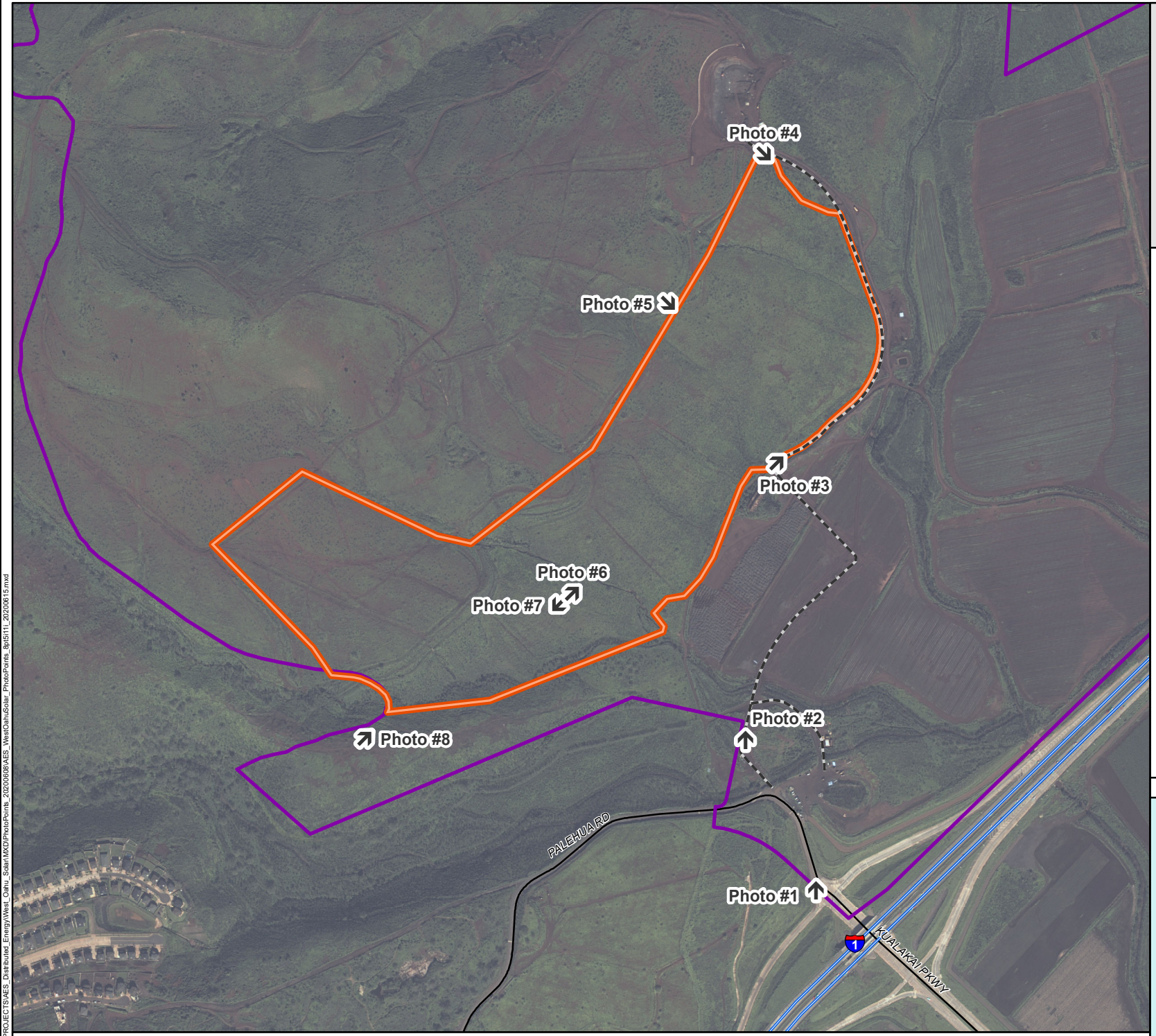
West Oahu Solar Plus Storage Project

AES Distributed Energy

Key Map of Representative Photograph Locations

HONOLULU COUNTY, HI



- Project Area
- Property Boundary
- Existing Access Road
- Interstate Highway
- Photo Points

