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DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS

P O BOX 1879
HONOLULU, HAWAII 96805

September 24, 2021 Ref.:PO-21-287

Ms. Mary Alice Evans, OPSD Director
Environmental Review Program
Office of Planning and Sustainable Development
Department of Business, Economic Development and Tourism
235 South Beretania Street, Suite 702
Honolulu, HI 96813

Dear Director Evans,

The Department of Hawaiian Homelands (DHHL) is transmitting the draft environmental assessment (DEA) for the Barbers Point Solar Project (Project). The Project is located in portions of Tax Map Key Nos. (TMK) 9-1-013:038, 9-1-013:040, and 9-1-016:027, Kalaeloa, 'Ewa, Island of O'ahu. The information and files required for publication, including an electronic copy of the DEA, have been provided via the Environmental Review Program's online submission platform. DHHL anticipates a Finding of No Significant Impact (AFONSI) determination. We request publication of the DEA and AFONSI in the October 8, 2021 edition of *The Environmental Notice*.

Please contact the DHHL Planning Office via email at: DHHL.Planning@hawaii.gov or by phone at (808)620-9480 if you have questions.

Aloha,

William J. Ailā Jr. Chairman,
Hawaiian Homes Commission

From: webmaster@hawaii.gov
To: DBEDT OPSD Environmental Review Program
Subject: New online submission for The Environmental Notice
Date: Friday, September 24, 2021 11:35:50 AM

Action Name

Barbers Point Solar Project

Type of Document/Determination

Draft environmental assessment and anticipated finding of no significant impact (DEA-AFNSI)

HRS §343-5(a) Trigger(s)

- (1) Propose the use of state or county lands or the use of state or county funds
- (4) Propose any use within any historic site as designated in the National Register or Hawai‘i Register

Judicial district

‘Ewa, O‘ahu

Tax Map Key(s) (TMK(s))

(1) 9-1-013:038; (1) 9-1-013:040; (1) 9-1-016:027

Action type

Applicant

Other required permits and approvals

Hawaii Revised Statutes (HRS) Chapter 6E Compliance (Historic Preservation Review); Hawaii Department of Transportation (HDOT) Use and Occupancy Permit and Driveway Permits National Pollutant Discharge Elimination System (NPDES) Permit; Hawai‘i Department of Health Community Noise Permit; City and County of Honolulu Building Permit and Grading and Grubbing Permit; Federal Aviation Administration (FAA) Notice of Proposed Construction or Alteration

Discretionary consent required

Hawaii Community Development Authority (HCDA) Conditional Use Permit (CUP), Development Permit, and Variance

Approving agency

Department of Hawaiian Home Lands

Agency contact name

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Map It

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Map It

Action summary

The proposed action involves the construction and operation of a 15 megawatt (MW) solar photovoltaic system coupled with a 60 MW-hour battery energy storage system as well as ancillary support infrastructure in east Kalaeloa, Oʻahu. The solar arrays will be located on DHHL lands and the project would interconnect with Hawaiian Electric's island-wide grid via an approximately 1.2-mile overhead and underground generation-tie line that would extend from the Project's substation, north along Coral Sea Road within HDOT Right-of-Way, to an termination point on an existing transmission line located on TMK 9-1-016:027. Power generated from the Project would be sold to Hawaiian Electric under a 25-year power purchase agreement. The Project will be decommissioned at the end of its useful life and the Project area would be returned to substantially pre-development condition.

Reasons supporting determination

Based upon the preliminary analysis and findings presented in the Draft EA, implementation of the

project is not expected to result in a significant adverse direct, indirect, or cumulative impact on the quality of the environment. As such, a Finding of No Significant Impact (FONSI) is anticipated in accordance with HRS Chapter 343. This assessment is based on an evaluation of the project impacts in relation to the significance criteria specified in HAR §11-200.1-13, as detailed in Section 6.1 of the Draft EA.

Attached documents (signed agency letter & EA/EIS)

- BarbersPointSolar-DEA_2021-09-24_Compiled.pdf
- 2021-DEA_Barbers-Point-Solar-project_DHHLCoverLetter.pdf

Action location map

- BarbersPoint_ProjectArea.zip

Authorized individual

Leslie McClain

Authorization

- The above named authorized individual hereby certifies that he/she has the authority to make this submission.

Draft Environmental Assessment

For the proposed

Barbers Point Solar Project

Department of Hawaiian Home Lands Property

ʻEwa District, Oʻahu, Hawaiʻi

Prepared for:

Barbers Point Solar, LLC
888 Dunsmuir Street, Suite 1100
Vancouver, BC V6C3K4 Canada

Prepared by:

TETRA TECH

Tetra Tech Inc.
737 Bishop St., Suite 2340 Mauka Tower
Honolulu, Hawaiʻi 96813-3201

October 2021

PROJECT SUMMARY

Project Name:	**Barbers Point Solar Project**
Applicant:	Barbers Point Solar, LLC
Project Overview:	Construction and operation of up to 15-megawatt (MW) solar photovoltaic (PV) and 60 MW-hour (MWh) battery energy storage system (BESS)
Location:	Kalaeloa, ‘Ewa District, O’ahu, Hawai’i South of the Kapolei Parkway and east of the Kalaeloa Airport
Tax Map Key (TMK):	TMKs 9-1-013:038 and 9-1-013:040 (PV array areas) and 9-1-016:027 (electrical transmission line)
Land Ownership:	Department of Hawaiian Home Lands (DHHL) (TMKs 9-1-013:038 and :040) Kapolei Infrastructure, LLC (TMK 9-1-016:027) Hawai‘i Department of Transportation (Coral Sea Road, Franklin D. Roosevelt Avenue, and Roadway Lot 13083-B Rights-of-Way; no TMK)
Project Area:	Approximately 163 acres[1] (Project footprint on DHHL parcels estimated to be less than 100 acres)
State Land Use District:	Urban District
Kalaeloa Community Development District (Land Use Designations):	TMK 9-1-013:038: Transect Zone T2 – Rural/Open Space Zone (portion) and Transect Zone T3 – General Urban Zone (portion) TMK 9-1-013:040: Transect Zone T2 – Rural/Open Space Zone
HCDA Kalaeloa Master Plan (Land Use Designations):	TMK 9-1-013:038: Eco-Industrial (Open Space Overlay) (portion) and Recreation/Cultural (portion). TMK 9-1-013:040: Recreation/Cultural
County Zoning:	TMKs 9-1-013:038 and :040, (F-1) Military and Federal Preservation District TMK 9-1-016:027: AG-1 Restricted Agricultural
Development Plan (Land Use Classification):	‘Ewa Development Plan TMK 9-1-013:038 and :040 (Industrial) TMK 9-1-016:027 (Residential and Low Density Apartment)
Special Management Area:	Outside Special Management Area
Required Permits and Approvals:	*Federal* • National Pollutant Discharge Elimination System (NPDES) Permit • Federal Aviation Administration (FAA) Notice of Proposed Construction or Alteration and FAA Notice of Actual Construction or Alteration *State/County* • Hawai‘i Revised Statutes (HRS) Chapter 343 Review (EA) • Hawaii Community Development Authority (HCDA) Conditional Use Permit (CUP), Development Permit, and Variance • HRS Chapter 6E Compliance (Historic Preservation Review) • Hawai‘i Department of Health Community Noise Permit • City and County of Honolulu Building Permit and Grading and Grubbing Permit

HRS Chapter 343 Trigger:	Use of State Lands (HRS Chapter 343-5(1)) Use within a historic site as designated in the National Register or Hawaii Register (HRS Chapter 343-5(4))
Approving Agency:	Department of Hawaiian Home Lands
Anticipated Determination:	Anticipated Finding of No Significant Impact
Contact Information:	**Applicant:** Barbers Point Solar, LLC 888 Dunsmuir Street, Suite 1100 Vancouver, BC V6C3K4 Canada Attn: Julia Mancinelli JMancinelli@innergex.con **Approving Agency:** Department of Hawaiian Home Lands P.O. Box 1879 Honolulu, Hawaiʻi 96805 Attn: Andrew H. Choy andrew.h.choy@hawaii.gov **Agent:** Tetra Tech 737 Bishop Street, Suite 2340 Mauka Tower Honolulu, Hawaiʻi 96813-3201 Attn: Leslie McClain Leslie.mcclain@tetratech.com

NOTES:

[1] Based on the current preliminary design, the Project layout is not expected to occupy the entire 163 acres of the Project area (see Figure 1-2). Barbers Point Solar, LLC anticipates that the total combined footprint of the Project components located on DHHL lands will be less than 100 acres, of which the solar panels will cover approximately 45 acres. The final area secured for the Project through agreements with DHHL, HDOT, Kapolei Infrastructure, LLC and sought for approval through the permitting process is anticipated to be a subset of the 163-acre Project area. Any such reduction in the Project area would not substantively change the size, scope, intensity, use, location or timing of the Project itself, as described herein.

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C Biological Resources Survey Report and Supplemental ʻAkoko Survey

D Correspondence from U.S. Fish and Wildlife Service and State of Hawaiʻi Department of Land and Natural Resources Division of Forestry

E Cultural Impact Assessment

F Visual Impact Assessment Report

G Glare Analysis Report and FAA Determination of No Hazard to Air Navigation

H Traffic Impact Analysis Report

I Community Outreach and Engagement Report

J Pre-Assessment Scoping Letter

K Pre-Assessment Scoping Comments and Responses

Acronyms and Abbreviations

AC	alternating current
AIS	Archaeological Inventory Survey
ATCT	Airport Traffic Control Tower
BMP	Best Management Practice
BESS	battery energy storage system
CIA	Cultural Impact Assessment
CFR	Code of Federal Regulations
CNHA	Center for Native Hawaiian Advancement
CSP	concentrated solar power
CUP	Conditional Use Permit
CZM	Coastal Zone Management
dBA	A-weighted decibels
DC	direct current
DC-ESS	direct current coupled energy storage system
DOFAW	Division of Forestry and Wildlife
DLNR	Department of Land and Natural Resources
DOH	State of Hawaiʻi Department of Health
EA	environmental assessment
EPA	U.S. Environmental Protection Agency
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
GHG	greenhouse gases
HAR	Hawai'i Administrative Rules
HCDA	Hawaiʻi Community Development Authority
HCEI	Hawaiʻi's Clean Energy Initiative
HDOT	Hawaiʻi Department of Transportation
HRS	Hawaiʻi Revised Statutes
Innergex	Innergex Renewable Energy Inc.
KCDC	Kapolei Community Development Corporation
KCDD	Kalaeloa Community Development District
kV	kilovolts
LID	low impact design
LOS	level of service
MCAS ʻEwa	Marine Corps Air Station ʻEwa

mph	miles per hour
MW	megawatts
MWh	megawatt hours
NAAQS	National Ambient Air Quality Standards
NASBP	Naval Air Station Barbers Point
NCT	Notice Criteria Tool
NEC	National Electric Code
NPDES	National Pollution Discharge Elimination System
NRHP	National Register of Historic Places
OP	observation point
PCS	power conversion systems
PPA	Power Purchase Agreement
Project	Barbers Point Solar Project
PSIP	Power Supply Improvement Plan
PUC	Public Utilities Commission
PV	photovoltaic
PV-Coupled-ESS	photovoltaic coupled battery energy storage system
RF	radio frequency
RFP	Request for Proposal
ROW	right-of-way
RPS	Renewable Portfolio Standard
SHPD	State Historic Preservation Division
TIAR	Traffic Impact Analysis Report
TMK	Tax Map Key
USFWS	U.S. Fish and Wildlife Service

1.0 PROJECT OVERVIEW

Barbers Point Solar, LLC is proposing to build and operate the Barbers Point Solar Project (Project) located in east Kalaeloa, ʻEwa District, on the island of Oʻahu. The Project will consist of a 15-megawatt (MW) solar photovoltaic (PV) system coupled with a 15 MW, 4-hour (60 MW-hour) photovoltaic coupled battery energy storage system (PV-Coupled ESS) as well as ancillary support infrastructure. The Project area encompasses approximately 163-acres[1] primarily located within tax map keys (TMKs): 9-1-013:038 and 9-1-013:040, both owned by Department of Hawaiian Home Lands (DHHL). Barbers Point Solar, LLC anticipates that the total combined footprint of the Project components located on DHHL lands will be less than 100 acres, of which the solar panels will cover approximately 45 acres. Project electrical transmission lines will also be located on portions of TMK 9-1-016:027 (owned by Kapolei Infrastructure, LLC) and within rights-of-way (ROW) owned by Hawaiʻi Department of Transportation (HDOT). The Project location, land ownership, and TMK boundaries, are shown in Figures 1-1 through 1-3, respectively.

The Project will assist DHHL in meeting Objective 2 of the Hawaiian Homes Commission 2009 Hoʻomaluō Energy Policy, which instructs DHHL to pursue the leasing of lands identified as suitable for renewable energy projects (DHHL 2009). Also, in 2009 DHHL and Hawaiian Electric Company (Hawaiian Electric) entered into an Energy Partnership Charter[2] where the two organizations agreed to collaborate on achieving critical energy objectives including the leasing of DHHL owned lands for renewable energy projects. All DHHL lands in Kalaeloa are designated "Industrial" in the Oʻahu Island Plan (DHHL 2014) and are intended for revenue generation as they were considered not suitable for residential development. Furthermore, the two DHHL owned Project parcels were identified in DHHL's 2014 Island Plan as having desirable conditions for solar energy generation (DHHL 2014). In 2018 and in 2019, DHHL ran consecutive competitive solicitation processes for the disposition of the DHHL lands in Kalaeloa by general leases for renewable energy projects. The DHHL request for proposal (RFP) was widely advertised and all qualified applicants were welcomed to bid. The Project was selected by DHHL to continue with the leasing process that included consultation meetings with DHHL's beneficiaries and public hearings. DHHL will use revenues developed from industrial leasing of these available lands in east Kalaeloa to develop new homesteads in suitable residential areas throughout the State.

The Project is also envisioned to help the State of Hawaiʻi achieve its Renewable Portfolio Standard (RPS) energy goals of generating 100 percent of the State's energy from renewable sources. Once operating, the Project will be capable of generating up to 37,014 MW-hours (MWh) per year, enough energy to

[1] Based on the preliminary design, the Project layout is not expected to occupy the entire 163-acre Project area (see Figure 1-2). The final area secured for the Project through an agreement with DHHL, HDOT, and Kapolei Infrastructure, LLC, and sought for approval through the permitting process is anticipated to be a subset of the 163-acre Project area. Any such reduction in the Project area would not substantively change the size, scope, intensity, use, location, or timing of the Project itself, as described herein.

