimated take for the Hawaiian goose between Draft and Final HCP (and original Draft and Second Draft EIS) was related to refinements in the population modeling, not a result of changes in turbine dimensions or number. For the Hawaiian short-eared owl, Hawaiian stilt, Hawaiian duck, Hawaiian coot, and Hawaiian moorhen the likelihood of transiting through the wind farm site is extremely low and take estimates were not based on turbine number or dimension; therefore there was no change in take estimates or requested take authorizations between the Draft and Final HCP. To account for uncertainty related to the risk of collision for these species, the requested take authorizations are four to eight times the estimated level of take (see Tables 4.11-10 and 11 in the EIS). For the Hawaiian hoary bat, for which estimated take and requested take authorization is the greatest among the Covered Species, adjustments in take calculation assumptions resulted in no change in the overall take estimate; however it should be noted that the requested take authorization is 150 percent of the actual take estimate to account for uncertainty associated with risk to this species (see Tables 4.11-1, 2, and 3 in the EIS). Therefore, each of these estimates have additional conservative assumptions to account for the uncertainty associated with potential changes in the collision risk associated with fewer but larger turbines or differences in the wind turbine rotor swept area or blade tip speed.

Most importantly, the Project HCP includes a robust post-construction monitoring program which is designed to continually assess the level of take occurring at the proposed Project. Data collected through this monitoring program would be used to identify the need for additional avoidance and minimization measures and ensure compliance with the incidental take limits set for under the Project's Incidental Take Permit/Incidental Take License issued by the U.S. Fish and Wildlife Service and Hawaii Division of Forestry and Wildlife, respectively.

Comment IND-92.5*: It appears that calculations for potential takings are based on the number of towers, yet the proposed towers are substantially larger than the existing wind turbines. The rotor sweep is 13,300 sq. meters compared to 8,000 sq. meters on the existing wind turbine. How does the much larger sweep affect calculations for potential environmental taking?*

Even with fewer turbines, the total sweep of the proposed blades (Option 2a) is greater than the original proposed blades (Option 2), yet the estimated takings and environmental impacts are "similar." Is this accurate? Should additional explanation be added to the report to clarify why there is no difference?

Response IND-92.5: Please see the response to comment IND-92.4. Additional information has been added to the Final EIS for clarification.

Comment IND-92.6*: The existing wind project (420 ft.) is very large and dominating on the landscape. In comparison, the proposed turbines are significantly more gigantic (565 ft.). What aesthetic criteria are used to determine when wind turbines are too big for a location? Can a project be too big for a location? If so, please describe.*

Response IND-92.6: The criteria applied in the visual resource impact analysis to determine impact intensity are documented in Section 4.16.1 of the EIS. Those criteria include existing scenic quality, visual contrast that would be introduced by the Project facilities, the change in visual quality resulting from the contrast, and the viewer response to the change in visual quality. These criteria, and scaled ratings for each criterion for the respective viewpoints, were applied with the intent to make the visual assessment process as objective as possible. Criteria intended to represent a size or height at which wind turbines would be considered "too big" for a specific location were not used in the assessment. Such a criterion would be a purely subjective measure that would vary widely among potential viewers, would differ among observation points, and therefore would be extremely difficult and impractical to incorporate in an assessment. The analysis approach documented in the EIS is consistent with the visual analysis methods that are commonly used in this field, including the Visual Resource Management (VRM) system employed by the Bureau of Land Management and the Scenery Management System (SMS) employed by

the U.S. Forest Service; both systems apply measures that account for the size and scale of new or changed features in the landscape, but neither system attempts to define limits of acceptability for size and/or scale.

A project or a wind turbine could objectively be considered too big for a specific location only if there were statutory or regulatory limits on size adopted by a unit of government with jurisdiction over that location. For example, local governments routinely set height limits for structures in specific locations through their zoning codes. City and County of Honolulu zoning regulations include horizontal setback requirements that are applicable to the Project wind turbines, but they do not prescribe height limits. As noted in Section 5.3.3 of the EIS, the Project would be in compliance with the setback requirements.

Comment IND-92.7*: "Environmental justice is the right of every person in Hawai'i to live in a clean and healthy environment, to be treated fairly, and to have meaningful involvement in decisions that affect their environment and health." What meaningful involvement in the decision making process do the residents of Kahuku really have? If the impacted community does not want this project, what authority does it have to prevent it from being developed?*

Response IND-92.7: The Executive Summary and Sections 1.5 and 1.6 of the Second Draft EIS describe consultation and public involvement activities associated with the environmental review of the proposed Project. Those activities included open federal and state public processes for scoping the EIS, a formal public review process for the Draft EIS, and another formal public review process for the Second Draft EIS. Five public open house meetings in Kahuku occurred in conjunction with the EIS scoping and review processes. Comments received from the community (and other areas) resulted in some modifications to the EIS, and Appendix M of this EIS documents the comments received and the responses to the comments. Please note that this EIS documents analysis of changes to the proposed Project that were made in response to public input early in the development of the initial project design (see page 2-2 of the EIS) and comments received on the Draft EIS. The lead agencies conducted these public involvement activities in a good-faith effort to obtain input from the local community and other interested parties, and consider the effort to be meaningful.

In addition to the public involvement activities associated specifically with the EIS, since 2013 Na Pua Makani Power Partners, LLC has conducted numerous meetings that were open to the community, with small focus groups, and with individual community leaders and elected officials. These meetings were a means of keeping community members informed about the status of the proposed Project and the environmental review; they also provided an opportunity to solicit community input and have focused discussions about topics of particular interest. For example, in January 2014 Na Pua Makani Power Partners, LLC hosted a talk story meeting in Kahuku on wind energy health and safety issues and potential effect of the proposed Project on rooftop photovoltaic system installation, two topics that community has voiced concern about. Invited guests included Representative Richard Fale, Mark Glick and Noreen Kam of the State Energy Office, and Dr. Robert McCunney, an internationally recognized expert in wind energy health issues from the Massachusetts Institute of Technology. Additional information on the outreach efforts conducted by Na Pua Makani Power Partners, LLC has been added to the Final EIS.

The agency permit approval actions addressed in this EIS are to be undertaken specifically by the U.S. Fish and Wildlife Service (USFWS) and Hawaii Department of Land and Natural Resources (DLNR). The respective federal and state review processes outline the corresponding requirements for those reviews, and the decisions resulting from the review processes are agency administrative actions. The statutes and regulations applicable to the USFWS and DLNR review processes do not provide a mechanism for a local community to approve or disapprove of the subject permit action, per se, before the agency renders its decision although they do provide important opportunities for the public to provide meaningful input which is taken into account during the decision making process.

Please note that during the public comment periods on the original Draft EIS and the Second Draft EIS, many letters were received from residents that live in Kahuku that support renewable energy in general, and support the proposed Project. Some letters expressing opposition to the Project, or concern over specific issues, were also received. All comment letters received from members of the Kahuku Community and associated responses are included in Appendix M of the Final EIS.

Comment IND-92.8*: "Environmental justice in Hawai'i recognizes that <u>no one segment of the population or geographic area should be disproportionately burdened</u> with environmental and/or health impacts resulting from development, construction, operations and/or use of natural resources." Kahuku residents already live below the 420 ft. towers. Please explain how the proposed 565 ft. towers would not disproportionately burden the population of this geographic area?*

Response IND-92.8: The communities of Kahuku and Laie were identified in the EIS as minority environmental justice populations based on the disproportionate concentration of Native Hawaiians and Other Pacific Islanders in these areas relative to Oahu as a whole (30 percent and 35 percent of the population, respectively, versus 9 percent for Honolulu County as a whole). This determination was based on U.S. Census Data and confirmed by the EPA's Environmental Justice screening tool (https://ejscreen.epa.gov). However, it is important to note that in Hawaii, as well as within Honolulu County, a majority of the population (78 percent and 81 percent for the State and County, respectively) consists of a non-white, minority group (Asian, Native American or other Pacific Islander, and Hispanic or Latino; see EIS Section 3.17 – Socioeconomic Resources for additional information).

Potential effects to residents living in the communities in the vicinity of the proposed Project relate to noise, socioeconomics, cultural resources, visual resources, and public health and safety, none of which were determined to be high and adverse. Moreover, the Project would result in short- and long-term socioeconomic benefits to the community through the creation of jobs and generation of tax revenues. Na Pua Makani Power Partners, LLC has incorporated input from the surrounding communities in development of the Project design, which has resulted in a number of significant design changes. Additionally, they are working with community leaders to establish a multi-million dollar community benefits fund which will contribute to the local Kahuku community for the life of the Project. For these reasons, Native Hawaiians and other Pacific Islanders are not anticipated to experience a disproportionate share of adverse effects, but will share in the benefits of the Project. Please also see the response to comment IND-92.13.

Comment IND-92.9*: To support bat habitat, tree trimming will be restricted during certain months. How is the habitat maintained if trees are trimmed in some months but not others? Will the recommended minimum heights and densities be maintained during the restricted months?*

Response IND-92.9: The restriction on tree trimming is a standard measure required by the U.S. Fish and Wildlife Service and Hawaii Division of Forestry and Wildlife to avoid disturbance to roosting bats, rather than to avoid habitat impacts per se. The timing is based on the bat pupping season (approximately June 1 – September 15). The specification of tree heights and densities actually relates to the characteristics of trees bats are known to roost in. Trees that meet have characteristics are likely to be used by bats for roosting, and therefore if trimming of these trees is required it must occur outside the bat pupping season.

Comment IND-92.10*: Fig 4.6-1 and 4.6-3 show the calculated noise levels. Is it accurate that the noise levels near the proposed towers will be lower with the taller towers and that the noise levels at various distances are essentially the same?*

Response IND-92.10: The minor reduction in maximum noise levels between the Proposed Action in the original Draft EIS and the Modified Proposed Action Option in the Second Draft EIS is due to the reduced number of turbines and also the turbine specific sound power levels accounted for in the modeling analysis, as provided by the turbine manufacturers. The difference in noise levels beyond the boundary of the wind farm site is not great enough to exceed the sound isopleth values, such that the noise contours look very much the same in Figures 4.6-1 and 4.6-3 of the EIS.

Comment IND-92.11*: It is my understanding that in order to qualify for Federal Production Tax Credits, wind projects needed to be substantially under development and equipment secured by a certain date. If so, what are those deadlines and when did this project meet them? If so, when was the relevant equipment secured? If the relevant equipment was secured and substantial progress requirements were met, how can changing out the equipment now maintain that qualification for the tax credits?*

Response IND-92.11: To date, the Project has not qualified for the Federal Production Tax Credit. Since its enactment under the Energy Policy Act of 1992, the Federal Production Tax Credit has been extended several times. Most recently, in December 2015, it was extended for an additional 5 years. Qualification for the Federal Production Tax Credit can be demonstrated in a variety of ways including starting construction or purchasing equipment for the project and is not driven by the most recent decision to consider the additional turbine models that are addressed in the Second Draft EIS.

Comment IND-92.12*: What long range bond or security will ensure financial capacity to deconstruct and decommission the project if it is not continued beyond the 20-year term?*

Response IND-92.12: Na Pua Makani Power Partners, LLC would provide the land owners with security as may be required under the terms of the leases to ensure decommissioning obligations are met. All aspects of Project decommissioning are described in Section 2.4 of the EIS. Under the Project HCP, funding assurances for monitoring and mitigation activities conducted over the life of the Project must also be provided to the U.S. Fish and Wildlife Service and Hawaii Division of Forestry and Wildlife.

Comment IND-92.13*: The proposed turbines are much too big for this location. The tower closest to the residences and schools should not be built there. These are gargantuan structures, much larger than any buildings in Hawaii. They must not be placed so close to Kahuku Town. The proposed turbines are so much larger than the existing wind project that I must object on the grounds of environmental justice. Why must the residents of Kahuku uniquely endure such impacts?*

Response IND-92.13: Please see the responses to comments IND-92.6, IND-92.7, and IND-92.8.

The EPA defines environmental justice as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic group should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies. Meaningful involvement means that people have an opportunity to participate in decisions about activities that may affect their environment and/or health and that community concerns will be considered in the decision making process. Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, directs federal agencies to identify and address the disproportionately high and adverse human health or environmental effects of their actions on minority and low-income populations, to the greatest extent practicable and permitted by law.

The State of Hawaii has developed its own legislation and guidance related to environmental justice (Act 294). Environmental Justice is defined for Hawaii as follows:

"Environmental justice is the right of every person in Hawai`i to live in a clean and healthy environment, to be treated fairly, and to have meaningful involvement in decisions that affect their environment and health; with an emphasis on the responsibility of every person in Hawai`i to uphold traditional and customary Native Hawaiian practices that preserve, protect, and restore the `aina for present and future generations."

Chapter 2 of the EIS describes the many factors that were taken into account in the siting of the proposed Project. These include land availability, sufficient wind resource, and access to adequate and available transmission capacity and proximity to existing transmission lines. Other locations along the North Shore did not meet these criteria and therefore were not considered. It is for these reason that the proposed wind farm site was selected; the site was not selected because of the presence of a minority environmental justice population.

As noted under the response to comment IND-91.7, extensive community outreach has been conducted for the proposed Project which has provided opportunities for formal and informal public participation. Since 2013, Na Pua Makani Power Partners, LLC's team of outreach specialists have been meeting with community members, small groups, neighborhood boards, and elected officials to share information about the project. Continued public involvement in the environmental review process has been demonstrated through strong attendance at each of the public meetings held at the community center in Kahuku, and through the submission of many thoughtful comments during each of the public comment periods. Input garnered through these efforts has resulted in modifications to the Project design (see Chapter 1 of the EIS for additional detail) and revision of the EIS.

The Modified Proposed Action Option was incorporated into the Second Draft EIS in response to public comments on the original Draft EIS related to visual impacts and a request to consider fewer turbines with greater generating capacities made by the State Department of Planning and Permitting. The ultimate goal was to reduce the maximum number of turbines needed for the proposed Project. As noted in Section 1.3 of the EIS, the Modified Proposed Action Option would reduce the maximum number of turbines from 10, to 9 and potentially as few as 8 turbines, depending on the turbine model selected. This modification also takes advantage of recent technological advancements that have resulted in the availability of uprated versions of turbine models that are larger, more efficient, and are better suited for the moderate to low wind conditions of the proposed wind farm site than previous models. Wind turbine technology is continually evolving and a number of the turbine models considered during the development of the original Draft EIS are now obsolete or are only available in uprated versions. Therefore, the wind turbine models considered for the proposed Project are larger than the wind turbines at the existing Kahuku Wind Farm which began operation in 2011.

Appendix L of the EIS provides a detailed comparison of the Proposed Action considered in the original Draft EIS and the Modified Proposed Action Option. For each resource evaluated in the EIS, the analysis in Appendix L demonstrates that a project with fewer but larger turbines would not result in any new or more adverse effects than the original Proposed Action project of up to 10 wind turbines.

Within the EIS, the hydrology and water resources (Section 4.4), air quality and climate change (4.5), noise (Section 4.6), visual resource (4.16), public health and safety (e.g., shadow flicker, turbine collapse, and fire; Section 4.18), and public infrastructure and services (Section 4.20) analyses address impacts in relation to the Kahuku high school, Kahuku elementary school, Kahuku medical center and the Kahuku community center all of which are important locations within the community. The proposed Project, as designed, would comply with noise, water and air quality standards; meet industry standard health and safety requirements; and exceed the required setback distances required by the City and County of Honolulu for safety; operation of the proposed Project would not affect traditional cultural uses or practices or inhibit mauka-makai access. While the wind

turbines would be visible from vantage points in the community, the newer "uprated" turbine models would not result in additional visual impact compared to the original turbine models considered. From some viewpoints, fewer turbines would be visible. For these reasons the proposed Project is not expected to result in disproportionate high and adverse effects to the community.

Na Pua Makani Power Partners, LLC has committed to honor the commitments of the original developer and establish a Community Benefit fund for the community. It is anticipated that Project funds ($10,000 per wind turbine per year) would be paid to a non-profit corporation to be administered by a board of local community members who would make decisions as to the use of the proceeds and which activities, programs, groups, and events would be sponsored. To date, Na Pua Makani Power Partners, LLC has supported the Kahuku High School "school-to-work" program, Kahuku "Project Grad", Kahuku Elementary School May Day program, and Kahuku High School rugby, football, boys basketball, girls soccer, and boys and girls volleyball teams.

Comment IND-92.14*: The simulations do not truly represent what a person will observe. The existing wind turbines are very large and noticeable today, yet they appear to be tiny poles in the lower right corner of some images. This may be technically factual, but deceiving nonetheless as that is not how we perceive our surroundings in real live.*

The sun shines regularly in Malaekahana and Kahuku. Hiding the simulated towers in the mist and clouds is unacceptable. New photos with clear skies should be taken and the simulations should be redone.

Response IND-92.14: The visual simulations presented in the EIS were prepared through a systematic, computer-based process that generates images in which wind turbines and other features are represented to scale and in their correct coordinate location on the landscape. The appearance of a particular feature in the landscape, whether viewed in the field or in a simulation, will be influenced by the size and position of that feature and its distance from the viewer and its relationships to other visible features in the landscape. The existing Kahuku wind turbines that are shown in the simulations are located from approximately 1 to 3 miles from the respective viewing locations and appear small relative to objects that are closer, such as the light poles at Kahuku District Park (in Figure 4.16-6). The proposed Project turbines are taller than the Kahuku turbines and closer to the viewer in all of the simulations, and therefore do appear to be considerably larger than the existing turbines. Although the comment notes that the appearance of the existing turbines in the simulations may be technically factual; it is not clear what higher standard is desired or attainable for the simulations.

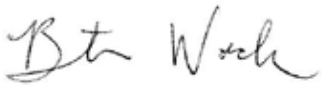
We agree that the sun does shine regularly in the Malaekahana area and Kahuku. However, cloudy, misty and rainy conditions are also a common occurrence in the local area. The photos used for the simulations were taken on different dates over a period of approximately 2 years, and they reflect natural variation in weather and sky conditions during that time. The conditions indicated in the four simulations can be characterized as mostly sunny/partly cloudy in one instance (Figure 4.16-6), mostly cloudy with some sun (Figure 4.16-7), cloudy (Figure 4.16-8), and mixed sun and clouds (Figure 4.16-9). The simulations cover a range of the conditions that are representative of weather conditions that actually occur in the local area. There was no attempt to "hide the simulated towers in the mist." Therefore, there is no need to prepare new photos and simulations reflecting only one type of common weather condition for the area.

Comment IND-92.15*: We must not have extended road closures if something goes wrong during delivery of the wind turbines. In this case, standard phrases and generalities about delivery plans are inadequate. Detailed analysis of the route and potential impediments and solutions must be considered now. Mistakes that close our highway for extended periods of time must not occur.*

Response IND-92.15: Na Pua Makani Power Partners, LLC is working closely with the Hawaii Department of Transportation and City and County of Honolulu Department of Transportation Services to ensure that all requirements are met in association with transport of the wind turbine components to the proposed wind farm site. This includes staying apprised of site-specific limitations and restrictions along the proposed transportation route. Specific measure for avoiding and minimizing traffic impacts will be developed in coordination with the Hawaii Department of Transportation and City and County of Honolulu Department of Transportation Services, and incorporated under the respective permits.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

NĀ PUA MAKANI
Clean Energy Powering Hawai'i's Future

IND-93

Na Pua Makani Wind Project
Second Draft Environmental Impact Statement
Public Comment Form

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Mike Cutbirth
C/O Tetra Tech, Inc.
737 Bishop St., Suite 2340, Mauka Tower
Honolulu, HI 96813
*All comments should be submitted/postmarked by **June 7, 2016**.

Background:

The original Draft EIS for the Na Pua Makani Wind Project (Project) was published on June 8, 2015. In response to public comments on the original Draft EIS related to visual impacts, Na Pua Makani reevaluated the proposed turbine locations and turbine models considered in the original Draft EIS. Through this effort, Na Pua Makani was able to reduce the maximum number of turbines needed to meet the target generating capacity for the Project from 10 to 9 wind turbines, and potentially 8 wind turbines depending on the model ultimately selected. This modification takes advantage of recent technological advancements that have resulted in the availability of uprated versions of turbine models that have increased generating capacity, are more efficient, and are better suited for the existing wind conditions of the wind farm site than previous models. **This Second Draft EIS incorporates a Modified Proposed Action Option, consisting of 9 larger wind turbines with greater generating capacities.**

**The purpose of this Second Draft EIS is to inform stakeholders of modifications to the proposed Project since the publication of the original Draft EIS; we are seeking comments related to these Project design changes only.

**Comments previously provided on the Project have been incorporated into the Second Draft EIS; therefore, there is no need to resubmit comments provided during the previous public comment periods.

Name: Stacy Ako

Address: 45-077 E Waikalua Rd
Kaneohe, Hi 96744

Email:

1 **Comments:** As a supporter of alternative energy I appreciate the idea of windfarms. I support NPM's project with its design
2 changes.

June 30, 2016

Ms. Stacy Ako
45-077E Waikalua Rd.
Kaneohe, HI 96744

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Moses:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment IND-93.1*: As a supporter of alternative energy, I appreciate the idea of windfarms.*

Response IND-93.1: As noted in your comment, the proposed Project would provide a clean source of renewable energy and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals. The Project would also contribute to reducing the cost of electricity and would reduce greenhouse gas emissions and other forms of pollution associated with coal or diesel fuel electric generation.

Comment IND-93.2*: I support NPM's project with its design changes.*

Response IND-93.2: As noted in your comment, the Project design has been modified in response to community input. The recent updates to the proposed Project are described in Section 2.1 of the EIS. Na Pua Makani Power Partners, LLC acknowledges your support for the proposed Project.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

NĀ PUA MAKANI
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IND-94

Na Pua Makani Wind Project
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Mike Cutbirth
C/O Tetra Tech, Inc.
737 Bishop St., Suite 2340, Mauka Tower
Honolulu, HI 96813
*All comments should be submitted/postmarked by **June 7, 2016.**

Background:

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**Comments previously provided on the Project have been incorporated into the Second Draft EIS; therefore, there is no need to resubmit comments provided during the previous public comment periods.

Name: James Moses

Address: 47-508 Kinana Way
Kaneohe, HI, 96744

Email:

Comments: 1 I am in support of alternative energy development. We need to get off dependence on oil in the future. I am in support of this wind energy project and their turbine adjustment. 2

June 30, 2016

Mr. James Moses
47-508 Kinana Rd.
Kaneohe, HI 96744

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Moses:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment IND-94.1*: I am in support of alternative energy development. We need to get off dependence on oil in the future.*

Response IND-94.1: The proposed Project would provide a clean source of renewable energy and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals. The Project would also contribute to reducing the cost of electricity and would reduce greenhouse gas emissions and other forms of pollution associated with coal or diesel fuel electric generation.

Comment IND-94.2*: I am in support of this wind energy project and their turbine adjustment.*

Response IND-94.2: As noted in your comment, the Project design has been modified in response to community input. The recent updates to the proposed Project are described in Section 2.1 of the EIS. Na Pua Makani Power Partners, LLC acknowledges your support for the proposed Project.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

NĀ PUA MAKANI
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IND-95

Na Pua Makani Wind Project
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Mike Cutbirth
C/O Tetra Tech, Inc.
737 Bishop St., Suite 2340, Mauka Tower
Honolulu, HI 96813
*All comments should be submitted/postmarked by **June 7, 2016.**

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Name: PHYLLIS MOSES

Address: 47-508 KINANE WAY
KANEOHE, HI., 96744

Email:

1

Comments: I am in support of this wind energy proposal. Future sustainable energy development is a must. This project will provide and help our future energy needs. Mahalo!

June 30, 2016

Ms. Phyllis Moses
45-077E Waikalua Rd.
Kaneohe, HI 96744

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Moses:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment IND-95.1*: I am in support of this wind energy proposal. Future sustainable energy development is a must. This project will provide and help our future energy needs.*

Response IND-95.1: Na Pua Makani Power Partners, LLC acknowledges your support for the proposed Project. The proposed Project would provide a clean source of renewable energy and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals. The Project would also contribute to reducing the cost of electricity and would reduce greenhouse gas emissions and other forms of pollution associated with coal or diesel fuel electric generation.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

NĀ PUA MAKANI
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IND-96

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Mike Cutbirth
C/O Tetra Tech, Inc.
737 Bishop St., Suite 2340, Mauka Tower
Honolulu, HI 96813
*All comments should be submitted/postmarked by **June 7, 2016.**

Background:

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Name: LORRAINE TOSIEK

Address: 45-077E WAIKALUA RD
KANEOHE, HI, 96744

Email:

Comments:
1 I SUPPORT NA PUA MAKANI'S WIND ENERGY PROJECT, AND THEIR HEIGHT INCREASE OF THEIR TURBINES.
2 ALTERNATIVE ENERGY DEVELOPMENT FOR OUR STATE IS VERY IMPORTANT AND THIS PROJECT CONTRIBUTES TO THIS GOAL! THANK YOU

June 30, 2016

Lorraine Toseik
45-077E Waikalua Rd.
Kaneohe, HI 96744

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Toseik:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment IND-96.1*: I support Na Pua Makani's wind energy project and their height increate of their turbines.*

Response IND-96.1: Na Pua Makani Power Partners, LLC acknowledges your support for the proposed Project. The Project design has been modified several times in response to community input. The recent updates to the proposed Project are described in Section 2.1 of the EIS.

Comment IND-96.2*: Alternative energy development for our state is very important and this project contributes to this goal!*

Response IND-96.2: As noted in your comment the proposed Project would provide a clean source of renewable energy and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals. The Project would also contribute to reducing the cost of electricity and would reduce greenhouse gas emissions and other forms of pollution associated with coal or diesel fuel electric generation.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

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Mike Cutbirth
C/O Tetra Tech, Inc.
737 Bishop St., Suite 2340, Mauka Tower
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*All comments should be submitted/postmarked by **June 7, 2016.**

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Name: MATT TOSEIK

Address: 45-077E WAIKALUA RD.
KANEOHE, HI., 96744

Email:

Comments: 1 IN ORDER FOR US TO MEET OUR FUTURE ENERGY NEEDS, ALTERNATIVE, SUSTAINABLE ENERGY DEVELOPMENT IS A MUST. THIS PROJECT IS A STEP FORWARD, AND SO, I AM IN SUPPORT OF NA PUA MAKAN'S PROJECT.

2 I ALSO AGREE AND SUPPORT THEIR TURBINE CHANGES. THANK YOU!

June 30, 2016

Mr. Matt Toseik
45-077E Waikalua Rd.
Kaneohe, HI 96744

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Toseik:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment IND-97.1*: In order for us to meet our future energy needs, alternative, sustainable energy development is a must. This project is a step forward, and so, I am in support of Na Pua Makani's project.*

Response IND-97.1: Na Pua Makani Power Partners, LLC acknowledges your support for the proposed Project. As noted in your comment, the proposed Project would provide a clean source of renewable energy and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals. The Project would also contribute to reducing the cost of electricity and would reduce greenhouse gas emissions and other forms of pollution associated with coal or diesel fuel electric generation.

Comment IND-97.2*: I also agree and support their turbine changes.*

Response IND-97.2: The Project design has been modified several times in response to community input. The recent updates to the proposed Project are described in Section 2.1 of the EIS.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

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Name: MONA WAGO, CHERYL WAGO, WADE WAGO

Address: 54-122 Puuowaa St.
Haula, HI. 96717

Email:

Comments: 1 ON BEHALF OF OUR WAGO FAMILY, WE WOULD LIKE TO VOICE OUR SUPPORT FOR THE NA PUA MAKANI WIND PROJECT. OUR ELECTRIC BILL IS OUTRAGEOUSLY HIGH, AND ALTERNATIVE ENERGY DEVELOPMENT IS NECESSARY FOR OUR FUTURE LESS EXPENSIVE ENERGY COSTS. WE ALSO SUPPORT WHAT
2 THEY FEEL IS NECESSARY FOR A SUCCESSFUL PROJECT DEVELOPMENT. Mahalo!

June 30, 2016

Mona Wago, Cheryl Wago, and Wade Wago
54-122 Puuowaa St.
Hauula, HI 96717

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mona Wago, Cheryl Wago, and Wade Wago:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment IND-98.1*: On behalf of our Wago family, we would like to voice our support for the Na Pua Makani wind project. Our electric bill is outrageously high and alternative energy development is necessary for our future less expensive energy costs.*

Response IND-98.1: Na Pua Makani Power Partners, LLC acknowledges your support for the proposed Project. The proposed Project would provide a clean source of renewable energy and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals. As noted in your comments, the Project would contribute to reducing the cost of electricity.