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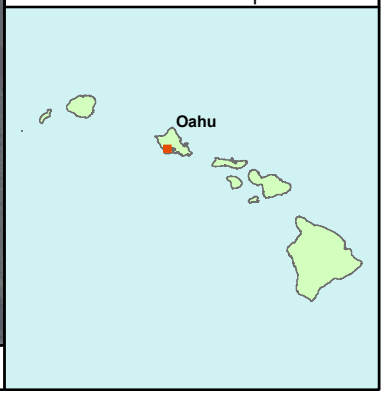
Reference Map



1:9,000 WGS 1984 UTM Zone 4N

0 0.125 0.25 0.5 Miles

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Photograph 1. Looking north along Pālehua Road toward guard shack

Photograph 2. Looking north along existing access road toward mill building and pump station

Photograph 3. Looking northeast along existing access road from mill building

Photograph 4. Looking southeast along existing access road from water tank

Photograph 5. Looking southeast over Project area, with mill building in background

Photograph 6. Looking northeast over Project area, with mill building in background

Photograph 7. Looking southwest from Project area toward Makakilo neighborhood

Photograph 8. Looking northeast toward Project area

Attachment E
Biological Resource Survey and Supplemental Pueo Survey Reports

West O'ahu Solar Plus Storage Project Biological Resources Survey Report

Prepared for:

AES Distributed Energy
May 2019

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Appendix B. List of Plant Species Observed During Surveys for the West O'ahu Solar Project

1 Introduction

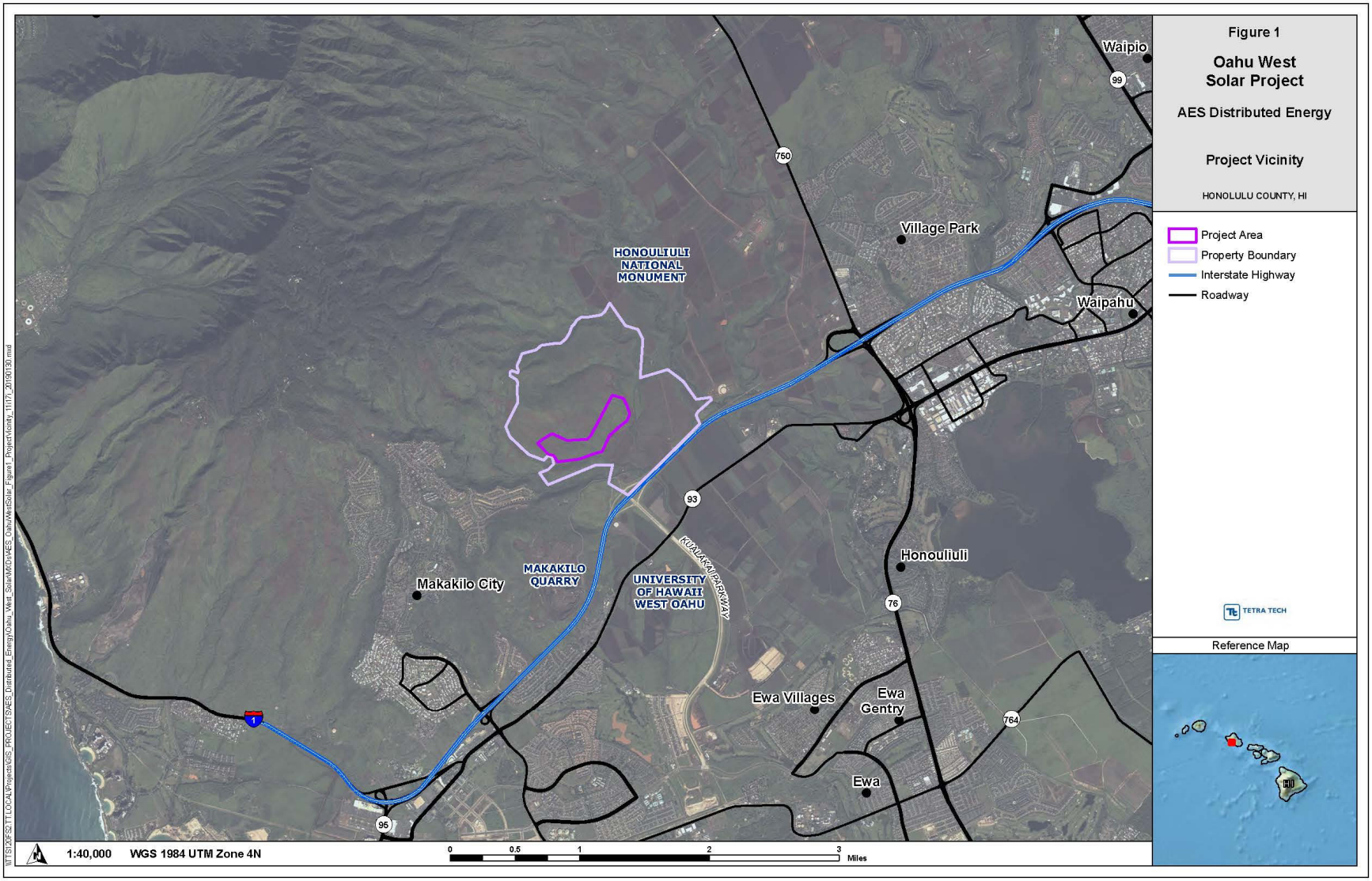
AES Distributed Energy (AES) is proposing the West O‘ahu Solar Plus Storage Project (Project) near Kapolei on the island of O‘ahu. The Project will involve construction and operation of a solar photovoltaic and battery energy storage system on land owned by University of Hawai‘i (UH). The major components of the Project will be an approximately 12.5-megawatt (MW) ground-mounted solar photovoltaic system coupled with a 50 MW-hour battery energy storage system, and related interconnection and ancillary facilities. Interconnection of the Project with the Hawaiian Electric Company (HECO) electrical grid will be via an existing 46-kilovolt transmission line that traverses the Project Area. A Project substation and interconnection equipment will be located immediately proximate to the existing transmission line, with a short connection installed to the transmission line. The Project will be accessed via the existing gated entry off Palehua Road and Kualakai Parkway, and will utilize a network of existing and new on-site access roads. Temporary construction staging and laydown will occur within the Project Area.