[2] https://dhhl.hawaii.gov/wp-content/uploads/2011/05/DHHL-HECO-Energy-Partnership-Charter-082709.pdf.

power approximately 6,200 Oʻahu households with clean, renewable energy. The Project will interconnect to the Hawaiian Electric island-wide grid via an approximately 1.2-mile generation-tie line (combination of overhead and underground transmission line) that would extend from the Project's collector substation on TMK 9-1-013:038 to a new interconnection point on an existing 46-kilovolt (kV) Hawaiian Electric transmission line near the intersection of Franklin D. Roosevelt Avenue and Coral Sea Road on TMK 9-1-016:027. The Project area would be secured for use through land agreements with DHHL, HDOT, and Kapolei Infrastructure, LLC. The power generated by the Project would be sold to Hawaiian Electric under a new 25-year power purchase agreement (PPA).

The Project will be owned and operated by Barbers Point Solar, LLC, a Delaware limited liability company and a wholly owned subsidiary of Innergex Renewables USA, LLC, which is a wholly owned subsidiary of Innergex Renewable Energy Inc. (Innergex). Innergex is a Canadian independent renewable power producer which develops, acquires, owns, and operates hydroelectric facilities, wind farms, and solar farms in Canada, the United States, France, and Chile. For over 30 years, Innergex and its employees (collectively, Innergex) have built strong, long-term relationships with the communities that host its projects and have seen firsthand how renewable energy projects can make positive, long-term impacts on society, economics, and the environment. Innergex achieves these positive community relationships through its commitment to conducting itself with integrity, transparency, and respect. Beginning with extensive pre-development consultations and community outreach, Innergex takes the time to engage the local community to learn about their needs and oftentimes work with them to ensure Innergex designs the best possible project, where commercially reasonable. Innergex remains driven by the belief that the three pillars of sustainability – environmental protection, social development, and economic development – are mutually reinforcing. Therefore, Innergex has adopted a Sustainable Development Policy that articulates its commitment to integrating sustainable development considerations in all aspects of its business.

1.1 Background Information

Hawaiʻi is the most petroleum-dependent state in the nation (U.S. EIA 2021) and is vulnerable to resource availability and price fluctuations. In 2008, the state of Hawaiʻi and the Department of Energy signed a Memorandum of Agreement to collaborate on the reduction of Hawaii's heavy dependence on imported fossil fuels (DBEDT 2019). This Memorandum of Agreement launched the Hawaiʻi Clean Energy Initiative (HCEI), a regulatory framework that is supported by a diverse group of stakeholders working to transform various systems that govern energy planning and delivery within Hawaiʻi (DBEDT 2019). In 2015, as part of the HCEI, the State increased the RPS[3] to require electric utility companies that sell electricity for consumption in Hawaiʻi to use renewable energy for the equivalent of 30 percent of net electricity sales by 2020, 40 percent by 2030, 70 percent by 2040, and 100 percent by 2045. Hawaiʻi became the first state in the nation to have a 100 percent RPS goal by the year 2045.

[3] The RPS is codified in HRS Chapter 269-92.

In response to the RPS, Hawaiian Electric issued its 2016 Power Supply Improvement Plan (PSIP; Hawaiian Electric 2016) to provide a detailed 5-year plan with specific actions to accelerate the achievement of Hawaiʻi's renewable energy goals. The plan assumes there will be strong growth in distributed energy resources including an assumption that 100 percent of all single-family homes and 20 to 25 percent of commercial customers will have rooftop solar PV producing the same amount of PV energy as they consume (net zero) by 2045. However, even with these high forecasts of distributed PV energy resources, the PSIP concluded that additional grid-scale PV generation would be required. Specific to the island of Oʻahu, the PSIP identified approximately 352 MW of new grid-scale solar energy and 64 MW of grid-scale wind energy by 2021 (Hawaiian Electric 2016). To meet these resource requirements Hawaiian Electric established a process for solicitation and procurement of grid-scale renewable dispatchable generation.

Hawaiian Electric issued its Stage 2 *Request for Proposals for Variable Renewable Dispatchable Generation and Energy Storage for the Island of Oʻahu* (RFP; Hawaiian Electric 2019) in August 2019. The RFP established a competitive bidding process for Hawaiian Electric to acquire grid-scale renewable generation, thus contributing to the state's RPS. Based on responses to the RFP, Hawaiian Electric (and its subsidiaries Maui Electric and Hawaiʻi Electric Light) selected a total of 16 solar plus storage projects (Hawaiian Electric 2020a), each of which required subsequent approval of a PPA by the Hawaiʻi Public Utilities Commission (PUC). The Barbers Point Solar Project was one of the six Oʻahu-based projects selected by Hawaiian Electric (Hawaiian Electric 2020b); the PPA for the Project was executed with Hawaiian Electric on September 3, 2020 and is pending approval by the PUC under Docket No. 2020-0143.

1.2 Purpose and Need

The purpose of the Project is to construct and operate a renewable energy facility on the DHHL property that would generate and store electricity derived from solar resources, thereby providing clean, renewable energy for the island of Oʻahu.

The HCEI and Hawaiʻi's RPS establish the need to reduce the State's dependence on imported fossil fuels and increase the State's locally produced energy capacity. In response to these statewide needs, Hawaiian Electric's PSIP and associated RFPs establishes the need for development and implementation of new renewable energy projects on Oʻahu (Hawaiian Electric 2019). The Project directly responds to this need as it will help meet the State's RPS and Hawaiian Electric's PSIP by providing up to 15 MW of solar energy and 60 MWh of battery energy storage. In doing so, the Project will fulfill an average of 0.56 percent of Hawaiian Electric's RPS over the 25-year term of the PPA and 0.43 percent to Hawaiian Electric's consolidated RPS (Hawaiian Electric 2020c).

Solar energy from the Project will replace a portion of electricity that is currently generated by burning fossil fuels, thus substantially reducing greenhouse gas emissions and other forms of pollution that are detrimental to the environment and human health. In total, the Project is expected to offset approximately 1,139,396 barrels of fossil fuel consumption by Hawaiian Electric's generating units and reduce net lifecycle greenhouse gas emissions by approximately 455,598 metric tons of carbon dioxide

equivalents over its lifecycle (Hawaiian Electric 2020c). Furthermore, it is estimated that the renewable energy supplied by the Project will potentially save Hawaiian Electric, and therefore customers, millions of dollars in total avoided fuel costs over the term of the PPA. The avoided fuel use and changes to Hawaiian Electric's system costs due to the addition of the Project will result in a significant reduction in the net present value of revenue requirement for Hawaiian Electric (Hawaiian Electric 2020c). Specifically, Hawaiian Electric presented uncontroverted evidence that the updated Company system net present value with the Project (versus without the Project), will result in a reduction of Hawaiian Electric's revenue requirement over the 25-year contract term of $21,691,462 (Hawaiian Electric 2020c). These savings will result in bill savings to the customers over the 25-year term of the PPA. A reduction in fossil fuel consumption due to the Project will in turn reduce the need for fuel imports, reduce fuel supply reliability risk and increase the state of Hawaiʻi's and Honolulu County's energy independence. The Project would also help to improve electric grid stability by enabling Hawaiian Electric to utilize stored solar energy to meet peak demand. As an additional benefit, the Project will provide a valuable revenue stream for DHHL over the next 25 years or more and will assist DHHL in meeting Objective 2 of the Hawaiian Homes Commission 2009 Hoʻomaluō Energy Policy (DHHL 2009). As noted earlier, the two DHHL owned Project parcels are designated "Industrial" in DHHL's Oʻahu Island Plan (DHHL 2014) and are intended for revenue generation as they were considered not suitable for residential development. DHHL may use revenues developed from the Project's land lease to develop new homesteads in suitable residential areas throughout the state.

1.3 Project Area

The Project area is located within the ahupuaʻa of Honouliuli in the ʻEwa District on the island of Oʻahu. As shown in Figure 1-1, the Project is located south of the Kapolei Parkway and east of the Kalaeloa Airport. The Project area encompasses approximately 163 acres and is bordered by Tripoli Road to the south, Coral Sea Road to the west, the Barbers Point Golf Course and Kalaeloa Renewable Energy Park to the east, and vacant land and Roosevelt Avenue/Geiger Road on the north. The Project area is primarily composed of two parcels owned by DHHL: TMK 9-1-013:038 and TMK 9-1-013:040. However, linear areas for access roads, collector lines, and a generation-tie line located within ROWs owned by HDOT (Coral Sea Road, Roosevelt Avenue, and Roadway Lot 13083-B[4]) and one privately owned parcel (TMK 9-1-016:027) are also included in the Project area (Figure 1-2). Table 1-1 lists the TMKs and ROWs within the Project area and their respective owners and the Project components proposed to be located on each parcel or ROW. Figure 1-3 shows land ownership within and adjacent to the Project area.

[4] The Applicant originally understood Roadway Lot 13083-B to be owned by HCDA. However, during the pre-assessment scoping process (see Section 7.2) it was clarified that Roadway Lot 13083-B is owned by HDOT.

Table 1-1. TMKs, ROWs, and Ownership Within Study Area

TMK Parcel # or ROW	Owner	Project Components Sited on Parcel
9-1-013:038	DHHL	PV arrays, PV-Coupled ESS, Project substation
9-1-013:040	DHHL	PV arrays, PV-Coupled ESS
9-1-016:027	Kapolei Infrastructure, LLC	Generation-tie line and new interconnection to existing Hawaiian Electric 45-kV line
Coral Sea Road	HDOT	Generation-tie line and collector lines
Roosevelt Ave	HDOT	Generation-tie line
Roadway Lot 13083-B	HDOT	Access road and collector lines

Much of the Project area was developed during the mid-twentieth century into the Marine Corps Air Station ‘Ewa (MCAS ‘Ewa) and later the Naval Air Station Barbers Point (NASBP). MCAS ‘Ewa was used by the Marine Corps during World War II as a training facility, was decommissioned in 1949, and was absorbed into the NASBP which closed in 1999 (see Appendix A). Except for a few leased parcels, much of the portion of the NASBP that is within the Project area has been vacant since the closure of NASBP and is presently overgrown with vegetation. There is a historic district as well as two proposed historic districts within portions of the Project area. The northern portion of the Project area (see Figure 1-4) is located within the southern portion of the ‘Ewa Plain Battlefield Historic District which was one of the sites attacked by Japanese Imperial Navy forces on December 7, 1941. As shown in Figure 1-4, the central portion of the Project area within TMK 9-1-013:038 is located in the Proposed Revetment District (Yoklavich 1997) which was nominated for the National Register of Historic Places (NRHP) in 1997 by Yoklavich because of the “half-dome” aircraft revetments’ association with the change in airplane parking protocol after the December 7, 1941 attack and for the unique architecture of the revetments (see Appendix A for more details). Following Yoklavich’s 1997 study, a portion of the revetment area outside of the current Project area (within the current U.S. Navy parcel, immediately east of the central portion of TMK 9-1-013:038, see Figure 1-4) was nominated for inclusion on the NRHP as the ‘Ewa Field South Revetment Historic District (Resnick et al. 2018). See Section 3.5 and the Project’s Archaeological Inventory Survey (AIS) in Appendix A for more information on the existing and proposed historic districts.

Since the closure of the NASBP, the U.S. Navy has disposed of or is in the process of disposing of many parcels that made up the NASBP to non-federal agencies. TMK parcels 9-1-013:038 and 9-1-013:040 were transferred from the U.S. Navy to DHHL in 1996 as part of a settlement agreement under the Hawaiian Home Lands Recovery Act (P.L. 1-4-42). The Project area contains no lands owned by the federal government.

Some areas of the DHHL-owned parcels are leased to tenants for commercial and agricultural purposes. There are large cleared, concrete and asphalt paved areas, as well as debris and abandoned vehicles and equipment in the Project area. Historic bunkers, aircraft revetments and associated structures located on the DHHL-owned parcels are actively re-used for other purposes. The majority of the Project area is vacant and overgrown by kiawe and koa haole. A private horse stable business operates in revetments located on TMK 9-1-013:164, immediately adjacent to and east of the Project area. The existing Kalaeloa Renewable Energy Park is located on TMK 9-1-013:096, immediately adjacent and east of the Project area on lands currently being transferred from the U.S. Navy to Hunt Companies, Inc. The U.S. Navy’s

former Northern Trap and Skeet Range and Southern Trap and Skeet Range are located on U.S. Navy-owned TMKs 9-1-013:039 and 9-1-013:042, which are located north and east of Project TMK 9-1-013:040.

The Project's solar arrays will include three areas: Area 1 in the northern portion of TMK 9-1-013:038, Area 2 in the southern portion of TMK 9-1-013:038, and Area 3 located on TMK 9-1-013:040 (see Figure 2-1). Access to Areas 1 and 2 on TMK 9-1-013:038 will be provided by a new driveway off of Coral Sea Road. This driveway will be located within an existing HDOT ROW associated with Roadway Lot 13083-B. Access to Area 3 on TMK 9-1-013:40 will be off Coral Sea Road via a previously disturbed hard-packed soil surface in the vicinity of the former military's Casablanca Street.

1.4 Hawai'i Revised Statutes Chapter 343 Compliance

Hawai'i Revised Statutes (HRS) Chapter 343 environmental review is required for any action that requires one or more approvals (defined as discretionary consent from an agency, see Hawai'i Administrative Rules (HAR) Section (§)11-200.1-2) prior to implementation and includes one or more triggers identified in HRS Chapter 343-5(a). These requirements are further detailed in HAR §11-200.1, the implementing rules for compliance with HRS Chapter 343.

As the Project will involve the use of lands owned by DHHL and HDOT, and as the northern portion of the Project area is located within the 'Ewa Battlefield Historical District, and as the Project requires discretionary review from Hawai'i Community Development Authority (HCDA) (see Section 5.9 for more details), compliance with HRS Chapter 343 is required. In accordance with HAR §11-200.1-7, DHHL was determined to be the approving agency for the purposes of HRS Chapter 343 compliance because they will be the agency hosting the majority of the Project components on their lands. Based on the scope and scale of the Project and consistent with HAR §11-200.1-14, DHHL determined an environmental assessment (EA) to be the appropriate level of environmental review. As such, a Draft EA was prepared in compliance with HRS Chapter 343 and HAR §11-200.1 and submitted to the Environmental Review Program[5] for publication in the *Environmental Notice*. Comments received during the required 30-day public review period will be incorporated into a Final EA, which will be provided to DHHL and published in the *Environmental Notice*. Based on their review of the Final EA and application of the significance criteria in HAR §11-200.1-13, DHHL will issue a determination notice of either a "Finding of No Significant Impact" or an "Environmental Impact Statement Preparation Notice". Based on preliminary information, it is currently anticipated that a Finding of No Significant Impact will be issued for the Project.