Comment IND-98.2*: We also support what they fell is necessary for a successful project development.*

Response IND-98.2: The Project design has been modified in response to community input. For more information on recent updates to the proposed Project, which were addressed in the Second Draft EIS, please see EIS Section 2.1.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

NĀ PUA MAKANI
Clean Energy Powering Hawai'i's Future

IND-99

Na Pua Makani Wind Project
Second Draft Environmental Impact Statement
Public Comment Form

For more information visit: **http://oeqc.doh.hawaii.gov/Shared%20Documents/Environmental_Notice/2016-04-23%20TEN.pdf**

Comments can be submitted by email to **brita.woeck@tetratech.com**, or by U.S. Mail addressed to:

Mike Cutbirth
C/O Tetra Tech, Inc.
737 Bishop St., Suite 2340, Mauka Tower
Honolulu, HI 96813
*All comments should be submitted/postmarked by **June 7, 2016.**

Background:

The original Draft EIS for the Na Pua Makani Wind Project (Project) was published on June 8, 2015. In response to public comments on the original Draft EIS related to visual impacts, Na Pua Makani reevaluated the proposed turbine locations and turbine models considered in the original Draft EIS. Through this effort, Na Pua Makani was able to reduce the maximum number of turbines needed to meet the target generating capacity for the Project from 10 to 9 wind turbines, and potentially 8 wind turbines depending on the model ultimately selected. This modification takes advantage of recent technological advancements that have resulted in the availability of uprated versions of turbine models that have increased generating capacity, are more efficient, and are better suited for the existing wind conditions of the wind farm site than previous models. **This Second Draft EIS incorporates a Modified Proposed Action Option, consisting of 9 larger wind turbines with greater generating capacities.**

**The purpose of this Second Draft EIS is to inform stakeholders of modifications to the proposed Project since the publication of the original Draft EIS; we are seeking comments related to these Project design changes only.

**Comments previously provided on the Project have been incorporated into the Second Draft EIS; therefore, there is no need to resubmit comments provided during the previous public comment periods.

Name: BILL LONG

Address: P.O. BOX 175
KAAWA, HI., 96730

Email:

Comments: 1 I SUPPORT NA PUA MAKAN'S WIND ENERGY PROJECT. THE NEED TO REDUCE OUR DEPENDING ON OIL IS VERY CRITICAL TO OUR FUTURE ENERGY NEEDS. I ALSO
2 SUPPORT THE HEIGHT INCREASE OF THEIR TURBINES, WHICH WILL PROVIDE A MORE EFFICIENT OPERATION.

June 30, 2016

Bill Long
P.O. Box 175
Kaaawa, HI 96730

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Long:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment IND-99.1*: I support Na Pua Makani's wind energy project. The need to reduce our depending on oil is very critical to our future energy needs.*

Response IND-99.1: Na Pua Makani Power Partners, LLC acknowledges your support for the proposed Project. As noted in your comment the proposed Project would provide a clean source of renewable energy. It would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals and would contribute to reducing the cost of electricity.

Comment IND-99.2*: I also support the height increase of the turbines, which will provide a more efficient operation.*

Response IND-99.2: The Project design has been modified several times in response to community input. For more information on the recent updates to the proposed Project, which were addressed in the Second Draft EIS, please see EIS Section 2.1. The larger turbines are being considered in part because they are more efficient, and better suited for the wind conditions at the proposed wind farm site.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

NĀ PUA MAKANI
Clean Energy Powering Hawai'i's Future

IND-100

Na Pua Makani Wind Project
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Mike Cutbirth
C/O Tetra Tech, Inc.
737 Bishop St., Suite 2340, Mauka Tower
Honolulu, HI 96813
*All comments should be submitted/postmarked by **June 7, 2016.**

Background:

The original Draft EIS for the Na Pua Makani Wind Project (Project) was published on June 8, 2015. In response to public comments on the original Draft EIS related to visual impacts, Na Pua Makani reevaluated the proposed turbine locations and turbine models considered in the original Draft EIS. Through this effort, Na Pua Makani was able to reduce the maximum number of turbines needed to meet the target generating capacity for the Project from 10 to 9 wind turbines, and potentially 8 wind turbines depending on the model ultimately selected. This modification takes advantage of recent technological advancements that have resulted in the availability of uprated versions of turbine models that have increased generating capacity, are more efficient, and are better suited for the existing wind conditions of the wind farm site than previous models. **This Second Draft EIS incorporates a Modified Proposed Action Option, consisting of 9 larger wind turbines with greater generating capacities.**

**The purpose of this Second Draft EIS is to inform stakeholders of modifications to the proposed Project since the publication of the original Draft EIS; we are seeking comments related to these Project design changes only.

**Comments previously provided on the Project have been incorporated into the Second Draft EIS; therefore, there is no need to resubmit comments provided during the previous public comment periods.

Name: JAN HIPA

Address: P.O. BOX 175
KAAAWA, HI. 96730

Email:

Comments: 1 NA PUA MAKANI'S WIND PROJECT WILL CONTINUE TO MOVE IN THE RIGHT DIRECTION OF HAVING AND MEETING OUR FUTURE ENERGY NEEDS. I SUPPORT THIS PROJECT AND ALSO
2 SUPPORT THEIR REQUEST TO INCREASE THE HEIGHT OF THEIR WIND MACHINE/TURBINES. THANK YOU!

June 30, 2016

Jan Hipa
P.O. Box 175
Kaaawa, HI 96730

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Jan Hipa:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment IND-100.1*: Na Pua Makani's wind project will continue to move in the right direction of having and meeting our future energy needs.*

Response IND-100.1: As noted in your comment, the proposed Project would provide a clean source of renewable energy and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals. The Project would also contribute to reducing the cost of electricity and would reduce greenhouse gas emissions and other forms of pollution associated with coal or diesel fuel electric generation.

Comment IND-100.2*: I support this project and also support their request to increase the height of the wind machines/turbines.*

Response IND-100.2: Na Pua Makani Power Partners, LLC acknowledges your support for the proposed Project. The Project design has been modified several times in response to community input. For more information on the recent updates to the proposed Project, which were addressed in the Second Draft EIS, please see EIS Section 2.1.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

NĀ PUA MAKANI
Clean Energy Powering Hawai'i's Future

IND-101

Na Pua Makani Wind Project
Second Draft Environmental Impact Statement
Public Comment Form

For more information visit: **http://oeqc.doh.hawaii.gov/Shared%20Documents/Environmental_Notice/2016-04-23%20TEN.pdf**

Comments can be submitted by email to **brita.woeck@tetratech.com**, or by U.S. Mail addressed to:

Mike Cutbirth
C/O Tetra Tech, Inc.
737 Bishop St., Suite 2340, Mauka Tower
Honolulu, HI 96813
*All comments should be submitted/postmarked by **June 7, 2016.**

Background:

The original Draft EIS for the Na Pua Makani Wind Project (Project) was published on June 8, 2015. In response to public comments on the original Draft EIS related to visual impacts, Na Pua Makani reevaluated the proposed turbine locations and turbine models considered in the original Draft EIS. Through this effort, Na Pua Makani was able to reduce the maximum number of turbines needed to meet the target generating capacity for the Project from 10 to 9 wind turbines, and potentially 8 wind turbines depending on the model ultimately selected. This modification takes advantage of recent technological advancements that have resulted in the availability of uprated versions of turbine models that have increased generating capacity, are more efficient, and are better suited for the existing wind conditions of the wind farm site than previous models. **This Second Draft EIS incorporates a Modified Proposed Action Option, consisting of 9 larger wind turbines with greater generating capacities.**

**The purpose of this Second Draft EIS is to inform stakeholders of modifications to the proposed Project since the publication of the original Draft EIS; we are seeking comments related to these Project design changes only.

**Comments previously provided on the Project have been incorporated into the Second Draft EIS; therefore, there is no need to resubmit comments provided during the previous public comment periods.

Name: TIM WELCH

Address: 54-303 Kawaewae Way
Hauula, HI, 96717

Email:

Comments: 1 Aloha, I support this wind project of Na Pua Makani and their need to increase the height of the turbine. We need
2 reliable future energy development such as Pua Makani Mahalo!

June 30, 2016

Mr. Tim Welch
54-303 Kawaeae Way
Hauula, HI 96717

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Welch:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment IND-101.1*: I support this wind project of Na Pua Makani and their need to increase the height of the turbine.*

Response IND-101.1: Na Pua Makani Power Partners, LLC acknowledges your support for the proposed Project. The Project design has been modified several times in response to community input. For more information on the recent updates to the proposed Project, which were addressed in the Second Draft EIS, please see EIS Section 2.1. The larger turbines are being considered in part because they are more efficient, and better suited for the wind conditions at the proposed wind farm site.

Comment IND-101.2*: We need reliable future energy development such as Pua Makani.*

Response IND-101.2: The proposed Project would provide a clean source of renewable energy and would assist HECO in meeting its Renewable Portfolio Standard and Hawaii's Clean Energy Initiative goals. The Project would also contribute to reducing the cost of electricity and would reduce greenhouse gas emissions and other forms of pollution associated with coal or diesel fuel electric generation. For more information on the purpose and need for the Project please see section 1.4 of the EIS.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

Organization Letters and Responses

ORG-8

Kahuku Community Association

P.O. Box 333 Kahuku, HI. 96731

To whom it may concern,

The Kahuku Community Association is a City recognized entity representing Kahuku residents via the Neighborhood Board system.

1 The Kahuku Community Association (KCA) is overwhelmingly in opposition to the proposed 25 megawatt wind machine facility proposed to be located South West of Kahuku town or within KCA's area of service.

2 We remain in support of responsible renewable energy projects that do not disproportionately impact small rural communities.

3 After reviewing the proponents second Draft Environmental impact Statement, KCA believes the proposed project will adversely impact Kahuku residents to a significant level and the visual and environmental impacts cannot be mitigated to an acceptable level.

Thank you for accepting KCA's position as part of your record.

Mahalo nui-

Kent Fonoimoana
Kahuku Community Association President
PO Box 360
Kahuku, Hawaii 96731

June 30, 2016

Mr. Kent Fonoimoana
Kahuku Community Association
PO Box 360
Kahuku, HI 96731

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Fonoimoana:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment ORG-8.1*: The Kahuku Community Association (KCA) is overwhelmingly in opposition to the proposed 25 megawatt wind machine facility proposed to be located South West of Kahuku town or within KCA's area of service.*

Response ORG-8.1: Na Pua Makani Power Partners, LLC acknowledges that there is opposition to the proposed Project. The Final EIS includes letters from residents that live in Kahuku that support renewable energy in general, and support the proposed Project. It also includes letters expressing opposition to the Project, or concern over specific issues. All comment letters received from members of the Kahuku Community are included in Appendix M of the Final EIS.

Comment ORG-8.2*: We remain in support of responsible renewable energy projects that do not disproportionately impact small rural communities.*

Response ORG-8.2: Your support for renewable energy projects is noted. A number of screening criteria were considered during the selection of the proposed Project location, described in Section 2.1 of the EIS. They include but are not limited to the availability of a sufficient wind resource, access to adequate and available transmission capacity, availability of contiguous land that is designated to allow wind energy development, and site-specific conditions such as topography which influence construction feasibility and compliance with setback requirements. Alternatives that were considered but eliminated from detailed study, including alternative project locations on Oahu, are described in Section 2.3 of the EIS. Alternative locations did not meet these criteria.

Comment ORG-8.3*: After reviewing the proponents second Draft Environmental impact Statement, KCA believes the proposed project will adversely impact Kahuku residents to a significant level and the visual and environmental impacts cannot be mitigated to an acceptable level.*

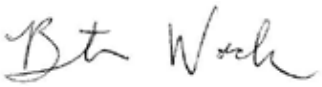
Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

Response ORG-8.3: Table 2-5 of the EIS provides a list of industry standard BMPs, Project-specific design features, and Project plans that Na Pua Makani Power Partners, LLC has committed to incorporating into the Project to reduce potential impacts. Additional avoidance and minimization measures specific to each resource area are discussed under their respective subsections in Chapter 4 of the EIS.

Visual simulations of the proposed Project, including the Proposed Action presented in the original Draft EIS (published in June 2015) as well as the Modified Proposed Action Option (fewer turbines with greater generating capacities) which was added to the Second Draft EIS, are included in Section 4.16 – Visual Resources. As noted in the EIS, the proposed Project would be most visible at viewpoints close to the wind farm site (within about 1 mile). Although the visibility of the proposed Project is unavoidable, it would be compatible with nearby existing residential, commercial, public, and agricultural land uses. Additionally, the Project would co-exist on the landscape with existing commercial and residential developments and would not visually dominate the landscape character because there is already a substantial degree of landscape modification in most views, including the existing Kahuku Wind Farm that is directly adjacent to the proposed Project which has been in operation since 2011.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

Woeck, Brita

ORG-9

From: Kent Fonoimoana-TRIsland <kent@trisland.com>
Sent: Wednesday, June 08, 2016 4:49 PM
To: Woeck, Brita
Cc: Tasi Ponder
Subject: Na Pua Makani HCP and DEISNa Pua Makani HCP and DEIS

Makani Pono 'o Kahuku's Response and Questions Regarding Na Pua Makani Power Partner's Second Draft Environmental Impact Statement (DEIS)
Submitted By: Kent Fonoimoana, Co-chair - Makani Pono 'o Kahuku
Submitted to: Brita Woeck, Tetratech personnel
Submitted via email to: brita.woeck@tetratech.com

Thank you for the opportunity to respond the Na Pua Makani Power Partners (NPMPP) second DEIS.

Makani Pono 'o Kahuku (MPK) is a grassroots community based organization comprised mostly of area residents who reside in the Ko'olauloa region. MPK's mission is to ensure responsible use of our wind resources while respecting and enhancing the delicate balance of Hawaii's environment. MKP supports non impactful, environmentally safe renewable energy that provides personal independence.

1 MPK is opposed to NPMPP's proposal in its entirety. The following is MKP's response as well as our questions regarding the proponents second DEIS.

2 We have attached a digital copy of germane petitions that our members have distributed via the internet as well as in person.

We look forward to reviewing the proponent's responses to all of our inquiries.

3 ES-1 - "In response to public comments on the original Draft EIS, a Modified Proposed Action Option (consisting of only nine turbines with larger generating capacities and dimensions) was added to the Second Draft EIS analysis."
Question: Can you please provide a specific references to this comment in the original Draft EIS. After reviewing the original DEIS, MPK could not locate comments advocating for fewer turbines.

4 ES-1 "The EIS addresses alternatives to the Proposed Action (and Modified Proposed Action Option), including the No Action Alternative…."
Questions: 1- Did NPMPP study offshore alternatives in the original Draft EIS? If not, why? 2- Was the Kahuku Military Reservation or the Kawailoa Military Reservation included in this study? If not, please list reason for omitting.

5 ES-2 "Alternatives that were eliminated from further consideration include smaller (less than 25 MW) and larger (more than 42 MW) facilities, alternative locations on Oahu, and other alternative renewable energy sources. These preliminary alternatives were subsequently dismissed if it was

determined they did not meet the Project's Purpose and Need or the Project's objectives, described in Chapter 1 of this EIS."
Question: Did NPMPP include all O'ahu locations including Palehua Ridge above Makakilo? If so, can the public access these studies?

ES-2 "NPMPP developed best management practices (BMPs) and mitigation measures that reduced the potential impact level to less than significant, thereby avoiding significant adverse impacts to sensitive environmental resources."
6 Question: If NPMPP developed the BMP's to mitigate potential impacts to levels less than significant, what Governmental agencies will monitor and enforce these practices and what constitutes "less than significant"?

ES-3 "The City and County of Honolulu General Plan is the guiding document for long-range development of the Island of Oahu. The General Plan, currently being updated, describes general conditions to be sought over the 20-year planning horizon and outlines policies to help direct attainment of the plan's objectives. Themes of the General Plan include supporting programs and projects that contribute to the attainment of energy self-efficiency on Oahu and developing and applying new, locally available energy resources. The Project is consistent with the General Plan goals, policies, and objectives."
7 Questions: 1- What specific City ordinance governs wind machine regulations and what if any legislative measures exist that seek to alter the current regulations? 2- When was the current ordinance last revised? 3- If no revision - When was ordinance implemented? 3- Same questions for State regulations?

ES-3 "The Project is compatible with existing agricultural uses, and as such, does not preclude the present and future agricultural productivity of the Wind Farm site or the Kahuku area. At the end of the approximately 20-year life of the Project, the Power Purchase Agreement could be renegotiated or the Project could be decommissioned, returning the land to its original condition to the extent possible." How many acres of farm land will not be available for cultivation due to denuding practices
8 that enable collection and documentation of flying animal strikes? Will the concrete foundations be removed?

ES-3 "Once in operation, the Project would not cause any emissions of air, water, or soil pollutants…"
9 Questions: 1- Due to the increase in output per turbine, will there be an increase in electromagnetic field production (EMF) and what levels are expected? 2- What levels of EMF is considered harmful if exposed to for long periods? 3- If there are negative impacts associated with EMF output, what is the best mitigation option?

Table ES-1 "Noise ITP/HCP Implementation: Negligible noise impacts. Na Pua Makani Wind Project: Minor, localized, temporary noise impacts during construction; Project would comply with Hawaii Department of Health (DOH) permit. Minor, localized, long-term increase in noise during operation; would comply with HAR 11-46 sound level limits. Negligible low frequency noise/infrasound impacts."

10 Questtions: 1- Table ES-1 mentions infrasound. What is infrasound and what are the reported impacts? 2- What is the best proven method to mitigate the impacts of infrasound?

Table ES-1 "Natural Hazards ITP/HCP Implementation: Negligible impacts due to implementation of project Fire Management Plan. Na Pua Makani Wind Project: Negligible to minor impacts to construction and operation. Impacts from natural hazards minimized through project design features and implementation of FMP and Site Safety Handbook."

11 Questions: 1- What are the potential impacts to the community that could be caused by acts of nature such as an 'Iniki type hurricane event? 2- Have there been any know tornado strikes or hurricane impacted industrial sized wind machines? 3- If yes, what were the results? 4- If no, what is the worst case scenario and what would be the most effective mitigation measure to prevent loss of property or life?

Table ES-1 "Wildlife Na Pua Makani Wind Project: Minor, localized habitat removal (no high quality or unique habitats); collision potential; and temporary noise and disturbance associated with construction and operation activities. Common, non-native species most likely impacted, although collision potential exists for MBTA-protected and other avian species of concern. Impacts would be avoided or minimized through implementation of the HCP." 12 Question: How will the implementation of the HCP aid in avoiding impact to subject species that transverse or exist in the project site?

Table Es-1 "Threatened and Endangered Species - ITP/HCP Implementation: Negligible adverse effects associated with HCP implementation. Long-term beneficial effects associated with the protection (fence installation or maintenance) and/or enhancement (invasive plant species control and feral pig removal) of native ecosystems, reduction in predation pressure (predator control), and/or through research and management. Overall net benefit to Covered Species from implementation of the HCP. Na Pua Makani Wind Project: Potential for collision with turbines; impacts considered negligible due to the net benefit of HCP mitigation activities (i.e., no population level effects anticipated). Requested take of Covered Species: Hawaiian hoary bat: Tier 1: 34 bats; Tier 2: 51 bats (tiers not additive; total take requested is 51 bats); mitigation consists of funding of bat research study and habitat restoration at Poamoho Ridge Mitigation Area. Newell's shearwater: 4 adults/fledged young, 2 chicks/eggs: mitigation consists of funding to support research and management of Newell's shearwaters. Hawaiian Goose: 6 adults; mitigation consists of constructing protective fencing at James Campbell NWR. Water birds: 4 Hawaiian duck adults, 4 Hawaiian stilt adults, 8 Hawaiian coot adults, 8 Hawaiian moorhen adults; mitigation consists of installation of fence and public information signs and funding of part-time biologist at Hamakua Marsh Mitigation Area. Hawaiian short-eared owl: 4 adults/fledged young, 4 chicks/eggs; mitigation consists of funding to support research and management of Hawaiian short-eared owls."

13 Question: 1- What percentage of the above endangered species populations respectively would be subject to impacts of turbine strikes? 2- How many is too many? 3- How many is acceptable? 4- In regards to the proposed HCP, will NPMPP be amenable to participating with the existing SunEdison Wind facility in shielding all street lights within a negotiated distance not less than 2 miles? 14

Table ES-1 "Socio-Economic Resources: Minor beneficial effects associated with short term and long-term employment associated with implementing mitigation. Na Pua Makani Wind project: Minor

short-term and long-term beneficial socioeconomic impacts through construction expenditures, job creation (approximately 43 short-term construction jobs and 3 to 6 full-time jobs during operation), and tax revenues. Negligible to minor, localized, temporary adverse effects associated demand for housing and community services associated with construction workforce. Adverse effects to property values or ability of homeowners to install rooftop photovoltaic systems on their homes not anticipated. Project would provide source of renewable energy helping Hawaii Electric Company (HECO) meet its Renewable Portfolio Standard (RPS) requirements. Includes long-term Community Benefits Package."

15 Questions: 1- Of these short term jobs, can you provide a breakdown to include the quantity of each tradesman anticipated and covered under which labor association? 16 2-What is the expected State tax revenue? City? 3- What is the expected localized increase in state expenditures? 4- What percentage of state tax revenue generated by NPMPP will be directly used to benefit Kahuku specific state owned 17 facilities? 5- Will this amount be over and above current state expenditures in Kahuku? 5- Is the 18 adverse effects regarding the demand for housing due to offshore workers? 6- In regards to impacts 19 with housing values, this document fails to adequately address the issue and stating "not anticipated" is not a clear or complete answer. Please cite specific independent studies to support that claim. 20 7- Has NPMPP performed a location specific study to support this claim? If not, why? If yes, is this information available to the public? 8- If there is in fact adverse impacts on private property values, 21 will NPMPP be responsible to make whole those who suffered losses? 9- In regards to the community benefits package, how will these funds be distributed? 10- What is NPMPP's definition of 22 "community" as referred to in this document? 11- What donations have NPMPP previously made to the community and or individuals and will the list of recipients be public information?

Table ES-1 "Visual Resources: Minor, short term and long-term adverse visual impacts due mitigation activities at Hamakua Marsh and Poamoho Ridge mitigation areas and presence of mitigation fence at Hamakua Marsh, respectively. Na Pua Makani Wind Project: Minor, temporary adverse impacts during construction due to presence of vehicles and equipment and dust. Moderate, long-term adverse impacts due to Project visibility mitigated through design and lighting measures. Project most visible from locations within 1 mile (1.6 kilometers from wind farm site)."

23 Questions: 1- Can you please explain how design will mitigate the Kahuku Project site visual impacts? 2- How will lighting mitigate the anticipated visual impacts at the Kahuku site?

Table ES-1 "Transportation: Negligible effects to transportation. Na Pua Makani Wind Project: Up to 100 nighttime roundtrips of oversized loads needed during 20 construction days. Average of 144 daytime and 154 nighttime construction-related trips per day. Minor, temporary adverse impact on transportation, minimized through implementation of traffic management plan and permit requirements for oversize and overweight loads. Temporary modifications of overhead utility lines, relocation of traffic lights and guardrails, tree trimming, and asphalt curb removal necessary along construction access routes. Negligible long-term Project-related transportation effects."
Currently, the bridges along the proposed transportation corridor are in disrepair. The Paumalu Bridge is currently being downgraded to a 25 ton limit.

24 Question: What is NPMPP plans for the heavily travelled Kamehameha Hwy should an unforeseen failure occur at any point along the corridor? 2- If there is an extra fee or permit required to transport

turbine components via the North Shore corridor, how much if any of the fee will be dedicated to improvements to Kamehameha Hwy between Haleiwa and Kahuku?

Table ES-1 "Public Health and Safety: Negligible effects on public health and safety. Na Pua Makani Wind Project: Negligible impacts associated turbine collapse and blade throw, EMF, and stray voltage and minor, long-term impacts associated with fire and fuels; impacts minimized by implementation of mitigation measures, including adherence to industry design standards and implementation of the Site Safety Handbook and other Project plans. Moderate, long-term shadow flicker impacts; 98 percent of receptors predicted to experience below 30 hours of shadow flicker per year (industry standard)."

Questions: 1- In a worst case scenario, what are the potential impacts to nearby residents should one
25 or more turbines suffer catastrophic damage during a category 5 hurricane and can you please supply data to support that scenario? 2- Has NPMPP developed a location specific analysis of what impacts may occur should one or more turbines suffer catastrophic failure during a high wind event? 26
Moderate wind? 3- What are the expected EMF levels directly below the turbines? 1600 feet removed?
27 4- What is stray voltage and what are the effects on living organisms? 5- Will NPMPP install fire
28 suppression measures? If so, what are the specific measures? 6- What is blade flicker and what are the reported effects on humans caused by blade flicker? 7- What is the best method to mitigate effects
29 cause by shadow flicker? 8- What is Electromagnetic Radiation (EMR) and why was this issue omitted from the proponent's original DEIS? 9- Will an EMR study be conducted for the Final EIS? Why/why not?
30 10- What is the recommended solution that best protects humans from the impacts associated with EMR?
11- Will NPMPP bury their on-site transmission lines to mitigate EMF and EMR? If not, why?

Table ES-1 "Environmental Justice: Na Pua Makani Wind Project: No high and adverse human health or environmental effects anticipated with construction or operation of the Project; all other effects (e.g., visual, noise, public health and safety, socioeconomic) less than significant. Because there are no high or adverse effects to any population, there would be no high or adverse effects to any minority or low income population and, therefore, no environmental justice issues resulting from this Project."

31 Question: Can you provide documentation that can substantiate the above claim as it differs greatly with the following statement that the Environmental Protection Agency submitted in the original Draft EIS?

...

"Subject: Draft Environmental Impact Statement for the Na Pua Makani Wind Project and Habitat Conservation Plan,
Kahuku, Hawaii [CEQ# 20150160]

Dear Ms. Young:
The U.S. Environmental Protection Agency has reviewed the Draft Environmental Impact Statement for the Na Pua Makani Wind Project and Habitat Conservation Plan. Our review and comments are provided pursuant to the National Environmental Policy Act, Council on Environmental Quality Regulations (40 CFR Parts 1500-1508), and our NEPA review authority under Section 309 of the Clean Air Act.

The EPA supports the development of renewable energy resources in an expeditious and well-planned manner. Accelerating the development of renewable resources and the deployment of clean energy technologies in Hawaii will help the state meet its energy demand, reduce dependence on imported oil, create new jobs, and provide for increased energy security, while reducing greenhouse gas emissions. The proposed incidental take permit represents a coordinated approach to protecting and preserving the eight proposed Covered Species and their habitat, while allowing the proposed wind energy project to proceed. We encourage the U.S. Fish and Wildlife Service to apply its regulatory authorities in a manner that will promote a long-term sustainable balance between the development of renewable energy resources and the protection of ecosystems and human health.

Wind power development offers many benefits to society and the environment; however, there can be burdens associated with living in close proximity to wind turbines. The community in the vicinity of the proposed project has been identified as a minority environmental justice population, due to the disproportionate concentration of Native Hawaiians and other Pacific Islanders, and may be less NPMPP has stated that that there is no adverse impacts "anticipated" on private property values. Question: Has NPMPP performed a location specific study to support this claim? If not, why? If yes, is this information available to the public? If there is in fact adverse impacts on private property values, will NPMPP be responsible to make whole those who suffered losses?
equipped than other communities to deal with those burdens.

Based on our review of the DEIS, we have rated the proposed Project and the document *as Environmental Concerns - Insufficient Information* (EC-2). Please see enclosed *Summary of EPA Rating Definitions.*We have concerns regarding potential impacts to aquatic resources. We are also concerned about the proximity of the proposed turbines to residents in Kahuku. We recognize that the Proponent has increased the setbacks beyond what is required by Hawaii regulations. Nonetheless, we remain concerned about the potential impacts of noise and shadow flicker from the proposed Project on residents. Our detailed comments provide recommendations regarding these and other concerns.

We appreciate the opportunity to review this DEIS, and are available to discuss our comments. When the Final EIS is released for public review, please send one hard copy and one CD-ROM to the address above (Mail Code: ENF-4-2).

If you have any questions, please contact me at 415-972-3521, or contact Ann McPherson, the lead reviewer for this project. Ann can be reached at 415-972-3545 or
rncpherson.ann@.epa.gov.
Enclosures: Summary of the EPA Rating System
EPA' s Detailed Comment"

...

Tetra Tech's Response

"The communities of Kahuku and Laie were identified in the Draft EIS as minority environmental justice populations based on the disproportionate concentration of Native Hawaiians and Other

Pacific Islanders in these areas relative to Oahu as a whole (30 percent and 35 percent of the population, respectively, versus 9 percent for Honolulu County as a whole). However, it is important to note that in Hawaii, as well as within Honolulu County, a majority of the population (78 percent and 81 percent, respectively) consists of a non-white, minority group (Asian, Native American or other Pacific Islander, and Hispanic or Latino; see Section 3.17 of the EIS for additional information). Potential adverse effects to residents living in the communities in the vicinity of the Project relate to noise, socioeconomic, cultural resources, visual resources, and public health and safety, none of which were determined to be high and adverse. Moreover, the Project would result in short- and long-term socioeconomic benefits to the community through the creation of jobs and generation of tax revenues. Na Pua Makani Power Partners has incorporated input from the surrounding communities in development of the Project design, which has resulted in a number of significant design changes. Additionally, they are working with community leaders to establish a multi-million dollar community benefits fund which will contribute to the local Kahuku community for the life of the Project. For these reasons, Native Hawaiians and other Pacific Islanders are not anticipated to experience a disproportionate share of effects."

....

31 Makani Pono 'o Kahuku agrees with the Environmental Protection Agency's assessment in identifying the Kahuku community as minority justice population. A surface investigation into Oahu's demographics supports it. The fact that there are no large wind turbines in East Honolulu while Kahuku may be getting a second facility supports the belief that low income communities bear a disproportionate burden when it comes to wind turbine siting. East Honolulu is Oahu's second best region to install wind machines according to wind profile studies. Although the EPA offers some solutions regarding the physical aspects of installing the project, the EPA is silent on how to mitigate Kahuku community's identification. More importantly, the EPA appears to be making a connection between wind turbine proximity to humans and human health.