Tetra Tech, Inc. (Tetra Tech) was contracted by AES to conduct a general biological survey for the Project. The purpose of the survey was to characterize the habitat and determine whether state or federally listed threatened, endangered, or otherwise rare plants or animals have the potential to occur within the Project Area, and whether they could be impacted by construction or operation of the Project. In addition, the survey evaluated the potential occurrence of streams, wetlands, and other features that may be considered Waters of the U.S. (WoUS), and therefore subject to agency jurisdiction under the Clean Water Act. This report summarizes the results of the biological survey conducted within the Project Area by Tetra Tech on January 31, 2019 and February 5, 2019.

2 Description of Project Area

As shown in Figure 1, the Project Area is located on the southwest side of O‘ahu, approximately 3 miles northeast of Kapolei. It encompasses approximately 80 acres in an area commonly referred to as the UH West O‘ahu Mauka property and is within tax map key 9-2-002:007. The Project Area and vicinity was previously cultivated as part of the extensive sugar cane and pineapple plantation that extended across O‘ahu’s ‘Ewa Plain. Since closure of the plantation in the 1990s, this area has not been recently cultivated and is now undeveloped, vacant land, with domestic cattle grazing occurring within portions of the Project Area. A minimal amount of infrastructure associated with the former plantation remains in the area, including a pump station, an associated wooden structure, and components of the irrigation system. A tributary to Kalo‘i Gulch runs through the central portion of the Project Area. Elevation in the Project Area ranges from approximately 300 to 600 feet above sea level.

Figure 1. Project Area and Vicinity



3 Methods

Prior to the field survey, Tetra Tech conducted a review of relevant publicly available literature and data with respect to biological resources in and near the Project Area. This review included environmental assessments and environmental impact statements, National Wetlands Inventory (NWI) data, the U.S. Geological Survey National Hydrography Dataset (NHD), scientific journals and reports, and available, unpublished data that are relevant to the natural history and ecology of the area. In addition, Tetra Tech reviewed available geospatial data, aerial photographs, and topographic maps of the area to identify occurrences of state or federally listed species, or habitats that could support these species. Details of the field survey conducted by Tetra Tech on January 31, 2019 and February 5, 2019 are provided below.

3.1 Plants

A pedestrian survey was conducted to record common plant species and dominant vegetation types, as well as rare or listed plant species within the Project Area. Areas more likely to support native plants (e.g., rocky outcrops and shady areas) were more intensively examined. Plant identifications were made in the field; plants that could not be positively identified were photo documented for comparison with the recent taxonomic literature.