2.0 DESCRIPTION OF PROPOSED PROJECT

The Project consists of construction and operation of a 15-MW solar PV system coupled with a 15 MW, 4-hour (60 MWh) PV coupled battery energy storage system (PV-Coupled ESS) as well as related interconnection and ancillary support infrastructure. Specifically, it includes the following major

[5] Formally called the Office of Environmental Quality Control

components: (1) solar PV system, (2) direct current (DC) electrical collector lines, (3) power conversion systems including PV-Coupled ESS units and step-up transformers, (4) alternating current (AC) electrical collector lines, (5) Project collector substation, (6) a generation-tie line (combination overhead and underground), (7) communication equipment, (8) access roads and fencing, and (9) temporary laydown areas. Each of these components is described in the following subsections. Barber's Point Solar, LLC anticipates that the total combined footprint of the Project components located on DHHL lands will be less than 100 acres, of which the solar panels will cover approximately 45 acres. All major components will be located within the Project fence line with the exception of the generation-tie line, select access roads, and portions of the collector lines. The preliminary site layout is shown in Figure 2-1 and schematics of the Project components are shown in Figures 2-2 through 2-8. An overview of the Project's associated construction, operations and maintenance activities is also described in the following subsections.

2.1 Project Components

2.1.1 Solar Photovoltaic System

The solar PV system will consist of a series of solar PV panels mounted on a solar tracker racking system and related electrical equipment. The final number of panels will be determined by power ratings (in watts) of the specific panels chosen prior to construction. The panels in portrait orientation will be organized in rows (or "tables") within several solar array areas (or "blocks"). The row-to-row spacing will be approximately 36 feet (with approximately 21 feet of open space between adjacent rows). The panels themselves will be approximately 6.6 feet long by 3.5 feet wide and 2 inches thick.

The racking system will be on a single axis, oriented south which will allow the panels to follow the sun in order to maximize power output. The racking system will be designed to support the panels as well as prevent wind uplift and will include steel posts, spaced approximately every 16 feet (varies) and installed to a depth of approximately 6–10 feet (depending on specific soil conditions). Once mounted on the racking system, the highest point of the panels is expected to extend approximately 9–14 feet above the ground surface, with an average of approximately 2 feet of ground clearance below the panels.

The Project's solar arrays will include three areas: Area 1 in the northern portion of TMK 9-1-013:038, Area 2 in the southern portion of TMK 9-1-013:038, and Area 3 located on TMK 9-1-013:040. A schematic drawing of the solar PV panel and racking system is included in Figure 2-2a.

2.1.2 Direct Current Electrical Collector Lines

The PV panels will produce DC electricity at a low voltage. Within each solar array area, the DC electricity from the panels will be transmitted via racking mounted and underground electrical wiring to one of the power conversion systems distributed throughout the solar array areas. The underground DC electrical wiring will be installed within trenches approximately 3 feet wide and 4 feet deep, however

final trench design will be determined by thermal resistivity studies. In areas where the desired depth cannot be achieved (due to basalt rock or other prohibitive subsurface conditions), the collector lines may be housed in above ground cable trays or covered with concrete slurry in accordance with the applicable National Electric Code (NEC) provisions.

2.1.3 Power Conversion Systems

The Project layout includes six power conversion systems (PCS) distributed throughout the solar array areas. Each PCS includes up to four PV-Coupled ESS units and a step-up transformer. A PV-Coupled ESS unit is a self-contained and standalone unit that combines a lithium-ion battery system, inverter, and controller that can either store DC electricity for future use, or convert DC electricity to AC electricity and send the AC electricity to the step-up transformer, as required based on grid demand. Each PV-Coupled ESS unit is approximately 11 feet (height) by 6 feet (width) by 30 feet (length) and will be positioned in groups of up to four around a single step-up transformer, which is approximately 12 feet (height) by 11 feet (width) by 16 feet (length). The step-up transformer increases the AC voltage from the DC-ESS units to 34.5 kV where it will then be conveyed via AC medium voltage collector lines and combiner boxes to the Project's collector substation where it is transformed to grid voltage. To ensure the Project maintains 100 percent storage capacity during its operation period, battery augmentation blocks will be added to the PV-Coupled ESS units during operations. Up to three battery augmentation blocks for each ESS unit can be added, with each block approximately 11 feet (height) by 6 feet (width) by 12 feet (length). All components of the PCSs will be mounted on concrete pads or beam foundations. Each PCS unit will include and incorporate multiple layers of protection to avoid failures and risks of fire. Figure 2-2b contains a schematic of the PV-Coupled ESS unit; Figure 2-2c contains a schematic drawing of the typical PCS layout. Figure 2-3 contains a schematic of the step-up transformer.

2.1.4 Alternating Current Medium Voltage Collector Network

The AC medium voltage (35 kV) collector network will convey the electricity from the medium voltage step-up transformers located at each PCS to the Project's collector substation where the electricity will be transformed to 46 kV by the main power transformer for final distribution to the grid via the Project's generation-tie line. Similar to the underground DC electric collector lines, the AC medium voltage collector lines will primarily be installed underground within a trench approximately 3 feet wide and 4 feet deep, with final design determined by thermal resistivity studies. The AC 35 kV collector line connecting the PCSs on TMK 9-1-013:040 to the collector substation on TMK 9-1-013:038 will run along Coral Sea Road. Portions of this line may need to be overhead depending on coordination with HDOT. Also, in cases where subsurface conditions make it difficult or too costly to trench, other portions of the collection system may go overhead similar to a transmission line. In total, it is anticipated that the Project will include approximately 8,000 to 10,000 linear feet of AC electrical collector lines.

2.1.5 Collector Substation

The collector substation will function to further increase the voltage in order to match the voltage of the Hawaiian Electric electrical grid of 46 kV. The Project collector substation and associated interconnection infrastructure will include equipment such as free-standing steel switch-rack structures, a main power transformer, breakers, power meters, and associated electrical lines. This infrastructure will be separately fenced for electrical safety, constructed within the Project solar area fence line will occupy a total of approximately 25,000 square feet (0.6 acres) and will include concrete foundations. The substation equipment will generally range in height from 15 feet to 25 feet above ground level, but at all times below the Kalaeloa airport height restrictions. Schematic drawings of the collector substation layout and profile are included in Figures 2-4 and 2-5.

2.1.6 Overhead Generation-Tie Line

An approximately 1.2-mile generation-tie line (combination of overhead and underground) will extend from the Project's collector substation to a new interconnection point into the existing Hawaiian Electric 46 kV overhead transmission line located near the intersection of Roosevelt Avenue and Coral Sea Road. The first approximately 0.5 mile of the generation-tie line extending west and north from the collector substation along Coral Sea Road is expected to be placed underground to comply with Federal Aviation Administration (FAA) clearance requirements/height restriction for placing structures within the runway approaches to the Kalaeloa Airport. The remaining approximately 0.7 mile of generation-tie line along Coral Sea Road to Roosevelt Avenue is anticipated to be overhead. At the intersection of Coral Sea Road and Roosevelt Avenue, the generation-tie line is anticipated to cross Roosevelt Avenue via overhead lines and will connect to the existing Hawaiian Electric 46 kV overhead transmission line at a point located on TMK 9-1-016:027.

It is intended that the overhead portions of the generation-tie line will consist of three sections of 46 kV aluminum conductor steel reinforced cable and one fiber optic cable. These lines will be supported by approximately 55-to 75-foot-tall mono-pole structures (i.e., poles) in order to incorporate the existing Hawaiian Electric owned 12 kV distribution line on the same poles. A schematic drawing of a typical mono-pole structure is included in Figure 2-6a while a schematic drawing of a typical section of the 46-kV duct for the underground portion of the gen-tie line is included in Figure 2-6b.

2.1.7 Access Roads and Fencing

Access to Areas 1 and 2 on TMK 9-1-013:038 will be provided by a new driveway off of Coral Sea Road. This driveway will be located within an existing HDOT ROW associated with Roadway Lot 13083-B. Access to Area 3 on TMK 9-1-013:040 will be provided by a previously disturbed hard-packed soil surface in the vicinity of the former military's Casablanca Street, off Coral Sea Road.

The Project proposes to construct a new driveway off Coral Sea Road onto the HDOT Roadway Lot 13083-B to access the southern portion of DHHL's parcel 9-1-013:038. Roadway Lot 13083-B extends

north from Coral Sea Road along the western boundary of TMK 9-1-013:038 and eventually joins with Roadway Lot 13076 to connect with Roosevelt Avenue (see Figure 1-2). These roadway lots were created during the U.S. Navy's disposal and transfer of these lands to HDOT and DHHL after the closure of NASBP in 1999. However, no roadways have been constructed on these roadway lots. Access within TMK 9-1-013:038 from Area 2 to Area 1 will be provided through a network of existing and new on-site access roads located on DHHL property.

Improvements to existing roads may include drainage upgrades, smoothing, and graveling as needed to accommodate construction vehicles. New access roads may require excavation and fill to achieve acceptable grades. Access roads will have a compacted gravel surface, with a width of approximately 16 feet or 20 feet as well as the required clearance and turning radius needed for emergency response vehicles, in accordance with fire code. The access roads will provide primary access to each of the solar array blocks, including each PCS, as well as the Project's collector substation. The spacing between the rows of panels will allow for localized access within each of the solar array areas. A schematic drawing of the typical access road design is included in Figure 2-7.

Fencing will be installed around the perimeter of the Project for general security purposes and public safety. The fence is expected to be an approximately 7-foot-tall chain link (or similar); no barbed wire will be installed on the perimeter fence. Gates will be installed for approved pedestrian and vehicular access. A schematic drawing of the typical fence design is included in Figure 2-8.

2.1.8 Temporary Laydown Areas

An approximately 2-acre temporary laydown (i.e., staging) area will be established in the southern portion of TMK 9-1-013:038. Other laydown areas may be established within the solar array footprint as the Project is built out. Some grading may be needed to level the ground surface, with geotextile materials and compacted gravel installed as needed.

2.2 Construction Activities

The construction phase of the Project is expected to include transport and delivery of Project equipment and materials, site preparation, equipment installation, and revegetation and landscaping. Each of these activities is generally described below.

2.2.1 Construction Staff

During construction, an estimated average of 70 people will be employed at the Project, with an estimated maximum of 140 employees. Most construction workers will be employees of construction and equipment manufacturing companies under contract to Barbers Point Solar. The construction workers would consist of a majority of locally hired workers and a limited number of specialized workers for specific construction tasks (for example, construction management). Barbers Point Solar, LLC will primarily solicit experienced Hawaiʻi-based contractors with the intention of a proportionally high locally hired workforce. All employees hired directly by Barbers Point Solar may go through U.S.-wide

background checks, including criminal record check, credit rating check, and employment/professional references, as applicable. Contractors for the Project will be subject to Innergex's "know your client" corporate requirements.

2.2.2 Transport and Delivery

Heavy vehicles delivering equipment and materials are expected to travel from the harbor on Sand Island Access Road to the Project site using the H-1 Freeway and exiting the Makakilo Interchange, then go southbound on Fort Barrette Road, eastbound on Roosevelt Avenue and southbound onto Coral Sea Road. It is anticipated that approximately 65 vehicles/day (including worker vehicles[6] and truck deliveries[7]) will be added to the roadway network during construction and commissioning (a 12–15-month period).

Minor public roadway improvements at the Project's two site entrances (driveways) off Coral Sea Road are expected to be required to accommodate the equipment transport. As further described in Section 3.12, a Traffic Impact Analysis Report (TIAR) was prepared to study existing traffic conditions, future traffic conditions without the Project, and future traffic conditions with the Project, and to determine if Project would have impacts to the roadway network. The TIAR identified operational mitigation measures such as staggering the times of the inbound and outbound construction related vehicles, but no road improvements are anticipated to be needed along the Project's anticipated roadway network. A traffic management plan will be developed, with implementation of appropriate measures to minimize traffic-related impacts.

2.2.3 Site Preparation

Initial site preparation will involve grubbing and vegetation clearing within the Project area, along with installation of best management practices (BMPs) as described below. Clearing and grubbing will be phased, and soil will be temporarily stabilized. Following clearing and grubbing, laydown/staging areas and access roads will be established. Some grading may be needed to level the ground surface of the laydown/staging areas and geotextile materials and compacted gravel will be installed as needed. Similarly, installation of new access roads will also involve grading, subgrade preparation and compacted gravel. Clearing, grubbing, and grading will be conducted using equipment such as bulldozers, excavators, compactors, graders, and front-end loaders. Water trucks will be used to provide moisture for compaction as well as dust control during construction as required. Depending on the moisture levels, upwards of 9 million gallons of water could be used throughout the construction phases. As there is no water available on site, water will be purchased from the Board of Water Supply or other supplier.

[6] The traffic analysis assumes workers would ride share and assumes a maximum of two workers per vehicle. In addition, due to construction activity phasing, the maximum number of workers anticipated on site on any single work day would be 114 (or 57 worker vehicles).

[7] The traffic analysis assumes eight average daily truck deliveries.

Barbers Point Solar will consider using R-1 recycled water for dust control during construction; however, the use of R-1 water will depend on availability and costs.

Project implementation will incorporate BMPs to avoid and minimize potential impacts to the surrounding environment. In particular, BMPs will include various procedures, practices, treatments, structures and/or devices designed to eliminate and minimize the potential discharge of pollutants to downstream waters. The City and County of Honolulu Best Management Practice Manual (City and County of Honolulu 2011) identifies five low impact design (LID) site design strategies for new development and redevelopment areas. Those strategies that are applicable will be implemented as described below.

- Conserve Natural Areas, Soils and Vegetation. There are no existing wetlands, riparian buffers, sensitive environmental areas, or natural streams on-site to be protected or preserved. Natural drainage patterns will be preserved as grading activities will not alter the overall flow patterns on the site. Vegetation will only be cleared and grubbed where required for grading and access road or equipment installation. Existing trees will be removed inside the fenced area and the remaining vegetation mowed to allow installation of the trackers. The vast majority of the site will be vegetated following construction.
- Minimize Disturbances to Natural Drainages. There are no existing water bodies on-site to be maintained. The site design limits grading to the smallest areas necessary to install the Project infrastructure and basins. Existing stormwater drainage patterns will be maintained so that the flow to adjacent properties is not impacted. Construction storage will be controlled by use of the laydown yard and BMPs. Fencing will be used to prevent disturbances to the unused portions of the property and the other areas identified to be avoided and protected.
- Minimize Soil Compaction. Some construction traffic throughout the site will be required to install the Project infrastructure, however traffic will be restricted to the site access roads to the extent possible to limit the amount of compaction. Topsoil stripping will be minimized on-site.
- Minimize Impervious Surfaces. The proposed impervious surfaces have been minimized to the extent possible, and only include the electrical equipment and foundations required for the site. Access roads will be constructed of coarse gravel to allow infiltration (i.e., semi-permeable surfaces). Solar panels will be raised above the proposed vegetation and will therefore not be considered impervious.
- Direct Runoff to Landscaped Areas. The impervious inverter pads are distributed throughout the interior of the site and will drain to the adjacent vegetated areas. During construction, stormwater from the proposed substation will sheet flow through the site and will be treated by a sediment basin (formed by detention berms) before discharging through a culvert discharge pipe within the site boundary. The sediment basin will be converted to a permanent detention basin once on-site vegetation has been established.