32 Questions: 1- Please provide any methodology NPMPP intends to employ to overcome this disparity with the EPA's community identification and NPMPP's interpretation of known statistics. 2-Has the proponent conducted an independent survey of the Kahuku/Laie demographics that support the proponent's position that the area is not a minority justice population? If not, why? If yes, are the findings supported by the EPA and/or the US Census Bureau or any other City, State or Federal agency and are they available for public review? 3- Regarding demographics, NPMPP has publicly claimed that a majority of the Kahuku community supports their proposal. Do they have documented evidence to support that claim? If so, is this evidence available for public review? 4- There are names and comments listed at the end of the original DEIS. Has the proponent mapped the location and position of each traceable comment as part of a demographic analysis study? If yes, is this information available to the public? If not, why? 5- Regarding the distribution of community benefits, can you please name the community leaders who will be distributing the benefits? 6- Also, can you please estimate the distances those individuals live from the nearest proposed turbine and tower site? 7- Can you please identify any individual, group or Foundation that supports this project and who have received or have been promised financial assistance from NPMPP or their agents?

33

34 Questions: Has NPMPP conducted a study regarding potential impacts on cellular phone signals and/or interference due to towers and blades? Is NPMPP aware of any claims (worldwide) of cellular interference due to wind turbines? If so, can NPMPP cite the studies in the final EIS? Is NPMPP aware

of any claims (worldwide) of disturbance to privately owned direct TV or other dish technology? Can NPMPP cite these studies in the final EIS? If there are known disturbances with privately owned dish technology and what are the recommended mitigation measures?

Please address these concerns and questions in your second DEIS and we look forward to your responses to our questions.

Mahalo nui-

Kent Fonoimoana
Co-chair - Makani Pono 'o Kahuku
PO Box 360
Kahuku Hawaii 96731

June 30, 2016

Makani Pono ‘o Kahuku
Kent Fonoimoana
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Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Makani Pono ‘o Kahuku:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment ORG-9.1*: MPK is opposed to NPMPP’s proposal in its entirety. The following is MKP’s response as well as our questions regarding the proponents second DEIS.*

Response ORG-9.1: Na Pua Makani Power Partners, LLC acknowledges your opposition to the proposed Project.

Comment ORG-9.2*: We have attached a digital copy of germane petitions that our members have distributed via the internet as well as in person.*

Response ORG-9.2: We have received the petitions included with your letter. We acknowledge that these are the same attachments included with your comments submitted via email on August 10, 2015, on the original Draft EIS. Please see the response to letter ORG-7 which were included in Appendix M of the EIS which addresses all of the comments provided in this attachment. Given the volume of comments and associated responses (50+pages), these responses are not repeated here.

Comment ORG-9.3*: ES-1 - “In response to public comments on the original Draft EIS, a Modified Proposed Action Option (consisting of only nine turbines with larger generating capacities and dimensions) was added to the Second Draft EIS analysis.” Can you please provide a specific references to this comment in the original Draft EIS. After reviewing the original DEIS, MPK could not locate comments advocating for fewer turbines.*

Response ORG-9.3: The State Department of Planning and Permitting’s letter on the original Draft EIS, dated August 6, 2015, asked if there was the potential to use wind turbines with larger generating capacities to reduce the number of turbines. This letter, and our response, was included in Appendix M of the Second Draft EIS and will also be included in the Final EIS.

Comment ORG-9.4*: ES-1 “The EIS addresses alternatives to the Proposed Action (and Modified Proposed Action Option), including the No Action Alternative….” Did NPMPP study offshore alternatives in the original*

Draft EIS? If not, why? Was the Kahuku Military Reservation or the Kawailoa Military Reservation included in this study? If not, please list reason for omitting.

Response ORG-9.4: Offshore wind development was not a consideration for the proposed Project. This Project, as proposed and designed, is land-based wind energy project. Section 2.3.4 of the EIS discusses why alternative locations on Oahu were not carried forward for consideration. Section 2.1 of the EIS describes screening criteria used to select the currently proposed wind farm site. The military lands near the proposed wind farm site were not considered because these areas are essential to the Department of the Army for military training operations. Other locations along the Northshore of Oahu were also not considered in part because they did not have adequate access to adequate and available transmission capacity.

Comment ORG-9.5*: ES-2 “Alternatives that were eliminated from further consideration include smaller (less than 25 MW) and larger (more than 42 MW) facilities, alternative locations on Oahu, and other alternative renewable energy sources. These preliminary alternatives were subsequently dismissed if it was determined they did not meet the Project’s Purpose and Need or the Project’s objectives, described in Chapter 1 of this EIS.” Did NPMPP include all O’ahu locations including Palehua Ridge above Makakilo? If so, can the public access these studies?*

Response ORG-9.5: Please see the response to comment ORG-9.4. Initial project siting studies conducted by the developer are propriety and beyond the scope of this EIS.

Comment ORG-9.6*: If NPMPP developed the BMP’s to mitigate potential impacts to levels less than significant, what Governmental agencies will monitor and enforce these practices and what constitutes “less than significant”?*

Response ORG-9.6: Significant impacts are those that are determined likely to be important effects to the human environment based on evaluation of the intensity (magnitude), duration, extent and context of effects. The guiding definitions of these considerations are presented in Chapter 4 of the EIS preceding the analysis of effects to each resource. Best Management Practices and other avoidance, minimization, and mitigation measures will in most cases be incorporated under individual permits and approvals required for the Project. These are listed in Table 5-1 of the EIS.

Comment ORG-9.7*: What specific City ordinance governs wind machine regulations and what if any legislative measures exist that seek to alter the current regulations? When was the current ordinance last revised? If no revision – When was the ordinance implemented? Same questions for State regulations?*

Response ORG-9.7: In the State of Hawaii, county zoning code lists the permitted uses within each zone, and also the required development standards, such as setbacks, height limits, and other controls. Wind machines are addressed in Chapter 21 (Land Use Ordinance) of the Revised Ordinances of the City and County of Honolulu 1990. The proposed wind farm site is zoned AG-2 General Agricultural and AG-1 Restricted Agricultural by the City and County of Honolulu. Articles 4.60(c)(7) and 5.700(a) address wind turbine setbacks, specifying that wind machines must be set back from all property lines one foot for each foot of height, measured from the highest vertical extension of the system. The proposed Project, as designed, is in compliance with these setback requirements. Article 5.700(c) requires that within the agricultural zoning district, wind machines with a rated capacity of more than 100 kilowatts shall require a conditional use permit (minor). A conditional use permit application for the proposed Project will be submitted to the City and County of Honolulu Department of Planning and Permitting. Resolution 15-311, introduced in November 2015, seeks an amendment to the land use ordinance permitting requirements for wind machines.

There are no specific State ordinances governing wind machines, although the proposed Project must demonstrate compliance with a variety of statutes and regulations which include but are not limited to Hawaii Revised Statutes (HRS) Section 195-D (Hawaii Endangered Species Law), HRS Chapter 343 (environmental review), HRS Chapter 6E (Hawaii Historic Preservation program), HRS Chapter 226 (Hawaii State Planning Act), and HRS Chapter 205 (Hawaii Land Use Law). Consistency of the proposed Project with these regulations is discussed in Chapter 5 of the EIS. The Hawaii Department of Health also sets forth requirements for water, air, noise, and solid waste. Consistency with these regulations is discussed in EIS Sections 4.4, 4.5, 4.6, and 4.7, respectively.

In 2015, the State passed HB 623 which set a new Renewable Portfolio Standard of 100 percent renewable energy by 2045, while also increasing Hawaii’s interim 2020 target to 30 percent. The proposed Project would contribute to the ability of the State to meet its RPS obligations.

Comment ORG-9.8*: How many acres of farm land will not be available for cultivation due to denuding practices that enable collection and documentation of flying animal strikes? Will the concrete foundations be removed?*

Response ORG-9.8: A total of 4.6 acres of active agricultural land (crops) would be impacted over the long-term by construction and operation of the proposed Project. In total, long-term impacts represent up to approximately 3 percent of actively farmed land within the wind farm site. Agricultural impacts are discussed in detail in EIS Section 4.22 – Agriculture. However, there would be no net loss of active agriculture as a result of the proposed Project because Na Pua Makani Power Partners, LLC has committed to working with the landowner, Malaekahana Hui West, LLC to identify suitable agricultural land within each of the parcels leased by individual farmers that can be prepared for agricultural production to compensate for the acreage of active agricultural land affected by the proposed Project.

Only the gravel pads surrounding the turbines would be maintained free of vegetation to facilitate operation and maintenance activities, including post-construction mortality monitoring for birds and bats. The surrounding land that falls within the monitoring plots would be planted with low growing crops that facilitate monitoring activities while allowing agricultural uses to continue.

Project decommissioning is described in Section 2.4.8 of the EIS. If the Project is decommissioned, the goal of decommissioning would be to remove the power generation equipment and return the site to a condition as close to its pre-construction state as possible within 1 year as contractually required in both the land lease with DLNR and the PPA with HECO. Foundations would be removed to a depth below grade, and roads would be left for use.

Comment ORG-9.9*: Due to the increase in output per turbine, will there be an increase in electromagnetic field production (EMF) and what levels are expected? 2- What levels of EMF is considered harmful if exposed to for long periods? 3- If there are negative impacts associated with EMF output, what is the best mitigation option?*

Response ORG-9.9: Electromagnetic fields (EMF) are described in EIS Section 4.18 – Public Health and Safety. Components of wind energy projects (transmission lines and wind turbines), like the energized components of electrical motors, home wiring, lighting, and all electrical appliances, produce electric and magnetic fields, commonly referred to as EMF. Measurements of EMF recorded in wind farm sites have shown very low EMF at the base of a wind turbine. For example, EMF levels detected at the base of the turbines in Ontario under both the ‘high wind’ and ‘low wind’ conditions had a mean EMF level of 0.9 mille gauss (mG; maximum 1.1 mG), which rapidly diminished with distance (McCallum et al. 2014). No detectable EMF is expected at 25 feet from a wind turbine (Windrush 2004). For reference, typical EMF levels associated with common household appliances reported by the U.S. National Institute of Environmental Health Sciences at six inches from the source, include 40 mG for a refrigerator, 50 mG for a ceiling fan, 100 mG for a dishwasher, 300 mG for a microwave, 600 mG for an electric shaver and 700 mG for a hairdryer (McCallum et al. 2014). Therefore, any EMF produced by the

proposed Project would be minor and would occur within the required wind turbine setback distance, thus within the wind farm site itself. For these reasons, no impacts to public health and safety associated with EMF are expected as a result of the proposed Project.

Comment ORG-9.10*: Table ES-1 mentions infrasound. What is infrasound and what are the reported impacts? What is the best proven method to mitigate the impacts of infrasound?*

Response ORG-9.10: Infrasound is normally defined as sound with a frequency range of below 20 Hz. Infrasound from wind turbines is significantly below recognized thresholds for both human perceptibility and thus well below the pressure sound levels at which known health effects occur. Common sources of infrasound include wind rustling through vegetation and roadway noise. Infrasound is discussed in EIS Section 4.6 – Noise, Section 4.18 – Public Health and Safety, and in the Noise Assessment in Appendix D of the EIS. These analyses rely on the best available science which demonstrates that there are no health effects from wind turbine-generated infrasound (Chatham-Kent Public Health Unit 2008, Colby et al. 2009). For these reasons, no mitigation related to infrasound is required for the proposed Project.

References:

Chatham-Kent Public Health Unit, (2008): The Health Impact of Wind Turbines: A Review of the Current White, Grey, and Published Literature. Chatham-Kent Municipal Council, Chatham Ottawa.

Colby DW, Doby R, Leventhall G, Lipscomb DM, McCunney RJ, Seilo MT, Søndergaard B. (2009): Wind Turbine Sound and Health Effects - An Expert Panel Review. Prepared for the American Wind Energy Association and the Canadian Wind Energy Association.

Comment ORG-9.11*: What are the potential impacts to the community that could be caused by acts of nature such as an ‘Iniki type hurricane event? 2- Have there been any know tornado strikes or hurricane impacted industrial sized wind machines? 3- If yes, what were the results? 4- If no, what is the worst case scenario and what would be the most effective mitigation measure to prevent loss of property or life??*

Response ORG-9.11: An Iniki-type hurricane could presumably cause severe and extensive wind and related damage to buildings, utility infrastructure and other facilities in the Kahuku community and nearby areas. It is unlikely that the proposed Project wind turbines would contribute incrementally to the damage in such an event. The wind turbines would be designed to withstand wind gusts typical of the region, and turbine selection and design would take into account site-specific meteorological data. In the unlikely event that wind speeds were high enough to damage a wind turbine and cause it to fall, the damage would likely be confined to the turbine pad and potentially the immediately adjacent areas. The turbine locations are at distances that are several times the County-required setbacks from key points in the Kahuku community (see Section 2.1, page 2-2 of the EIS). These setbacks are intended to maintain safety in the event of turbine collapse.

All modern wind turbines are designed with several levels of built-in safety and comply with the codes set forth by Occupational Safety and Health Administration (OSHA) and American National Standards Institute (ANSI) standards. The wind turbines would also be equipped with sophisticated computer control systems to monitor variables such as wind speed and direction, air and machine temperatures, electrical voltages, currents, vibrations, blade pitch, and yaw angles. Each turbine would be connected to a central data control system. The system would allow for remote control and monitoring of individual turbines and the wind farm as a whole from both the central host computer or from a remote computer. This system would enable the emergency halting of the rotors at any time.

Modern utility-scale turbines are certified according to International Electrotechnical Commission (IEC) standards (IEC 61400-1), which include ratings for withstanding different levels of hurricane-strength winds and other criteria. Historical records show that on average four to five tropical storm systems develop in the central Pacific region each year and hurricanes have occurred in Hawaii in the past although infrequently (two in the last 50 years; NOAA 2013), with most storm systems passing south of the Hawaiian Islands. The island of Oahu has never been directly hit by a hurricane (NOAA 2013). Thus, the occurrence of hurricane-force winds is rare. Nonetheless, final selection of the turbine models for the Project would take into account Project-specific meteorological data and historic weather patterns to ensure selection of models with IEC ratings appropriate for site-specific wind conditions.

The EIS team conducted an internet-based search for information about storm damage to wind turbines and was unable to identify any comprehensive records of Iniki type events on an international, national scale or regional scale. The search encountered a number of reports regarding site-specific wind turbine events in widespread locations, summarized here. Several reports addressed the situation involving wind turbines near Atlantic City, New Jersey during Superstorm Sandy in 2012. Although Category 5 winds were expected at one time, the wind speeds dropped to below hurricane strength just before landfall; the Jersey Atlantic Wind Project experienced sustained wind speeds of 65 mph and gusts with much higher speeds, and the turbines survived undamaged[1]. The subject article reported that no other U.S. wind project had taken a direct hit from a tropical storm of Sandy’s strength, and that two wind farms in Haiti and Cuba had survived Hurricane Sandy winds of up to 110 mph. Similarly, in June 2013 two relatively small wind turbines in the Canadian Valley area of Oklahoma experienced a direct hit from the 295-mph winds of a tornado rated E5 and remained functional with no visible damage[2]. By contrast, there have also been reports of less-intense storms causing the failure of a turbine in Huron County, Michigan in February 2016[3], and near Ardrossan, Ayrshire in the United Kingdom in 2011[4].

The outcome of the Michigan event is indicative of the likely consequences if a storm were to cause significant damage to a Project wind turbine. As reported in the applicable news article, the turbine collapsed in the middle of a field and caused no damage or injury. As suggested by that case, the most effective means to prevent loss of property or life is to adopt, enforce and observe appropriate setback requirements, which are intended to confine damage from turbine collapse to the site of the turbine.

Sources:
[1]https://www.quora.com/Could-wind-turbines-withstand-Category-5-hurricanes
[2]http://www.sustainablebusiness.com/index.cfm/go/news.display/id/24960
[3]http://www.wxyz.com/news/photos-wind-turbine-comes-down-in-huron-county-during-winter-storm
[4]http://www.bbc.com/news/blogs-magazine-monitor-24706238

References:
NOAA. 2013. National Hurricane Center. Saffir-Simpson Hurricane Wind Scale. Available online at: http://www.nhc.noaa.gov/aboutsshws.php

Comment ORG-9.12*: How will the implementation of the HCP aid in avoiding impact to subject species that transverse or exist in the project site?*

Response ORG-9.12: A required component of the HCP is a set of avoidance and minimization measures for birds and bats designed to avoid Project-related impacts. These measures are listed in Section 2.5.1 of the EIS. As required under the Endangered Species Act, Na Pua Makani Power Partners, LLC must avoid and minimize potential impacts to threatened and endangered species to the extent possible. Compensatory mitigation, as outlined in the Project HCP, is required for any impacts that cannot be avoided or minimized.

Comment ORG-9.13*: What percentage of the above endangered species populations respectively would be subject to impacts of turbine strikes? How many is too many? How many is acceptable?*

Response ORG-9.13: Based on the best available information impacts to the Covered Species as a result of the proposed Project are not anticipated to result in population level effects, both individually and in combination with other wind projects in Hawaii (cumulative effects). As part of its requirements under the Endangered Species Act, the U.S. Fish and Wildlife Service must ensure that the issuance of the Incidental Take Permit (including approval of the Habitat Conservation Plan) must not jeopardize the continued existence of the Covered Species. Their rationale for drawing this “no jeopardy” conclusion is discussed in detail in their Biological Opinion for the proposed Project. From the State’s perspective, the mitigation measures outlined in the HCP must result in net benefit to each species, such that the benefits of the mitigation outweigh the amount of incidental take authorized.

Comment ORG-9.14*: In regards to the proposed HCP, will NPMPP be amenable to participating with the existing SunEdison Wind facility in shielding all street lights within a negotiated distance not less than 2 miles?*

Response ORG-9.14: No street lights are proposed as part of the Project. During construction, to minimize the attractiveness of construction lights to wildlife, Na Pua Makani Power Partners, LLC will use shielded lights and non-white lights to the extent practicable and allowable, taking into account safety considerations. During operation, onsite lighting at the operations and maintenance building and substation will be shielded and/or directed downward, triggered by a motion detector, and fitted with non-white light bulbs to the extent possible. Lighting is expected to be used only when workers are at the site at night. These measures will reduce the potential for seabird attraction to Project lights.

Comment ORG-9.15*: Of these short term jobs, can you provide a breakdown to include the quantity of each tradesman anticipated and covered under which labor association?*

Response ORG-9.15: The construction job estimates presented in the EIS were generated using the Department of Energy National Renewable Energy Laboratory’s Jobs and Economic Development Impacts (JEDI) Wind model (National Renewable Energy Laboratory 2014). The JEDI Wind model allows the user to identify potential impacts assuming general wind industry averages. The resulting employment estimates are not broken down by trades and Na Pua Makani Power Partners, LLC has not yet identified the construction workforce that would be employed on the proposed Project.

Comment ORG-9.16*: What is the expected State tax revenue? City? What is the expected localized increase in state expenditures?*

Response ORG-9.16: Tax revenues are discussed in EIS Section 4.12 – Socioeconomics. The proposed Project would have a total expected installed cost of approximately $97 million, including equipment costs (turbines, blades, towers), balance of materials (concrete, rebar, transformers, electrical connection equipment), construction labor, and other development costs (engineering, financing, and legal services, easement costs) based on filings made with the Public Utilities Commission. The proposed facility would generate general excise tax (GET) revenues, with the majority of the project components, materials, and construction-related services expected to be subject at the state-level to either GET or use tax of 4 percent, with an additional tax of 0.5 percent levied by The Honolulu County. Local purchases by construction workers and others employed directly and indirectly by the Project would also generate GET revenue. Potential expenditures of Project-related GET and use tax revenues are addressed below, under the response to comment ORG-9.17.

Comment ORG-9.17*: What percentage of state tax revenue generated by NPMPP will be directly used to benefit Kahuku specific state owned facilities? Will this amount be over and above current state expenditures in Kahuku?*

Response ORG-9.17: As noted in response to comment ORG-9.16, the proposed Project is expected to be subject at the state-level to either GET or use tax of 4 percent, plus the additional 0.5 percent county surcharge levied by Honolulu County to fund a mass transit project on Oahu. State revenues generated by GET and use taxes are deposited in the state general fund, which is used to fund state operations. The 0.5 percent county surcharge is levied by Honolulu County to pay for transit. GET and use taxes generated by the Project are not expected to be directly returned to Kahuku, but would benefit the state and county as a whole.

Comment ORG-9.18*: Is the adverse effects regarding the demand for housing due to offshore workers?*

Response ORG-9.18: The temporary relocation of non-local construction workers to the project vicinity would result in demand for temporary accommodation. Review of the housing suggests that limited housing options exist for construction workers in the immediate vicinity of the Project, with the majority of temporary accommodation oriented towards tourism (see EIS Section 4.12 – Socioeconomics for additional information). More temporary housing options are available further from the site, especially in the urbanized Honolulu area about 1 hour’s drive away. The temporary relocation of construction workers is not expected to reduce the available supply of temporary housing for tourists or other visitors.

Comment ORG-9.19*: In regards to impacts with housing values, this document fails to adequately address the issue and stating “not anticipated” is not a clear or complete answer. Please cite specific independent studies to support that claim.*

Response ORG-9.19: The comment quotes a very brief statement included in Executive Summary Table ES-1 (page ES-12) that is necessarily a high-level summary of content provided in Section 4.12 of the EIS. Section 4.12.2.1 of the EIS (page 4-132) summarizes the existing academic and professional literature that assesses the potential impacts of wind facilities on property values. Key points from that discussion are that (1) most of these studies found no evidence that the presence of an operating wind facility affected residential property values; (2) some studies reported mixed results that included some evidence of negative effects; and (3) most of the studies concluded that more research is required to more fully understand the impacts of wind facility development on property values. Based on the review of the existing studies, the EIS summary discussions for the alternatives (Sections 4.12.4.5 and 4.12.5.5) stated that impacts associated with property values would be expected to vary by location. Table 4.12-2, the summary of potential impacts to socioeconomic resources, indicates that impacts to property values would be variable for Alternatives 2, 2a and 3. This reflects the interpretation of the results reported for the applicable studies.

Comment ORG-9.20*: 7- Has NPMPP performed a location specific study to support this claim? If not, why? If yes, is this information available to the public?*

Response ORG-9.20: Please see the response to comment ORG-9.19, which provides a summary of the EIS content relative to potential property value impacts. The analysis of this issue that is presented in the EIS is based on review of existing studies on the potential impacts of wind projects on property values. Na Pua Makani Power Partners, LLC has not performed a property-value study specific to the proposed Project and the properties near the Project. Please note that the existing applicable studies discussed in EIS Section 4.12.2.1 all addressed investigation of property value conditions before and following the construction of the subject wind projects. Unless, and until, property-value research demonstrates conclusively whether there is or is not an adverse effect of wind facility development on property values, it is not possible to make a scientific prediction of local property value effects prior to the development of a specific wind project.

Comment ORG-9.21*: If there is in fact adverse impacts on private property values, will NPMPP be responsible to make whole those who suffered losses?*

Response ORG-9.21: The description of the proposed Project that is provided in Chapter 2 of the EIS does not include information regarding existing or expected contractual arrangements between Na Pua Makani Power Partners, LLC and private or commercial entities owning property within the Project site or nearby. Such arrangements involve private legal transactions that are not properly within the scope of a review of environmental impacts of a proposed action.

Comment ORG-9.22*: In regards to the community benefits package, how will these funds be distributed? What is NPMPP's definition of "community" as referred to in this document? What donations have NPMPP previously made to the community and or individuals and will the list of recipients be public information*

Response ORG-9.22: The term community generally refers to the Kahuku Community. Na Pua Makani Power Partners, LLC has committed to honor the commitments of the original developer and establish a Community Benefit fund for the community. It is anticipated that Project funds ($10,000 per wind turbine per year) would be paid to a non-profit corporation to be administered by a board of local community members who would make decisions as to the use of the proceeds and which activities, programs, groups, and events would be sponsored. To date, Na Pua Makani Power Partners, LLC has supported the Kahuku High School "school-to-work" program, Kahuku "Project Grad", Kahuku Elementary School May Day program, and Kahuku High School rugby, football, boys basketball, girls soccer, and boys and girls volleyball teams.

Comment ORG-9.23*: Can you please explain how design will mitigate the Kahuku Project site visual impacts? How will lighting mitigate the anticipated visual impacts at the Kahuku site?*

Response ORG-9.23: The elements of the proposed Project design that minimize visual impacts are burying the electrical collection line that would run between the wind turbines and the onsite substation. Additionally, all lights will be down shielded and/or operate with motion sensors which will reduce nighttime impacts.

Comment ORG-9.24*: What is NPMPP plans for the heavily travelled Kamehameha Hwy should an unforeseen failure occur at any point along the corridor? If there is an extra fee or permit required to transport turbine components via the North Shore corridor, how much if any of the fee will be dedicated to improvements to Kamehameha Hwy between Haleiwa and Kahuku?*

Response ORG-9.24: A detailed transportation route survey for the proposed Project has been conducted by ATS, Inc. (ATS, Inc. 2016) which formed the basis of the Transportation Assessment included in Appendix B of the EIS. The transportation route survey identifies areas along the transportation route which would require the use of civilian and police escorts, vegetation trimming, traffic signal and roadway sign relocation, guardrail relocation, overhead utility line adjustments, and asphalt curb removal to facilitate the transport of wind turbine components. Na Pua Makani Power Partners, LLC will continue to work closely with the Hawaii Department of Transportation (HDOT) and City and County of Honolulu Department of Transportation Services regarding special transportation requirements along the proposed transportation route to ensure all requirements are met. This includes observance of current road conditions and weight limits.

The proposed Project would require permits from HDOT and the City and County of Honolulu for oversized and overweight loads. Permit fees and funds presumably go toward administrative expenses.

Comment ORG-9.25*: In a worst case scenario, what are the potential impacts to nearby residents should one or more turbines suffer catastrophic damage during a category 5 hurricane and can you please supply data to*

support that scenario? Has NPMPP developed a location specific analysis of what impacts may occur should one or more turbines suffer catastrophic failure during a high wind event? Moderate wind?

Response ORG-9.25: Please see the response to comment ORG-9.11. As indicated above, the worst-case scenario in the unlikely event of catastrophic damage to a wind turbine would be collapse of the turbine with confinement of the consequences to the immediate wind turbine site. Wind turbines are large and extremely heavy structures that are securely fastened to their foundations (see Section 2.4.1 of the EIS). Based on rare events that have been reported from other locations, it is conceivable that severe winds could cause a turbine tower to fail and the turbine to collapse in place. It is unlikely that the winds could completely separate a turbine tower from the foundation and transport it a significant distance to the nearby community. For these reasons, and because the proposed project as designed meets require setback distances, Na Pua Makani Power Partners, LLC has not developed a location-specific analysis of potential turbine failure impacts as referenced in the comments.

Comment ORG-9.26*: What are the expected EMF levels directly below the turbines? 1600 feet removed?*

Response ORG-9.26: Electromagnetic Fields (EMF) are discussed in EIS Section 4.16 – Public Health and Safety. Please see the response to comment ORG-9.9.

Comment ORG-9.27*: What is stray voltage and what are the effects on living organisms?*

Response ORG-9.27: When electrical systems are grounded some current flows through the earth and a small voltage develops at each point where the system is grounded. If a system is not properly wired, the point(s) at which a system is grounded can develop a small voltage that can push current through the earth and end up contacting unintended objects. The main concern with stray voltage is electrical shock, however it is a localized issue that would not affect off-site parties or properties as access to the wind farm site would be controlled.

Stray voltage is discussed in under Public Health and Safety in EIS Sections 3.18 and 4.18. The Construction of the above ground portions of the transmission line would follow standard industry procedures including structure assembly and erection, ground wire, and conductor stringing. Operation activities would include routine monitoring, inspection, and maintenance by qualified personnel. For these reasons, the proposed Project is not expected to have effects associated with stray voltage.

Comment ORG-9.28*: Will NPMPP install fire suppression measures? If so, what are the specific measures?*

Response ORG-9.28: To mitigate the risk of fire posed by the proposed Project, Na Pua Makani Power Partners, LLC would implement a Project-specific Fire Management Plan during construction and operation. The Fire Management Plan identifies potential fire hazards and provides pre-suppression actions that include ignition prevention, firebreaks, fuel breaks, and fuels management. However, in general there is a very low probability of ignition at the proposed wind farm site and minimal fire behavior is expected should an ignition occur (see the Fire Management Plan in Appendix C of the EIS). The risk of fire is further minimized by the design features of the wind turbines, such as over-temperature sensors that will shut down the turbine if normal temperature limits are exceeded. In addition, undergrounding of the electrical collection system would reduce the risk of fire.

Water tanks will be maintained onsite for emergency fire suppression during construction. Additional fire suppression measures to be implemented during construction and operation will be developed in coordination with the City and County of Honolulu Fire Department and will be incorporated into a Site Safety Handbook. These measures may include, but are not limited to requiring vehicles to carry fire suppression equipment when onsite such as fire extinguishers, flappers, and shovels, and storing fire suppression tools at designated locations within the wind farm.

Comment ORG-9.29*: What is blade flicker and what are the reported effects on humans caused by blade flicker? What is the best method to mitigate effects cause by shadow flicker?*

Response ORG-9.29: Shadow flicker, discussed in Sections 3.16 and 4.18 of the EIS, is defined as moving blades passing between the sun and a receptor, creating alternating changes in light intensity of shadows. Wind turbine shadow flicker generally occurs during low angle sunlight conditions, typical during sunrise and sunset. Shadow flicker intensity for receptor-to-turbine distances beyond 4,921 feet is very low and generally considered imperceptible.