Plants recorded during this survey are indicative of the season and environmental conditions at the time of the survey. Since plants are dynamic and influenced by seasonal and temporal changes, there may be additional species that occur on site, but which were not present during this survey.

The taxonomy and nomenclature of the flowering plants are in accordance with Wagner et al. (1999, Wagner et al. 2012) and Wagner and Herbst (2003) for native and naturalized flowering plants, and Staples and Herbst (2005) for ornamental plants. In Section 4 and Appendix B, common/Hawaiian names are provided first, followed by scientific names in parentheses. If no common or Hawaiian name is known, only the scientific name is provided.

3.2 Wildlife

Wildlife surveys consisted of observations of birds, mammals, and large insects and other invertebrates. All species detected by sight and sound were recorded, and any wildlife sign (e.g., scat, tracks, feeding) noted. Specific survey methods of each wildlife group are provided below.

3.2.1 Birds

Tetra Tech recorded all birds seen or heard within the Project Area. Habitats or plants that could support listed birds were also identified, if present (e.g., water features as potential habitat for listed Hawaiian waterbirds).

A survey specifically to detect the pueo or Hawaiian short-eared owl (*Asio flammeus sandwichensis*) was conducted in the morning on February 5, 2019. Pueo are not federally listed but are listed as endangered by the State of Hawai'i for the Island of O'ahu. The survey followed the Pueo Project Survey

Protocol (Price and Cotín 2018), and was conducted from civil twilight to 60 minutes after sunrise on February 5, 2019. A single survey location was chosen to provide the best vantage point of the Project Area, which was scanned with binoculars and the naked eye.

Scientific nomenclature for birds follows the American Ornithologists' Union *Check-list of North American Birds 7th Edition* (American Ornithologists' Union 1998) and the 42nd through the 46th supplements to *Check-list of North American Birds* (American Ornithologists' Union 2000, Banks et al. 2002, Banks et al. 2003, Banks et al. 2004, Banks et al. 2005).

3.2.2 Mammals

The mammal survey was limited to visual and auditory detection, coupled with visual observation of scat, tracks, and other animal sign. Scientific names for mammals follow Tomich (1986).

Specific surveys for the endangered Hawaiian hoary bat or 'ōpe'ape'a (*Lasiurus cinereus semotus*), through the use of acoustic bat detectors or night vision goggles, were not conducted. The U.S. Fish and Wildlife Service (USFWS) recognizes woody vegetation greater than 15 feet tall as potential bat roosting habitat (USFWS 2019). For this reason, Tetra Tech noted the presence/absence of trees or shrubs greater than 15 feet tall within the Project Area.

3.2.3 Insects and Other Invertebrates

Large insects and other invertebrates were noted while conducting the pedestrian surveys. Scientific nomenclature follows Nishida (2002) for insects.

3.3 Waters of the U.S.

Prior to the survey, data from the NWI, NHD, and the State of Hawai'i Department of Aquatic Resources (DAR) dataset were reviewed to identify streams, wetlands, and other potential jurisdictional features in the Project area. These features may be potential WoUS, regulated under Sections 404 and 401 of the Clean Water Act. During the survey, streams and ditches identified by these datasets were visited to evaluate the presence of an ordinary high water mark (OHWM) and assess whether the features are potentially jurisdictional. This survey did not constitute a formal delineation of WoUS but was intended to determine whether a formal delineation is warranted.

4 Results and Discussion

In general, the biological resources in the Project Area have been modified by previous agricultural use and the introduction of invasive species, which has resulted in a reduction of the number and abundance of native species and the habitats suitable for native species. No federal or state-listed species were recorded during the survey. Although not observed, several listed animal species, including the Hawaiian hoary bat and pueo, may occasionally occur in or transverse the area. These species are

discussed in further detail below. No critical habitat has been designated by USFWS within or adjacent to the Project Area.

Conditions during the survey were relatively dry, particularly for the wet season. The National Weather Service rainfall gages closest to the Project Area (Kunia and Honouliulli) documented below average rainfall for January 2019 and the months preceding the survey (National Weather Service 2019). Representative photographs from the survey are presented in Appendix A.