In compliance with the water quality criteria specified in the City and County of Honolulu's Post-Construction Water Quality Requirements (City and County of Honolulu 2019), the vast majority of the site will be vegetated post construction, including the area under the solar panels. Non-vegetated areas

will consist of a network of semi-pervious gravel access roads, isolated inverter pads, and the substation area. Areas outside the fence will remain as existing condition with the addition of 0.4 acres of additional roadway. In addition to BMPs, the Project will also incorporate, where deemed required and applicable based on latest design, a series of rock berms/swales and retention areas to temporarily capture and treat stormwater in areas with increased impervious surfaces associated with the Project infrastructure (see Figure 2-1 for proposed detention berms and infiltration basins). Temporary berms are proposed for construction conditions to provide water quality treatment before water leaves the site. Following stabilization and Project completion these berms will be altered for permanent conditions. The north section of the site will have an infiltration basin as it has soils conducive to infiltration. The central and south sections of the site will have detention basins to meet the runoff reduction and water quality treatment requirements for the site. The size and design of the stormwater management infrastructure will be based on site-specific conditions as well as the requirements of the City and County of Honolulu's Rules Relating to Water Quality and Rules Relating to Storm Drainage Standards (Administrative Rules Section 14-12.31). The retention areas will be designed to drain within 48 hours of the end of a storm event and will be kept free of emergent vegetation to avoid attracting waterbirds. Vegetation along the perimeter of the retention areas and adjacent areas will be kept as low as possible to discourage waterbirds from nesting.

The final BMPs to be implemented will be determined in accordance with applicable regulatory requirements, including those associated with the National Pollutant Discharge Elimination System (NPDES) program and the City and County of Honolulu's Rules Relating to Water Quality (Administrative Rules Section 20-3-63), which require approval of a stormwater pollution prevention plan and erosion and sediment control plan prior to construction. No ground disturbing activities would occur until BMPs have been properly implemented.

Barbers Point Solar, LLC will develop an emergency response plan with the appropriate agencies, including Honolulu Fire Department. The emergency response plan will establish protocols for minimizing risk of fire ignition and providing fire response (should it be needed) during construction and/or operations and maintenance. In the event of an emergency, local fire and police stations will be notified immediately.

2.2.4 Installation of Project Equipment

Following site preparation activities, the general sequence for construction will involve installation of the following equipment: foundations, the racking system, solar PV panels and associated wiring, electrical collector lines, concrete equipment pads and substation foundations, PV-Coupled ESS units, step-up transformers, collection substation equipment, and underground and overhead generation-tie transmission line segments and interconnection switch at the existing 46 kV transmission line.

Overall, the extent of ground disturbance associated with the solar array areas is expected to be relatively minimal, as the single axis tracking system will be installed using structural steel posts (as opposed to larger foundations) and can tolerate slopes up to 13 percent (based on the manufacturers'

specifications). The Project is being designed to accommodate as much as possible the existing topography of the site in order to minimize the amount of earthwork needed. In general, grading for the Project will primarily occur in areas where new access roads, concrete equipment pads, retention areas, and the Project collector substation will be sited.

The foundation posts for the racking system will be installed using a hydraulic pile driver and/or auger for pre-drilling to depths of approximately 6 to 10 feet (depending on soil conditions). In areas where the desired depth cannot be achieved, foundations will be pre-drilled and supported with concrete slurry or cast in place concrete spread footings. Gas pressure blasting may be used where rock is encountered. If blasting were necessary, the extent of the blasting would be minimized as feasible, and a blasting procedure would be developed and implemented. The procedure would include BMPs such as pre-blast surveys, safe work procedures, use of blast mats, and monitoring of the potential effects of blasting, to minimize noise and vibration to surrounding land uses. Prior to blasting activities, Barbers Point Solar would notify and consult with adjacent landowners to discuss and mitigate concerns related to blasting. Required permits for blasting activities would be obtained from Honolulu Fire Department Bureau prior to construction. A blasting schedule would be established and coordinated with adjacent landowners to specify times for blasting work. Blasting may only be required on occasion during the early stages of construction and therefore have a limited noise impact.

The panel frames and other components of the racking system will be bolted to the posts, with the solar PV panels affixed to the frames. For any electrical wiring or collector lines to be installed belowground, trenches will be excavated with track-mounted excavators (or similar) or specific trenching machines and will be approximately 3 feet wide and 4 feet deep; following placement of the electrical lines, the excavated soil will be backfilled into the trench and tamped back to the appropriate level of compaction per the design specifications. In areas where the desired depth cannot be achieved (due to basalt rock or other prohibitive subsurface conditions), the collector lines may be placed in above ground cable trays in accordance with the applicable NEC provisions. In cases where adequate space for undergrounding the collector lines is limited (i.e., within public ROW), the collection system may go overhead similar to a generation-tie line.

The equipment pads and collector substation foundation will involve excavation up to approximately 6 feet in depth and installation of concrete. Excavated soil will either be used elsewhere within the Project area or hauled to an approved offsite facility. Concrete for the pads and foundations will be delivered in ready-mix concrete trucks; the Project will not include a concrete batch plant. Once the concrete equipment pads and collector substation foundation have been installed, the PV-Coupled ESS units, transformers and various electrical equipment will be installed. All electrical equipment and wiring will be installed and inspected in accordance with applicable code requirements and best industry practices.

2.2.5 Revegetation, Landscaping, and Post-Construction Site Control

Following construction, areas that have been temporarily disturbed will be revegetated for soil stabilization and erosion control purposes. It is anticipated that revegetation will involve application of

hydroseeding, with a suitable mix of non-invasive grass species and/or species currently found throughout the site. Landscaping will also be installed, as required, to provide and/or supplement the visual screening provided by the existing vegetation. It is anticipated that the landscaping will incorporate trees and shrubs in key locations along the Coral Sea Road and Tripoli Road frontage along TMK 9-1-013:040 (per HCDA requirements) and will include drought tolerant species from the HCDA preferred plant species list or otherwise approved by HCDA (see HAR §15-215). Species selected for landscaping will not require long-term irrigation; irrigation during the initial establishment period following planting will likely be provided via temporary water tanks (filled using water trucks). A detailed landscaping plan, including selection of appropriate species, would be developed prior to construction. All proposed landscaping would need to be approved by DHHL and HCDA.

In addition to revegetation of temporarily disturbed areas, permanent BMPs will be implemented to address long-term stormwater requirements. Accordingly, it is expected that the Project would comply with the City and County of Honolulu's Rules Relating to Water Quality and Storm Drain Standards, as well as the State's water quality standards, which establishes basic water quality criteria and requires that water quality be maintained to protect existing uses as specified in HAR §11-54.

2.3 Operations and Management Activities

Following construction and commissioning, the Project will generally involve passive operations and maintenance. Normal operation of the Project will not require on-site personnel and, therefore, the Project will not be manned daily. The site will be continuously monitored, in real time, remotely and with the support of a local response team. Approved technicians will service electrical equipment, primarily the PV-Coupled ESS units and transformers, on average once per month. A performance audit and inspection to assess the quality of equipment will be conducted annually. If any equipment needs replacing before the Project's end-of-life, Barbers Point Solar would seek the most environmentally responsible route for reuse, recycling, or disposal.

Periodic maintenance and inspection of the infrastructure will occur intermittently over the course of Project operations. Typical maintenance would follow basic monthly inspections, preventative quarterly inspections, and an in-depth annual maintenance program. Personnel at site are expected to range from two man-days per month to 32 man-days depending on the type of maintenance scheduled per month. However, the average number of employees to access the site on a monthly basis for maintenance is assumed to be two to four (i.e., two to four man-days per month).

Typical maintenance of the solar PV panels will include surface cleaning to remove accumulated dust and dirt to optimize performance. Based on environmental conditions and rainfall, it is anticipated cleaning cycles will be every 18 months. A variety of equipment is available on the market for cleaning solar panels. Typical utility-scale solar projects utilize water trucks with an assortment of hoses and support personnel to scrub down panels with heavier soiling. A mild, biodegradable detergent may be used in conjunction with the water for cleaning. The amount of water needed for cleaning will be dependent on the extent of the soiling but is not anticipated to be significant. Other more innovative water-less and dry brushing techniques will be explored as an option.

Vegetation within the Project fence line and along the generation-tie line will be managed throughout the life of the Project. A vegetation management plan will be followed during operation to ensure that vegetation does not overgrow the PV panels, preventing solar radiation from reaching them. The vegetation management plan will also establish and maintain fire breaks around each solar array, PCS, the collector substation, and along the Project's fence line. The plan will employ BMPs and techniques that are most appropriate for the local environment. A draft vegetation management plan is included in Appendix B. Mechanical vegetation control such as mowing, trimming, and pruning will be the primary means for vegetation management. In rare circumstances, herbicides may be utilized for vegetation control. However, an effort will be made to minimize use and only apply bio-degradable, U.S. Environmental Protection Agency (EPA) registered, organic solutions that are non-toxic to wildlife and used in a manner that fully complies with all applicable laws and regulations.

2.4 Decommissioning

Based on the Project's PPA with Hawaiian Electric, the Project is expected to operate for approximately 25 years (through 2048). At the end of the PPA term, the Project may be repowered under a renegotiated PPA or other contract (with subsequent permits/approvals) or decommissioned. Decommissioning will involve removal of all equipment associated with the Project and returning the area to substantially the same condition as existed prior to Project development. Decommissioning would include consideration of local environmental factors to minimize effects such as erosion during the removal process, and the recycling of materials demolished or removed from the site to the extent feasible. The activities that may occur as part of decommissioning are summarized below.

- Decommissioning will commence once the Project has been fully de-energized and isolated from all external electrical connections, in coordination with Hawaiian Electric.
- Consistent with the measures described for construction and operation of the Project, BMPs will be implemented and maintained throughout the decommissioning phase as needed to avoid and minimize potential impacts to the surrounding environment, particularly those related to dust, erosion and stormwater.
- Once the site has been adequately prepared for decommissioning, the following equipment will be removed: solar PV panels and racking system, including steel piles, power conversion systems (including DC-ESS units and step-up transformers), electrical wiring and connections, Project collector substation components, communication equipment, and fencing. All above grade foundations will be removed or as agreed upon by the landowner. The extent of which access roads will be removed will be coordinated with the landowners at the time of decommissioning.
- Equipment and materials will be salvaged or recycled to the extent feasible and in coordination with licensed subcontractors, local waste haulers and/or other facilities that recycle construction/demolition waste; the remaining materials will be disposed of by the contractor at authorized sites on O'ahu, in accordance with applicable laws. Reuse or recycling of materials would be prioritized over disposal. Recycling is an area of great focus in the solar industry, and programs for both batteries and solar panels are advancing every year. Panels and batteries

would most likely be shipped to recycling facilities on the mainland. All waste requiring special disposal (e.g., transformers) will be handled according to regulations that are in effect at the time of disposal.

- Following removal of Project equipment, site restoration will be conducted such that the physical conditions of the area are returned to substantially the same condition as existed prior to Project development. These activities will include removal of gravel and other aggregate material, localized grading and disking to match surrounding elevations, replacement of topsoil from on-site stockpiles, and revegetation of disturbed areas with an appropriate hydroseed mix.
- Decommissioning will occur within 12 months of the conclusion of Project operation. Decommissioning plans will be communicated with the landowner, the public and the regulatory agencies, prior to and during the decommissioning phase, as appropriate.[8]

2.5 Project Schedule and Costs

It is anticipated that construction and commissioning would require approximately 12–15 months. Estimated construction start is the fourth quarter of 2022 with commercial operations commencing at the end of 2023. The construction schedule will be part of the construction request for proposal and contract negotiation process with contractors. The construction sequence and timeline are anticipated as outlined in Table 2-1.

Table 2-1. Estimated Construction Milestone Dates

Milestone	Estimated Date[1]
Obtain all required permits and approvals	End of Quarter 3 2022
Begin construction	Quarter 4 2022
End construction, start commissioning	Quarter 4 2023
Begin commercial operations	End of 2023

[1] Estimated dates are subject to Interconnection Requirements Study.

3.0 AFFECTED ENVIRONMENT, POTENTIAL IMPACTS, AND MITIGATION MEASURES

This section describes the affected environment and potential impacts of the Project relative to applicable environmental resources. Mitigation measures or BMPs that would be implemented to avoid or minimize potential impacts are identified, where relevant. In accordance with HRS Chapter 343 and HAR §11-200.1, the description of the affected environment focuses on those resources and conditions

[8] Decommissioning activities will be conducted in accordance with all relevant ordinances and regulatory requirements that are in place at the time of decommissioning. Because decommissioning will not be expected to occur for many years, and given that regulatory requirements could change, the applicable permitting and regulatory requirements will be reviewed with the appropriate county and state agencies prior to decommissioning activities to ensure compliance.

potentially impacted by the Project, with the level of detail commensurate with the importance of the impact; resources that are not present (or otherwise do not apply) are not discussed.

3.1 Climate

3.1.1 Affected Environment

The Hawaiian Islands have a semi-tropical climate, characterized by mild temperatures and moderate humidity throughout the year (except at high elevations), persistent northeasterly trade winds, and infrequent, severe storms. The two primary seasons recognized are summer and winter. The summer or dry season (May through September) is characterized by warmer temperatures, drier conditions, and trade winds are prevalent 80 to 90 percent of the time. During the winter or wet season (October through April) temperatures are cooler, winds are more variable, and rainfall is higher compared to the summer (Juvik and Juvik 1998; WRCC 2021). Local climate conditions in Hawaiʻi are influenced by its rugged, mountainous topography, and winds.

The climate in the area of the proposed Project is characterized as arid and sunny (Price et al. 2012). In this area of Oʻahu, dry weather is prevalent, with the exception of sporadic trade wind showers and short-duration storms. According to the Online Rainfall Atlas of Hawaiʻi (Giambelluca et al. 2013), the area receives a mean annual rainfall of approximately 21 inches. Rainfall is typically highest in November–January and lowest in June–July (Giambelluca et al. 2013). The mean annual air temperature for the area is 75 degrees Fahrenheit (Giambelluca et al. 2014). Annual wind speed ranges from 6 to 7 miles per hour (mph), and the prevailing wind direction is from the east.

Climate Change

Climate change is a result of greenhouse gas (GHG) emitted all around the world from sources such as the combustion of fuel for transportation and heat, cement manufacture, and refrigerant emissions. GHG trap heat in the atmosphere, thus affecting the earth's temperature. Scientific evidence indicates a trend of increasing global temperatures and other related climatic changes caused by an increase in global GHG emissions.

In the absence of GHG emissions abatement, climate change impacts will include rising sea levels, increasing air temperatures and associated heat waves, declining trade winds and rainfall levels, increasing intensity of storms and frequency of extreme weather events, increasing ocean temperature and acidification, and exposure of native plants and animals to risk of extinction (ICF and UHERO 2021a).

Area sources of GHG include emissions from natural gas combustion, landscaping equipment, consumer products, and architectural coatings. Indirect sources include emissions from energy consumption and water conveyance. Mobile sources include emissions from passenger vehicles and delivery trucks. Typically, mobile sources are the primary contributor of GHG emissions.