There is no state or national standard that exist for frequency or duration of shadow flicker from wind turbines. However, a threshold of 30 hours per year has been widely used in the industry as a target value in the absence of formal guidelines. However, there are no reported health effects associated with shadow flicker, as shadow flicker speeds from turbines are well below levels that would potentially trigger epileptic seizures (MassDEP and MDPH 2012, McCunney et al. 2014, NHMRC 2015). Methods for reducing shadow flicker impacts, if considered a nuisance, include adding awnings or blinds to windows facing the wind farm and/or landscaping/trees. A modeling analysis was used to determine exposure to shadows cast by the moving turbine blades for locations within 1.6 miles of proposed wind turbine locations. Modeling methods and assumptions are presented in Appendix K of the EIS.

References:

MassDEP and MDPH (Massachusetts Department of Public Health). 2012. Wind Turbine Health Impact Study: Report of Independent Expert Panel. January 2012. Available online at: http://www.mass.gov/eea/docs/dep/energy/wind/turbine-impact-study.pdf.

McCunney, R.J., K.A. Mundt, D. Colby, R. Dobie, K. Kaliski, and M. Blais. 2014. Wind Turbines and Health: A Critical Review of the Scientific Literature. Journal of Environmental and Occupational Medicine 56(11):e108-e130. Available online at: http://canwea.ca/comprehensive-scientific-literature-review-on-wind-turbines-and-human-health-now-published/

NHMRC (Australian Government National Health and Medical Research Council). 2015. NHMRC Statement: Evidence on Wind Farms and Human Health. February 2015.

Comment ORG-9.30*: What is Electromagnetic Radiation (EMR) and why was this issue omitted from the proponent’s original DEIS? Will an EMR study be conducted for the Final EIS? Why/why not? What is the recommended solution that best protects humans from the impacts associated with EMR? Will NPMPP bury their on-site transmission lines to mitigate EMF and EMR? If not, why?*

Response ORG-9.30: Light, microwaves, X-rays, and cell phone transmissions are all examples of electromagnetic radiation. Electromagnetic radiation (EMR) is discussed in EIS Section 4.20 – Public Infrastructure and Services. If the electrical charge and current produced by a source are sufficiently high, corona activity may occur which produces broadband EMR that may be perceived as interference.

The proposed Project transmission line, which extends for approximately 0.9 mi from the proposed onsite substation to the interconnection point with the existing HECO transmission line, would be a 46-kV line and may exhibit a very low level of corona activity and thus very low levels of EMR interference. Corona activity is known to produce EMR in the frequency spectrum from below 100 kHz to approximately 1,000 MHz, which partially overlaps with the frequencies used for AM and FM radio and some television signals. The effects are most pronounced directly underneath the line conductors, and decrease with distance from the transmission line.

The electrical collection system that would run between the wind turbines and the onsite substation would be buried, and therefore would have no effects associated with EMR.

The advent of cable and satellite television service, and the Federally-mandated conversion to digital television broadcast in June 2009, have greatly reduced the occurrence of corona-generated interference; cable, satellite, and digital broadcast are generally not affected by corona-generated interference. Wireless computer network systems, cell phones, GPS units, and satellite receivers typically operate at high frequencies in the tens to hundreds of megahertz (MHz) or gigahertz (GHz). In general, the low frequency EMR that can be generated by corona activity would not interact with the much higher frequencies used by these types of communications. Because no interference associated with EMR is anticipated for the proposed Project, no mitigation is proposed.

Comment ORG-9.31*: Can you provide documentation that can substantiate the above claim as it differs greatly with the following statement that the Environmental Protection Agency submitted in the original Draft EIS?*

Response ORG-9.31: Please see the response to comment ORG-9.32 below.

Comment ORG-9.32*: The Environmental Protection Agency is correct in identifying the Kahuku community as minority justice population. A surface investigation into Oahu’s demographics supports it. The fact that there are no large wind turbines in East Honolulu while Kahuku may be getting a second facility supports the belief that low income communities bear a disproportionate burden when it comes to wind turbine siting. East Honolulu is Oahu’s second best region to install wind machines according to wind profile studies. Although the EPA offers some solutions regarding the physical aspects of installing the project, the EPA is silent on how to mitigate Kahuku community’s identification. More importantly, the EPA appears to be making a connection between wind turbine proximity to humans and human health.*

Please provide any methodology NPMPP intends to employ to overcome this disparity with the EPA’s community identification and NPMPP’s interpretation of known statistics. Has the proponent conducted an independent survey of the Kahuku/Laie demographics that support the proponent’s position that the area is not a minority justice population? If not, why? If yes, are the findings supported by the EPA and/or the US Census Bureau or any other City, State or Federal agency and are they available for public review? Regarding demographics, NPMPP has publically claimed that a majority of the Kahuku community supports their proposal. Do they have documented evidence to support that claim? If so, is this evidence available for public review?

Response ORG-9.32: Based on the information provided in the comment, the EPA is in fact citing the EIS when it states that the “community in the vicinity of the proposed project *has been identified* as a minority environmental justice population, due to the disproportionate concentration of Native Hawaiians and other Pacific Islanders” (emphasis added). This identification was made in the EIS (see Section 3.17.1). Therefore, there is no disparity between the potential environmental justice communities identified in the EPA letter.

The EIS (for example, the Executive Summary, page ES-4) summarizes consultation and public involvement activities that Na Pua Makani Power Partners, LLC has conducted. The EIS does not specifically address the level of public support for or opposition to the proposed Project, because that is not a topic that is within the scope of the environmental review or the technical studies supporting the review. The EIS does not include the statement in question that is attributed to Na Pua Makani Power Partners, LLC. Please understand that responses provided in the Final EIS are necessarily limited to issues that pertain directly to the EIS. Appendix M of the EIS provides all the comments from the community, and associated responses, received during the environmental review process.

Comment ORG-9.33*: Regarding the distribution of community benefits, can you please name the community leaders who will be distributing the benefits? Also, can you please estimate the distances those individuals live*

from the nearest proposed turbine and tower site? Can you please identify any individual, group or Foundation that supports this project and who have received or have been promised financial assistance from NPMPP or their agents?

Response ORG-9.33: As stated in EIS Section 4.12 - Socioeconomics, Na Pua Makani Power Partners, LLC continues its outreach efforts with affected stakeholders to define its Community Benefits Package. This may include honoring the commitment of the prior developer to pay $10,000 per wind turbine per year over the life of the project to the Kahuku Community. This translates into $80,000 to $90,000 per year over a 20- to 25-year project life or the equivalent of approximately $2,000,000 of direct economic benefits to the Kahuku Community. It is anticipated that Project funds would be administered by a board of local community members who would make decisions as to the use of the proceeds and which activities, programs, groups, and events would be sponsored.

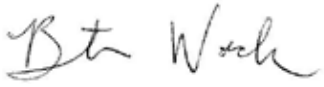
Please see the response to comment ORG-9.32 regarding disclosure of public support or opposition to the proposed Project. Private agreements between Na Pua Makani Power Partners, LLC are proprietary and outside of the scope of this EIS and not information that is discussed in the environmental review.

Comment ORG-9.34*: Has NPMPP conducted a study regarding potential impacts on cellular phone signals and/or interference due to towers and blades? Is NPMPP aware of any claims (worldwide) of cellular interference due to wind turbines? Is NPMPP aware of any claims (worldwide) of privately owned direct TV or other dish technology? If so, what are the recommended mitigation measures?*

Response ORG-9.34: As described in EIS Section 4.18 – Public Health and Safety, Na Pu Makani Power Partners, LLC has consulted with Comsearch, a company that identifies the potential impact of wind turbines on licensed non-Federal government microwave systems. Comsearch has developed and maintains comprehensive technical databases containing information on licensed microwave networks throughout the United States. Microwave bands that may be affected by the installation of wind turbine facilities operate over a wide frequency range (900 MHz to 23 gigahertz) and include systems that are the telecommunication backbone of the country, providing long-distance and local telephone service, backhaul for cellular and personal communication service, data interconnects for mainframe computers and the Internet, network controls for utilities and railroads, and various video services (Comsearch 2011). The Project would avoid any impacts as identified by Comsearch. Please also see the response to comment ORG-9.30.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

State Letters and Responses

DAVID Y. IGE
GOVERNOR OF HAWAII

VIRGINIA PRESSLER, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HI 96801-3378

In reply, please refer to:
File:

EPO 16-146

ST-7

April 28, 2016

Ms. Brita Woeck
Tetra Tech, Inc.
737 Bishop Street, Suite 2340
Mauka Tower
Honolulu, Hawaii 96813
Email: Brita.woeck@tetratech.com

Dear Ms. Woeck:

SUBJECT: Second Draft Environmental Impact Statement (SDEIS) for Na Pua Makani Wind Project Koolauloa, Oahu
TMK: (1) 5-6-005:018 (portion), (1) 5-6-006:018; 47, 51, 55; and (1) 5-6-008:006 (portion)

The Department of Health (DOH), Environmental Planning Office (EPO), acknowledges receipt of your second DEIS via post and the OEQC link:
http://oeqc.doh.hawaii.gov/Shared%20Documents/EA_and_EIS_Online_Library/Oahu/2010s/2016-04-23-OA-5E-SDEIS-Na-Pua-Wind-Project.pdf

1 EPO recommends that you review the standard comments and available strategies to support sustainable and healthy design provided at: http://health.hawaii.gov/epo/landuse. Projects are required to adhere to all applicable standard comments. EPO has recently updated the environmental Geographic Information System (GIS) website page. It now compiles various maps and viewers from our environmental health programs. The eGIS website page will be continually updated so please visit it regularly at: http://health.hawaii.gov/epo/egis.

2 EPO also encourages you to examine and utilize the Hawaii Environmental Health Portal at: https://eha-cloud.doh.hawaii.gov. This site provides links to our e-Permitting Portal, Environmental Health Warehouse, Groundwater Contamination Viewer, Hawaii Emergency Response Exchange, Hawaii State and Local Emission Inventory System, Water Pollution Control Viewer, Water Quality Data, Warnings, Advisories and Postings.

3 We suggest you review the requirements for the National Pollutant Discharge Elimination System (NPDES) permit. We recommend contacting the Clean Water Branch at (808) 586-4309 or cleanwaterbranch@doh.hawaii.gov after relevant information is reviewed at:

1. http://health.hawaii.gov/cwb
2. http://health.hawaii.gov/cwb/site-map/clean-water-branch-home-page/standard-npdes-permit-conditions
3. http://health.hawaii.gov/cwb/site-map/clean-water-branch-home-page/forms

4 EPO recommends you review the need and/or requirements for a Clean Air Branch permit. The Clean Air Branch can be consulted via e-mail at: Cab.General@doh.hawaii.gov or via phone: (808) 586-4200.

5 If noise created during the construction phase of the project may exceed the maximum allowable levels as set forth in Hawaii Administrative Rules, Chapter 11-46, "Community Noise Control". A noise permit may be required and should be obtained before the commencement of work. Please call the Indoor and Radiological Health Branch at (808) 586-4700 and review relevant information online at: http://health.hawaii.gov/irhb/noise.

6 We advise that, if appropriate, the Hazard Evaluation and Emergency Response (HEER) Office's Site Discovery and Response (SDAR) Section be contacted. The SDAR section protects human health and the environment by identifying, investigating, and remediating sites contaminated with hazardous substances (non-emergency site investigations and cleanup). The HEER Office's SDAR Section can be contacted at: (808) 586-4249. For historical maps on lands where sugarcane was grown see: http://health.hawaii.gov/epo/egis/sugarcane

7 You may also wish to review the draft Office of Environmental Quality Control (OEQC) viewer at: http://eha-web.doh.hawaii.gov/oeqc-viewer. This viewer geographically shows where some previous Hawaii Environmental Policy Act (HEPA) {Hawaii Revised Statutes, Chapter 343} documents have been prepared.

8 In order to better protect public health and the environment, the U.S. Environmental Protection Agency (EPA) has developed a new environmental justice (EJ) mapping and screening tool called EJSCREEN. It is based on nationally consistent data and combines environmental and demographic indicators in maps and reports. EPO encourages you to explore, launch and utilize this powerful tool in planning your project. The EPA EJSCREEN tool is available at: http://www.epa.gov/ejscreen.

We request that you utilize all of this information on your proposed project to increase sustainable, innovative, inspirational, transparent and healthy design. Thank you for the opportunity to comment.

Mahalo nui loa,

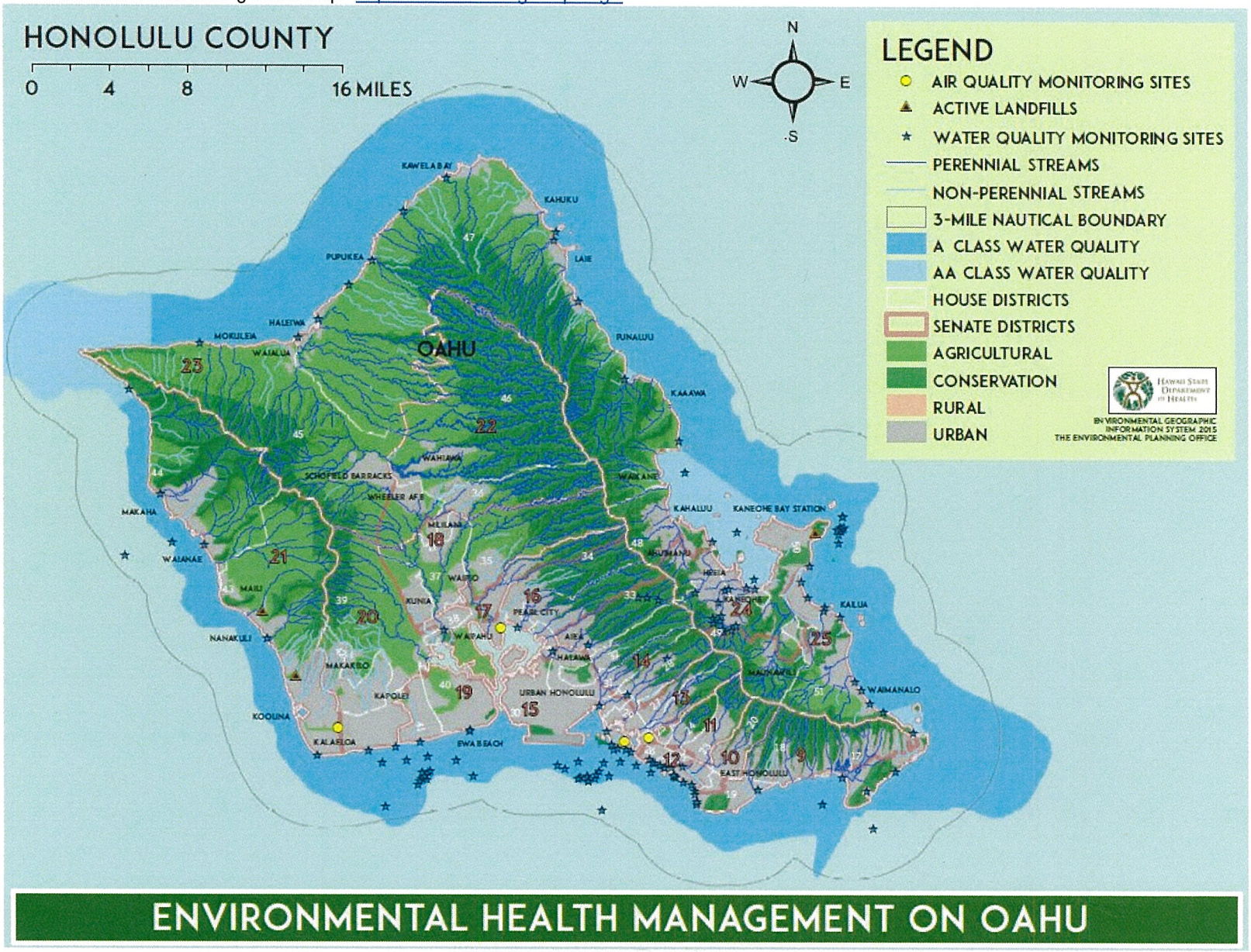
Laura Leialoha Phillips McIntyre, AICP
Program Manager, Environmental Planning Office

LM:nn

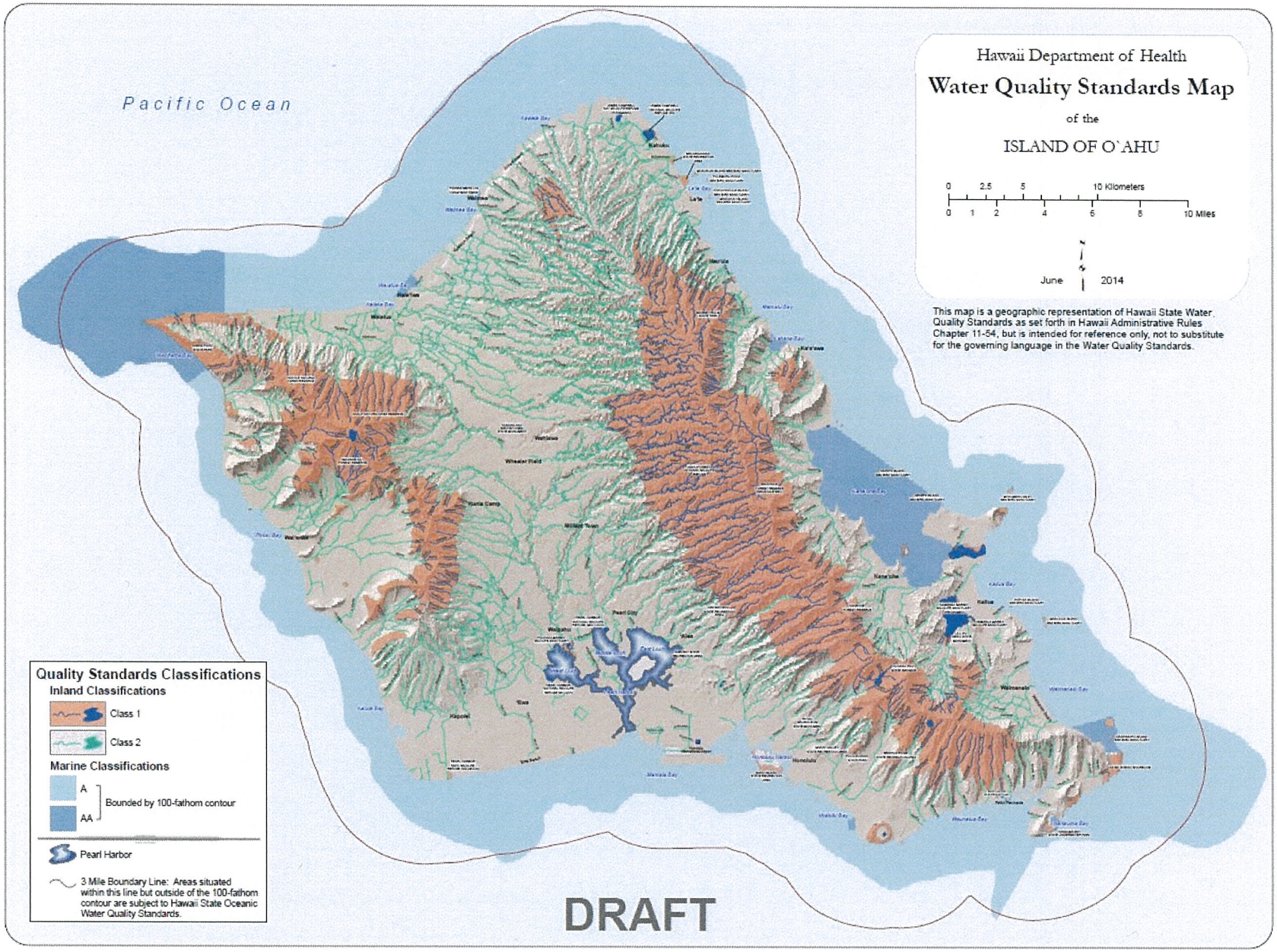
Attachment 1: EPO Draft Environmental Health Management Map - Oahu
Attachment 2: Clean Water Branch: Water Quality Standards Map - Oahu
Attachment 3: Wastewater Branch: Recycled Water Use Map of Project Area
Attachment 4: Historic Sugarcane Map of Project Area
Attachment 5: OEQC Viewer Map of Project Area
Attachment 6: U.S. EPA EJSCREEN Report for Project Area

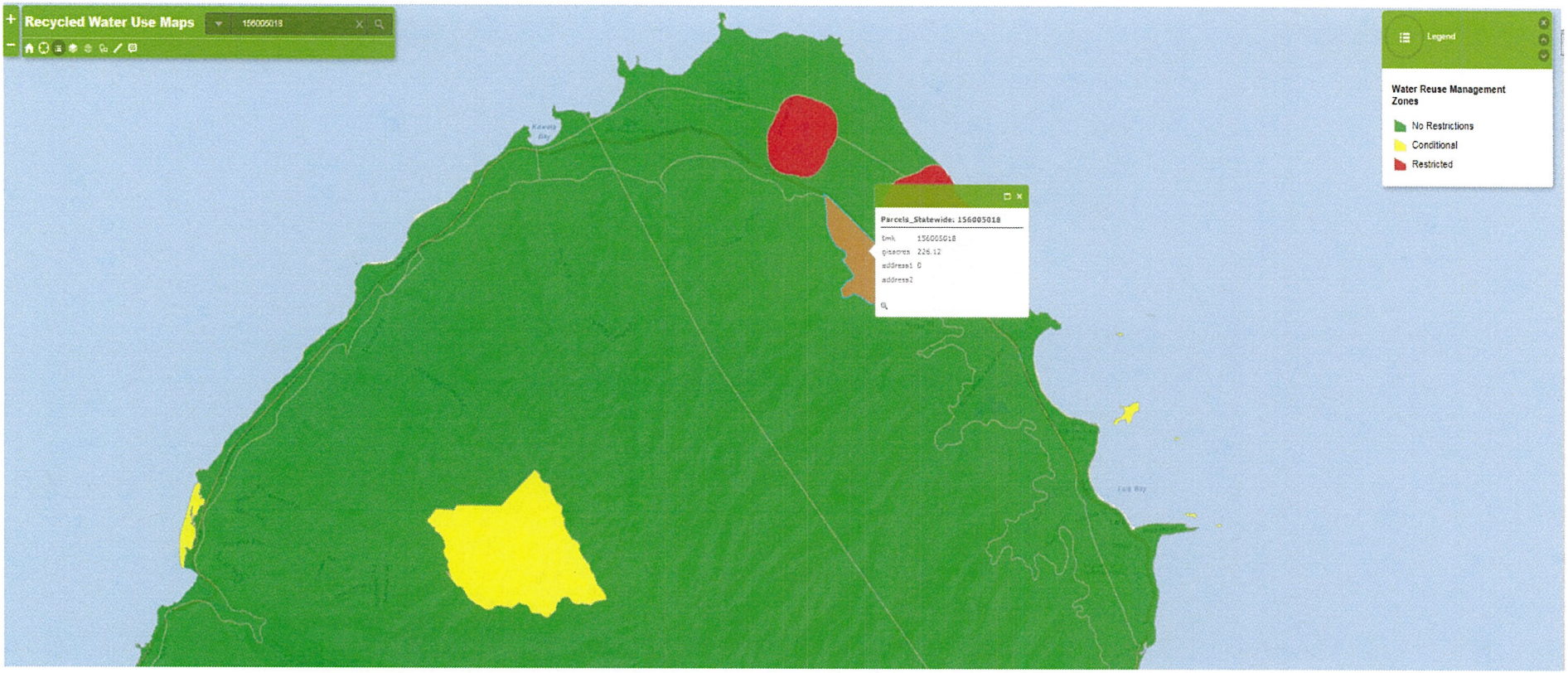
c: Mark Cutbirth, Champlin Oahu Wind Holdings, LLC {via email: mcutbirth@champlinwind.com}
Suzanne Case, DLNR {via email: dlnr@hawaii.gov}
DOH: CWB, IRHB, CAB, HEER {via email only}

EPO Draft Environmental Health Management Map: http://health.hawaii.gov/epo/egis



MAP INTENDED FOR ILLUSTRATIVE PURPOSES ONLY. SITE LOCATIONS ARE APPROXIMATE.


Hawaii Department of Health
Water Quality Standards Map
of the
ISLAND OF O`AHU
0 2.5 5 10 Kilometers
0 1 2 4 6 8 10 Miles
June 2014
This map is a geographic representation of Hawaii State Water Quality Standards as set forth in Hawaii Administrative Rules Chapter 11-54, but is intended for reference only, not to substitute for the governing language in the Water Quality Standards.
Pacific Ocean
Quality Standards Classifications
Inland Classifications
Class 1
Class 2
Marine Classifications
A
AA
Bounded by 100-fathom contour
Pearl Harbor
3 Mile Boundary Line: Areas situated within this line but outside of the 100-fathom contour are subject to Hawaii State Oceanic Water Quality Standards.
DRAFT


Recycled Water Use Maps
156005018
Legend
Water Reuse Management Zones
No Restrictions
Conditional
Restricted
Parcels_Statewide: 156005018
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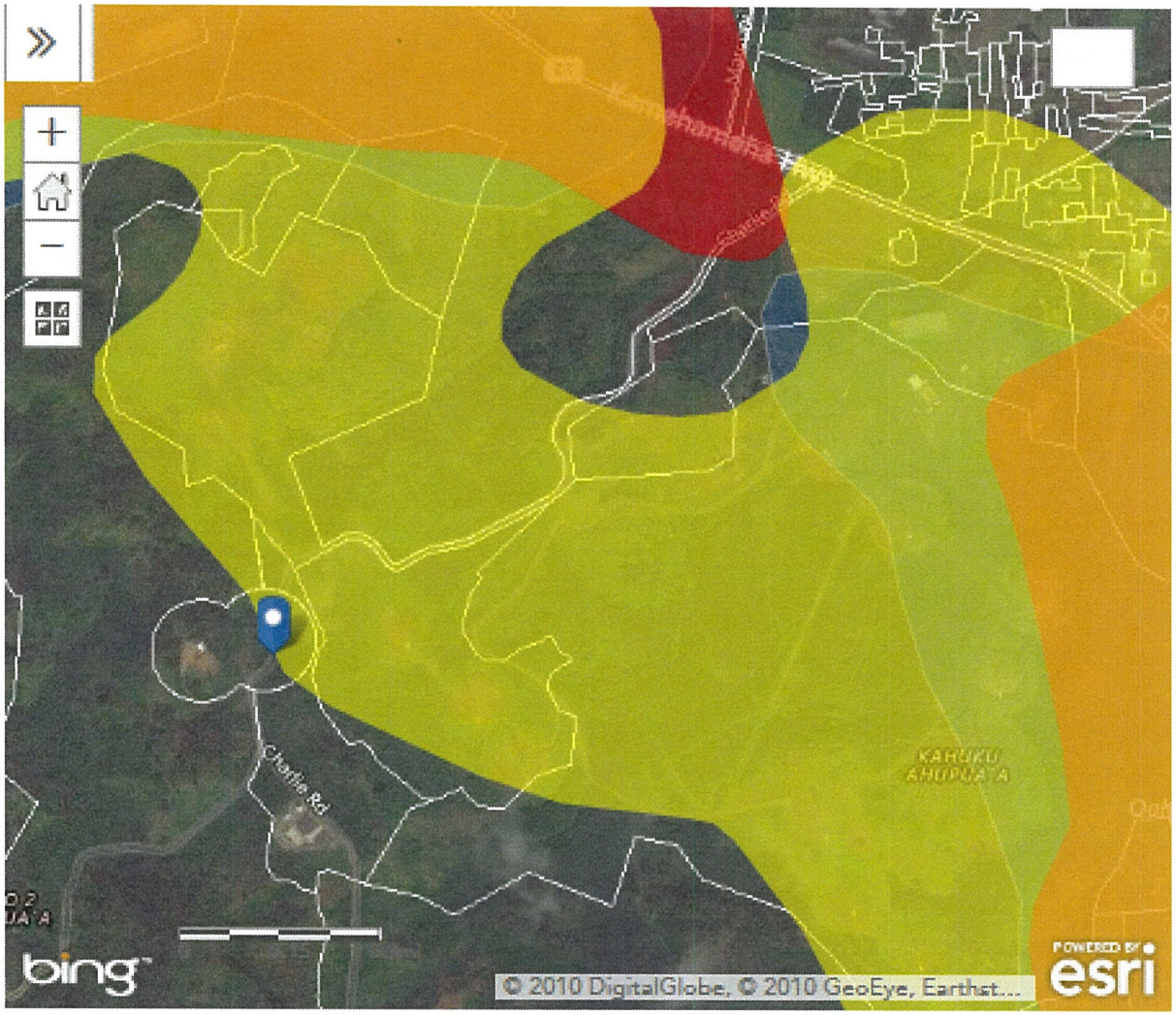
gisacres 226.12
address1 0
address2

HISTORIC SUGARCANE LANDS MAP VIEWER



Legend | Details

Sugarcane - Sugarcane_1937

Sugarcane - Sugarcane_1920

Sugarcane - Sugarcane_1900

Statewide TMK NAD43

State TMK

hawaii.gov Stay Connected

OEQC Viewer

kahuku

3 sites found

Results | Filter

Show sites with no location

Kahuku Village (DEA-AFNSI)
Environmental Assessment (Applicant)

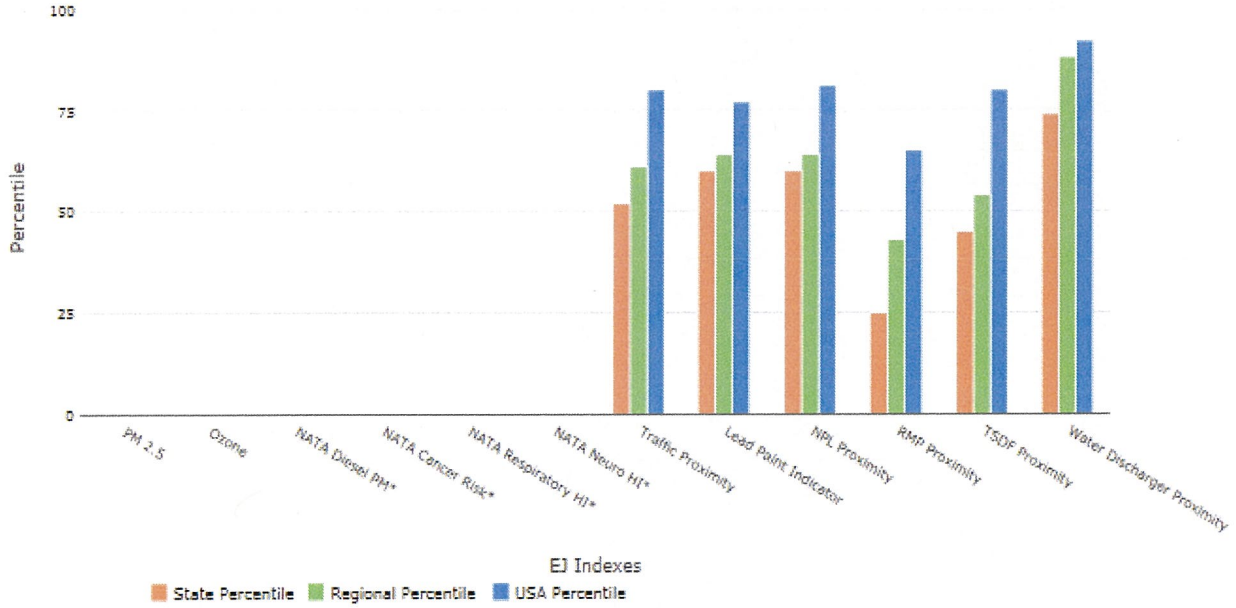
Kahuku Storm Reduction Project (FEA-FONSI)
Environmental Assessment (Agency)

Kahuku Storm Drainage (DEA-AFNSI)
Environmental Assessment (Agency)

1 mile Ring Centered at 21.692974,-157.957770
HAWAII, EPA Region 9
Approximate Population: 70

Selected Variables	Percentile in State	Percentile in EPA Region	Percentile in USA
EJ Indexes			
EJ Index for Particulate Matter (PM 2.5)	N/A	N/A	N/A
EJ Index for Ozone	N/A	N/A	N/A
EJ Index for NATA Diesel PM*	N/A	N/A	N/A
EJ Index for NATA Air Toxics Cancer Risk*	N/A	N/A	N/A
EJ Index for NATA Respiratory Hazard Index*	N/A	N/A	N/A
EJ Index for NATA Neurological Hazard Index*	N/A	N/A	N/A
EJ Index for Traffic Proximity and Volume	52	61	80
EJ Index for Lead Paint Indicator	60	64	77
EJ Index for NPL Proximity	60	64	81
EJ Index for RMP Proximity	25	43	65
EJ Index for TSDF Proximity	45	54	80
EJ Index for Water Discharger Proximity	74	88	92

EJ Index for the Selected Area Compared to All People's Block Groups in the State/Region/US



This report shows environmental, demographic, and EJ indicator values. It shows environmental and demographic raw data (e.g., the estimated concentration of ozone in the air), and also shows what percentile each raw data value represents. These percentiles provide perspective on how the selected block group or buffer area compares to the entire state, EPA region, or nation. For example, if a given location is at the 95th percentile nationwide, this means that only 5 percent of the US population has a higher block group value than the average person in the location being analyzed. The years for which the data are available, and the methods used, vary across these indicators. Important caveats and uncertainties apply to this screening-level information, so it is essential to understand the limitations on appropriate interpretations and applications of these indicators. Please see EJSCREEN documentation for discussion of these issues before using reports.