4.1 Plants

In all, 28 plant species were observed during the survey (Appendix B). Of these, only three are native to the Hawaiian Islands and include: hoary abutilon (*Abutilon incanum*), 'ilima (*Sida fallax*), and 'uhaloa (*Waltheria indica*). These three native plants are indigenous, that is found in the Hawaiian Islands and elsewhere. Two additional native plant species—wiliwili (*Erythrina sandwicensis*) and 'a'ali'i (*Dodonaea viscosa*)—were observed immediately outside the Project Area. No federal or state-listed threatened, endangered, proposed listed, or candidate plant species were observed in the Project Area during the survey. None of the native plants observed are considered rare throughout the Hawaiian Islands (Wagner et al. 1999).

The area is dominated by Koa Haole Scrub. This vegetation type is characterized by open to dense stands of non-native koa haole trees (*Leucaena leucocephala*), ranging from 4 to 8 feet in height. Guinea grass (*Urochloa maxima*) is the most abundant plant in the understory, although buffelgrass (*Cenchrus ciliaris*) is also occasionally present. Kiawe trees (*Prosopis pallida*) are sparsely scattered throughout the area. Other common species widely occurring in the Project Area include klu (*Acacia farnesiana*), 'ilima, 'uhaloa, and *Sida ciliaris*.

4.2 Wildlife

4.2.1 Birds

A total of 21 bird species were recorded during the survey (Table 1). All of these species are non-native to the Hawaiian Islands and are commonly found in rural or agricultural areas. Zebra dove (*Geopelia striata*) and common myna (*Acridotheres tristis*) were the most common bird species recorded during the survey. Several of the bird species seen or heard are protected under the Migratory Bird Treaty Act (Table 1).

Table 1. Birds Recorded in the Project Area during the Survey

Common Name	Scientific Name	Status	MBTA
Barn owl	*Tyto alba*	NN	X
Black francolin	*Francolinus francolinus*	NN	
Cattle egret	*Bubulcus ibis*	NN	X
Chestnut munia	*Lonchura atricapilla*	NN	

Common Name	Scientific Name	Status	MBTA
Common myna	*Acridotheres tristis*	NN	
Common waxbill	*Estrilda astrild*	NN	
Gray francolin	*Francolinus pondicerianus*	NN	
House finch	*Haemorhous mexicanus*	NN	X
Japanese White-eye	*Zosterops japonicus*	NN	
Java sparrow	*Padda oryzivora*	NN	
Northern cardinal	*Cardinalis cardinalis*	NN	X
Northern mockingbird	*Mimus polyglottos*	NN	X
Nutmeg mannikin	*Lonchura punctulata*	NN	
Red avadavat	*Amandava amandava*	NN	
Red-crested Cardinal	*Paroaria coronata*	NN	
Red-vented Bulbul	*Pycnonotus cafer*	NN	
Rock pigeon	*Columba livia*	NN	
Sky lark	*Alauda arvensis*	NN	X
Spotted dove	*Streptopelia chinensis*	NN	
White-rumped Shama	*Copsychus malabaricus*	NN	
Zebra dove	*Geopelia striata*	NN	
Status: E = Endemic, End = Endangered, I = Indigenous, M = Migrant, NN = non-native established species. MBTA = Migratory Bird Treaty Act.			

No state or federally listed bird species were recorded during the survey, but several such species have the potential be present in or transverse the Project Area, as discussed below.

- **Pueo:** The state-listed pueo was not seen nor heard during the survey; however, pueo have been reported to use the surrounding areas and have been observed in similar vegetation types (Price and Cotín 2018, Pueo Project 2019). Pueo could also potentially forage or nest in and around the Project Area, given the habitat present.
- **Seabirds:** The endangered Hawaiian petrel (*Pterodroma sandwichensis*) and threatened Newell's shearwater (*Puffinus newelli*) (collectively referred to as seabirds) have not been documented in the Project Area, and suitable nesting habitat does not occur in the area. However, suitable nesting habitat may exist in upper elevations of the Wai'anae Mountains, suggesting the potential for these birds to fly over the area at night while transiting between nest sites and the ocean. These listed seabirds may be attracted to construction lights at night. Disorientation and fallout as a result of light attraction could occur for individuals attracted to nighttime construction lighting and unshielded nighttime facility lighting. Juvenile birds are particularly vulnerable to light attraction, and grounded birds are vulnerable to mammalian predators or vehicle strikes.