In Hawaiʻi, total GHG emissions increased approximately 13 percent from 1990 to 2007 but have been declining since that time. In 2007, the state of Hawaiʻi passed Act 234 to establish the state's policy

framework and requirements to address GHG emissions. The law aimed to achieve emission levels at or below Hawaii's 1990 GHG emissions by January 1, 2020 (excluding emissions from airplanes). Compared to 1990, total GHG emissions for 2017 were estimated to be approximately 21.5 million metric tons of carbon dioxide equivalent, roughly 6 percent lower than 1990 levels. It is projected that total emissions will continue to decline, largely driven by the projected trend in emissions from energy industries (i.e., electric power plants and petroleum refineries), which are expected to decrease between 2017 and 2030 (ICF and UHERO 2021b).

In 2020, the City and County of Honolulu adopted Ordinance 20-47, establishing "a Climate Action Policy for the city to transition to 100 percent renewable energy within the city and achieve net-negative carbon emissions for emissions related to activities within the city no later than 2045, consistent with state law." The One Climate One O'ahu, Climate Action Plan 2020-2025, presents nine climate strategies and 47 actions for the City to pursue in the next five years to substantially reduce GHG emissions from ground transportation, electricity, and waste sectors — a reduction of 45 percent by 2025 relative to 2015, an additional 16 percent relative to an estimated baseline (ICF and UHERO 2021a).

3.1.2 Potential Impacts and Mitigation Measures

Construction of the Project would not be expected to have a measurable effect on local climate conditions including temperature, rainfall, humidity, or wind patterns. Construction of the Project would result in a limited amount of GHG emissions, including the use of construction equipment and vehicles. Published data from the EPA indicate that 22.4 pounds of carbon dioxide are produced for every gallon of diesel fuel burned, and 19.6 pounds are produced for every gallon of gasoline used (EPA 2021). Impacts from Project construction emissions would be temporary and localized and would not substantially affect regional or global GHG levels. In order to minimize GHG emissions associated with Project construction, Project vehicles and equipment will be maintained in proper working order and in compliance with federal and state emissions standards. As such, construction of the Project would be expected to have a negligible, short-term impact on GHG emissions and climate change.

Once constructed, solar energy from the Project will replace a portion of electricity that is currently generated by burning fossil fuels, thus substantially reducing GHG emissions. In total, the Project is expected to offset approximately 1,139,396 barrels of fossil fuel consumption by Hawaiian Electric's generating units and reduce net lifecycle GHG emissions by approximately 455,598 metric tons of carbon dioxide equivalents over its lifecycle (Hawaiian Electric 2020c). A small amount of GHG emissions would occur from Project operation activities, such as employee vehicle use and vegetation maintenance. The amount of these emissions would be very minor in comparison to the reductions in GHG emissions provided by the Project. As such, the Project would be expected to provide a net benefit relative to GHG emissions and climate conditions; no mitigation measures are proposed.

3.2 Geology, Topography, and Soils

3.2.1 Affected Environment

The island of Oʻahu was formed by two ancient shield volcanoes that erupted between 1.3 and 2.2 million years ago: the Waiʻanae volcano in the west, and the Koʻolau volcano in the east. Over millennia, erosion of the Koʻolau and Waiʻanae volcanoes created the existing Waiʻanae and Koʻolau mountain ranges resulting in the formation of the island's characteristic ridges, valleys, gullies, and gulches (Juvik and Juvik 1998). The Project area is located approximately 3.5 miles south of the foot of the Waiʻanae Mountains on the ʻEwa Plain, which formed when the lavas from the two volcanoes merged. The coastal portion of the ʻEwa Plain consists of exposed coral reef (Moberly et al. 1963).

The topography in the Project area is relatively flat and generally slopes gently to the southeast over 1.5 miles toward the ocean. Elevations within the Project area range approximately 50 feet above mean sea level on the northern extent to 10 feet above mean sea level at the southwestern extent. Slopes in the Project area range about 0–15 percent. Within portions of the Project area the microtopography is uneven due to numerous coral reef limestone outcroppings and sinkholes (also referred to as limestone pits) scattered throughout the area. Sinkholes are openings in the surface created by rainwater corroding the coral ground surface (Ziegler 2002).

Soil cover across nearly the entire Kalaeloa area consists of a thin layer of friable, red material present in cracks and crevices on coral outcrop. As shown in Figure 3-1, the Natural Resources Conservation Service identifies three soil types in the Project area (NRCS 2019). Approximately 87 percent of the Project area is identified as coral outcrop, which consists of coral and cemented calcareous sand. The northern portion of the Project area (Area 1) is defined as fill land, mixed; this soil type occurs in areas that were filled by materials dredged from the ocean or hauled from nearby areas. A very small portion of the Project area near the intersection of Coral Sea Road and Roosevelt Avenue is classified as Mamala stony silty clay loam, 0 to 12 percent slopes. Coral rock fragments are common in this soil type, and it is moderately permeable with slight to modern erosion potential (Foote et al. 1972).

The soils underlaying the northern portion of the Project area (Area 1) are classified by the Natural Resources Conservation Service as Type B Hydrologic Soils which have moderate infiltration and runoff potential. The southern portions of the Project area (Area 2 and Area 3) contain Type D Hydrologic Soils, which have little infiltration and high runoff potential (Westwood 2020).

3.2.2 Potential Impacts and Mitigation Measures

As described in Section 2.2, the Project has been designed to follow the existing topography of the Project area to minimize soil and ground disturbance. Grading is limited to smoothing existing topography in limited areas for installation of solar PV equipment, substation foundation, gravel roads, and equipment pads. Other forms of ground disturbance would include trenching for installation of electrical wiring and collector lines that would connect the solar arrays with the power conversion stations and substation and trenching for portions of the generation-tie line.

Although soil disturbance would be minimized to the extent possible, Project construction would result in small topographic changes and disturbance of soils. The affected soils have previously been extensively disturbed by fill, as well as military and agricultural activities. Therefore, the Project would not disturb or otherwise modify any native soil formations. Nevertheless, soil disturbance related to Project construction activities would increase the potential for soil erosion in the form of fugitive dust and suspended sediment in stormwater runoff. Stormwater and erosion control BMPs would be implemented to minimize the potential for construction-related erosion. BMPs related to water quality and air quality are discussed in Sections 3.3.2 and 3.9.2, respectively.

After construction is completed, operations and maintenance of the Project would involve little to no ground disturbance. The potential for erosion during operations will be minimized through the incorporation of rock berms/swales and retention areas described in Section 2.2. Therefore, operation of the Project would not be expected to contribute to soil erosion or sedimentation. At the end of its useful lifetime, the Project components would be removed, as detailed in Section 2.4. Project decommissioning would involve some ground disturbance which may result in soil erosion. The BMPs discussed for construction would be implemented again during decommissioning to minimize the potential for erosion.

With implementation of BMPs discussed in this section and Section 2.2, construction and operation of the Project would not be expected to result in significant impacts to soils, geology, and topography. Therefore, the Project is expected to have minor, less than significant impacts to these resources.

3.3 Water Resources

3.3.1 Affected Environment

The Project is in the Kaloʻi Gulch watershed, which encompasses roughly 10.9 square miles (Parham et al. 2008). Hydrology in this area of Oʻahu is influenced by low rainfall (see Section 3.1 above) and high evapotranspiration rates.

Groundwater

Groundwater resources on Oʻahu have been distributed into six hydrologic units, primarily based on geologic and hydrologic characteristics. Each hydrologic unit is further split into aquifer systems. The Project area is located within the Puʻuloa aquifer system, one of several aquifer systems in the Pearl Harbor hydrologic unit. The Puʻuloa aquifer system is also located in the ʻEwa Caprock Aquifer System Area. In this area of Oʻahu, groundwater generally flows to the ocean through volcanic material, but is impeded by the ʻEwa caprock. This caprock consists of a thick wedge of marine and terrestrial sediments that were deposited on the flanks of the Koʻolau and Waiʻanae volcanoes during sea level changes. Below the upper layers, the caprock is a relatively impermeable barrier that restricts seaward flow of freshwater (Stearns and Chamberlain 1967; Bauer 1996).

Because the ‘Ewa Caprock Aquifer System Areas overlie basal groundwater bodies of other aquifer sectors and systems (such as Pu‘uloa), and because the dynamics of groundwater communication between the caprock and basal aquifers is unclear, the Hawai‘i Commission on Water Resource Management established sustainable yields for the ‘Ewa Caprock Aquifer System Areas based on the chloride content of groundwater in individual irrigation wells rather than on average daily pumping rates across the aquifer system area, as was done for the basal aquifers (CWRM 2019). A sustainable yield of 1,000 milligrams per liter of chloride was adopted for all three ‘Ewa Caprock Aquifer System Areas including Pu‘uloa (CWRM 2019). The Pearl Harbor hydrologic unit has been designated a Groundwater Management Area, meaning groundwater use and development is regulated by the Commission on Water Resource Management (CWRM 2019).

No groundwater was encountered during geotechnical investigation borings conducted in the Project area in November 2020 (Geolabs 2021); however, groundwater levels in the area likely change in response to various factors including rainfall and surface runoff.

As discussed in Section 3.11, prior to the closure of NASBP and disposal of real properties, the U.S. Navy was required to identify contaminated and uncontaminated areas of the NASBP and therefore conducted environmental baseline surveys at the NASBP from August to November 1993 and documented their findings in the *Environmental Baseline Survey (ESB) Report, NAS Barbers Point, Oahu, Hawaii* (Ogden 1994). The Navy identified a base wide Point of Interest (POI-49) associated with the regional groundwater quality below the former NAS Barbers Point. During the remedial investigation conducted in 1999 (Ogden 1999), hazardous substances (arsenic, atrazine, bis(2-ethylhexyl)phthalate, 4,4’-DDE [dichlorodiphenyldichloroethylene], 4,4’-DDT [dichlorodiphenyltrichloroethane], lead, lindane, and thallium) were detected in base wide groundwater at low concentrations that posed no threat to human health or the environment (Ogden 2001). Due to the low concentrations of hazardous substances, a no further action decision was decided by the U.S. Navy and concurred with by EPA and DOH in 1999 as presented in the Record of Decision (Department of Navy 1999a).

Surface Water

There are no wetlands, streams, or other surface water bodies within the Project area vicinity likely due to the highly permeable substrate. Water resources identified in the vicinity by the U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory data (NWI 2019), the U.S. Geological Survey topographic and National Hydrography Dataset (2020), and the State of Hawai‘i Division of Aquatic Resources dataset (DAR 2008) are shown in Figure 3-2. The closest surface water body to the Project area is Ordy Pond which is less than 130 feet (40 meters) southeast of the Project area, north of Tripoli Road on TMK 9-1-013:041. This pond is identified as a freshwater forested/shrub wetland by National Wetlands Inventory (NWI 2019) and a perennial land/pond by National Hydrography Dataset (2020). According to the U.S. Navy, Ordy Pond is a brackish water filled sinkhole that was previously hydrologically connected to the ocean prior to sediment accumulation (Department of Navy 2011). The Pacific Ocean is less than 0.4 miles to the south of the Project area.

3.3.2 Potential Impacts and Mitigation Measures

Groundwater

During Project construction, no direct interaction with groundwater is anticipated from the construction activities described in Section 2.2. This includes the installation of foundation posts for the racking system to depths of approximately 6–10 feet and undergrounding the collector and generation-tie lines. In addition, no local groundwater resources would be utilized within the Project area by wells or other means.

Potential indirect impacts to groundwater include decreased recharge, reduced availability, or degraded quality due to stormwater runoff associated with the creation of impervious surfaces. As discussed below, the Project would result in the addition of minimal amounts of impervious surfaces. However, the Project area vicinity contains sufficient permeable ground surface to allow for natural infiltration. The Project would incorporate stormwater retention features to increase groundwater infiltration within the Project area. Therefore, no negative impacts to groundwater recharge are anticipated. The Project's total water consumption for construction and operations would be minimal. Therefore, the Project would not significantly affect groundwater availability.

During construction, some hazardous materials, such as diesel fuel, gasoline, and lubricants would be used within the Project area. If not properly handled, accidental spills or releases of these materials could adversely affect groundwater quality. As discussed in Section 3.11, quantities of these materials would be limited, and BMPs would be implemented to minimize the potential for release. Adequate sanitation facilities would be provided. With implementation of these measures, no adverse impacts to groundwater are expected.

Surface Water

No surface water resources occur within the Project area; therefore, the Project would not result in indirect impacts to surface waters. Indirect impacts to surface water can include changes in drainage patterns, increased stormwater runoff volume or velocity, and discharge of pollutants to downstream waters via sedimentation. As discussed in Section 2.2, proposed impervious surfaces have been minimized to the extent possible, and only include the electrical equipment and foundations required for the site. Access roads will be constructed of coarse gravel to allow infiltration. Solar panels will be raised above the proposed vegetation and will therefore not be considered impervious. Impervious surfaces can increase stormwater runoff volume and velocity. The Project would utilize mitigation measures to protect and limit indirect impacts to surface waters, including but not limited to:

- Minimizing grubbing and disturbance of soils by limiting tree removal and grading activities.
- Revegetating the site following construction for soil stabilization.
- Maintaining natural stormwater drainage patterns and utilizing LID techniques.
- Minimizing soil compaction by limiting traffic to established gravel roads.

- Minimizing creation of impervious surface by utilizing permeable ground vegetation around solar panels.
- Directing stormwater runoff to vegetated areas by means of vegetated stormwater infiltration basins, water detention basins, and planned vegetation management.
- Utilizing LID measures and BMPs such as groundwater infiltration basins and sedimentation basins.
- Avoiding earthwork during adverse weather conditions and revegetating or stabilizing disturbed areas as soon as possible.
- Preparing a Spill Prevention, Containment, and Countermeasure Plan prior to construction, to include measures for the safe transport, handling, and storage of hazardous materials.
- Preparing an Erosion Sediment Control Plan, which will include more specific BMPs.
- Obtaining an NPDES Construction Stormwater Permit.

With the implementation of these BMPs, minor increases in impervious surface are expected to have negligible, less than significant effects on surface waters in the vicinity of the Project area.

3.4 Biological Resources

3.4.1 Affected Environment

Several biological surveys have been conducted in the Project area (Tetra Tech 2021a, 2021b). Tetra Tech conducted a general plant and wildlife survey within the Project area on June 3, 9, and 11, 2020. The purpose of this survey was to characterize the existing plant and animal habitat and determine whether federally or state-listed endangered or threatened species (pursuant to the federal Endangered Species Act or HRS Chapter 195D), or otherwise rare plants or animals have the potential to occur and could be impacted by construction or operation of the Project. In addition, specific surveys to detect the state listed pueo or Hawaiian short-eared owl (*Asio flammeus sandwichensis*) were conducted on the morning of June 11, 2020 and the evenings of August 17, October 8, and November 16, 2020. The pueo survey methods followed the Pueo Project Survey Protocol (Price and Cotin 2018) but were adjusted to stay within the boundaries of the Project area. Because the June 2020 biological survey was conducted during the dry season and the endangered ‘akoko (*Euphorbia skottsbergii var. skottsbergii*) is known to occur nearby, a supplemental survey for the endangered ‘akoko was conducted by Tetra Tech and LeGrande Biological Surveys Inc. during the wet season in April 2021. The ‘akoko survey included appropriate portions of the Project area, as well as a 328-foot (approximately 100-meters) buffer from the Project’s limits of disturbance in areas with suitable habitat. Finally, Tetra Tech conducted a general plant and wildlife survey of the Coral Sea Road ROW on May 5, 2021.