April 28, 2016

Digitized Point

1:18,056

0 0.25 0.5 1 km

Selected Variables	Raw data	State Average	%ile in State	EPA Region Average	%ile in EPA Region	USA Average	%ile in USA
Environmental Indicators							
Particulate Matter (PM 2.5 in µg/m³)	N/A	N/A	N/A	9.95	N/A	9.78	N/A
Ozone (ppb)	N/A	N/A	N/A	49.7	N/A	46.1	N/A
NATA Diesel PM (µg/m³)*	N/A	N/A	N/A	N/A	N/A	N/A	N/A
NATA Air Toxics Cancer Risk (risk per MM)*	N/A	N/A	N/A	N/A	N/A	N/A	N/A
NATA Respiratory Hazard Index*	N/A	N/A	N/A	N/A	N/A	N/A	N/A
NATA Neurological Hazard Index*	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Traffic Proximity and Volume (daily traffic count/distance to road)	42	280	36	190	35	110	54
Lead Paint Indicator (% pre-1960s housing)	0.11	0.17	50	0.25	46	0.3	37
NPL Proximity (site count/km distance)	0.05	0.092	50	0.11	44	0.096	52
RMP Proximity (facility count/km distance)	0.024	0.18	5	0.41	2	0.31	3
TSDF Proximity (facility count/km distance)	0.025	0.092	30	0.12	22	0.054	53
Water Discharger Proximity (count/km)	0.36	0.33	68	0.19	88	0.25	83
Demographic Indicators							
Demographic Index	56%	51%	66	46%	66	35%	79
Minority Population	87%	77%	61	57%	78	36%	88
Low Income Population	26%	25%	60	35%	42	34%	42
Linguistically Isolated Population	5%	6%	62	9%	46	5%	72
Population with Less Than High School Education	14%	10%	74	18%	50	14%	58
Population under Age 5	5%	6%	39	7%	35	7%	38
Population over Age 64	12%	14%	40	12%	60	13%	50

*The National-Scale Air Toxics Assessment (NATA) environmental indicators and EJ indexes, which include cancer risk, respiratory hazard, neurodevelopment hazard, and diesel particulate matter will be added into EJSCREEN during the first full public update after the soon-to-be-released 2011 dataset is made available. The National-Scale Air Toxics Assessment (NATA) is EPA's ongoing, comprehensive evaluation of air toxics in the United States. EPA developed the NATA to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that NATA provides broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. More information on the NATA analysis can be found at: https://www.epa.gov/national-air-toxics-assessment.

For additional information, see: www.epa.gov/environmentaljustice

EJSCREEN is a screening tool for pre-decisional use only. It can help identify areas that may warrant additional consideration, analysis, or outreach. It does not provide a basis for decision-making, but it may help identify potential areas of EJ concern. Users should keep in mind that screening tools are subject to substantial uncertainty in their demographic and environmental data, particularly when looking at small geographic areas. Important caveats and uncertainties apply to this screening-level information, so it is essential to understand the limitations on appropriate interpretations and applications of these indicators. Please see EJSCREEN documentation for discussion of these issues before using reports. This screening tool does not provide data on every environmental impact and demographic factor that may be relevant to a particular location. EJSCREEN outputs should be supplemented with additional information and local knowledge before taking any action to address potential EJ concerns.

June 30, 2016

Ms. Laura Leialoha Phillips McIntyre, AICP
State of Hawaii Department of Health
P.O. Box 3378
Honolulu, HI 96801-3378

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Laura Leialoha Phillips McIntyre:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). While your letter indicated that you have no specific comments on the Second Draft EIS, we provide the following responses to your general comments.

Comment ST-7.1*: EPO recommends that you review the standard comments and available strategies to support sustainable and healthy design provided at: http://health.hawaii.gov/epo/landuse. Projects are required to adhere to all applicable standard comments. EPO has recently updated the environmental Geographic Information System (GIS) website page. It now compiles various maps and viewers from our environmental health programs. The eGIS website page will be continually updated so please visit it regularly at: http://health.hawaii.gov/epo/egis.*

Response ST-7.1: As recommended, we have reviewed the department's standard comments. Responses to the standard comments that are applicable to the Project are provided in Attachment 1.

Comment ST-7.2*: EPO also encourages you to examine and utilize the Hawaii Environmental Health Portal at: https://eha-cloud .doh.hawaii.gov. This site provides links to our e-Permitting Portal, Environmental Health Warehouse, Groundwater Contamination Viewer, Hawaii Emergency Response Exchange, Hawaii State and Local Emission Inventory System, Water Pollution Control Viewer, Water Quality Data, Warnings, Advisories and Postings.*

Response ST-7.2: Thank you for your recommendation to examine and use the Hawaii Environmental Health Portal.

Comment ST-7.3*: We suggest you review the requirements for the National Pollutant Discharge Elimination System (NPDES) permit. We recommend contacting the Clean Water Branch at (808) 586-4309 or cleanwaterbranch@doh.hawaii.gov after relevant information is reviewed at:*
1. http://health .hawaii.gov/cwb
2. http://health .hawaii.gov/cwb/site-map/clean-water-branch-home-page/standard-npdes-permit-conditions
3. http://health .hawaii.gov/cwb/site-map/clean-water -branch-home-page/forms

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

Response ST-7.3: A NPDES permit will be acquired for the proposed Project. Na Pua Makani Power Partners, LLC, will coordinate with the HDOH Clean Water Branch to ensure all requirements are met.

Comment ST-7.4*: EPO recommends you review the need and/or requirements for a Clean Air Branch permit. The Clean Air Branch can be consulted via e-mail at: Cab.General@doh.hawaii.gov or via phone: (808) 586-4200.*

Response ST-7.4: Thank you for your recommendation to examine and use the Hawaii Environmental Health Portal.

Comment ST-7.5*: If noise created during the construction phase of the project may exceed the maximum allowable levels as set forth in Hawaii Administrative Rules, Chapter 11-46, "Community Noise Control". A noise permit may be required and should be obtained before the commencement of work. Please call the Indoor and Radiological Health Branch at (808) 586-4700 and review relevant information online at: http://health .hawaii.gov/irhb/noise.*

Response ST-7.5: As noted in your comment, it is possible that construction noise may exceed allowable levels set forth under HAR Chapter 11-14. Noise impacts are discusses in Section 4.6 of the EIS. This section acknowledges that the proposed Project would likely require a permit from the HDOH to allow the operation of construction equipment that results in exceedances of the maximum permissible noise level at property line locations.

Comment ST-7.6*: We advise that, if appropriate, the Hazard Evaluation and Emergency Response (HEER) Office's Site Discovery and Response (SOAR) Section be contacted. The SOAR section protects human health and the environment by identifying, investigating, and remediating sites contaminated with hazardous substances (non-emergency site investigations and cleanup). The HEER Office's SOAR Section can be contacted at: (808) 586-4249. For historical maps on lands where sugarcane was grown see: http://health.hawaii.gov/epo/egis/sugarcane.*

Response ST-7.6: Hazardous and regulated materials and wastes are discussed in Section 3.5 of the EIS. A Phase I Environmental Site Assessment of the wind farm site was performed in 2014 to assess the potential presence of hazardous materials on the site (Tetra Tech 2014). The Phase I assessment did not find evidence that hazardous materials, solid waste, or petroleum products have been released to the environment in or around the wind farm site. There was no evidence of the presence of storage of hazardous materials; improper disposal of hazardous wastes, dumping, or landfilling; or wastewater such as pits, ponds, or lagoons. There were also no solid waste dumpsters or waste staging areas at the wind farm site.

Reference: Tetra Tech, Inc. 2014. Phase I Environmental Site Assessment. 56-452 and 56-668 Kamehameha Highway, Kahuku, Hawaii 96731, TMK: (2) 5-6-006-018 and 5-6-008-006, April 2014.

Comment ST-7.7*: You may also wish to review the draft Office of Environmental Quality Control (OEQC) viewer at: http:// eha-web.doh.hawaii.gov/oeqc-viewer. This viewer geographically shows where some previous Hawaii Environmental Policy Act (HEPA) {Hawaii Revised _Statutes, Chapter 343} documents have been prepared.*

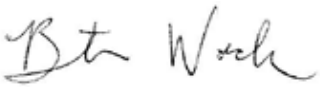
Response ST-7.7: Thank you for your recommendation to review the OEQC Viewer. We have used previously prepared Chapter 343 documents in the vicinity of the proposed Project to inform the cumulative effects analysis.

Comment ST-7.8*: In order to better protect public health and the environment, the U.S. Environmental Protection Agency (EPA) has developed a new environmental justice (EJ) mapping and screening tool called EJSCREEN. It is based on nationally consistent data and combines environmental and demographic indicators in maps and reports. EPO encourages you to explore, launch and utilize this powerful tool in planning your project. The EPA EJSCREEN tool is available at: http://www .epa.gov/ejscreen.*

Response ST-7.8: Thank you for the recommendation to use the EPA's EJSCREEN tool. Use of this tool confirms that Kahuku is a minority environmental justice population, consistent with the discussion of environmental justice in Sections 3.17- Environmental Justice (existing conditions) and 4.19-Environmental Justice (effects analysis) of the EIS.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

Attachment 1
Department of Health General Comments and Responses

Comment Clean Air Branch 1: A significant potential for fugitive dust emissions exists during all phases of construction and operations. Proposed activities that occur in proximity to existing residences, businesses, public areas or thoroughfares, exacerbate potential dust problems. It is recommended that a dust control management plan be developed which identifies and addresses all activities that have a potential to generate fugitive dust. The plan, which does not require DOH approval, would help with recognizing and minimizing the dust problems from the proposed project.

Activities must comply with the provisions of Hawaii Administrative Rules, §11-60.1-33 on Fugitive Dust. In addition, for cases involving mixed land use, we strongly recommend that buffer zones be established, wherever possible, in order to alleviate potential nuisance problems.

Response: The Project would be constructed in compliance with the provisions of Hawaii Administrative Rules, §11-60.1-33 on Fugitive Dust. As described in Section 2.6, during Project construction, wind erosion would be minimized by using common dust suppression techniques, such as regularly watering exposed soils, stockpiling soils, and stabilizing soils. As noted in Section 4.5 – Air Quality and Climate Change of the EIS fugitive dust emissions would be localized and temporary and would occur at relatively low levels compared to the State and Federal ambient air quality standards.

Comment Clean Water Branch 1: Any project and its potential impacts to State waters must meet the State's:

1) Antidegradation policy, which requires that the existing uses and the level of water quality necessary to protect the existing uses of the receiving State water be maintained and protected;
2) Designated uses, as determined by the classification of the receiving State waters; and
3) Water quality criteria [Hawaii Administrative Rules (HAR), Chapter 11-54].

Response: The Project would not directly impact State waters. As described in Section 4.2 – Hydrology and Water Resources, the Project design has been refined since the publication of the Draft EIS to ensure that it avoids all waterbodies. There would be no discharge of dredge or fill material into any waterbody; therefore a Federal Section 404 Water Quality Permit will not be required. Standard best management practices, listed in Table 2.6 of the EIS, would be implemented to avoid and minimize impacts to surface and ground water quality and quantity associated with Project construction and operation.

Comment Clean Water Branch 2: A Section 401 Water Quality Certification (WQC) is required if your project/activity:
- Requires a federal permit, license, certificate, approval, registration, or statutory exemption; and
- May result in a discharge into State waters. The term "discharge" is defined in Clean Water Act, Subsections 502(16), 502(12), and 502(6). Examples of "discharge" include, but are not limited to, allowing the following pollutants to enter State waters from the surface or in-water: solid waste, rock/sand/dirt, heat, sewage, construction debris, any underwater work, chemicals, fugitive dust/spray paint, agricultural wastes, biological materials, industrial wastes, concrete/sealant/epoxy, and washing/cleaning effluent.

Response: The Project would not directly impact State waters and there would be no discharge of dredge or fill material into any waterbody; therefore a Section 401 Water Quality Certification will not be required for the Project.

Comment Clean Water Branch 3: National Pollutant Discharge Elimination System (NPDES) permit coverage is required for:

- Storm water associated with construction activities for land disturbances of one (1) acre or more. Land disturbance includes, but is not limited to, clearing, grading, grubbing, excavation, demolition, uprooting of vegetation, equipment staging, and storage areas.
- Storm water associated with industrial activities for facilities with Standard Industrial Classification Codes regulated in 40 CFR 122.26(b)(14)(i) through (ix) and (xi).
- Storm water and certain non-storm water from a small Municipal Separate Storm Sewer System.
- Discharges of water pollutants into State surface waters. Examples of these discharges include, but are not limited to, cooling water, hydrotesting waters, dewatering effluent, and process wastewater.
- Discharges from the application of pesticides (including insecticides, herbicides, fungicides, rodenticides, and various other substances to control pest) to State waters.

Response: A NPDES permit will be obtained for the Project.

Comment Clean Water Branch 4: According to State law, all discharges related to the project construction or operation activities, whether or not NPDES permit coverage and/or Section 401 WQC are required, must comply with the State's Water Quality Standards.

Response: As noted in EIS Section 4.4 – Hydrology and Water Resources, impacts to surface water quality from increased erosion, sedimentation, stormwater runoff and/or pollutants would occur as a result of the Project would be minor due to implementation of design measures and standard best management practices. Negligible effects to groundwater quality or quantity are anticipated.

Comment Hazard Evaluation and Emergency Response 1: A Phase I Environmental Site Assessment (ESA) should be conducted for developments or redevelopments. If the investigation shows that a release of petroleum, hazardous substance, pollutants or contaminants occurred at the site, the site should be properly characterized through an approved Hawaii State Department of Health (DOH)/Hazard Evaluation and Emergency Response Office (HEER) soil and or groundwater sampling plan. If the site is found to be contaminated, then all removal and remedial actions to clean up hazardous substance or oil releases by past and present owners/tenants must comply with chapter 128D, Environmental Response Law, HRS, and Title 11, Chapter 451, HAR, State Contingency Plan.

Response: As discussed in EIS Section 4.7 – Hazardous and Regulated Materials and Wastes, a Phase I Environmental Site Assessment of the wind farm site was performed in 2014 to assess the potential presence of hazardous materials on the site. The Phase I was conducted in accordance with ASTM International Standard E1527-13, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process. The Phase I assessment did not find evidence that hazardous materials, solid waste, or petroleum products have been released to the environment in or around the wind farm site. There was no evidence of the presence of storage of hazardous materials; improper disposal of hazardous wastes, dumping, or landfilling; or wastewater such as pits, ponds, or lagoons. There were no solid waste dumpsters or waste staging areas at the wind farm site. No evidence of the presence of underground storage tanks (USTs) was observed.

Comment Indoor and Radiological Health Branch 1: Project activities shall comply with the Administrative Rules of the Department of Health:

- Chapter 11-39 Air Conditioning and Ventilating.
- Chapter 11-45 Radiation Control.

- Chapter 11-46 Community Noise Control.
- Chapter 11-501 Asbestos Requirements.
- Chapter 11-502 Asbestos-Containing Materials in Schools.
- Chapter 11-503 Fees for Asbestos Removal and Certification
- Chapter 11-504 Asbestos Abatement Certification Program

Response: As described in Section 4.4 – Noise of the EIS modeling of operational sound levels indicate that the Project will be incompliance with Chapter 11-46 Community Noise Control. Construction activities would likely require a permit, obtained from the DOH, to allow the operation of construction equipment that result in exceedances of the maximum permissible noise level at property line locations. None of the other Administrative Rules noted above apply to the Project.

Comment Solid and Hazardous Wastes Branch 1: The state regulations for hazardous waste are in Chapters 11-260 to 11-280, Hawaii Administrative Rules (HAR). These rules apply to the identification, handling, transportation, storage and disposal of regulated hazardous waste. Generators, transporters and treatment, storage and disposal facilities of hazardous waste must adhere to these requirements or be subject to fines and penalties.

Response: Na Pua Makani Power Partners, LLC would prepare and implement a Hazardous Materials and Wastes Management Plan that details proper procedures for storing and using hazardous materials and storing and disposing of hazardous waste. Section 4.7 of the EIS presents a list of pollutants that could be used during construction, a brief description of their storage and use, and a brief description of control measures that would be implemented to ensure they are properly stored.

Comment Solid and Hazardous Wastes Branch 2: Generators of solid waste are required to ensure that their wastes are properly delivered to permitted solid waste management facilities. Managers of construction and demolition projects should require their waste contractors to submit disposal receipts and invoices to ensure proper disposal of wastes.

Response: Waste generated by the Project may include scrap metal, wood, plastic and cardboard from shipping of turbine components, and incidental waste from construction workers (e.g. food and beverage containers). Solid wastes generated during construction and operation of the Project would be taken to the City and County of Honolulu's Waimanalo Gulch landfill or the H-power facility in Kapolei. Alternatively, construction wastes could be taken to the privately-owned PVT landfill, which is authorized specifically to receive construction and demolition waste.

Comment Solid and Hazardous Wastes Branch 3: HRS Chapter 342G encourages the reduction of waste generation, reuse of discarded materials, and the recycling of solid waste. Businesses, property managers and developers, and government entities are highly encouraged to develop solid waste management plans to ensure proper handling of wastes.

Response: As noted in EIS Section 4.18 – Public Infrastructure, construction and other wastes will be recycled to the extent practicable to limit the impacts to existing landfills.

DAVID Y. IGE
GOVERNOR OF HAWAII

VIRGINIA PRESSLER, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HI 96801-3378

ST-8

In reply, please refer to:
EMD/CWB

05003PCTM.16

May 2, 2016

Mr. Mike Cutbirth
Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Mauka Tower
Honolulu, Hawaii 96813

Dear Mr. Cutbirth:

SUBJECT: Comments on the 2nd Draft Environmental Impact Statement (EIS) for the Proposed Na Pua Makani Wind Project
TMKs: (1) 5-6-005:018 (portion; (1) 5-6-006:018, 047, 051, 055; and (1) 5-6-008:0006 (portion)
Kahuku, Island of Oahu, Hawaii

The Department of Health (DOH), Clean Water Branch (CWB), acknowledges receipt of your letter, dated April 19, 2016, requesting comments on your project. The DOH-CWB has reviewed the subject document and offers these comments. Please note that our review is based solely on the information provided in the subject document and its compliance with the Hawaii Administrative Rules (HAR), Chapters 11-54 and 11-55. You may be responsible for fulfilling additional requirements related to our program. We recommend that you also read our standard comments on our website at: http://health.hawaii.gov/epo/files/2013/05/Clean-Water-Branch-Std-Comments.pdf

1

1. Any project and its potential impacts to State waters must meet the following criteria:

   a. Antidegradation policy (HAR, Section 11-54-1.1), which requires that the existing uses and the level of water quality necessary to protect the existing uses of the receiving State water be maintained and protected.

   b. Designated uses (HAR, Section 11-54-3), as determined by the classification of the receiving State waters.

   c. Water quality criteria (HAR, Sections 11-54-4 through 11-54-8).

2

2. You may be required to obtain National Pollutant Discharge Elimination System (NPDES) permit coverage for discharges of wastewater, including storm water runoff, into State surface waters (HAR, Chapter 11-55).

For NPDES general permit coverage, a Notice of Intent (NOI) form must be submitted at least 30 calendar days before the commencement of the discharge. An application for a NPDES individual permit must be submitted at least 180 calendar days before the commencement of the discharge. To request NPDES permit coverage, you must submit the applicable form ("CWB Individual NPDES Form" or "CWB NOI Form") through the e-Permitting Portal and the hard copy certification statement with the respective filing fee ($1,000 for an individual NPDES permit or $500 for a Notice of General Permit Coverage). Please open the e-Permitting Portal website located at: https://eha-cloud.doh.hawaii.gov/epermit/. You will be asked to do a one-time registration to obtain your login and password. After you register, click on the Application Finder tool and locate the appropriate form. Follow the instructions to complete and submit the form.

3. If your project involves work in, over, or under waters of the United States, it is highly recommended that you contact the Army Corp of Engineers, Regulatory Branch (Tel: 835-4303) regarding their permitting requirements.

3 Pursuant to Federal Water Pollution Control Act [commonly known as the "Clean Water Act" (CWA)], Paragraph 401(a)(1), a Section 401 Water Quality Certification (WQC) is required for "[a]ny applicant for Federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may **result** in any discharge into the navigable waters..." (emphasis added). The term "discharge" is defined in CWA, Subsections 502(16), 502(12), and 502(6); Title 40 of the Code of Federal Regulations, Section 122.2; and Hawaii Administrative Rules (HAR), Chapter 11-54.

4. Please note that all discharges related to the project construction or operation activities, whether or not NPDES permit coverage and/or Section 401 WQC are

4 required, must comply with the State's Water Quality Standards. Noncompliance with water quality requirements contained in HAR, Chapter 11-54, and/or permitting requirements, specified in HAR, Chapter 11-55, may be subject to penalties of $25,000 per day per violation.

5. It is the State's position that all projects must reduce, reuse, and recycle to protect, restore, and sustain water quality and beneficial uses of State waters. Project planning should:

5 a. Treat storm water as a resource to be protected by integrating it into project planning and permitting. Storm water has long been recognized as a source of irrigation that will not deplete potable water resources. What is often overlooked is that storm water recharges ground water supplies and feeds streams and estuaries; to ensure that these water cycles are not disrupted, storm water cannot be relegated as a waste product of impervious surfaces. Any project planning must recognize storm water as an asset that sustains and protects

natural ecosystems and traditional beneficial uses of State waters, like community beautification, beach going, swimming, and fishing. The approaches necessary to do so, including low impact development methods or ecological bio-engineering of drainage ways must be identified in the planning stages to allow designers opportunity to include those approaches up front, prior to seeking zoning, construction, or building permits.

b. Clearly articulate the State's position on water quality and the beneficial uses of State waters. The plan should include statements regarding the implementation of methods to conserve natural resources (e.g. minimizing potable water for irrigation, gray water re-use options, energy conservation through smart design) and improve water quality.

c. Consider storm water Best Management Practice (BMP) approaches that minimize the use of potable water for irrigation through storm water storage and reuse, percolate storm water to recharge groundwater to revitalize natural hydrology, and treat storm water which is to be discharged.

d. Consider the use of green building practices, such as pervious pavement and landscaping with native vegetation, to improve water quality by reducing excessive runoff and the need for excessive fertilization, respectively.

e. Identify opportunities for retrofitting or bio-engineering existing storm water infrastructure to restore ecological function while maintaining, or even enhancing, hydraulic capacity. Particular consideration should be given to areas prone to flooding, or where the infrastructure is aged and will need to be rehabilitated.

If you have any questions, please visit our website at:http://health.hawaii.gov/cwb/, or contact the Engineering Section, CWB, at (808) 586-4309.

Sincerely,

ALEC WONG, P.E., CHIEF
Clean Water Branch

CTM:bk

c: EPO [via e-mail only]
Ms. Brita Woeck, Tetra Tech, Inc. [via e-mail brita.woeck@tetratech.com only]

June 30, 2016

Mr. Alec Wong, P.E., Chief
Clean Water Branch
State of Hawaii Department of Health
P.O. Box 3378
Honolulu, HI 96801-3378

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Wong:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following responses to your comments.

Comment ST-8.1*: Any project and its potential impacts to State waters must meet the following criteria:*
a. Antidegradation policy (HAR, Section 11-54-1.1), which requires that the existing uses and the level of water quality necessary to protect the existing uses of the receiving State water be maintained and protected.
b. Designated uses (HAR, Section 11-54-3), as determined by the classification of the receiving State waters.
c. Water quality criteria (HAR, Sections 11-54-4 through 11-54-8).

Response ST-8.1: Impacts to water quality are discussed in Section 4.4 – Hydrology and Water Resources of the EIS. Best management practices, including implementation of a site-specific Stormwater Pollution Prevention Plan, Temporary Erosion and Sediment Control Plan, and Spill Prevention, Containment, and Countermeasures Plan as well as avoidance of streams within the wind farm site, would avoid or minimize any water quality-related impacts both within the wind farm site and in downstream receiving waters, and ensure that water quality criteria are met.

Comment ST-8.2*: You may be required to obtain National Pollutant Discharge Elimination System (NPDES) permit coverage for discharges of wastewater, including storm water runoff, into State surface waters (HAR, Chapter 11-55).*

For NPDES general permit coverage, a Notice of Intent (NOI) form must be submitted at least 30 calendar days before the commencement of the discharge. An application for a NPDES individual permit must be submitted at least 180 calendar days before the commencement of the discharge. To request NPDES permit coverage, you must submit the applicable form ("CWB Individual NPDES Form" or "CWB NOI Form") through the e-Permitting Portal and the hard copy certification statement with the respective filing fee ($1,000 for an individual NPDES permit or $500 for a Notice of General Permit Coverage). Please open the e-Permitting Portal website located at: https://eha-cloud.doh.hawaii.gov/epermit/. You will be asked to do a one-time registration to obtain your login and password. After you register, click on the Application Finder tool and locate the appropriate form. Follow the instructions to complete and submit the form.

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

Response ST-8.2: A NPDES permit will be acquired for the proposed Project. Na Pua Makani Power Partners, LLC, will coordinate with the HDOH Clean Water Branch to ensure all requirements are met.