- **Waterbirds:** Listed waterbird species include Hawaiian stilt or ae'o (*Himantopus mexicanus knudseni*), Hawaiian coot or 'alea kea (*Fulica alai*), Hawaiian common gallinule, 'alea 'ula (*Gallinula galeata sandvicensis*), and Hawaiian duck or koloa (*Anas wyvilliana*). No listed waterbirds or their habitat were observed in the Project Area. At solar facilities in the continental U.S., water dependent birds (e.g., grebes, loons, rails, coots, shorebirds, and waterfowl) have been documented to collide with photovoltaic arrays. It has been hypothesized that water-dependent birds perceive the panel arrays to be bodies of water and collide with the panels while attempting a water landing (Kagan et al. 2014, WEST 2014, Walston et al. 2016). This hypothesis is termed the "lake effect." Much more research is needed to investigate whether water-dependent birds are actually attracted to solar arrays, and how proximity to water sources relates to avian mortality at the facilities. There has been no evidence from operating solar facilities in Hawai'i to suggest the lake effect occurs in Hawai'i. It is possible the lake effect would not occur in Hawai'i, where water is generally not limited in the surrounding environment.

4.2.2 Mammals

Two non-native terrestrial mammalian species - cattle (*Bos taurus*) and small Indian mongooses (*Herpestes auropunctatus*) - were seen in the area during the survey. Although not observed, other introduced mammals, such as dogs (*Canis familiaris*), cats (*Felis catus*), house mice (*Mus musculus*), and rats (*Rattus* spp.) are likely to occur within the Project Area.

The endangered Hawaiian hoary bat is also likely to forage in the Project Area. This species will forage in open and semi-cluttered landscapes in a wide range of habitats and vegetation types (Bonaccorso et al. 2015). Although the majority of the woody vegetation within the Project Area is under 15 feet (primarily shorter koa haole trees), some kiawe trees greater than 15 feet tall are scattered throughout the Project Area. According to USFWS and the State of Hawai'i Department of Land and Natural Resources Division of Forestry and Wildlife (DOFAW), these trees have the potential to function as bat roost trees (USFWS 2019; ESRC 2015).