In general, the biological surveys found that the Project area has been extensively disturbed and modified by the previous military use, current activities, and the introduction of invasive species, which has resulted in a reduction of native species and suitable habitats for native species. The results of the biological surveys are summarized in the sections below. Additional detail is provided in the Biological

Resources Survey Report (Tetra Tech 2021a) and Supplemental ʻAkoko Survey Report (Tetra Tech 2021b), which is contained in Appendix C.

Vegetation

A total of 138 plant species were recorded during the biological surveys; a complete list is provided in the Biological Resources Survey Report (Appendix C). Of the species observed, 12 plant species are native to the Hawaiian Islands (Table 3-1). None of the plant species observed in the Project area are federal or state listed threatened, endangered, proposed listed, or candidate plant species. Eleven wiliwili (*Erythrina sandwicensis*) trees were recorded in the Project area during the biological survey; however, wiliwili is not a federal or state listed species but is listed as Vulnerable in the International Union for Conservation of Nature's Red List (IUCN 2021). Wiliwili trees are relatively rare on Oʻahu but are more abundant on other Hawaiian Islands. It is considered a keystone species in lowland dry forests and is culturally important to Hawaiians (Kaufman et al. 2020). None of the other native plants observed in the Project area are considered rare throughout the Hawaiian Islands (Wagner et al. 1999). Details about the endangered ʻakoko that occurs outside the Project area are provided in the subsection below.

Table 3-1. Native Plant Species Recorded in the Project Area During the Surveys

Common/Hawaiian Name	Scientific Name	Status
ʻānunu	*Sicyos pachycarpus*	E
hoary abutilon	*Abutilon incanum*	I
ʻiliahiʻaloʻe	*Santalum ellipticum*	E
ʻilieʻe	*Plumbago zeylanica*	I
ʻilima	*Sida fallax*	I
kaunaʻoa pehu	*Cassytha filiformis*	I
kīpūkai, seaside heliotrope	*Heliotropium curassavicum*	I
pāʻū-o-Hiʻiaka	*Jacquemontia sandwicensis*	E
pololei	*Ophioglossum polyphyllum*	I
pōpolo	*Solanum americanum*	I
wiliwili	*Erythrina sandwicensis*	E
ʻuhaloa	*Waltheria indica*	I

Status: E = Endemic (native only to the Hawaiian Islands); I = Indigenous (native to the Hawaiian Islands and elsewhere). Species highlighted in grey were observed immediately outside of the Project Area.

The primary vegetation type within the Project area is kiawe (*Prosopis pallida*)/buffelgrass (*Cenchrus ciliaris*) forest, which is characterized by large kiawe trees, roughly 15 to 30 feet (5 to 9 meters) tall. The kiawe canopy ranges from open to dense thickets. In general, dense mats of buffelgrass occur in the understory. In areas with denser canopy cover, Guinea grass (*Megathyrsus maximus*), Chinese violet (*Asystasia gangetica*), and Zulu giant (*Stapelia gigantea*) are common in the understory. The non-native koa haole (*Leucaena leucocephala*) and ʻopiuma (*Pithecellobium dulce*) trees are also widely scattered in this vegetation type. Sisal (*Agave sisalana*) also occurs in dense patches. Three native species—ʻilima (*Sida fallax*), hoary abutilon (*Abutilon incanum*), and ʻuhaloa (*Waltheria indica*)—are common. The native kaunaʻoa pehu (*Cassytha filiformis*) grows down from the canopy of kiawe trees in some areas, and the native ʻilieʻe (*Plumbago zeylanica*) is also present (Tetra Tech 2021a).

The Koa Haole Scrub is the second most common vegetation type and is scattered in the area located between array Areas 1 and 2, as well as in Area 2, and along the outer edges of the Coral Sea Road ROW. It is characterized by open to dense stands of non-native koa haole trees, ranging from 4 to 10 feet (1 to 2.5 meters) in height. Buffelgrass and Guinea grass are the most abundant plants in the understory, although the native ʻuhaloa and ʻilima, along with non-native Sida acuta, Chinese violet, and Zulu giant are also common in the understory. ʻOpiuma and kiawe trees are sparsely scattered throughout this vegetation type (Tetra Tech 2021a).

Other vegetation types in the Project area include: Ruderal Vegetation on fallow land, along the edges of roads, in mowed or cleared areas, surrounding existing facilities, or in previously disturbed areas; Non-Native Grassland occurs in the central portion of Area 3; and small areas of Mixed Non-Native Forest are in Areas 1 and 2 (Tetra Tech 2021a).

Federally and State Listed Species

The Endangered Species Act provides protection for species listed as threatened or endangered and their habitats, specifically those areas that have been designated as "critical habitat." The Endangered Species Act defines an endangered species as one that is "in danger of extinction throughout all or a significant portion of its range" and a threatened species as one that "is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." Critical habitat includes areas containing essential habitat features for threatened or endangered species, regardless of whether those areas are currently occupied by the species (16 United States Code § 1532). Endangered and threatened species are also protected under state law, pursuant to HRS Chapter 195D. HRS Chapter 195D-4 specifies that any species listed as endangered or threatened under the Endangered Species Act shall also be listed as such under state law; other species may also be state listed as endangered or threatened based on habitat impacts, overutilization, disease or predation, or other specified factors. The Endangered Species Act and HRS Chapter 195D are administered by the USFWS and state of Hawaiʻi Department of Land and Natural Resources (DLNR) Division of Forestry and Wildlife (DOFAW), respectively.

As stated above, no federal or state listed plant species were recorded in the Project area during the surveys. However, the endangered ʻakoko (*Euphorbia skottsbergii* var. *skottsbergii*) has been recorded adjacent to the Project area within TMK 9-1-013:039 (the U.S. Navy's former Northern Trap and Skeet Shooting Range) (Department of Navy and Isla Botanica 2012; USFWS 2019b). The April 2021 survey by Tetra Tech and LeGrande Biological Surveys Inc. recorded a total of 36 ʻakoko plants in three locations outside of the Project area within the northern portion of TMK 9-1-013:039, which is south of Area 2 (Tetra Tech 2021b). All of the ʻakoko individuals recorded during the April 2021 survey are more than 100 meters from the Project's limits of disturbance and more than 100 meters from the closest TMK boundary of TMK 9-1-013:039.

In addition, critical habitat for the endangered ʻakoko and 16 other listed species has been designated by USFWS adjacent to the Project area on TMKs 9-1-013:039 and 9-1-013:042 (USFWS 2012; see

Figure 3-3). This 166-acre critical habitat area, referred to as Oʻahu Lowland Dry – Unit 11, is occupied by the endangered ʻakoko, but none of the other 16 listed plant species are known to occur in the unit.

Wildlife

The majority of the animal species recorded in the Project area are not native to the Hawaiian Islands (see Table 3-2). A total of 33 bird species were recorded during the biological surveys. Warbling white-eye (*Zosterops japonicus*), common myna (*Acridotheres tristis*), and red-vented bulbul (*Pycnonotus cafer*) were the most commonly observed avian species recorded during the surveys. Most of the bird species recorded are non-native to the Hawaiian Islands and are commonly found in rural or agricultural areas; however, two listed bird species—the state and federally endangered aeʻo or Hawaiian stilt (*Himantopus mexicanus knudseni*)[9] and the state listed pueo—were recorded within the Project area. In addition, endangered ʻalae keʻokeʻo or Hawaiian coots (*Fulica alai*) were detected immediately adjacent to the Project area at Ordy Pond. Listed species are discussed in further detail below. One native migratory bird species—the kōlea or Pacific golden-plover (*Pluvialis fulva*)—was seen in the Project area and is protected by the Migratory Bird Treaty Act. A complete list of the bird species observed is provided in the Biological Resources Survey Report (Appendix C).

Table 3-2. Native Wildlife Species Recorded in the Project Area During the Surveys

Common/Hawaiian Name	Scientific Name	Status
Birds		
ʻAlae keʻokeʻo, Hawaiian coot**	*Fulica alai*	E
Aeʻo, Hawaiian stilt**	*Himantopus mexicanus knudseni*	E
Pacific-golden plover	*Pluvialis fulva*	M
Pueo, Hawaiian short-eared owl*	*Asio flammeus sandwichensis*	E
Invertebrates		
Globe skimmer	*Pantala flavescens*	I
Green darner	*Anax junis*	I

Status: E = Endemic (native only to the Hawaiian Islands); I = Indigenous (native to the Hawaiian Islands and elsewhere); M = Migrant.
Species highlighted in grey were seen or heard immediately outside of the Study Area.
** = Federal and state listed species.
*= State listed species

Several non-native terrestrial mammalian species were detected in the Project area. Cats (*Felis catus*), small Indian mongoose (*Herpestes javanicus*), horses (*Equus ferus caballus*), goats (*Capra aegagrus hircus*), a single cow (*Bos taurus*), dogs (*Canis lupus familiaris*), and sheep (*Ovis aries*) were all observed within the Project area. According to a resident in the area, feral pigs (*Sus scrofa*) have also been seen within the area (J. Bond, pers. comm., January 2021). Although not observed, other introduced mammals, such as house mice (*Mus musculus*) and rats (*Rattus* spp.), are likely to occur in the Project area.

[9] USFWS (2021) recently proposed to reclassify the Hawaiian stilt from an endangered species to a threatened species.

Twenty-four invertebrate species were observed during the biological surveys. Of these species, only the globe skimmer (*Pantala flavescens*) and green darner (*Anax junis*) are native to the Hawaiian Islands. A complete list of the invertebrate species observed is provided in the Biological Resources Survey Report (Appendix C).

Federally and State Listed Species

As stated above, two listed wildlife species—the Hawaiian stilt and the pueo—were recorded in the Project area. In addition, Hawaiian coots were detected immediately outside of the Project area at Ordy Pond, and could transit through the Project area. Several other federally or state listed species also have the potential to occur within or traverse over the Project area. These species include ʻōpeʻapeʻa or Hawaiian hoary bat (*Lasiurus cinereus semotus*), ʻuaʼu or Hawaiian petrel (*Pterodroma sandwichensis*), ʻakeʻake or band-rumped storm petrel (*Oceanodroma castro*), ʻaʼo or Newell's shearwater (*Puffinis auricularis newelli*), and ʻalea ʻula or Hawaiian common gallinule (*Gallinula galeata sandvicensis*). Listed species are briefly described below.

Pueo

Pueo or Hawaiian short-eared owl, are not federally listed, but are listed as endangered by the state of Hawaiʻi only for the island of Oʻahu. It is a culturally significant endemic subspecies of the widespread short-eared owl (*Asio flammeus*) and is believed to have colonized the Hawaiian Islands after the arrival of Polynesians (Price and Cotín 2018).

Pueo are found on all of the main Hawaiian Islands, at elevations ranging from sea level to 8,000 feet (2,438 meters). On Oʻahu, pueo occupy a variety of habitats, including agricultural lands, grasslands, wetlands, shrublands, and native forests. It is suggested their habitat use may be influenced by food availability (Price and Cotín 2018). Pueo are active during the day, with increased activity levels at dawn and dusk, and are commonly seen hovering or soaring over open areas. There is limited information regarding breeding of this species, but nests have been found throughout the year. Nests are made of scrapes in the ground lined with grasses and feather down (DLNR 2015; Price and Cotín 2018). Threats to the pueo include loss and degradation of habitat, predation by introduced mammals, and disease; other concerns relate to pesticides and other contaminants, food shortages, nest predation, and human interaction (Pueo Project 2019).

A single Hawaiian short-eared owl was observed in the Project area on the morning of June 11. The pueo was observed flying into the non-native grassland in Area 3. No additional Hawaiian short-eared owl were detected on the subsequent three evening surveys. Given the pueo sighting and habitat present, pueo could forage, roost, or nest in and around the Project area.

Listed Waterbirds

Listed waterbird species that occur on Oʻahu include the Hawaiian stilt, Hawaiian coot, and Hawaiian common gallinule (collectively referred to as listed waterbirds).[10] Listed Hawaiian waterbirds are primarily found in and around fresh and brackish-water marshes and natural or man-made ponds. Hawaiian stilts may also be found in fields, and wherever ephemeral or persistent standing water may occur (Kawasaki et al. 2019). No suitable habitat for listed waterbirds occurs in the Project area. However, suitable habitat does occur immediately adjacent to the Project area at Ordy Pond, which is approximately 130 feet from Area 3. Tetra Tech detected the Hawaiian stilt flying over the Study Area, and Hawaiian coots were detected immediately outside the Project area at Ordy Pond. Both listed waterbirds have been reported to regularly occur at and nest at Ordy Pond (C. Carnes/NAVFAC Hawaii, pers. comm., March 2021); therefore, these two waterbird species could traverse the Project area.

Listed Seabirds

Federally and state listed seabird species that occur in Hawaiʻi include the Hawaiian petrel, band-rumped storm petrel, and Newell's shearwater (collectively referred to as listed seabirds). Both petrel species are federally and state listed as endangered, and Newell's shearwater is federally and state listed as threatened.

Hawaiian petrels are known to breed on Kauaʻi, Maui, Hawaiʻi, Lānaʻi, and possibly Molokaʻi and Kahoʻolawe (Pyle and Pyle 2017). Although previously thought to be extirpated from Oʻahu, this species was recently detected at Mt. Kaʻala and Poamoho (Young et al. 2019) and appear to be regularly prospecting for nesting sites and potentially breeding on Oʻahu (Pacific Rim Conservation 2019). Hawaiian petrels spend most of their life at sea, and rarely return to land outside of the breeding season (March to December). During the non-breeding season, they are found far offshore, primarily in equatorial waters of the eastern tropical Pacific. They nest in colonies, returning to the same nest site each year. Colonies are typically located in high elevation, xeric habitats, or wet, dense forests. Nesting occurs in burrows, crevices, or cracks in lava tubes (DLNR 2015).

Band-rumped storm petrels breed on islands in the subtropical Pacific and Atlantic Oceans, with Pacific populations found in Hawaiʻi, Japan, and the Galapagos Islands. Historically, this species is believed to have commonly occurred on all of the main Hawaiian Islands, but its' population size and range have significantly decreased over time. In Hawaiʻi, the breeding population is believed to be very small with scarce breeding sites, including remote cliff locations on Kauaʻi and Lehua Island, and steep cliffs and high-elevation lava fields on Hawaiʻi Island (KESRP 2019a; USFWS 2016). Although historically known from Oʻahu, no known breeding population occurs on Oʻahu and observations of band-rumped storm petrels on Oʻahu are very rare (USFWS 2016; Price 2020).