Comment ST-8.3*: If your project involves work in, over, or under waters of the United States, it is highly recommended that you contact the Army Corp of Engineers, Regulatory Branch (Tel: 835-4303) regarding their permitting requirements.*

Pursuant to Federal Water Pollution Control Act [commonly known as the "Clean Water Act" (CWA)], Paragraph 401(a)(1), a Section 401 Water Quality Certification (WQC) is required for "[a]ny applicant for Federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may ***result*** *in any discharge into the navigable waters..." (emphasis added). The term "discharge" is defined in CWA, Subsections 502(16), 502(12), and 502(6); Title 40 of the Code of Federal Regulations, Section 122.2; and Hawaii Administrative Rules (HAR), Chapter 11-54.*

Response ST-8.3: A preliminary jurisdictional determination for the proposed Project was issued by the U.S. Army Corp of Engineers on April 6, 2015 concluding that the delineated non-wetland waters within the wind farm site may be Waters of the U.S. requiring a Department of Army permit for any activity resulting in the discharge and/or placement of dredged or fill materials into these waters. The proposed Project footprint has been designed to avoid these jurisdictional features; therefore, Project components would not directly impact Malaekahana Stream, Keaaulu Stream, or Ohia Stream which are located within the wind farm site. Na Pua Makani Power Partners, LLC, is coordinating with the USACE to ensure compliance with Section 4 of the CWA.

Comment ST-8.4*: Please note that all discharges related to the project construction or operation activities, whether or not NPDES permit coverage and/or Section 401 WQC are required, must comply with the State's Water Quality Standards. Noncompliance with water quality requirements contained in HAR, Chapter 11-54, and/or permitting requirements, specified in HAR, Chapter 11-55, may be subject to penalties of $25,000 per day per violation.*

Response ST-8.4: Thank you for the comment that water quality requirements must be met regardless of the need for a NPDES permit or Section 401 WQC.

Comment ST-8.5*: It is the State's position that all projects must reduce, reuse, and recycle to protect, restore, and sustain water quality and beneficial uses of State waters. Project planning should:*

a. Treat storm water as a resource to be protected by integrating it into project planning and permitting. Storm water has long been recognized as a source of irrigation that will not deplete potable water resources. What is often overlooked is that storm water recharges ground water supplies and feeds streams and estuaries; to ensure that these water cycles are not disrupted, storm water cannot be relegated as a waste product of impervious surfaces. Any project planning must recognize storm water as an asset that sustains and protects natural ecosystems and traditional beneficial uses of State waters, like community beautification, beach going, swimming, and fishing. The -approaches necessary to do so, including low impact development methods or ecological bio-engineering of drainage ways must be identified in the planning stages to allow designers opportunity to include those approaches up front, prior to seeking zoning, construction, or building permits.

b. Clearly articulate the State's position on water quality and the beneficial uses of State waters. The plan should include statements regarding the implementation of methods to conserve natural resources (e.g. minimizing

potable water for irrigation, gray water re-use options, energy conservation through smart design) and improve water quality.

c. Consider storm water Best Management Practice (BMP) approaches that minimize the use of potable water for irrigation through storm water storage and reuse, percolate storm water to recharge groundwater to revitalize natural hydrology, and treat storm water which is to be discharged.

d. Consider the use of green building practices, such as pervious pavement and landscaping with native vegetation, to improve water quality by reducing excessive runoff and the need for excessive fertilization, respectively.

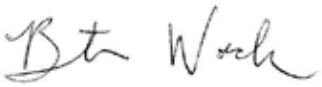
e. Identify opportunities for retrofitting or bio-engineering existing storm water infrastructure to restore ecological function while maintaining, or even enhancing, hydraulic capacity. Particular consideration should be given to areas prone to flooding, or where the infrastructure is aged and will need to be rehabilitated.

Response ST-8.5: Specific stormwater management approaches would be developed in conjunction with preparation of detailed Project construction plans. As noted in EIS Section 4.4 – Hydrology and Water Resources and the Preliminary Drainage Report in Appendix B of the EIS, ditches and culverts and other erosion controls will be used to capture and convey stormwater in areas of temporary disturbance. Stormwater control measures, such as drainage drywells, seepage pits and/or detention basins will be used to manage the minor net increase in storm water runoff anticipated as a result of the proposed Project. These measures will allow stormwater to dissipating back into the ground.

The proposed Project is being designed to minimize the creation of new impervious surfaces. The proposed Project would result in up to approximately 9.1 acres (3.7 hectares) of impervious surfaces, which includes 9 acres (3.6 hectares; 99 percent) of gravel surfaces which would be considered semi-pervious. Additionally, areas of temporary disturbance will be revegetated. These green building practices will minimize water quality degradation.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

DAVID Y. IGE
GOVERNOR
STATE OF HAWAII

SHAN S. TSUTSUI
LT GOVERNOR
STATE OF HAWAII

JOBIE M. K. MASAGATANI
CHAIRMAN
HAWAIIAN HOMES COMMISSION

WILLIAM J. AILA, JR.
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P O BOX 1879
HONOLULU, HAWAII 96805

May 6, 2016

ST-9

TETRA TECH
Attn: Brita Woeck, Project Manager
737 Bishop Street, Suite 2340
Mauka Tower
Honolulu, Hawaii 96813

Subject: Second Draft Environmental Impact Statement for the Proposed Na Pua Makani Wind Project locate at Kahuku, Koolauloa, Hawaii, TMKs (1) 5-6-005:018 (portion); (1) 5-6006:018, 047, 051, 055: and (1) 5-6-008:006 (portion)

Aloha Brita Woeck:

1 The Department of Hawaiian Home Lands acknowledges receiving the request for comments for the proposed project. After reviewing the material submitted, and due to its lack of proximity to Hawaiian Home Lands, we do not anticipate any impacts to our lands or beneficiaries from the Second Draft Environmental Impact Statement for the Proposed Na Pua Makani Wind Project.

2 However, we highly encourage all agencies to consult with Hawaiian Homestead community association and other (N) native Hawaiian organizations when preparing environmental assessments in order to better assess potential impacts to cultural and natural resources, access and other traditional and customary practices of Native Hawaiians.

Mahalo for the opportunity to provide comments. If you have any questions; please call the Planning Office at 620-9517 or contact us via email at dhhl.planning@hawaii.gov.

Sincerely,

Marvin Kaleo Manuel
Acting Planning Program Manager.

June 30, 2016

Mr. Marvin Kaleo Manuel
Acting Planning Program Manager
State of Hawaii Department of Hawaiian Home Lands
P.O. Box 1879
Honolulu, HI 96805

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Manuel:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment ST-9.1*: The Department of Hawaiian Home Lands acknowledges receiving the request for comments for the proposed project. After reviewing the material submitted, and due to its lack of proximity to Hawaiian Home Lands, we do not anticipate any impacts to our lands or beneficiaries from the Second Draft Environmental Impact Statement for the Proposed Na Pua Makani Wind Project.*

Response ST-9.1: We appreciate your confirmation that no impacts would occur to Hawaiian Home Lands or beneficiaries as a result of the proposed Project.

Comment ST-9.2*: However, we highly encourage all agencies to consult with Hawaiian Homestead community association and other (N) native Hawaiian organizations when preparing environmental assessments in order to better assess potential impacts to cultural and natural resources, access and other traditional and customary practices of Native Hawaiians.*

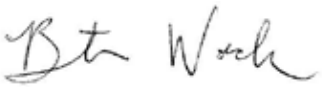
Response ST-9.2: As part of the Cultural Impact Assessment for the proposed Project, community association representatives, other Native Hawaiian organizations (civic clubs, burial counsels, etc.), and knowledgeable individuals were contacted to provide input on the cultural context of the proposed wind farm site. This information is included in Appendix G of the EIS.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

DAVID Y. IGE
GOVERNOR

KATHRYN S. MATAYOSHI
SUPERINTENDENT

STATE OF HAWAI'I
DEPARTMENT OF EDUCATION
P.O. BOX 2360
HONOLULU, HAWAI'I 96804

OFFICE OF SCHOOL FACILITIES AND SUPPORT SERVICES

ST-10

May 18, 2016

Mr. Mike Cutbirth
Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Mauka Tower
Honolulu, Hawaii 96813

Re: Draft Environmental Assessment for the Second Draft Environmental Impact Statement for the Proposed Na Pua Makani Wind Project, Kahuku

Dear Mr. Cutbirth:

The Department of Education (DOE) has reviewed the Second Draft Environmental Impact Statement (SDEIS) for a proposed 25-megawatt Na Pua Makani Wind Project (Project) at Kahuku.

1 There is an error in the descriptive material about DOE schools that are located in, and serve the residents of, Kahuku. Kahuku Elementary School and Kahuku High and Intermediate School are not located on a single 4.5-acre campus. Kahuku Elementary is located on a 4.9-acre parcel. Kahuku High and Intermediate School is located on four (4) separate parcels which are combined into an approximately 21.2 acre campus.

The significance of correctly identifying the parcels that comprise the two schools would address the problem of varying references in the SDEIS to the distance between the project and the schools. There would be a difference between the distances between boundaries of the Project and the two campuses and distances between the closest proposed turbine and the closest classroom.

2 It seems important to note that the anticipated noise impact of the windmills operation is less than the daytime noise limit regulations. However, there will be a discernible increase in daily outdoor noise on the campuses due to the project. The students will hear the windmills and other equipment when they are outside.

The DOE has no other comments at this time. We appreciate this opportunity to review the DEIS. If you have any questions, please call Heidi Meeker of the Facilities Development Branch, at 784-5080.

Respectfully,

Kenneth G. Masden II
Public Works Manager
Planning Section

KGM:jmb
Attachment

c: Matthew C.W. Ho, Complex Area Superintendent, Castle-Kahuku Complex Areas

June 30, 2016

Mr. Kenneth G. Masden II
Public Works Manager, Planning Section
State of Hawaii Department of Education
P.O. Box 2360
Honolulu, HI 96804

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Masden:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment ST-10.1*: There is an error in the descriptive material about DOE schools that are located in, and serve the residents of, Kahuku. Kahuku Elementary School and Kahuku High and Intermediate School are not located on a single 4.5-acre campus. Kahuku Elementary is located on a 4.9-acre parcel. Kahuku High and Intermediate School is located on four (4) separate parcels which are combined into an approximately 21.2 acre campus.*

The significance of correctly identifying the parcels that comprise the two schools would address the problem of varying references in the SDEIS to the distance between the project and the schools. There would be a difference between the distances between boundaries of the Project and the two campuses and distances between the closest proposed turbine and the closest classroom.

Response ST-10.1: Thank you for correcting the information on the descriptions of the Kahuku Elementary School and the Kahuku High and Intermediate School campuses. The Final EIS has been updated to incorporate this information into Section 3.18 – Public Infrastructure and Services and to clarify the references to the distances between the proposed wind turbines and the schools.

Comment ST-10.2*: It seems important to note that the anticipated noise impact of the windmills operation is less than the daytime noise limit regulations. However, there will be a discernible increase in daily outdoor noise on the campuses due to the project. The students will hear the windmills and other equipment when they are outside.*

Response ST-10.2: Worst-case modeled wind turbine operational noise levels would be approximately 43 dBA, at Kahuku Elementary School and 42 dBA at Kahuku High and Intermediate School, which are roughly equivalent to the sound level in a quiet library. As noted in your comment this sound level is less than the 55 dBA daytime noise limit established in Hawaii's Community Noise Control regulation (HAR 11-46). This represents an increase of 3 to 4 dBA outside at these locations above baseline (existing) conditions, which is just at the threshold of human hearing. For reference, a 5 dBA increase is considered perceptible to the average human and a 10 dBA increase is perceived as a doubling of sound. Therefore, as noted in Section 4.6 – Noise of the EIS, wind

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737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

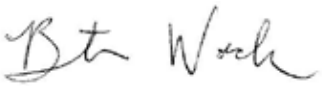
turbine operational noise may be discernable to some people outside at the schools. It should be noted that these predicted noise levels are maximum noise levels under downwind propagation conditions and under maximum rotation operational conditions.

Additionally, studies have shown that even with windows open there is attenuation of noise going from outdoor to indoor conditions. For example, the Federal Highways Administration conservatively estimates that noise is reduced by 10 dBA when transitioning from outdoor to indoor conditions with windows open (FHWA 2011). Therefore, noise levels within classrooms, even with windows open, would be much less than the predicted operational noise levels. Appendix D of the EIS and Section 4.6 – Noise include additional information on the baseline noise monitoring conducted for the proposed Project and the modeling analysis.

Reference: FHWA. 2011. Highway Traffic Noise: Analysis and Abatement Guidance. U.S. Department of Transportation, Federal Highway Administration. FHWA-HEP-10-025. Available online at: https://www.fhwa.dot.gov/environment/noise/regulations_and_guidance/analysis_and_abatement_guidance/revguidance.pdf

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

DAVID Y. IGE
GOVERNOR

DOUGLAS MURDOCK
COMPTROLLER

AUDREY HIDANO
Deputy Comptroller

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810-0119

MAY - 5 2016

(P)1119.6

ST-11

Mr. Mike Cutbirth
C/O Tetra Tech, Inc.
737 Bishop Street. Suite 2340, Mauka Tower
Honolulu, Hawaii 96813

Dear Mr. Cutbirth:

Subject: Second Draft Environmental Impact Statement for the Proposed
Na Pua Makani Wind Project located at Kahuku, Koolauloa, Hawaii
TMK:(1) 5-6-005:018 (por), (1)5-6-006:018, 047, 051, 055 and (1) 5-6-008:006 (por)

1 Thank you for the opportunity to provide comments for the subject project. The project does not impact any of the Department of Accounting and General Services' projects or existing facilities and we have no comments to offer at this time.

If you have any questions, your staff may call Mr. Myles Nakamura of the Public Works Division at 586-0491.

Sincerely,

For DOUGLAS MURDOCK
Comptroller

June 30, 2016

Mr. Douglas Murdock
State of Hawaii Department of Accounting and General Services
P.O. Box 119
Honolulu, HI 96810-0119

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Murdock:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). Thank you for confirming that the Project does not impact any of the Department of Accounting and General Services' projects or existing facilities and that you have no comments to offer at this time.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

DAVID Y. IGE
Governor

SHAN S. TSUTSUI
Lt. Governor

SCOTT E. ENRIGHT
Chairperson, Board of Agriculture

PHYLLIS SHIMABUKURO-GEISER
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawaii 96814-2512
Phone: (808) 973-9600 FAX: (808) 973-9613

May 18, 2016

ST-12

Mr. Mike Cutbirth
c/o Tetra Tech, Inc.
Pacific Guardian Center, Mauka Tower
737 Bishop St., Suite 2340
Honolulu Hawaii 96813

Dear Mr. Cutbirth:

Subject: Second Draft EIS for the Proposed Na Pua Makani Wind Project Located at Kahuku, Koolauloa, Hawaii, TMKs (1) 5-6-005:018 (portion); (1) 5-6-006:018, 047, 051, 055; and (1) 3-6-008:006 (portion)

Thank for the opportunity to review the subject document. By letter dated July 22, 2015, the Hawaii Department of Agriculture (HDOA) shared its comments and concerns relating to the project as presented by the initial Draft EIS, dated November 2014. Ms. Brita Woeck of Tetra Tech, Inc. responded by letter dated April 4, 2016, however, we believe some clarification is needed with respect to our concerns.

1

1. ST-3.1: 3.15.1.3 – Transportation – [re-stated] The use of the State-owned Kahuku Agricultural Park interior roadways needs to be expanded to explain that agreements for the long-term use, on-going maintenance, mitigation and/or modification of said roadway for delivery of turbine components needs to be negotiated.

   As clarification, the Board of Agriculture, at its meeting of October 27, 2015, approved the issuance of a non-exclusive term easement for construction access and on-going maintenance of the wind turbines to be installed. The board's approval further stated that its approval is **SUBJECT TO ADDITIONAL TERMS AND CONDITIONS OF THE EASEMENT AND FURTHER SUBJECT TO THE REVIEW AND APPROVAL OF THE DEPARTMENT OF THE ATTORNEY GENERAL.** The additional terms and conditions are currently being negotiated with attorneys representing Na Pua Makani Power Partners, LLC and have not concluded with mutual agreements. Also, additional discussions and agreements are required for the short-term taking of portions of parcels 018, 047 and 051, which are currently under lease to individual tenants. Therefore, an expanded explanation of the significance of the agricultural park's interior roadway access plays in the construction and operation and maintenance scenario.

2

2. ST 3.7: Unresolved Issues – As clarified above, the use of the Kahuku Agricultural Park's interior roadways remains unresolved and therefore needs to be addressed in this section of the Second DEIS.

3 3. Table 5-1: Applicable Federal, State, and Local Statutes, etc. should reflect the need to consummate a long-term easement authorizing the use of the Kahuku Agricultural Park's interior roadways for construction access and on-going operations and maintenance.

4 4. Table 4.2-2 – Does not consider the cumulative effects analysis of the use of the Kahuku Agricultural Park's interior roadways. An analysis should be made and the potential number of daily trips anticipated during the operation and maintenance period of twenty (20) plus years.

Should you have any questions, please contact me at (808) 973-9550 or Mr. Brian Kau, Administrator, Agricultural Resource Management Division, at (808) 973-9473.

Sincerely,

Scott E. Enright, Chair
Board of Agriculture

c: Honorable Suzanne D. Case
Chairperson, Board of Land and
Natural Resources
Kalanimoku Building
1151 Punchbowl Street
Honolulu, Hawaii 96813

Pacific Island Fish and Wildlife Office
U.S. Fish and Wildlife Service
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawaii 96850
Attention: Ms. Kristi Young, Field Supervisor

June 30, 2016

Mr. Scott Enright
State of Hawaii Department of Agriculture
1428 South King Street
Honolulu, HI 96814-2512

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Enright:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment ST-12.1*: ST-3.1: 3.15.1.3-Transportation- [re-stated) The use of the State-owned Kahuku Agricultural Park interior roadways needs to be expanded to explain that agreements for the long-term use, on-going maintenance, mitigation and/or modification of said roadway for delivery of turbine components needs to be negotiated.*

As clarification, the Board of Agriculture, at its meeting of October 27, 2015, approved the issuance of a non-exclusive term easement for construction access and on-going maintenance of the wind turbines to be installed. The board's approval further stated that its approval is SUBJECT TO ADDITIONAL TERMS AND CONDITIONS OF THE EASEMENT AND FURTHER SUBJECT TO THE REVIEW AND APPROVAL OF THE DEPARTMENT OF THE ATIORNEY GENERAL The additional terms and conditions are currently being negotiated with attorneys representing Na Pua Makani Power Partners, LLC and have not concluded with mutual agreements. Also, additional discussions and agreements are required for the short-term taking of portions of parcels 018, 047 and 051, which are currently under lease to individual tenants. Therefore, an expanded explanation of the significance of the agricultural park's interior roadway access plays in the construction and operation and maintenance scenario.

Response ST-12.1: Additional discussion has been added to Chapter 6 under Unresolved Issues to clarify that the Hawaii Department of Agriculture and Na Pua Makani Power Partners, LLC are negotiating the terms and conditions of the non-exclusive term easement along the Kahuku Agricultural Park interior road way approved by the Board of Agriculture for construction access and on-going maintenance of the wind turbine.

During construction, this road would be used to allow construction equipment, superloads, and other vehicles to transit to the wind farm site. Na Pua Makani Power Partners, LLC will work with the Department of Agriculture to develop procedures for notifying and communicating with its tenants. In total the Kahuku Agricultural Park interior road way could see between 150 and 250 vehicles over a 2 to 4 month period. During the delivery of turbine components (approximately 70 truckloads) this road may be blocked momentarily until turbine component

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Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

passes through. All other traffic would be standard traffic and should not impede passing traffic. A brief discussion of traffic impacts along this road has also been added to Section 4.17 – Transportation.

Comment ST-12.2*: ST 3.7: Unresolved Issues -As clarified above, the use of the Kahuku Agricultural Park's interior roadways remains unresolved and therefore needs to be addressed in this section of the Second DEIS..*

Response ST-12.2: See response to ST-12.1.

Comment ST-12.3*: Table 5-1: Applicable Federal, State, and Local Statutes, etc. should reflect the need to consummate a long-term easement authorizing the use of the Kahuku Agricultural Park's interior roadways for construction access and on-going operations and maintenance.*

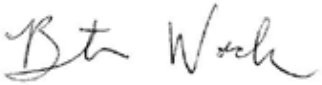
Response ST-12.3: The long-term easement for use of the Kahuku Agriculture Park's interior roadways has been added to Table 5-1.

Comment ST-12.4*: Table 4.2-2 - Does not consider the cumulative effects analysis of the use of the Kahuku Agricultural Park's interior roadways. An analysis should be made and the potential number of daily trips anticipated during the operation and maintenance period of twenty (20) plus years.*

Response ST-12.4: Table 4.2-2 does include existing roadways used to access the DLNR and Malaekahana lands; however the table was corrected to specify that the access roads are owned in part by the Department of Agriculture and that they include the Kahuku Agricultural Park interior roadways. Additional discussion has been added to Section 4.17 – Transportation regarding traffic impacts along the Kahuku Agricultural Park's interior roadways during the Project's operating period.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE
MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

June 6, 2016

ST-13

Tetra Tech, Inc.
Attention: Mr. Mike Cutbirth,
and Ms. Brita Woeck
737 Bishop St., Suite 2340
Honolulu, HI 96813

via email: brita.woeck@tetratech.com

Dear Mr. Cutbirth and Ms. Woeck:

SUBJECT: Second Draft Environmental Impact Statement for the Proposed Na Pua Makani Wind Project

Thank you for the opportunity to review and comment on the subject matter. The Department of Land and Natural Resources' (DLNR) Land Division distributed or made available a copy of your report pertaining to the subject matter to DLNR Divisions for their review and comments.

At this time, enclosed are comments from the (a) Engineering Division and (b) Land Division – Oahu District on the subject matter. Should you have any questions, please feel free to call Lydia Morikawa at 587-0410. Thank you.

Sincerely,

Russell Y. Tsuji
Land Administrator

Enclosure(s)
cc: Central Files

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE
MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

May 4, 2016

RECEIVED
2016 MAY 19 AM 11:08
DEPT. OF LAND & NATURAL RESOURCES STATE OF HAWAII
2016 MAY 19 AM 10:52
LAND DIVISION ENGINEERING

MEMORANDUM

TO: **DLNR Agencies:**
__Div. of Aquatic Resources
__Div. of Boating & Ocean Recreation
X Engineering Division
__Div. of Forestry & Wildlife
__Div. of State Parks
X Commission on Water Resource Management
__Office of Conservation & Coastal Lands
X Land Division – Oahu District
X Historic Preservation

FROM: Russell Y. Tsuji, Land Administrator
SUBJECT: Second Draft Environmental Impact Statement for the Proposed Na Pua Makani Wind Project
LOCATION: Kahuku, Koolauloa, Island of Oahu; TMK No. (1) 5-6-005:018 (por.); 5-6-006:018, 047, 051, 055; and 5-6-008:006 (por.)
APPLICANT: Na Pua Makani Power Partners, LLC

Transmitted for your review and comment is information on the above-referenced project. We would appreciate your comments on this project. Please submit any comments by **June 3, 2016.**

The DEA can be found on-line at: http://health.hawaii.gov/oeqc/ (Click on the Current Environmental Notice under Quick Links on the right.)

If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact Lydia Morikawa at 587-0410. Thank you.

Attachments

( ) We have no objections.
( ) We have no comments.
(X) Comments are attached.

Signed: _____

Print Name: Carty S. Chang, Chief Engineer
Date: 5/18/16

cc: Central Files

DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

To: Land Division
Ref: Second Draft EIS for the Proposed Na Pua Makani Wind Project, Oahu, Hawaii

COMMENTS

1

The rules and regulations of the National Flood Insurance Program (NFIP), Title 44 of the Code of Federal Regulations (44CFR), are in effect when development falls within a designated Flood Hazard.

The owner or the project property and/or their representative is responsible to research the Flood Hazard Zone designation for the project. Flood Hazard Zone designations can be found using the Flood Insurance Rate Map (FIRM), which can be accessed through the Flood Hazard Assessment Tool (FHAT) (http://gis.hawaiinfip.org/FHAT).

National Flood Insurance Program establishes the rules and regulations of the NFIP - Title 44 of the Code of Federal Regulations (44CFR). The NFIP Zone X is a designation where there is no perceived flood impact. Therefore, the NFIP does not regulate any development within a Zone X designation.

Be advised that 44CFR reflects the minimum standards as set forth by the NFIP. Local community flood ordinances may take precedence over the NFIP standards as local designations prove to be more restrictive. If there are questions regarding the local flood ordinances, please contact the applicable County NFIP Coordinators below:

- Oahu: City and County of Honolulu, Department of Planning and Permitting (808) 768-8098.
- Hawaii Island: County of Hawaii, Department of Public Works (808) 961-8327.
- Maui/Molokai/Lanai County of Maui, Department of Planning (808) 270-7253.
- Kauai: County of Kauai, Department of Public Works (808) 241-4846.

Signed: _____
CARTY S. CHANG, CHIEF ENGINEER

Date: 5/12/14

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE
MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

RECEIVED
LAND DIVISION
2016 MAY -9 PM 2:42
DEPT. OF LAND &
NATURAL RESOURCES
STATE OF HAWAII

May 4, 2016

MEMORANDUM

TO: **DLNR Agencies:**
___Div. of Aquatic Resources
___Div. of Boating & Ocean Recreation
_X_Engineering Division
___Div. of Forestry & Wildlife
___Div. of State Parks
_X_Commission on Water Resource Management
___Office of Conservation & Coastal Lands
_X_Land Division – Oahu District
_X_Historic Preservation

FROM: Russell Y. Tsuji, Land Administrator
SUBJECT: Second Draft Environmental Impact Statement for the Proposed Na Pua Makani Wind Project
LOCATION: Kahuku, Koolauloa, Island of Oahu; TMK No. (1) 5-6-005:018 (por.); 5-6-006:018, 047, 051, 055; and 5-6-008:006 (por.)
APPLICANT: Na Pua Makani Power Partners, LLC

Transmitted for your review and comment is information on the above-referenced project. We would appreciate your comments on this project. Please submit any comments by **June 3, 2016.**

The DEA can be found on-line at: http://health.hawaii.gov/oeqc/ (Click on the Current Environmental Notice under Quick Links on the right.)

If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact Lydia Morikawa at 587-0410. Thank you.

Attachments

2

( ) We have no objections.
(✓) We have no comments.
( ) Comments are attached.

Signed: TChee

Print Name: Timy Che
Date: May 9, '16

cc: Central Files

June 30, 2016

Mr. Russell Tsuji
State of Hawaii Department of Land and Natural Resources
P.O. Box 621
Honolulu, HI 96809

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Tsuji:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We appreciate you gathering input.

Your letter indicated that the Land Division had no comments on the Second Draft EIS. The Engineering Division provided the comment noted below.

Comment ST-13.1*: The rules and regulations of the National Flood Insurance Program (NFIP), Title 44 of the Code of Federal Regulations (44CFR), are in effect when development falls within a designated Flood Hazard.*

The owner or the project property and/or their representative is responsible to research the Flood Hazard Zone designation for the project. Flood Hazard Zone designations can be found using the Flood Insurance Rate Map (FIRM), which can be accessed through the Flood Hazard Assessment Tool (FHAT) (http://gis.hawaiinfip.org/FHAT).

National Flood Insurance Program establishes the rules and regulations of the NFIP - Title 44 of the Code of Federal Regulations (44CFR). The NFIP Zone X is a designation where there is no perceived flood impact. Therefore, the NFIP does not regulate any development within a Zone X designation.

Be advised that 44CFR reflects the minimum standards as set forth by the NFIP. Local community flood ordinances may take precedence over the NFIP standards as local designations prove to be more restrictive. If there are questions regarding the local flood ordinances, please contact the applicable County NFIP Coordinators below:

- *Oahu: City and County of Honolulu, Department of Planning and Permitting (808) 768-8098.*
- *Hawaii Island: County of Hawaii, Department of Public Works (808) 961-8327.*
- *Maui/Molokai/Lanai County of Maui, Department of Planning (808) 270-7253.*
- *Kauai: County of Kauai, Department of Public Works (808) 241-4846.*

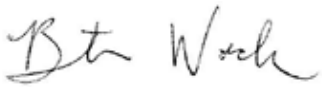
Response ST-13.1: Thank you for the information regarding flood ordinances. Flood Hazard Zone designations for the proposed Project are discussed in EIS Section 3.6 – Natural Hazards and shown on Figure 3.6-1.

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

According to the Flood Insurance Rate Maps, the wind farm site is located predominantly within Flood Zones D and X, with small portions along Kamehameha Highway located in Flood Zones A, AE, AEF, and XS.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

OFFICE OF PLANNING
STATE OF HAWAII

235 South Beretania Street, 6th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

DAVID Y. IGE
GOVERNOR

LEO R. ASUNCION
DIRECTOR
OFFICE OF PLANNING

Telephone: (808) 587-2846
Fax: (808) 587-2824
Web: http://planning.hawaii.gov/

Ref. No. P-15176

June 1, 2016

ST-14

Mr. Mike Cutbirth
c/o Tetra Tech, Inc.
737 Bishop Street, Suite 2340
Honolulu, Hawaii 96813

Dear Mr. Cutbirth:

Subject: Second Draft Environmental Impact Statement for the Na Pua Makani Wind Project and Habitat Conservation Plan, Kahuku, Koolauloa District, Oahu; Tax Map Keys: (1) 5-6-8:018; 5-6-6:018; 47, 51, 55 (por); and 5-6-5:018 (por)

Thank you for the opportunity to provide comments on the Second Draft Environmental Impact Statement (Second DEIS) for the proposed Na Pua Makani Wind Project and Habitat Conservation Plan. The notification letter and DEIS review material was transmitted to our office via letter dated April 19, 2016.