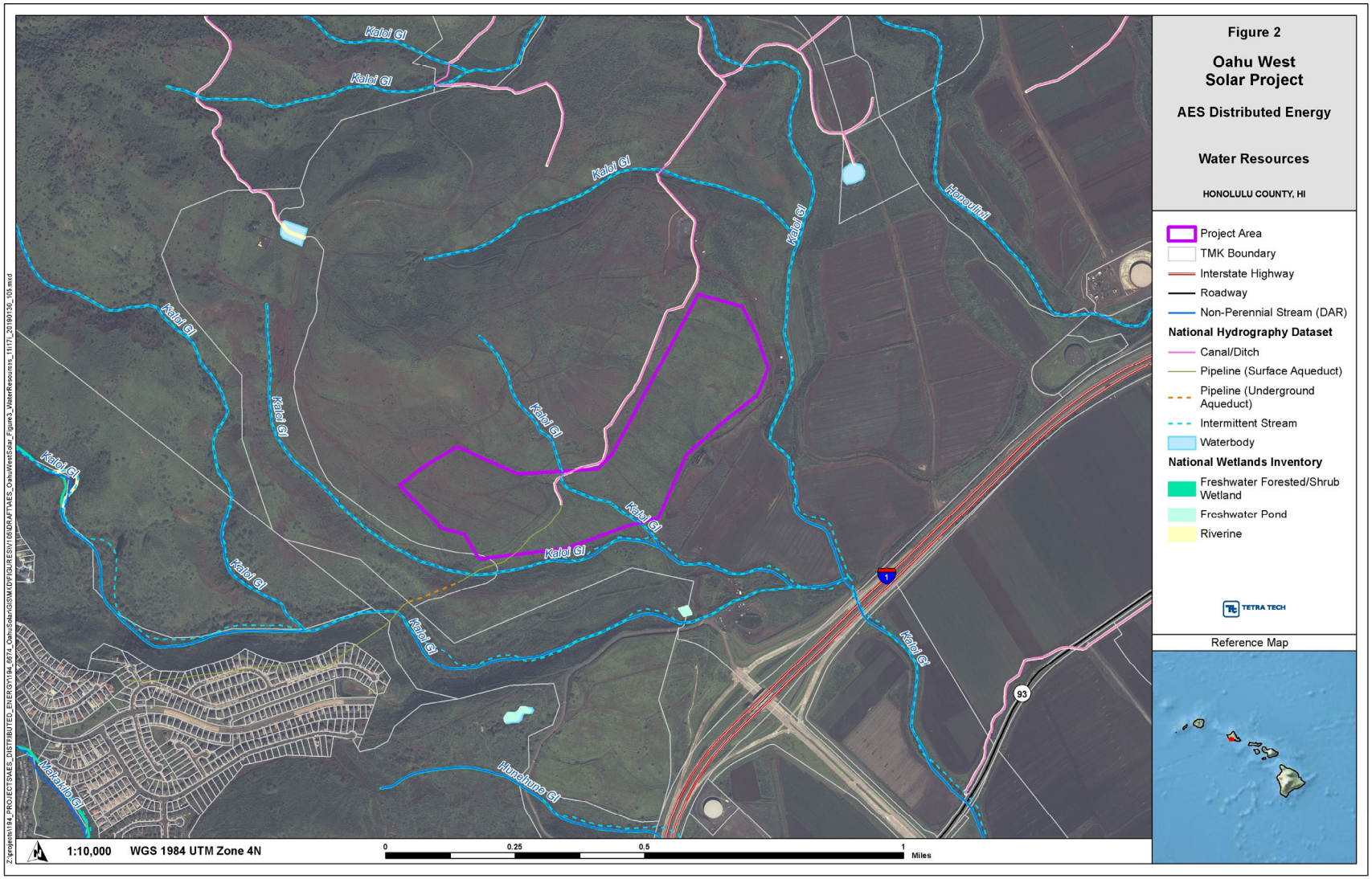
4.2.3 Insects and Other Invertebrates

Large insects observed during the survey include: yellow garden spider (*Argiope aurantia*), globe skimmer (*Pantala flavescens*), fork-tailed bush katydid (*Scudderia furcata*), praying mantis (*Mantis religiosa*), large orange sulfur (*Phoebis agarithe*), gulf fritillary (*Agraulis vanillae*), and Carolina locust (*Dissosteira carolina*). Of these species, only the globe skimmer is native to the Hawaiian Islands.

4.3 Waters of the U.S.

Figure 2 depicts water resources identified by the NWI, NHD, and Hawai'i DAR data in relation to the Project Area. The Project is located in the Kalo'i Gulch watershed. The Kalo'i Gulch stream system consists of numerous tributaries that originate in the Wai'anae Mountain Range near Palikea Ridge and

Figure 2. Water Resources in the Project Area and Vicinity



enjoin just mauka of the H-1 Freeway (Parham et al. 2008). One intermittent tributary of Kalo‘i Gulch occurs within the Project Area. Various indicators of OHWM were observed at this tributary during the survey. Additional tributaries skirt the Project Area to the west and east.

South of the Project Area, the Kalo‘i Gulch passes through the UH West O‘ahu campus, various residential developments, and a series of golf courses. Kalo‘i Gulch does not currently have a defined ocean outlet; however, a storm drainage improvement plan for the Kalo‘i Gulch watershed has been proposed for the lowermost reaches, which would create a permanent open channel at the Oneula Beach Park (R.M. Towill Corporation 2005, WRRC 2019).

In addition to Kalo‘i Gulch, NHD identifies a canal/ditch and pipeline crossing through the Project Area that intersects with Kalo‘i Gulch. The canal/ditch is identified as riverine by NWI data (Figure 2). This feature is part of the former Waiāhole Ditch System. The potential jurisdictional status of the ditch and pipeline will need to be further evaluated based on connection to other jurisdictional waters, flow regime, and the recently implemented federal Clean Water Rule.

5 Conclusions and Recommendations

As described in Section 4, no federal or state-listed threatened, endangered, proposed listed, or candidate species for listing were observed during the biological survey. The species observed in the Project Area are primarily non-native and not considered unique. Although not observed, the following listed wildlife have the potential to occur in or transit through the Project Area: pueo, Hawaiian petrel, Newell’s shearwater, and Hawaiian hoary bat. Recommended measures to avoid and minimize potential impacts to listed species that may occur in the Project area are included below.

5.1 Plants

Overall, the vegetation in the Project Area is disturbed from previous and current land use activities. Only three native plant species were observed within the Project Area, all of which commonly occur throughout Hawai‘i; no federal or state-listed threatened, endangered, proposed listed, or candidate plant species were observed. No specific impact avoidance or minimization measures are warranted for plants; however, Tetra Tech encourages the use of native species as part of any landscaping or revegetation activities.