[10] The Hawaiian duck is not included in this discussion because genetic studies indicate that the Oʻahu population is heavily compromised by hybridization with feral mallards (*Anas platyrhynchos*) and few ducks with predominantly Hawaiian duck characteristics remain (Browne et al. 1993; Fowler et al. 2009; USFWS 2011).

Newell's shearwaters breed primarily on Kaua'i, but small populations also occur on Maui and Hawai'i. The species also possibly breeds on Moloka'i. Similar to Hawaiian petrels, Newell's shearwaters were recently detected in two locations on O'ahu—Mount Ka'ala in the Wai'anae Mountains and at Poamoho in the Ko'olau Mountains (KESRP 2019b; Young et al. 2019). Evidence suggests Newell's shearwaters are regularly prospecting for nesting sites and potentially breeding on O'ahu (Pacific Rim Conservation 2019). Newell's shearwaters remain at sea during the non-breeding season. Breeding colonies are typically located on steep mountain slopes and cliffs, with nesting in burrows, generally beneath ferns and tree roots. During the breeding season (April–November), adults forage at sea during the day and return to the colony at night (DLNR 2015; KESRP 2019b).

Seabirds have not been documented in the Project area and suitable nesting habitat does not exist in the Project area. However, suitable nesting habitat may exist in upper elevations of the Wai'anae and Ko'olau Mountains, suggesting the potential for these birds to fly over the Project area at night while transiting between nest sites and the ocean.

Hawaiian Hoary Bat

The Hawaiian hoary bat is the only extant native land mammal present in the Hawaiian archipelago. It is federally and state listed as endangered due to apparent population declines and a lack of knowledge concerning its distribution, abundance, and habitat needs (USFWS 1998). Recent studies have found that Hawaiian hoary bats are more abundant across the Hawaiian Islands than previously believed (USGS 2019). It is widely distributed across the Hawaiian Islands, with breeding populations known to occur on O'ahu, Maui, Moloka'i, Kaua'i, and Hawai'i Island (Gorresen et al., 2013; Bonaccorso et al. 2015).

Hawaiian hoary bats are tree-roosting bats and roost in native and non-native vegetation over 15 feet in height, including 'ōhi'a (*Metrosideros polymorpha*), hala (*Pandanus tectorius*), coconuts (*Cocos nucifera*), kukui (*Aleurites moluccana*), kiawe, avocado (*Persea americana*), mango (*Mangifera indica*), shower trees (*Cassia javanica*), pūkiawe (*Leptecophylla tameiameiae*), ironwood (*Casuarina equisetifolia*), macadamia trees (*Macadamia* spp.), and fern clumps (USFWS 1998; Gorresen et al. 2013; DLNR 2015, 2021a). Hawaiian hoary bats are primarily solitary roosters; however, mothers and pups roost together with young left alone in roost trees during foraging (USFWS 1998). Foraging occurs in open and semi-cluttered landscapes in a wide range of habitats and vegetation types, including open pastures, forest gaps and edges, and above forest canopies (Bonaccorso et al. 2015). Hawaiian hoary bats feed at night on a variety of night-flying insects, primarily aerial beetles and moths (Todd 2012).

The biological surveys for the Project did not include focused surveys for the Hawaiian hoary bat (e.g., acoustic bat detectors or night vision goggles). As USFWS and DOFAW recognize all woody vegetation greater than 15 feet tall as potential bat roosting habitat (USFWS 2019a; DLNR 2021a), Tetra Tech noted the presence of any such trees or shrubs within the Project area which could be used for roosting. Numerous trees in the Project area (kiawe, ironwood, *Ficus* spp.) may provide suitable roosting habitat. Given the species' wide range of foraging habitat, it is also likely that bats forage in or near the Project area.

Systematic surveys for Hawaiian hoary bats are currently being conducted across O‘ahu as part of an island-wide occupancy and distribution study. The detector deployed near the Kroc Center as part of this study, approximately 1.4 miles from the Project area, has recorded bats (WEST 2020). This is the nearest known bat detector, and therefore nearest recorded detection of a Hawaiian hoary bat to the Project area. This station has documented low bat activity compared to other detector sites on O‘ahu (WEST 2020).

3.4.2 Potential Impacts and Mitigation Measures

This section discusses potential impacts to biological resources. A list of measures that would be implemented to avoid and minimize impacts to vegetation and wildlife is provided at the end of each section. The list of measures incorporates recommendations provided by USFWS and DOFAW in response to a request for input regarding potential impacts to listed species; copies of the correspondence with USFWS and DOFAW are contained in Appendix D.

Vegetation

Direct impacts to vegetation would occur primarily as a result of clearing and ground disturbance during construction. The Project is expected to have a total combined footprint of less than 100 acres on DHHL lands, of which the solar panels will cover approximately 45 acres. However, as described above, the Project area has been extensively disturbed by previous military operations and the introduction of invasive species, and the existing vegetation is largely comprised of non-native species. No federally or state listed endangered, threatened, or candidate plant species have been identified within the Project area, and no portion of the Project area has been designated as critical habitat for any listed plant species.

As stated above, wiliwili trees are present in the Project area. Although wiliwili is not listed by USFWS or DOFAW, the species is considered vulnerable and is culturally important. No Project components are planned in the areas where the wiliwili trees were mapped during the surveys; therefore, the 11 recorded wiliwili trees within the Project area will not be directly impacted by the Project. The remainder of the native plant species identified within the Project area are not considered rare throughout the Hawaiian Islands.

Although the endangered ‘akoko and plant critical habitat occur adjacent to the Project area, the Project would maintain a buffer of at least 328 feet (100 meters) from the known ‘akoko plants on TMK 9-1-013:039, as recommended by DOFAW and USFWS (USFWS 2018). The Project would incorporate multiple layers of fire prevention and suppression measures as described in Section 3.13.2; this would include on-going vegetation management, fire breaks, a fire detection and suppression system specifically designed for lithium-ion battery energy storage systems, and alarms and sensors that would alert staff and emergency personnel in the event of a system issue. Additional measures to minimize direct or indirect impacts to the nearby endangered ‘akoko and nearby critical habitat are listed in the subsection below.

Ground disturbance, as well as the movement of construction and operation equipment and personnel in the Project area, could also indirectly impact vegetation through the further introduction or spread of invasive species. Although non-native and invasive species are already abundant or common in the area, measures to avoid the unintentional introduction or transport of new invasive species, or spread invasive species further, are provided below.

Following construction, all temporarily disturbed areas would be revegetated to stabilize soil and prevent erosion. As described in Section 2.2.5, it is anticipated that revegetation would involve application of hydroseeding using a suitable mix of non-invasive grasses and/or species that are currently found throughout the site. In addition to revegetation of temporarily disturbed areas, landscaping may also be installed to provide visual screening of Project equipment from adjacent areas to the extent practicable, and as required by HCDA. It is anticipated that the landscaping would incorporate suitable plant material in key locations and would include native species appropriate for this location, as practicable.

During Project operations, little to no ground disturbance is anticipated. As stated in Section 2.3, vegetation within the Project area would be routinely managed under and in the areas between the solar panels, primarily through mechanical control such as mowing, trimming, and pruning. In rare circumstances, herbicides may be utilized for vegetation control. However, an effort will be made to minimize use and only apply biodegradable, EPA-registered, organic solutions that are nontoxic to wildlife and used in a manner that fully complies with all applicable laws and regulations. Details on vegetation control during operations will be provided in the Project's Vegetation Management Plan (Appendix B). Decommissioning of the Project, at the end of its useful life, would involve removal of the Project facilities and returning the site to the same condition (or similar) as existed prior to Project development, including revegetation with a suitable mix of species.

In summary, as the Project area is dominated by non-native vegetation, measures would be implemented to avoid or minimize impacts to the wiliwili trees on the site and the endangered 'akoko known to occur nearby (off site), implementation of the Project is not expected to have a significant impact on vegetation.

Impact Avoidance and Minimization Measures

The measures listed below would be implemented to avoid and minimize potential Project-related impacts to vegetation. With implementation of these measures, the Project would not be expected to result in significant adverse impacts to vegetation, including federally and state-listed species.

- The Project would maintain a 328-foot (100-meter) buffer from the remaining 'akoko individuals recorded in TMK 9-1-013:039, as recommended by DOFAW and USFWS (USFWS 2018).
- The Project would establish an environmental education and observation program to educate all construction and operational personnel about the nearby endangered 'akoko and critical habitat. Staff would be trained to identify the 'akoko and to take appropriate steps if the species is found.

- If landscaping is installed along the perimeter of the Project for visual screening or due to HCDA requirements, non-invasive plants will be used and native plant species will be incorporated to the maximum extent practicable.
- The Project will develop an Emergency Response Plan and Vegetation Management Plan to reduce potential fire risk to/from the Project.
- The following measures would be implemented to avoid the unintentional introduction or transport of new invasive species to the area: utilize on-site gravel, rock, soil when practicable, or purchase raw materials (e.g., gravel, rock, soil) from a local supplier when practicable; utilize certified, weed-free seed mixes; and wash and/or visually inspect (as appropriate) construction materials or equipment arriving from outside O‘ahu for excessive debris, plant materials, and invasive or harmful non-native species before transport to the Project area.
- The Project would coordinate with HDOT on their efforts to control the invasive rubbervine (*Cryptostegia grandiflora*) known to occur along Coral Sea Road and Tripoli Road.

Wildlife

As described in Section 3.4.1, most of the wildlife in the Project area is non-native to the Hawaiian Islands, and native habitats have been disturbed by previous activities and the introduction of invasive species, which has reduced the presence of native wildlife. As previously stated, the state listed pueo was observed within the Project area, and Hawaiian stilts were seen flying over the Project area during the biological surveys. Several other threatened and endangered wildlife species could occur within or traverse over the Project area. Potential impacts and associated mitigation measures specific to listed wildlife species are discussed in the subsections below.

Direct impacts to wildlife as a result of the Project could occur as a result of collision with equipment or vehicles during construction or operation. In addition, there is potential for native and non-native birds to collide with the Project facilities, particularly the solar PV modules. However, based on avian mortality data from various sources in the United States, avian mortality rates at utility-scale solar projects are estimated to be considerably lower than that associated with other types of energy projects (wind facilities, fossil fuel power plants), roads, and buildings (Walston et al. 2016).

Indirect impacts to wildlife may include habitat loss and temporary disturbance. Due to vegetation clearing, the Project would result in some wildlife habitat loss. As detailed in Section 2.2, the Project is expected to have a total combined footprint of less than 100 acres on DHHL lands, of which the solar panels will cover approximately 45 acres. This would reduce the availability of wildlife habitat within the Project area; however, the affected habitat is highly disturbed and dominated by non-native species. Furthermore, a substantial amount of habitat would remain intact within the Project area and similar habitat is present in the surrounding vicinity. It is expected that wildlife species would readily occupy the remaining habitat in the Project area and similar habitat in the vicinity, such that temporary displacement or habitat loss would not be expected to measurably affect the size or stability of any wildlife populations.

In addition to habitat loss, temporary disturbance of wildlife within the Project area would occur throughout the construction period due to increased activity and noise levels, including the use of construction vehicles and equipment. Following construction, activity and noise levels within the Project area would generally be limited to occasional facility maintenance and vegetation control. As detailed in Section 3.10, operation of the electrical equipment would also generate some sound. It is expected that wildlife would exhibit avoidance behavior and relocate to avoid Project-related activity and noise, both during the construction and operational phases of the Project, as needed.

Federally and State Listed Species

Pueo

The Project area includes suitable foraging, roosting, and nesting habitat for the state listed pueo, and as previously described, a single pueo was detected during surveys within the Project area. Pueo could be directly impacted by the Project, primarily if a nest is disturbed or removed during construction. The Project would minimize potential impacts to pueo nests by conducting pre-construction nest surveys within areas of suitable nesting habitat. In addition, site workers (particularly heavy equipment operators) would be trained to identify pueo and take appropriate steps if a pueo (or pueo nest) is found. These impact minimization measures are described in further detail in the subsection below and are expected to avoid direct impacts to pueo.

Indirect impacts to pueo may include habitat loss and temporary disturbance. As discussed above, the Project is expected to have a total combined footprint of less than 100 acres on DHHL lands, of which the solar panels will cover approximately 45 acres. Similar habitat as what will be impacted in the Project area is known to occur in the Project vicinity. It is expected that the pueo would readily use other nearby similar habitat, such that temporary displacement or habitat loss would not be expected to significantly affect the species.

During operations, the Project is not expected to significantly impact pueo. Similar to construction workers, operations personnel would be trained to identify pueo and take appropriate steps if found. To prevent secondary poisoning from toxins in pueo prey, no rodent baiting would occur as part of the Project. Although it has been generally suggested that solar panels could reflect sunlight, moonlight, or artificial light and therefore disorient pueo, there is no evidence regarding this potential impact to pueo. Solar modules are specifically designed to absorb light; they include a surface material that allows light to pass with minimal reflection, as well as an anti-reflective coating that further reduces reflectivity.

Avian mortality (including owls) has been recorded at solar projects outside of Hawaiʻi; while panel collision has been reported, the cause of avian death at these projects is typically unknown (Kagan et al. 2014; WEST 2014; Walston et al. 2016; Kosciuch et al. 2020). Pueo collision with solar PV panels is not known to have been documented at any utility-scale solar project in Hawaiʻi.

Listed Waterbirds

Hawaiian stilts were observed flying over the Project area, and both Hawaiian stilts and Hawaiian coots are known to occur and nest at nearby Ordy Pond. Although no suitable habitat for listed Hawaiian

waterbirds occurs within the Project area, it is likely Hawaiian stilts and coots could traverse the Project area while moving to and from Ordy Pond. Direct impacts to listed waterbirds are not anticipated during construction as the Project does not currently contain suitable habitat for waterbird species, nor would suitable waterbird habitat be created as a result of the Project.

During operation, there is limited potential for Project features to attract listed waterbirds to the area. At solar facilities in the continental United States, water dependent birds (e.g., grebes, loons, rails, coots, shorebirds, and waterfowl) have been documented to collide with PV arrays (Kosciuch et al. 2020). It has been hypothesized that some waterbirds may 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 has been termed the "lake effect." However, no studies have found a causal link for the source of waterbird mortalities observed in the continental United States.

Listed waterbird species that occur in Hawaiʻi have not been documented to collide with PV arrays. Hawaiʻi currently has over 1,000 MW of installed solar (HECO 2020; KIUC 2021) and utility-scale solar has existed in Hawaiʻi since 2008; yet there are no public records indicating endangered birds are colliding with solar panel arrays in Hawaiʻi. Waterbird activity and abundance varies regionally and may result in variation in avian mortality risk across different landscapes. There have been no reports to date of the "lake effect" from operating solar facilities in Hawaiʻi or information to indicate listed birds are colliding with solar panel arrays in Hawaiʻi.