We understand that this Second DEIS was created in response to public comments on visual impacts and a request to consider fewer turbines with greater generating capacities. The Second DEIS reevaluates the proposed turbine locations and turbine models. The four alternatives presented in the Second DEIS are similar to the previous DEIS, however the preferred alternative reduces the maximum number of turbines needed to meet the target generating capacity for the project from 10 turbines to nine.

The Office of Planning (OP) has reviewed the Second DEIS and provides the following comments:

1. The Second DEIS addresses comments made in a previous letter dated August 6, 2015 (Reference No. P-14843). The Second DEIS examines setback distances in regards to community input on safety and generating capacity; includes a discussion on the addition of economic benefits of the Habitat Conservation Plan; includes a discussion on visual resources and visual impacts from the wind turbines; and addresses the applicable goals, objectives, policies, and priority guidelines of the Hawaii State Plan, as listed in Hawaii Revised Statutes (HRS) Chapter 226 (which includes HRS § 226-18 - facility systems – energy, and HRS § 226-108 the priority guidelines on sustainability).

1

2. Based on our pre-consultation comment letter dated December 1, 2014 (Reference No. P-14590) and the previously mentioned DEIS comment letter, the Second DEIS maintains

2 its examination of the objectives and policies of the Hawaii Coastal Zone Management Program as listed in HRS § 205A-2; contains an analysis of stormwater mitigation impacts; contains an analysis on soil types and erosion hazard risks; and lists the mitigation strategies that will be followed to control sediment and soil erosion on coastal waters.

3 3. We acknowledge, as stated in Section 5.2.6, page 5-10 of the Second DEIS, Na Pua Makani Power Partners, LLC should consult with the City and County of Honolulu, Department of Planning and Permitting, for the potential requirements of a special management area (SMA) use given that the proposed action may require grading, grubbing and installation of a gravel surface, and installation of a fence for predator control within the SMA. We suggest that the Final Environmental Impact Statement provide a map to illustrate the SMA in relation to the project and proposed actions.

4 4. We acknowledge that the applicant is coordinating with the U.S. Army Corps of Engineers (USACE) to avoid impacts to wetlands and stream areas in the vicinity of the project area. As stated in our earlier comment letters referenced above, if deemed necessary by the USACE that a Clean Water Act, Section 404 or a Rivers and Harbors Act, Section 10 permit is needed, then this wind farm project may need to be evaluated against Federal Consistency requirements. OP will be the lead State agency to conduct this evaluation.

If you have any questions regarding this comment letter, please contact Josh Hekekia of our office at 587-2845.

Sincerely,

Leo R. Asuncion
Director

June 30, 2016

Mr. Leo Asuncion
Office of Planning
State of Hawaii
P.O. Box 2359
Honolulu, HI 96804

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Asuncion:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment ST-14.1*: The Second DEIS addresses comments made in a previous letter dated August 6, 2015 (Reference No. P-14843). The Second DEIS examines setback distances in regards to community input on safety and generating capacity; includes a discussion on the addition of economic benefits of the Habitat Conservation Plan; includes a discussion on visual resources and visual impacts from the wind turbines; and addresses the applicable goals, objectives, policies, and priority guidelines of the Hawaii State Plan, as listed in Hawaii Revised Statutes (HRS) Chapter 226 (which includes HRS§ 226-18 - facility systems energy, and HRS § 226-108 the priority guidelines on sustainability).*

Response ST-14.1: Thank you for confirming that the Second Draft EIS adequately addresses comments on the original Draft EIS provided by the Office of Planning.

Comment ST-14.2*: Based on our pre-consultation comment letter dated December 1, 2014 (Reference No. P-14590) and the previously mentioned DEIS comment letter, the Second DEIS maintains its examination of the objectives and policies of the Hawaii Coastal Zone Management Program as listed in HRS § 205A-2; contains an analysis of stormwater mitigation impacts; contains an analysis on soil types and erosion hazard risks; and lists the mitigation strategies that will be followed to control sediment and soil erosion on coastal waters..*

Response ST-14.2: Thank you for confirming that the EIS also addresses comments provided in the Office of Planning's pre-consultation letter.

Comment ST-14.3*: We acknowledge, as stated in Section 5.2.6, page 5-10 of the Second DEIS, Na Pua Makani Power Partners, LLC should consult with the City and County of Honolulu, Department of Planning and Permitting, for the potential requirements of a special management area (SMA) use given that the proposed action may require grading, grubbing and installation of a gravel surface, and installation of a fence for predator control within the SMA. We suggest that the Final Environmental Impact Statement provide a map to illustrate the SMA in relation to the project and proposed actions.*

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

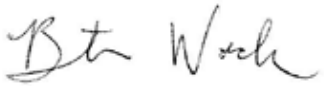
Response ST-14.3: As noted in your comment, Section 5.2.6 of the EIS describes the SMA in relation to the Project. The SMA has been added to Figure 5-1 of the EIS.

Comment ST-14.4*: We acknowledge that the applicant is coordinating with the U.S. Army Corps of Engineers (USA CE) to avoid impacts to wetlands and stream areas in the vicinity of the project area. As stated in our earlier comment letters referenced above, if deemed necessary by the USACE that a Clean Water Act, Section 404 or a Rivers and Harbors Act, Section 10 permit is needed, then this wind farm project may need to be evaluated against Federal Consistency requirements. OP will be the lead State agency to conduct this evaluation.*

Response ST-14.4: Thank you for confirming that an evaluation of Federal Consistency requirements may be required if an US Army Corp of engineers permit is needed for the proposed Project.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

OFFICE OF ENVIRONMENTAL QUALITY CONTROL

DAVID Y. IGE
GOVERNOR

SCOTT GLENN
DIRECTOR

DEPARTMENT OF HEALTH | 235 South Beretania Street, Suite 702, Honolulu, HI 96813 | oeqchawaii@doh.hawaii.gov

(808) 586-4185

June 7, 2016

ST-15

Ms. Suzanne Case, Chairperson
Board of Land and Natural Resources
1151 Punchbowl St.
Honolulu, HI 96813

Dear Ms. Case,

Subject: Second Draft Environmental Impact Statement (EIS) for the Na Pua Makani Wind Project

The Office of Environmental Quality Control (OEQC) reviewed the 2nd Draft EIS prepared for the subject project and offers the following comments for your consideration.

1 The document alludes to the complexities in delivering the multiple loads of oversized and overweight equipment that would comprise the project, including 8 undefined "superloads" and at least 27 blades (3 blades/turbine and at least 9 turbines) up to 208 feet long. An estimate is provided that up to 100 round trips between Kalaeloa Harbor and the Kahuku site would be required at speeds approaching 5 miles per hour, along with requisite tree trimming, traffic signal and roadway sign relocation, guardrail relocation, overhead utility line adjustments, and asphalt curb removal. Road closures are inevitable, and at least one bridge along the route has been derated and thus cannot tolerate oversized loads. Given the impact these deliveries will have all along the 40+ mile routes, we recommend the EIS consider alternative delivery means, such as via barge or helicopter to the project site.

2 The rotor sweep per turbine for the recently proposed option is up to 143,160 square feet, a greater than 20% increase per turbine over the 115,723 square feet originally proposed, and yet page 2-31 states that endangered species "take" estimates of bird/bat strikes are comparable and possibly even less than presented in the original draft Habitat Conservation Plan. This suggests rotor sweep is not a relevant factor in takings or bird/bat strikes. Please clarify this in the EIS. If rotor sweep is a relevant consideration in strikes/takings, then provide substantiating information regarding the "comparable or less" statement.

3 A perusal of the document did not reveal a discussion of "blade tip speed," yet similar to the point above about "rotor sweep," this topic seems rationally relevant to a discussion of strikes/takings. Physically, with the newly proposed option of longer turbine blades, the blade tips will achieve higher angular momentum than the original blades, and thus may present a greater threat for bird/bat strikes. Please clarify this issue in the EIS.

Thank you for the opportunity to comment on this draft EIS. We look forward to a response that also will be included within the project's Final EIS. If you have questions about these comments, please consult myself or Tom Eisen in our office at (808) 586-4185.

Sincerely,

Scott Glenn, Director

c: Brita Woeck, Mike Cutbirth

16-356

June 30, 2016

Mr. Scott Glenn
Office of Environmental Quality Control
Department of Health
235 South Beretania Street, Suite 702
Honolulu, HI 96813

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Glenn:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment ST-15.1*: The document alludes to the complexities in delivering the multiple loads of oversized and overweight equipment that would comprise the project, including 8 undefined "superloads" and at least 27 blades (3 blades/turbine and at least 9 turbines) up to 208 feet long. An estimate is provided that up to 100 round trips between Kalaeloa Harbor and the Kahuku site would be required at speeds approaching 5 miles per hour, along with requisite tree trimming, traffic signal and roadway sign relocation, guardrail relocation, overhead utility line adjustments, and asphalt curb removal. Road closures are inevitable, and at least one bridge along the route has been derated and thus cannot tolerate oversized loads. Given the impact these deliveries will have all along the 40+ mile routes, we recommend the EIS consider alternative delivery means, such as via barge or helicopter to the project site.*

Response ST-15.1: There are three commercial ports located on Oahu, all on the South Shore, including Honolulu Harbor, Kalaeloa Barbers Point Harbor, and Kewalo Basin. As noted in your comment, use of the port at Kalaeloa Barbers Point Harbor which currently has the capacity to receive and store wind turbine components is proposed for the Project. This port has been used by the other North Shore wind energy projects. Use of any of these ports would require transporting the wind turbine components through the Honolulu urban area and would require various improvements along a route to the wind farm site.

Use of an ocean-based transport system, as suggested in your comment, would consist of delivering the wind turbine components arriving at the port by barge to a docking and off-loading site near the wind farm site. There are no ports on the North Shore of Oahu that currently have the capacity to receive and store wind turbines. Therefore, use of an ocean-based transport system would require considerable shore side and ocean side improvements. Shore side improvements might include construction of new access roads between the docking site and the wind farm site, staging areas for off-loading and areas for truck turnaround and parking. Ocean side improvements might include installation of dock supporting foundation and abutments and an unloading platform. These improvements would result in a host of separate environmental effects (e.g., to marine biota, water quality,

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

archaeological resources, and flora/fauna) and would likely also trigger a number of permits including but not limited to:

- Special Management Area (SMA) Use Permit for shore side construction within the SMA, which is intended to protect and preserve shoreline environments;
- Shoreline Setback Variance for construction within the shoreline setback;
- U.S. Department of the Army Section 10 Permit for obstruction or alteration of navigable waters of the United Sates;
- Section 404 permit from the U.S. Department of the Army for placement of dredge or fill material in the ocean associated with dock construction (e.g., supporting pier, concrete abutments, etc.),
- Section 401 Water Quality Certification from the State Department of Health, if triggered by the need for a Section 404 permit; and
- Coastal Zone Management Consistency Review approval from the State Office of Planning.

Moreover, the aforementioned permitting would trigger additional Chapter 343 Hawaii Revised Statutes environmental review. Collectively, assessing the feasibility of an ocean-based transport system, selecting a location, and designing and permitting a docking facility is a process that at a minimum would extend the anticipated start construction date by 18 to 24 months. In this regard, the regulatory requirements for implementing an ocean-based transportation system would place the project beyond the implementation milestone requirements established by the Project's Power Purchase Agreement. Given that there are no existing facilities with the capacity to offload and store wind turbine components near the proposed Project, that developing such as system would result in new potentially adverse effects, and would require additional permitting requirements that exceed the time frame of Na Pua Makani Power Partner's agreement with Hawaiian Electric Company, an ocean-based transport system is not being considered for the Project.

Likewise, the transportation of tower components by helicopter was not proposed for this Project in part due to lift capacity constraints. The largest heavy lift helicopter available in the U.S. is the Erickson Air-Crane S-64 that has a maximum lift capacity of 25,000 pounds (Erickson Inc. 2016). This would not be sufficient to lift the smallest components of the turbine models being considered for the proposed Project. For reference, of the turbine models being considered, representative dimensions are as follows:

Turbine Component	Weight (lbs)
Turbine tower - bottom section	92,594
Turbine tower - second section	146,607
Turbine tower - third section	151,017
Turbine tower - fourth section	111,333
Turbine tower - top section	90,300
Nacelle[1]	154,234
Blade	31,306
Hub[2]	42,512
Drive train	136,687

Source: ATS Inc. 2016. Transport study for the Na Pua Makani Wind Farm. Prepared for
[1] Without drive train, cooler top & roof kit
[2] With H-frame, without nose cone

The proposed transportation plan for the Project involves the turbines being off-loaded directly from the ship in Kalaeloa Barbers Point Harbor and transported via existing paved public roads to the wind farm site in Kahuku. Modifications to existing public roads, as described in your comment, would be temporary and lasting only during the time frame during which the super load deliveries would occur. In addition to the use of police escorts, community notifications, and other measures to avoid traffic impacts, the delivery of superloads would be

conducted at night to avoid times of high traffic. As noted above, Kalaeloa Barbers Point Harbor and the roads of Oahu's North Shore have already successfully supported the logistics for the construction of two wind projects, requiring the delivery of 42 wind turbines in total, while the propose Project would require the delivery of 8 to 9 wind turbines. Na Pua Makani Power Partners, LLC, is currently working closely with the Hawaii Department of Transportation and City and County of Honolulu Department of Transportation Services regarding special transportation requirements along the proposed transportation route to ensure all requirements are met.

Comment ST-15.2*: The rotor sweep per turbine for the recently proposed option is up to 143,160 square feet, a greater than 20% increase per turbine over the 115,723 square feet originally proposed, and yet page 2-31 states that endangered species "take" estimates of bird/bat strikes are comparable and possibly even less than presented in the original draft Habitat Conservation Plan. This suggests rotor sweep is not a relevant factor in takings or bird/bat strikes. Please clarify this in the EIS. If rotor sweep is a relevant consideration in strikes/takings, then provide substantiating information regarding the "comparable or less" statement.*

Response ST-15.2: The risk of bird and bat collisions with wind turbines is driven by a combination of factors including the characteristics of individual species (morphology, sensorial perception, phenology, behavior or abundance), wind farm site characteristics (landscape, bird flight paths, food availability, wind regime, and weather) and features of the wind farm (wind turbine type, number, configuration, and lighting; Marques et al. 2014). The effect of wind turbine height, rotor swept area, and blade tip speed on bird and bat collision fatalities remains uncertain. As noted in your comment, taller turbines have larger rotor swept areas (RSAs) which could influence collision risk. However, there are conflicting results on whether bird or bat fatalities increase with turbine size and rotor swept area (Barclay and Baerwald 2009, Barclay et al. 2007, Strickland et al. 2011, Arnett and Baerwald 2013, Loss et al. 2013). Moreover, collision risk may decrease through the use of larger turbines because fewer are required to produce the same amount of energy (AWWI 2014). Thus, although wind turbine features may play an important role in bird and bat collision risk, risk is driven by a complex suite of factors and it is not possible to partition this risk according to individual wind turbine features (AWWI 2014, Marques et al. 2014). Because these relationships are unknown, conservative assumptions were used in estimating take of the bird and bat species addressed in the Project HCP (the Covered Species) to account for the uncertainty associated with turbine size and number. This has been clarified in Section 2.5 of the EIS and is discussed in more detail below.

For the Newell's shearwater and Hawaiian goose, estimated per turbine fatality rates were so low, the net effect of the increased turbine size and removal of one turbine had no influence on the "rounded up" take estimate or the requested take authorization, which was conservatively increased to account for uncertainty (see Tables 4.11-4, 5, 6, 7, 8, and 9 in the EIS). The decrease in estimated take for the Hawaiian goose between Draft and Final HCP (and original Draft and Second Draft EIS) was related to refinements in the population modeling, not a result of changes in turbine dimensions or number. For the Hawaiian short-eared owl, Hawaiian stilt, Hawaiian duck, Hawaiian coot, and Hawaiian moorhen the likelihood of transiting through the wind farm site is extremely low and take estimates were not based on turbine number or dimension; therefore there was no change in take estimates or requested take authorizations between the Draft and Final HCP. To account for uncertainty related to the risk of collision for these species, the requested take authorizations are four to eight times the estimated level of take (see Tables 4.11-10 and 11 in the EIS). For the Hawaiian hoary bat, for which estimated take and requested take authorization is the greatest among the Covered Species, adjustments in take calculation assumptions resulted in no change in the overall take estimate; however it should be noted that the requested take authorization is 150 percent of the actual take estimate to account for uncertainty associated with risk to this species (see Tables 4.11-1, 2, and 3 in the EIS). Therefore, each of these estimates have additional conservative assumptions to account for the uncertainty associated with potential changes in the collision risk associated with fewer but larger turbines or differences in the rotor swept area or blade tip speed.

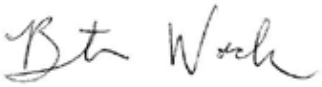
Most importantly, the Project HCP includes a robust post-construction monitoring program which is designed to continually assess the level of take occurring at the proposed Project. Data collected through this monitoring program would be used to identify the need for additional avoidance and minimization measures and ensure compliance with the incidental take limits set for under the Project's Incidental Take Permit/Incidental Take License issued by the U.S. Fish and Wildlife Service and Hawaii Division of Forestry and Wildlife, respectively.

Comment ST-15.3*: A perusal of the document did not reveal a discussion of "blade tip speed," yet similar to the point above about "rotor sweep," this topic seems rationally relevant to a discussion of strikes/takings. Physically, with the newly proposed option of longer turbine blades, the blade tips will achieve higher angular momentum than the original blades, and thus may present a greater threat for bird/bat strikes. Please clarify this issue in the EIS.*

Response ST-15.3: Please see the response to comment ST-15.2. Note that the maximum blade tip speed among the turbine models considered in the original Draft EIS is 243 miles per hour, whereas the maximum blade tip speed of the largest turbines considered under the Modified Proposed Action Option in the Second Draft EIS is 192 miles per hour due to lower wind turbine rotor speed (maximum revolutions per minute).

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

Public Meeting Transcript and Responses to Speakers

PUBLIC MEETING

PROPOSED NA PUA MAKANI WIND PROJECT

SECOND DRAFT ENVIRONMENT IMPACT STATEMENT

WEDNESDAY, MAY 25, 2016

Kahuku Community Center
56-576 Kamehameha Highway
Kahuku, Hawaii 96731

Reporter: Jennifer Duy, RPR, CSR #507

APPEARANCES: Page

Mr. Toagaifasa J. Mataafa	3
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Mr. Bill Quinlan	5
Ms. Charlotte Kamauoha	5-8
Ms. Merania Kekaula	8-13
Mr. Bob Leinau	13-15

TRANS-13 MR. TOAGAIFASA J. MATAAFA: First off, I would like to start off, I really enjoy the windmill crew here. It is trying to get a full perspective of the public's opinion on their project. And I understand that they are trying to meet Hawaii's goal for 100 percent renewable energy. And I realize that they are making moves towards that way. But I feel that we should -- the second half of it, we should -- we got to be careful that we are not sacrificing more than what we were trying to gain.

For me, my point is, we might be sacrificing the cultural and visual aspects of our North Shore side. I know that 50 percent of tourists come to 13.1 our side to enjoy the rural and country side of the North Shore. And I feel that, maybe, the windmills might not be the fit for it. But then again, I feel that we should get a bigger opinion from the community.

That's pretty much it. Because I feel like the community -- it is a smaller group of community members that are concerned about it. But while the rest 13.2 are not sure what actually is going on. So if we can, at least, inform them, maybe we will get a fuller grasp of the community's perspective. Thank you.

TRANS-14 MS. MICHAELA PRIMACIO: Just pretty much I 14.1 support Na Pua Makani and the wind project in Kahuku.

TRANS-15 MR. JOSHUA K. PRIMACIO: Joshua K. Primacio. I do support the project as well. I believe that where the state is headed in renewable energy is a plus, to benefit not just the community but the island as a whole. Among the other benefits that the community is going to be getting, I believe the project in and of itself allows the community to benefit from the project. So I think it's a good thing. And especially the location where it's at, it is up in the back in the mountains, kind of out of sight. That's it. I believe it will be a good thing for our community in its entirety.

15.1

TRANS-16 MS. VASA TAUALII: Questions. 1. The current and existing windmills are visually adverse and reduce what makes Hawaii Hawaii. Against the backdrop of our beautiful mountains, trees, flowers, shrubs, ocean, wind turbines are offensive and diminish the aesthetics of being in Hawaii. Why build more wind turbines to further reduce the reason to visit Hawaii?

16.1

2. Follow the money. Who gains monetarily? The companies behind wind turbines, the politician, government funding. How and when and how much does this project benefit the local people? The wind turbine companies benefit upfront and continue to do so.

16.2

3. When do locals get hard, objective facts about any actual financial savings? Wind turbines

16.3

have been around enough to get facts.

4. Health issues related to wind turbines. Actual studies made by communities living near or close to windmills have documented studies regarding health issues affecting hearing, psychological impairment, et cetera. Why aren't these issues discussed objectively?

16.4

5. Why larger wind turbines? They're obsolete. Spain now has wind turbines without gigantic blades.

16.5

6. Who is responsible for any accidents to wind turbines that would impact safety or community? Who and how will those issues be resolved?

16.6

TRANS-17 MR. BILL QUINLAN: How can increasing the height of the towers by 50 percent reduce the visual impact?

17.1

TRANS-18 MS. CHARLOTTE KAMAUOHA: This is a royal screw over for my community, and I have lived here most of my life. To be honest, a lot of us were sleeping when they put in the first set of windmills. We woke up and they already started erecting them, that's how we found out. I got involved in the community association because of that, because of this second set of windmills coming in.

Not at all against alternative energy. What I am against is this additional windmills in my

18.1

1 community and the type of energy source it gives. Because
2 I don't believe it is safe, and I don't believe it is
3 clean. And to me clean energy means you are not hurting
4 people and putting their health at risk, and you are not
5 killing animals. And it's ugly, and it brings down our
18.2 property values.
7 So that's one of the things when they say
8 the benefit of wind, it is not benefiting Kahuku in any
9 way, shape, or form. And I am talking about their little
10 benefit package, or whatever donations they are giving to
11 the community. Give me a freak'n break. Because that's
18.3 just B.S. It's not benefiting us. We don't see it
13 currently. We are not seeing it in our electricity bills
14 for what is out here, even though we have to live with it
15 every day. And I know it's a HECO thing, and they say it
16 has to be across the board or whatever, that's bullshit.
17 Because our community has it. So we should benefit a
18 little bit more, because we have to live with it.
19 I canvassed this neighborhood with my sister and
20 the overwhelming majority of people that are here, that
18.4 live here, are against this. And I can't fathom why this
22 company will ramrod their windmills down our throat when
23 we are saying we are against it. And they are saying that
24 there is an overwhelming majority that is for it.
25 However, they are not very upfront with this overwhelming

18.4 (cont.)

majority. If they are talking about the State, yeah, it is not in their back yard. When I asked about their survey, they said it was residents from Waialua to Kaaawa, that is not Kahuku. When I asked how many people in Kahuku are part of their survey, they couldn't give me a number. I asked about the questions, they said it was confidential. The questions are confidential? Come on, I wasn't even asking about the answers.

So, they are full of shit. And you can quote me on that, because they are full of shit. And what they are feeding us is a bunch of bullshit. And we are going to be the ones living with it, and that's just wrong.

The original person who came and sold this second set of windmills said that if the community didn't want it, of course they weren't going to do that. But, of course, that person isn't around to answer for that anymore. And the community overwhelmingly does not want it. The community association has taken a stand against it. And yet it is still happening. Because Kahuku is a right place to screw people over. This is the right community to screw people over, because we don't collectively fight. But, hey, you know, it's just a few of us. And we are trying to say it's wrong. Morally wrong. Ethically wrong. Just wrong. And I just really feel bad for my community and the kids here.

And it's not just the Kahuku community, it is all the other kids that come. There is five feeders elementary schools from the five different neighboring communities that have their kids here at Kahuku High School. So whatever it does, it can impact us. And whatever benefits they are throwing or donations they are throwing out or little goodie gift packages that they are throwing out, like protein bars to the football boys, that is nothing compared to what they are doing and royally screwing over our community.

18.4 (cont.)

TRANS-19

MS. MERANIA KEKAULA: First of all, I question the legality of this wind company and because the parent company has filed Chapter 11. But they keep insisting that certain parts of the company are still viable and operable. Well, first of all, how can the parent company claim Chapter 11 and yet some subsidiaries that are operating within the parent company say they are viable? That's fraud.

19.1

Secondly, I think that, and I am sure you got it down here, the socioeconomic impact of Kahuku. But -- and I will go into that a little later, but the legalities of this company wanting to come into Kahuku. And, you know, if people think that Kahuku, you know, they are going to turn a blind eye to this, they got another thought coming. Because it's coming to their neighborhood

19.2

too. That's the side issue. My basic focus is, those who are in power, the city council, those in the state legislature, all the way up to governor, all these types of activities, these money-making activities within our communities are designed to suck the living -- the blood out of all the people. And we are the ones who put them in power. But they seem to think that they can be arrogant and throw their power around and dictate to us while robbing us blind. And to me, that is just intolerable.

So my message to those in power -- I didn't see Ernie, the councilman, out there. My message is to them, because if they are going to pull this on us anymore, you know, putting those horrible turbine towers out and then we suffer from them, our children, and the coming generations -- it's not going to happen. You know what, we are going to fight them. And maybe he's forgotten, but he is up for reelection. He is coming up. And you know what, people like that don't deserve to be in power.

You know, the power is in the people. We elected them. How can they be doing what they are doing when we are the ones with the power? They represent us. Why are they doing this? They should be slapped with fines. They should be thrown in jail. Because that's

where they belong, these people. And it's just frustrating.

And you know what, I have got my life here in Kahuku. I have got my children. I have got my grandchildren growing up. This is the place where they were born. And it should be a place of safety. Now those we have elected, they are the ones who are the problem, along with these multi-national companies who come in and steal the health of the land. They are the ones who need to be thrown in jail. If that was the case, you know, it will be fine with me, when they are thrown in jail. Then we can live somewhat of a decent life. But right now we were taxed to blazes with this company and Charlotte mentioned it, the one that already has wind turbines. Nothing has come back to the community. Yeah, they promise the world and yet it's all lies.

And they come in under the pretenses that they are here for our good. Well, you know what, we are sick and tired of it. That's a whole load of garbage. They are not here for our good. They are here for their own greed and power. That's why they are here. We want them out of our community and Oahu. All communities in Oahu need to wake up. This is a wake up call. You know, we want the other communities to come in, to see what is happening. Don't just sit on your haunches and think, oh,

well that's a Kahuku problem. No. This is a people's problem no matter what community you live in. This is a fight for the freedom of your children and your grandchildren. It's a fight for your future.

So how do we get rid of this problem? We vote those -- don't put this down -- those bastards out of power. And put them where they belong, and that is in prison. All right.

I know from what I heard from Charlotte that you have learned of some of the socioeconomic problems. But I just wanted to add to that fact that this whole scheme of wind turbines is designed to not only suck the life blood out of the people right now and their children and grandchildren, like I said, it's also a phase to get us out of the community, away from the area so they can come in and essentially take over the land. It's a sovereignty issue. Do you see what I mean?

So that's why I say, Oahu, Hawaii, state of Hawaii, wake up. This isn't just about some company -- some two-bit company that is coming in and what you see the result here. No. This is all part and parcel of an agenda that they are ramming down our throat. But it is also insidious because it is designed to rob us of this whole area. And to put us somewhere else? I do not know. And that's not only for Kahuku, but that's for every

19.5 (cont.)

1 community here. And if you think you are safe, you are
2 dead wrong. Because this isn't the only way that they can
3 shift you out of your land. Oh, sure, they are using the
4 methods of turbines here. In other communities it may be
5 something else. But you take off the mask, it's the same
6 thing. And that's how we are losing sovereignty. You
7 know, you talk about the Hawaiian's losing sovereignty,
8 but now it's coming out to bite us in the okole, all those
9 people here. Because we didn't do anything about the
10 Hawaiians. And now they think they can come in and do
11 whatever they want. Well you know what, no. You know
12 what, it has to stop. Because if they take Kahuku, it's a
13 precedent of what is to come throughout Hawaii. Mark my
14 words.
15 And so the only way we solve this is get
16 those crooks out of power. Get them out. Throw them out.
17 Make them ashamed. Although, I don't think you can shame
18 those people, they have no moral fiber at all. But get
19 them out. Because they don't belong in Honolulu in the
20 halls of power that are reserved unto the people. Not
21 unto themselves. As they have lost themselves. They have
22 lost their souls. Because they have sold themselves out
23 to these two-bit companies and these multi-billion dollar
24 companies that go into countries and into towns like
25 Kahuku and do whatever they want. Rip up the

socioeconomic stability of the people by ramming these things down our throats. It's got to stop. It's got to stop. Get them the hell out. And that's what we are going to do.

TRANS-20 MR. LEINAU: Well, I read it -- and there is a lot of good material in there. And I had concerns about the farmers that are mauka, in the most mauka areas. They look like the offset from the wind turbines is going to impact them visually or audibly or whatever.