5.2 Wildlife

5.2.1 Pueo

Although not observed in the Project Area during the biological survey, pueo have been reported to use the surrounding areas (Price and Cotín 2018, Pueo Project 2019) and it is possible that pueo may fly through or nest within the Project Area. Should this species occur within the Project Area, it could be impacted by construction activities. Tetra Tech recommends the following avoidance measures, which are consistent with the protocols established by UH for their West O‘ahu property:

- At least two (preferably three) additional pueo surveys should be conducted in the Project Area to increase detectability; two survey points for each survey would ensure the entire Project Area is visible. Because most pueo detections have occurred in the evenings (Price and Cotín 2018), twilight pueo surveys are preferred over morning surveys. Additional pueo surveys should follow the Pueo Project Survey Protocol (Price and Cotín 2018).
- Conduct pre-construction pueo nest surveys to confirm no pueo are nesting in the area prior to any vegetation clearing or ground-disturbing activities.
- All regular, on-site staff should be trained to identify pueo and implement the appropriate steps to take if pueo are present in the Project Area.
- If a ground nest or an owl nesting on the ground is observed, an approximately 50-foot buffer should be established and marked in the field.
- A designated UH representative should be contacted immediately, and the UH representative should notify USFWS and DOFAW.

5.2.2 Seabirds

The Project Area does not provide suitable nesting or foraging habitat for listed Hawaiian seabirds. However, individuals may fly over the area at night, and may be attracted to construction lights at night. Tetra Tech recommends the following measures to avoid and minimize potential impacts to listed seabirds:

- Construction activity should be restricted to daylight hours as much as possible during the seabird peak fallout period (September 15–December 15) to avoid the use of nighttime lighting that could attract seabirds.
- Should nighttime construction be required, construction lighting should be shielded, directed downward, and fitted with non-white lights if construction safety is not compromised, to minimize the attractiveness of construction lights to seabirds.
- If nighttime construction occurs during the seabird peak fallout period, a biological monitor should be present in the construction area between approximately 0.5 hours before sunset to 0.5 hours after sunrise to watch for the presence of seabirds. Should a seabird be observed, and appears affected by the lighting, the monitor should notify the construction manager to reduce or turn off construction lighting until the individual(s) move out of the area.
- Operational on-site lighting should consist of fixtures that will be shielded or directed downward to prevent upward radiation, triggered by a motion detector, and fitted with non-white light bulbs to the extent possible.

5.2.3 Hawaiian Hoary Bat

It is possible that Hawaiian hoary bats could forage or possibly roost within the Project Area. Direct impacts to bats could occur if a juvenile bat that is too small to fly, but too large to be carried by a parent, is present in a tree that is cut down or disturbed. The USFWS provides the following avoidance and minimization measures for the Hawaiian hoary bat (USFWS 2019):

- No woody vegetation (trees or shrubs) taller than 15 feet should be disturbed, removed, or trimmed between June 1 and September 15, which is when juvenile bats that are not yet capable of flying may be roosting in the trees and have the potential to be impacted.
- Barbed wire should not be used for any fences that are erected as part of the Project to prevent entanglement.

5.2 Waters of the U.S.

Tetra Tech recommends a complete WoUS determination and delineation be completed to identify the boundaries of potentially jurisdictional waters, so that the Project can be sited to avoid impacts to the extent possible. Kalo'i Gulch may be jurisdictional based on evidence of OHWM and bed and bank. The features related to the Waiāhole Ditch System may also be jurisdictional. If the features identified in Figure 2 are considered jurisdictional by the U.S. Army Corps of Engineers (USACE) and the Project intends to place dredged or fill material within these features, a Clean Water Act 404 permit may be required from USACE, Honolulu District. The determination will need to be verified by USACE, Honolulu District.

In general, if USACE requires a permit (e.g., Nationwide Permit) under Section 404, the applicant will likely also need a Section 401 Water Quality Certification from the Hawai'i Department of Health Clean Water Branch. In addition, depending on the activities proposed, a Stream Channel Alteration Permit may be required from the Commission on Water Resource Management, pursuant to the State Water Code.

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APPENDIX A

REPRESENTATIVE PHOTOGRAPHS OF THE WEST O‘AHU SOLAR PROJECT AREA