I think that people really have a hard time relating what 5 to 600-foot machine really is until you are standing in front of it or it is standing in front of you. And I just hope that some accommodations can be made for these guys. I saw a video of a farmer on the mainland, who signed a contract, some easy money. Had a wind turbine on his property, and it drove him crazy. No birds. Sound was there day and night. And he went nuts. It can happen. There can be some -- you know you talked about there is no health risk, but mental health is more subjective and harder to quantify. There maybe some impacts in that regard.

20.1

The other area that doesn't have much structure yet and could be a major variable in a positive direction is as it relates to the statement that they want to put 2 million dollars into a community project or good,

20.2

back to the community, throughout the course of the project. And how that is structured is yet to be done. And there is a lot of safeguards that could be built into that. For instance, large companies sometimes go bankrupt because of someone's decision somewhere. And it can be that these payoffs, can go with the land and the assets instead of tanking with the company. And it should be transferable. It would be advisable to, perhaps, to engage the Hawaii Community Foundation, which is a third party that specializes in dispersing goods for a community. It takes a lot to work, to review grants. And you can still be on the committee and help the designation with the nuts and bolts of moving out into a community with benefits. It worked well for First Wind when they employed and connected with the Hawaii Community Foundation.

20.2 (cont.)

The other good thing about Hawaii Community Foundation is that they have been able -- they will take money from other donors and piggy back it onto money from this community. And so the net effect did actually increase the amount of benefit to the community in some cases, in some years.

So, anyway, these are just thoughts that blows across my mind here. It looks like you got a good crew together. It looks like everybody is working hard.

20.3

20.3 (cont.)

I just hope that the down sides, with enough forethought, could be mitigated. That is all. There is some history here of windmills, wind turbines, and some lessons to be learned.

I don't know enough about the project to know what the end game is, whether it's within the contract and everything has to be demoed. But wind turbine farms in the past weren't -- they just turned to rust up in the hills. So there is some things that can go wrong, if somebody doesn't learn from that stuff. Does the current owner own the land, or is he leasing it? Do you know? Okay. Well, those are thoughts that cross my mind.

(The meeting concluded at 7:40 p.m.)

1 C E R T I F I C A T E

2 STATE OF HAWAII)

3)

4 CITY AND COUNTY OF HONOLULU)

5

6 I, JENNIFER DUY, a Certified Shorthand Reporter in and for the State of Hawaii do hereby certify hereby
7 certify:

8 That the foregoing proceedings were taken down by me in in machine shorthand and was thereafter reduced to
9 typewritten form under my supervision;

10 That the foregoing represents, to the best of my ability, a true and correct transcript of the proceedings
11 had in the foregoing matter;

12 I further certify that I am not an attorney for any of the parties hereto, nor in any way concerned with the
13 cause.

14 DATED this 26th day of May, 2016, in Honolulu, Hawaii.

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16 Jennifer Duy, CSR No. 507

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20

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23

24

25

June 30, 2016

Mr. Toagaifasa J. Mataafa
55-484 Kam Highway
Laie, HI 96762

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Mataafa:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment TRANS-13.1*: For me, my point is, we might be sacrificing the cultural and visual aspects of our North Shore side. I know that 50 percent of tourists come to our side to enjoy the rural and country side of the North Shore. And I feel that, maybe, the windmills might not be the fit for it. But then again, I feel that we should get a bigger opinion from the community.*

Response TRANS-13.1: A Cultural Impact Assessment was conducted for the proposed Project and is included as Appendix G to the EIS. Based upon the ethnographic interviews conducted as part of the CIA there does not appear to be a need for traditional access to the wind farm site for the collection of natural resources or for performing traditional cultural practices and no traditional activities were identified within the wind farm site. The Cultural Impact Assessment concludes that the Project would have no effect to traditional cultural uses and practices.

Section 4.12 of the EIS provides assessment of the anticipated visual impacts of the proposed Project, including a comparison of existing conditions to the computer simulated view of the turbines from five key observation locations in the community. The Project will be most visible form the locations within one mile from the wind farm site. Although the visibility of the Project is unavoidable, the proposed Project would be compatible with nearby existing residential, commercial, public, and agricultural land uses. It is important to note that the existing Kahuku Wind Farm that is directly adjacent to the proposed Project has co-existed in the Kahuku community since 2011.

Comment TRANS-13.2*: That's pretty much it. Because I feel like the community – it is a smaller group of community members that are concerned about it. But while the rest are not sure what actually is going on. So if we can, at least, inform them, maybe we will get a fuller grasp of the community's perspective.*

Response TRANS-13.2: The Project design has been modified several times in response to community input. The recent updates to the proposed Project area described in Section 2.1 of the EIS. Five public meetings have been held for the EIS environmental review process on behalf of the U.S. Fish and Wildlife Service and the Department of Land and Natural Resources (DLNR), the two lead agencies for the Project EIS. Please note that

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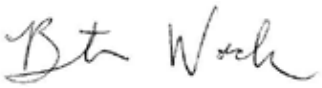
during the public comment periods on the original Draft EIS and the Second Draft EIS, many letters were received from residents that live in Kahuku that support renewable energy in general, and support the proposed Project. Some letters expressing opposition to the Project, or concern over specific issues, were also received. All comment letters received from members of the Kahuku Community and associated responses are included in Appendix M of the Final EIS.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

June 30, 2016

Ms. Michaela Primacio
No address provided

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Primacio:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment TRANS-14.1*: Just pretty much I support Na Pua Makani and the wind project in Kahuku.*

Response TRANS-14.1: Na Pua Makani Power Partners, LLC acknowledges your support for the proposed Project.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

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Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

June 30, 2016

Mr. Joshua K. Primacio
P.O. Box 509
Kahuku, HI 96731

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Primacio:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment TRANS-15.1*: I do support the project as well. I believe that where the state is headed in renewable energy is a plus, to benefit not just the community but the island as a whole. Among the other benefits that the community is going to be getting, I believe the project in and of itself allows the community to benefit from the project. So I think it's a good thing. And especially the location where it's at, it is up in the back in the mountains, kind of out of sight. That's it. I believe it will be a good thing for our community in its entirety.*

Response TRANS-15.1: Na Pua Makani Power Partners, LLC acknowledges your support for the proposed Project. As noted in your comment, Na Pua Makani Power Partners, LLC has committed to honor the commitments of the original developer and establish a Community Benefit fund for the community. It is anticipated that Project funds ($10,000 per wind turbine per year) would be paid to a non-profit corporation to be administered by a board of local community members who would make decisions as to the use of the proceeds and which activities, programs, groups, and events would be sponsored.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

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June 30, 2016

Ms. Vasa Taualii
P.O. Box 360
Kahuku, HI 96731

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Taualii:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment TRANS-16.1*: The current and existing windmills are visually adverse and reduce what makes Hawaii Hawaii. Against the backdrop of our beautiful mountains, trees, flowers, shrubs, ocean, wind turbines are offensive and diminish the aesthetics of being in Hawaii. Why build more wind turbines to further reduce the reason to visit Hawaii?*

Response TRANS-16.1: The Project design has been modified several times in response to community input. The recent updates to the proposed Project, which were incorporated into the Second Draft EIS, are described in Section 2.1 of the EIS. While the wind turbines would be visible from vantage points in the community, the newer "uprated" turbine models would not result in additional visual impact compared to the original turbine models considered. From some viewpoints, fewer turbines would be visible. Visual simulations showing the proposed Project with fewer, but taller wind turbines are included in Section 4.16 of the EIS. The purpose and need for the proposed Project are described in EIS Section 1.4, and include providing a clean, renewable sources of energy for Oahu.

Comment TRANS-16.2*: Follow the money. Who gains monetarily? The companies behind wind turbines, the politician, government funding. How and when and how much does this project benefit the local people? The wind turbine companies benefit upfront and continue to do so.*

Response TRANS-16.2: Costs associated with the proposed Project area discussed in Section 4.12 of the EIS. The Project would have a total expected installed cost of approximately $97 million, including equipment costs (turbines, blades, towers), balance of materials (concrete, rebar, transformers, electrical connection equipment), construction labor, and other development costs (engineering, financing, and legal services, easement costs) based on filings made with the Public Utilities Commission (PUC). Equipment costs are the largest estimated cost component accounting for about 70 percent of the estimated total.

Construction of the proposed Project would also generate GET tax revenues, with the majority of the project components, materials, and construction-related services expected to be subject at the state-level to either GET tax of 4.172 percent. Local purchases by construction workers and others employed directly and indirectly by the Project would also generate GET tax revenue.

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Operational costs are in addition to this amount and would be dependent on the actual staffing needs, post-construction environmental compliance associated with the project Habitat Conservation Plan (which include ongoing post-construction monitoring and mitigation for impacts to threatened and endangered species). Local operations and maintenance expenditures would generate state and local GET tax revenues. Costs for implementation of the HCP (mitigation and monitoring) are anticipated to be approximately $4.6 million dollars over the life of the Project (see Appendix F of the Project Habitat Conservation Plan for additional detail).

Finally, as described in Sections 4.12, Na Pua Makani Power Partners, LLC, has committed to establishing a Community Benefit fund and is in discussion with Kahuku community members regarding the details of its administration. It is anticipated that Project funds ($10,000 per wind turbine per year) would be administered by a board of local community members who would make decisions as to the use of the proceeds and which activities, programs, groups, and events would be sponsored.

Comment TRANS-16.3*: When do locals get hard, objective facts about any actual financial savings? Wind turbines have been around enough to get facts.*

Response TRANS-16.3: The proposed Project is just one of a number of renewable energy projects that contribute to the overall power supply on Oahu. The cost of electricity for the consumers/residents of Hawaii is the blended average cost of all sources (e.g., oil, wind, solar, etc.) and current rates reflect that high cost from burning oil. Over time, as the proportion of energy coming from renewable sources increases, the average cost of electricity is expected to decrease (HECO 2016).

Comment TRANS-16.4*: Health issues related to wind turbines. Actual studies made by communities living near or close to windmills have documented studies regarding health issues affecting hearing, psychological impairment, et cetrera. Why aren't these issues discussed objectively?*

Response TRANS-16.4: Many studies have been conducted worldwide to examine the relationship between wind turbines and possible human health effects. The EIS analysis relies on the best available published scientific information. Section 3.16 of the EIS discusses the non-peer reviewed report of health impacts conducted by Nina Pierpont, who coined the term "wind turbine syndrome." Conclusions from this, and similar studies, were based on interviews conducted with very few people and did not include medical or diagnostic tests. Scientists and medical experts from around the world continue to publish in this area; but to date, no scientific peer-reviewed study has demonstrated a direct link between people living in proximity to modern wind turbines and resulting physiological health effects. Section 4.18 of the EIS discusses public health and safety impacts.

Comment TRANS-16.5*: Why larger wind turbines? They're obsolete. Spain now has wind turbines without gigantic blades.*

Response TRANS-16.5: In response to public comments on the original Draft EIS related to visual impacts and a request to consider fewer turbines with greater generating capacities, Na Pua Makani Power Partners reevaluated the proposed turbine locations and turbine models considered under the Proposed Action with the goal of reducing the number of turbines. Through this effort, NPMPP was able to reduce the maximum number of turbines needed to meet the target generating capacity for the Project from 10 turbines to 9 turbines. Depending on the selection of the final turbine model, the number of turbines may be as few as 8. This modification takes advantage of recent technological advancements that have resulted in the availability of uprated versions of turbine models that are larger, more efficient, and are better suited for the moderate to low wind conditions of the wind farm site than previous models. Wind turbine technology is continually evolving and a number of the turbine models considered during the development of the original Draft EIS are now obsolete or are only available in

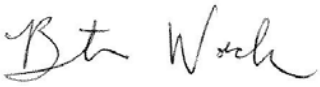
uprated versions. Therefore, the wind turbine models considered for the proposed Project are larger than those considered in the original Draft EIS.
The wind turbine models being considered for the Na Pua Makani wind farm site are those most appropriate for site-specific wind conditions and terrain as well as economic and energy production considerations. Bladeless technologies are still in the research and development stage and are not yet commercially viable or available. Therefore, they are not considered for the Project.

Comment TRANS-16.6*: Who is responsible for any accidents to wind turbines that would impact safety or community? Who and how will those issues be resolved?*

Response TRANS-16.7: The project as designed exceeds all City and County of Honolulu safety setback requirements. Access to the wind farm site would be controlled to prevent the exposure of the community to any safety risk associated with wind turbine operation.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

June 30, 2016

Mr. Bill Quinlan
58-115 Napoonala Place
Haleiwa, HI 96712

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Quinlan:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment TRANS-17.1*: How can increasing the height of the towers by 50 percent reduce the visual impact?*

Response TRANS-17.1: From some viewpoints, fewer turbines would be visible. However, the EIS actually states that the taller wind turbines would be visible from vantage points in the community, and that the newer "uprated" turbine models would not result in additional visual impact compared to the original turbine models considered. Visual simulations showing the proposed Project with fewer, but taller wind turbines are included in Section 4.16 of the EIS.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED

Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

Tetra Tech, Inc.
737 Bishop Street, Suite 2340, Honolulu, Hawaii 96813
Tel 808.441.6652 Fax 808.836.1689 www.tetratech.com

June 30, 2016

Ms. Charlotte Kamauoha
No address provided

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Kamauoha:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment TRANS-18.1*: Not at all against alternative energy. What I am against is this additional windmills in my community and the type of energy source it gives. Because I don't believe it is safe, and I don't believe it is clean. And to me clean energy means you are not hurting people and putting their health at risk, and you are not killing animals.*

Response TRANS-18.1: Na Pua Makani Power Partners, LLC acknowledges your opposition to the proposed Project.

Comment TRANS-18.2*: And it's ugly, and it brings down our property values.*

Response TRANS-18.2: Property values are discussed in EIS Sectin 4.12 – Socioeconomics. The main points from that discussion are that (1) most of these studies on property values found no evidence that the presence of an operating wind facility affected residential property values; (2) some studies reported mixed results that included some evidence of negative effects; and (3) most of the studies concluded that more research is required to more fully understand the impacts of wind facility development on property values. Based on the review of the existing studies, the EIS states that impacts associated with property values would be expected to vary by location.

Comment TRANS-18.3*: So that's one of the things when they say the benefit of wind, it is not benefiting Kahuku in any way, shape, or form. And I am talking about their little benefit package, or whatever donations they are giving to the community. Give me a freakin' break. Because that's just B.S. It's not benefiting us. We don't see it currently. We are not seeing it in our electricity bills for what is our here, even though we have to live with it every day. And I know it's a HECO thing, and they say it has to be across the board or whatever, that's bullshit. Because our community has it. So we should benefit a little bit more, because we have to live with it.*

Response TRANS-18.3: Na Pua Makani Power Partners, LLC has committed to honor the commitments of the original developer and establish a Community Benefit fund for the community. It is anticipated that Project funds ($10,000 per wind turbine per year) would be paid to a non-profit corporation to be administered by a board of

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local community members who would make decisions as to the use of the proceeds and which activities, programs, groups, and events would be sponsored.

Regarding reducing electricity costs, based on the most recent 2014 Renewable Portfolio Standard Status Report approximately 80 percent of Hawaii's energy is currently derived from fossil fuels and approximately 20 percent comes from renewable sources (Hawaiian Electric Company, Inc. et al. 2014). The cost of electricity for the consumers/residents of Hawaii is the blended average cost of all sources (e.g. oil, wind, solar, etc.) and current rates reflect that high cost from burning oil. Over time, as the proportion of energy coming from renewable sources increases, the average cost of electricity is expected to decrease. This information has been added to EIS Section 4.12 – Socioeconomics. The cost of electricity for the consumers / residents of Hawaii is the blended average cost of all sources (e.g. oil, wind, solar, etc.) and current rates reflect that high cost from burning oil. Over time, as the proportion of energy coming from renewable sources increases, the average cost of electricity is expected to decrease.

Comment TRANS-18.4*: I canvassed this neighborhood with my sister and the overwhelming majority of people that are here, that live here, are against this. And I can't fathom why this company will ramrod their windmills down our throat when we are saying we are against it. And they are saying that there is an overwhelming majority that is for it. However, they are not very upfront with this overwhelming majority. If they are talking about the State, yeah, it is not in their back yard. When I asked about their survey, they said it was residents from Waialua to Kaaawa, that is not Kahuku. When I asked how many people in Kahuku are part of their survey, they couldn't give me a number. I asked about the questions, they said it was confidential. The questions are confidential? Come on, I wasn't even asking about the answers.*

So, they are full of shit. And you can quote me on that, because they are full of shit. And what they are feeding us is a bunch of bullshit. And we are going to be the ones living with it, and that's just wrong.

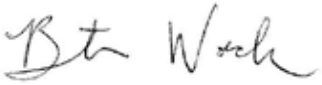
The original person who came and sold this second set of windmills said that if the community didn't want it, of course they weren't going to do that. But, of course, that person isn't around to answer for that anymore. And the community overwhelmingly does not want it. The community association has taken a stand against it. And yet it is still happening. Because Kahuku is a right place to screw people over. This is the right community to screw people over, because we don't collectively fight. But, hey, you know, it's just a few of us. And we are trying to say it's wrong. Morally wrong. Ethically wrong. Just wrong. And I just really feel bad for my community and the kids here.

And it's not just the Kahuku community, it is all the other kids that come. There is five feeders elementary schools from the five different neighboring communities that have their kids here at Kahuku High School. So whatever it does, it can impact us. And whatever benefits they are throwing or donations they are throwing out or little goodie gift packages that they are throwing out, like protein bars to the football boys, that is nothing compared to what they are doing and royally screwing over our community.

Response TRANS-18.4: Na Pua Makani Power Partners, LLC acknowledges your opposition to the proposed Project. Please note that during the public comment periods on the original Draft EIS and the Second Draft EIS, many letters were received from residents that live in Kahuku that support renewable energy in general, and support the proposed Project. Some letters expressing opposition to the Project, or concern over specific issues, were also received. All comment letters received from members of the Kahuku Community and associated responses are included in Appendix M of the Final EIS. Please see the response to comment TRANS-18.3 regarding Project benefits.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

June 30, 2016

Ms. Merania Kekaula
No address provided

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Ms. Kekaula:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment TRANS-19.1*: First of all, I question the legality of this wind company and because the parent company has filed Chapter 11. But they keep insisting that certain parts of the company are still viable and operable. Well, first of all, how can the parent company claim Chapter 11 and yet some subsidiaries that are operating within the parent company say they are viable? That's fraud.*

Response TRANS-19.1: Long-term viability of the Applicant is outside of the scope of the EIS.

Comment TRANS-19.2*: Secondly, I think that, and I am sure you got it down here, the socioeconomic impact of Kahuku.*

Response TRANS-19.2: Please see Section 4.12 of the EIS for a discussion of socioeconomic resources.

Comment TRANS-19.3*: And you know what, I have got my life here in Kahuku. I have got my children. I have got my grandchildren growing up. This is the place where they were born. And it should be a place of safety. Now those we have elected, they are the ones who are the problem, along with these multi-national companies who come in and steal the health of the land.*

Response TRANS-19.3: The proposed wind farm site is located on land zoned as Agriculture by the City and County of Honolulu, where wind machines are an allowable use. It is located on privately owned land, and land owned by the Department of Land and Natural Resources, and would operate under long-term leases held with these entities. In addition to the rigorous environmental review process, Na Pua Makani Power Partners, LLC must coordinate with numerous federal, state, and local agencies to ensure that all regulatory requirements are met prior to moving forward with project development.

Comment TRANS-19.4*: I know from what I heard from Charlotte that you have learned of some of the socioeconomic problems. But I just wanted to add to that fact that this whole scheme of wind turbines is designed to not only suck the life blood out of the people right now and their children and grandchildren, like I said, it's also a phase to get us out of the community, away from the area so they can come in and essentially take over the land. It's a sovereignty issue. Do you see what I mean?*

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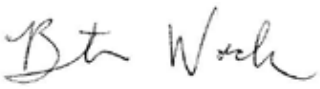
Response TRANS-19.4: Please see the response to comment TRANS-19.3. As noted above, the proposed Project is located on agricultural lands privately owned land and land owned by the Department of Land and Natural Resources, and would operate under long-term leases held with these entities. No displacement of community members would occur as a result of the proposed Project.

Comment TRANS-19.5*: So that's why I say, Oahu, Hawaii, state of Hawaii, wake up. This isn't just about some company -- some two-bit company that is coming in and what you see the result here. No. This is all part and parcel of an agenda that they are ramming down our throat. But it is also insidious because it is designed to rob us of this whole area. And to put us somewhere else? I do not know. And that's not only for Kahuku, but that's for every community here. And if you think you are safe, you are dead wrong. Because this isn't the only way that they can shift you out of your land. Oh, sure, they are using the methods of turbines here. In other communities it may be something else. But you take off the mask, it's the same thing. And that's how we are losing sovereignty. You know, you talk about the Hawaiian's losing sovereignty, but now it's coming out to bite us in the okole, all those people here. Because we didn't do anything about the Hawaiians. And now they think they can come in and do whatever they want. Well you know what, no. You know what, it has to stop. Because if they take Kahuku, it's a precedent of what is to come throughout Hawaii. Mark my words.*

Response TRANS-19.5: Please see the response to comments TRANS-19.3 and 19.4.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC

June 30, 2016

Mr. Leinau
No address provided

Subject: Proposed Na Pua Makani wind project Second Draft Environmental Impact Statement, Kahuku, Oahu, TMK: (1)5-6-008:006 (portion); (1)5-6-006:018, 47, 51, 55, (portion); and (1)5-6-005:018 (portion)

Dear Mr. Leinau:

On behalf of Na Pua Makani Power Partners, LLC, thank you for your letter commenting on the proposed Na Pua Makani wind project (Project) Second Draft Environmental Impact Statement (EIS). We provide the following information in response to your comments.

Comment TRANS-20.1*: Well, I read it – and there is a lot of good material in there. And I had concerns about the farmers that are mauka, in the most mauka areas. They look like the offset from the wind turbines is going to impact them visually or audibly or whatever. I think that people really have a hard time relating what 5 to 600-foot machine really is until you are standing in front of it or it is standing in front of you. And I just hope that some accommodations can be made for these guys. I saw a video of a farmer on the mainland, who signed a contract, some easy money. Had a wind turbine on his property, and it drove him crazy. No birds. Sound was there day and night. And he went nuts. It can happen. There can be some – you know you talked about there is no health risk, but mental health is more subjective and harder to quantify. There may be some impacts in that regard.*

Response TRANS-20.1: Public health and safety are common topics brought up in relation to proposed wind energy Projects. These issues are discussed in Section 4.18 of the EIS. Seventeen separate independent scientific reviews have been conducted both nationally and internationally to examine the relationship between wind turbines and possible human health effects associated with audible (the "whooshing" sound created by the rotating blades) and inaudible noise, vibration, shadow flicker, and electromagnetic fields (EMF). To date, no scientific peer-reviewed study has demonstrated a direct link between people living in proximity to modern wind turbines and resulting physiological health effects. The following are a sample of conclusions from the scientific studies that have been conducted:

- "After careful consideration and deliberation of the body of evidence, [the National Health and Medical Research Council] concludes that there is currently no consistent evidence that wind farms cause adverse health effects in humans." (NHMRC 2015)
- "Cross-sectional studies, despite their inherent limitations in assessing causal links, however, have consistently shown that some people living near wind turbines are more likely to report annoyance than those living farther away. These same studies have also shown that a person's likelihood of reporting annoyance is strongly related to their attitudes toward wind turbines, the visual aspect of the turbines, and whether they obtain economic benefit from the turbines. Our review suggests that these other risk factors play a more significant role than noise from wind turbines in people reporting annoyance." (McCunney et al. 2014)

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- "while some people living near wind turbines report symptoms such as dizziness, headaches, and sleep disturbance, the scientific evidence available to date does not demonstrate a direct causal link between wind turbine noise and adverse health effects. The sound level from wind turbines at common residential setbacks is not sufficient to cause hearing impairment or other direct health effects, although some people may find it annoying." (UK Health Protection Agency 2010)
- "There is no evidence that the audible or sub-audible sounds emitted by wind turbines have any direct adverse physiological effects."(Colby 2009)
- "None of the... evidence reviewed suggests an association between noise from wind turbines and pain and stiffness, diabetes, high blood pressure, tinnitus, hearing impairment, cardiovascular disease, and headache/migraine." (MassDEP and MDPH 2012)
- "Although opposition to wind farms on aesthetic grounds is a legitimate point of view, opposition to wind farms on the basis of potential adverse health consequences is not justified by the evidence." (Chatham-Kent Public Health Unit 2011)
- "The electromagnetic fields produced by the generation and export of electricity from a wind farm do not pose a threat to public health..."(NHMRC 2010)

Sources:

Chatham-Kent Public Health Unit. 2008. The Health Impact of Wind Turbines: A Review of the Current White, Grey, and Published Literature. Prepared for Chatham-Kent Municipal Council, Chatham Ontario. June 2008.

Colby, David W., M.D.; Robert Dobie, M.D.; Geoff Leventhall, Ph.D.; David M. Lipscomb, Ph.D.; Robert J. McCunney, M.D.; Michael T. Seilo, Ph.D.; and Bo Søndergaard, M.Sc. 2009. Wind Turbine Sound and Health Effects: An Expert Panel Review. Prepared for: American Wind Energy Association and Canadian Wind Energy Association. December 2009.

MassDEP and MDPH (Massachusetts Department of Public Health). 2012. Wind Turbine Health Impact Study: Report of Independent Expert Panel. January 2012. Available online at: http://www.mass.gov/eea/docs/dep/energy/wind/turbine-impact-study.pdf.

McCunney, R.J., K.A. Mundt, D. Colby, R. Dobie, K. Kaliski, and M. Blais. 2014. Wind Turbines and Health: A Critical Review of the Scientific Literature. Journal of Environmental and Occupational Medicine 56(11):e108-e130. Available online at: http://canwea.ca/comprehensive-scientific-literature-review-on-wind-turbines-and-human-health-now-published/

NHMRC (Australian Government National Health and Medical Research Council). 2015. NHMRC Statement: Evidence on Wind Farms and Human Health. February 2015.

NHMRC (Australian Government National Health and Medical Research Council). 2010. Wind Turbines and Health – A Rapid Review of Evidence. July 2010. http://www.nhmrc.gov.au/_files_nhmrc/publications/attachments/new0048_evidence_review_wind_turbines_and_health.pdf

UK Health Protection Agency. 2010. Health Effects of Exposure to Ultrasound and Infrasound. Report for the Ad Hoc Expert Group on Noise and Health by the Health Protection Agency. February 2010. http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1265028759369

Comment TRANS-20.2*: The other area that doesn't have much structure yet and could be a major variable in a positive direction is as it relates to the statement that they want to put 2 million dollars into a community project or good, back to the community, throughout the course of the project. And how that is structured is yet to be done. And there is a lot of safeguards that could be built into that. For instance, large companies sometimes go bankrupt because of someone's decision somewhere. And it can be that these payoffs, can go with the land and the assets instead of tanking with the company. And it should be transferable. It would be advisable to, perhaps, to engage the Hawaii Community Foundation, which is a third party that specializes in dispersing goods for a*

community. It takes a lot to work, to review grants. And you can still be on the committee and help the designation with the nuts and bolts of moving out into a community with benefits. It worked well for First Wind when they employed and connected with the Hawaii Community Foundation. The other good thing about Hawaii Community Foundation is that they have been able they will take money from other donors and piggy back it onto money from this community. And so the net effect did actually increase the amount of benefit to the community in some cases, in some years.

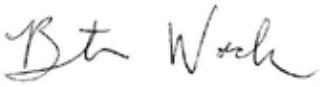
Response TRANS-20.2: Thank you for the suggestions regarding the community benefits package. As noted in your comment, Na Pua Makani Power Partners, LLC has committed to honor the commitments of the original developer and establish a Community Benefit fund for the community. It is anticipated that Project funds ($10,000 per wind turbine per year) would be paid to a non-profit corporation to be administered by a board of local community members who would make decisions as to the use of the proceeds and which activities, programs, groups, and events would be sponsored.

Comment TRANS-20.3*: So, anyway, these are just thoughts that blows across my mind here. It looks like you got a good crew together. It looks like everybody is working hard. I just hope that the down sides, with enough forethought, could be mitigated. That is all. There is some history here of windmills, wind turbines, and some lessons to be learned. I don't know enough about the project to know what the end game is, whether it's within the contract and everything has to be demoed. But wind turbine farms in the past weren't – they just turned to rust up in the hills. So there is some things that can go wrong, if somebody doesn't learn from that stuff. Does the current owner own the land, or is he leasing it? Do you know?*

Response TRANS-20.3: The proposed Project is located on agricultural lands, privately owned and owned by the Department of Land and Natural Resources. Na Pua Makani Power Partners, LLC would operation under a long-term lease held with both entities. At the end of the anticipated life span of the proposed Project (20 years) the project would either be decommissioned, or it could be repowered. Details associated with decommissioning are include in Section 2.4.8 of the EIS.

We appreciate the input provided and will include a copy of your letter in the Final EIS for the Project. A copy of the Final EIS will be mailed to you once it has been accepted by the State of Hawaii Board of Land and Natural Resources. If you have any questions, or would like further clarification, please feel free to call me at (808) 441-6652 or email brita.woeck@tetratech.com.

Sincerely,
TETRA TECH, INCORPORATED



Brita Woeck
Project Manager

cc: Na Pua Makani Power Partners, LLC