Listed Seabirds

Although unlikely, it is possible that the three listed Hawaiian seabird species could fly over the Project area in transit between the ocean and upland breeding sites during the breeding, nesting, and fledging seasons (March to December). Seabirds may be attracted and disoriented by lights at night, which could result in fallout (Telfer et al. 1987; Ainley et al. 1997). Juvenile seabirds are particularly vulnerable to light attraction and can become exhausted from circling the light sources, resulting in collision with nearby structures or grounding. Once grounded, the birds are vulnerable to collision with vehicles and predation by small mammals (Rodríguez et al. 2017). Measures that are intended to avoid and minimize the potential seabird impacts from artificial night lights would be implemented as part of the Project, as described below.

Similar to owls, it has been generally suggested that solar PV panels could reflect moonlight, which could disorient seabirds; however, there is no known evidence regarding this potential impact to listed Hawaiian seabirds.

Seabirds have been documented colliding with overhead powerlines in Hawaiʻi, particularly on Kauaʻi Island (Raine et al. 2017); however, given that the sections of the Project's overhead generation tie-line would be replacing an existing overhead line along a busy road, this line is not anticipated to create a new collision risk for seabirds.

Hawaiian Hoary Bat

Based on the existing vegetation, Hawaiian hoary bats could forage in the Project area, or roost in woody vegetation 15 feet or taller. During construction, impacts to the Hawaiian hoary bat could occur as a result of removing or disturbing roost trees that contain young bats. During the birthing and pupping season (June 1 through September 15), there is a risk that juvenile bats that cannot yet fly on their own could inadvertently be harmed or killed. To avoid this potential impact, the Project will not remove or disturb woody vegetation during the birthing and pupping season, as described below. In addition, no barbed wire would be installed on the Project fence to prevent entanglement.

Indirect impacts to the Hawaiian hoary bat could include temporary displacement and/or permanent loss of foraging and roosting habitat. However, construction activities would generally occur during daylight hours when bats are not typically foraging; therefore, the potential for disturbance to foraging would be minimal. Given the low bat activity rates recorded at the nearby bat detectors (WEST 2020), and the extent of similar roosting and foraging habitat available in the vicinity, the potential for bat impacts associated with permanent habitat loss is also expected to be minimal.

During operations, the Project would not include any activities that would be expected to disturb or otherwise impact Hawaiian hoary bats. It has been generally suggested that bats could mistake solar PV panels for waterbodies, or artificial lighting at night could attract insect prey to the panels which could in turn attract bats to forage near infrastructure (Horváth et al. 2010; Harrison et al. 2016); however, there is no experimental, observational, or scientific literature regarding this potential impact to bats (Harrison et al. 2016; Taylor et al. 2019; Bennun et al. 2021). In addition, measures (as listed at the end of this section) would be implemented to avoid and minimize potential impacts associated with artificial night lighting to the extent possible.

Impact Avoidance and Minimization Measures

The measures listed below would be implemented to avoid and minimize potential Project-related impacts to wildlife. With implementation of these measures, the Project would not be expected to result in significant adverse impacts to wildlife, including federally and state listed species.

- The Project would establish an environmental education and observation program for all construction and regular on-site staff. Staff would be trained to identify listed species that may be found on-site or the vicinity (including ʻakoko, pueo, listed Hawaiian waterbirds, listed Hawaiian seabirds, and the Hawaiian hoary bat) and to take appropriate steps if these species are observed.
- If downed listed species are observed during construction or operations, USFWS and DOFAW would be notified using the standard protocol (USFWS 2020).
- Prior to clearing vegetation or ground-disturbing activities with heavy machinery within areas of suitable pueo nesting habitat within the Project area, pre-construction ground pueo nest surveys would be conducted by a qualified biologist to confirm pueo are not nesting in the area.

- If a pueo is observed in the Project area at any time (prior to construction, during construction, or during operation), all activities in the immediate vicinity would stop immediately. The location of the bird would be reported to a designated representative, and a qualified biologist would check the area for the presence of a pueo nest.
- If a ground nest or a pueo nesting on the ground is observed at any time (prior to construction, during construction, or during operation), an approximately 100-foot (30-meter) buffer would be established around the nest and marked in the field by a qualified biologist. DOFAW would be notified immediately. If the nest is confirmed as a pueo nest, no work would occur in the buffer until pueo nesting is complete.
- No rodent baiting would occur as part of the Project to prevent secondary poisoning from toxins in pueo prey.
- No surface water features would be created by the Project during construction or operation. Stormwater retention areas would drain within 48 hours and would be kept free of emergent vegetation to avoid attracting listed waterbirds to areas with sub-optimal habitat.
- If listed waterbirds are found in the Project area during active construction, all activities within 100 feet (30 meters) of the bird(s) will cease, and a biological monitor that is familiar with the species' biology will conduct Hawaiian waterbird nest surveys where appropriate habitat occurs. The surveys would be repeated again after any subsequent delay of work of 3 days or more (during which birds may attempt nesting). If a nest of a listed waterbird is not discovered, work may continue after the listed waterbird leaves the area of its own accord. If a nest of a listed waterbird is discovered, USFWS and DOFAW will be contacted and a 100-foot (30-meter) buffer will be established around all active nests and/or broods until the chicks/ducklings have fledged.
- Construction activities would 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 during the seabird peak fallout period, a biological monitor would be present in the construction area from approximately 0.5-hour before sunset to 0.5-hour after sunrise to watch for the presence of seabirds. Should a seabird (or other listed species) be observed and appear to be affected by the lighting, the monitor would notify the construction manager to reduce or turn off construction lighting until the individual(s) move out of the area.
- During operation, any on-site lighting would be fully shielded, triggered by motion detector, and fitted with light bulbs having a correlated color temperature of four thousand Kelvin or less, to the extent possible. Lighting would also be directed away from the solar arrays to minimize the potential for reflection and would only be used when necessary.
- No trees or shrubs greater than 15 feet tall would be disturbed, trimmed, or removed during the Hawaiian hoary bat birthing and pupping season (June 1 through September 15).
- Fencing erected as part of the Project would not have barbed wire to prevent entanglements of the Hawaiian hoary bat, except as required for safety and code compliance around the Project collector substation.

3.5 Historical Properties

3.5.1 Affected Environment

To identify, document and assess the significance of historic properties within the Project area, Pacific Legacy, Inc. conducted an AIS of approximately 163 acres of lands owned by the DHHL as well as a corridor within the HDOT Coral Sea Road ROW.

During the literature and historic map research for this Project, several repositories were visited. Relevant archaeological reports were obtained from the library of the Hawaiʻi State Historic Preservation Division (SHPD). Historic documents, maps, and reference volumes were found in the Hawaiʻi State Archives, the University of Hawaiʻi Library system, Bishop Museum Archives, and private collections. Online sources of information included the United States Department of Agriculture, the State of Hawaiʻi Department of Accounting and General Services, the Office of Hawaiian Affairs Kīpuka and Papakilo Databases, the Hawaiʻi Office of Planning Statewide Geographic Information System Program, Waihona ʻĀina, and AVA Konohiki. The field component included a 100 percent pedestrian inspection of the Project area, including the solar array and associated infrastructure areas, access corridors, and generation tie-line corridor, to identify any potential historic properties within the Project area. The results of the background research and field investigation were documented in a Draft AIS Report, which has been submitted and is pending review by the SHPD in compliance with HRS Chapter 6E and HAR §13-284. The findings of the AIS are summarized below; a copy of the Draft AIS Report is provided in Appendix A.

The Barbers Point Solar Project is located in the traditional land division of Honouliuli Ahupuaʻa, in the ʻEwa District. The traditional name for Barbers Point is Kalaeloa. Honouliuli is the largest ahupuaʻa on the island of Oʻahu and forms a portion of the ʻEwa Plain. In general, an ahupuaʻa is a land division that extends from mountain to sea, so that people residing there have access to the range of resources in those environments, from marine resources to upland agriculture and everything in between (Alexander 1882:4).

The numerous named places, myths, and proverbs associated with Honouliuli intimate that in the pre-Contact period, the region was populated and traversed. This is further shown by the many kuleana land claims[11] that were submitted during the Māhele[12] by the residents who were living on and cultivating the land. During the post-Contact period, as Western influence in the islands grew, Honouliuli Ahupuaʻa was utilized for agricultural purposes from the late nineteenth to early twentieth centuries when it transitioned to use for sugarcane and ranching.

[11] Per the Kuleana Act of 1850, common Hawaiian people were allowed to petition for land titles for land they cultivated and lived on. Land claims of native tenants were presented to the Land Commission.

[12] The Māhele was the Hawaiian land division proposed by King Kamehameha III in 1848. Land was divided into three classifications: Crown Lands (lands retained by the king), Konohiki Lands (lands given to aliʻi [royalty] and konohiki [landlords]), and makaʻāinana (common people) lands.

In the 1930s, in the northern portion of the Project area, the Ewa Mooring Mast Field was developed, which would eventually be expanded into the MCAS 'Ewa airfield, which was later subsumed under the NASBP. This was a result of the air station being targeted in the 1941 Japanese attack, which led to the United States' engagement in World War II. Plans morphed into an air station with greater capacity because of the involvement in the war. The U.S. Coast Guard remained in Honouliuli, but the U.S. Navy closed the air station in 1999, and the John Rodgers airfield became Kalaeloa Airport, as it remains today.

Extensive ground disturbance has occurred in the Project area from past commercial agriculture use followed by military development. Many remnants of traditional use in the Project area that may have existed are most likely disturbed, if not destroyed. However, structures from the military era, such as revetments, and remnants from the 1941 attack are still preserved. Some of these are recognized in the NRHP.

The AIS resulted in the identification and documentation of 17 historic properties containing a total of 438 archaeological features, see Table 3-3 and Figure 3-4. The 17 historic properties consist of limestone structures or modified limestone pits used for Hawaiian habitation, agriculture, and ceremonial activities; unmodified limestone pits of an undetermined function; and intact historical buildings and remnant infrastructure associated with MCAS 'Ewa and NASBP military bases that date from the 1940s to the late 1950s.

Table 3-3. Summary of Historic Properties Documented in Barbers Point Solar Project Area

SIHP No. (50-80-12-)	Temp Site No.	No of Features	Site Type	Possible Function	Possible Temporal Period
01729	-	2	Unmodified limestone pits	Undetermined	Undetermined
01733	-	18	Walls, mounds, and C-shapes, and limestone pits	Habitation-agriculture complex	Pre-Contact to early Post-Contact
01745	-	18	Modified and unmodified limestone pits	Agriculture	Pre-Contact to early Post-Contact
05094	-	5	Unmodified limestone pits	Undetermined	Undetermined
05099	-	27	Structural remains of Navy Seabee Camp	U.S. military	World War II era
05100	-	24	Mounds, platforms, C-shapes, enclosures, walls, mounds, and limestone pit	Pre-Contact/early post-Contact habitation and agriculture	Pre-Contact to early Post-Contact
05106	-	99	Walls, enclosures, platform, mounds, modified/ unmodified limestone sinks, berm, stone-masoned channel	Pre-Contact/early post-Contact habitation, ceremony, agriculture, recreation/U.S. military training	Pre-Contact to early Post-Contact/World War II and after
05107	-	7	Modified and unmodified limestone pits	Pre-Contact/early post-Contact agriculture	Pre-Contact to early Post-Contact
-	T-01	7	Bunkers and building foundation	U.S. military	World War II era
-	T-02	57	Aircraft revetments and related infrastructure	U.S. military	World War II era
-	T-03	160	Modified and unmodified limestone pits	Undetermined	Undetermined
-	T-07	1	L-shaped wall	Habitation	Pre-Contact to early post-Contact

SIHP No. (50-80-12-)	Temp Site No.	No of Features	Site Type	Possible Function	Possible Temporal Period
-	T-08	4	MCAS ʻEwa Airfield features	Runways, aprons, taxiways, tie-down rings, utility box, irrigation ditch	1942-1944 World War II era
-	T-09	6	Concrete structures for utilities, foundation	U.S. Military	1942, World War II and after
-	T-10	1	Unmodified limestone pit	Undetermined	Undetermined
-	T-11	1	Unmodified limestone pit	Undetermined	Undetermined
-	T-12	1	Cultural deposit	Habitation	Pre-Contact to early post-Contact

Given the substantial land modifications undertaken during construction of the U.S. military facilities in the Project area, the current distribution of archaeological features shows only a fragmented picture of the Pre-Contact and early Post-Contact archaeological record. Two concentrations of traditional Hawaiian historic properties are located in the Project area: one in the southern portion of TMK 9-1-013:040 (SIHP 50-80-12-01733, -05106, and -05107) and another in the southeastern portion of TMK 9-1-013:038 (SIHP 50-80-12-05100). Both site clusters are on exposed reef (limestone). The remaining historic properties include concentrations of unmodified limestone pits (SIHP 50-80-12-01729, -05094, T-10, and T-11), concentrations of limestone pits with a few modified pits (Sites -01745 and T-03), an isolated traditional Hawaiian habitation feature (Site T-07), a subsurface cultural deposit (T-12), and five U.S. military sites (SIHP 50-80-12-05099 and T-01, T-02, T-08, and T-09). A portion of historic property T-02 is included in the proposed Revetment District (Yoklavich 1997). No historic properties were documented within the portion of the NRHP-listed ʻEwa Battlefield Historic District located within the northern-most extent of the Project area.

3.5.2 Potential Impacts and Mitigation Measures

Significance Assessment

The State of Hawaiʻi has developed a system for evaluating significance of historic properties under HAR Title 13 Chapter 284 (HAR §13-284-6, Rules Governing Procedures for Historic Preservation Review to Comment on projects subject to review pursuant to Hawaiʻi Revised Statutes [HRS] Section 6E-42). This system is patterned after Federal Regulations 36 CFR §60.4 and is meant to provide a framework for the evaluation of significance.

For a historic property to be considered significant, it must possess integrity of location, design, setting, materials, workmanship, feeling, and/or association and meet one or more of the following cultural/historic criteria as defined by HAR §13-284-6:

Criterion “a” Be associated with events that have made an important contribution to the broad patterns of our history;

Criterion “b” Be associated with the lives of persons important in our past;

Criterion "c" Embody the distinctive characteristics of a type, period, or method of construction; represent the work of a master; or possess high artistic value;

Criterion "d" Have yielded, or is likely to yield, information important for research on prehistory or history;

Criterion "e" Have an important traditional cultural value to the native Hawaiian people or to another ethnic group of the state because of associations with traditional cultural practices once carried out, or still carried out, at the property or because of 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 17 historic properties that were identified in the AIS has been assessed pursuant to HAR §13-275-6. All of the recorded sites are assessed as significant under Criterion "d" and some were assessed as significant under additional criteria (see Table 3-4). Table 11 in the AIS Report (Appendix A) provides the significance assessment and recommended treatment for features documented during the AIS.

Table 3-4. Significance and Integrity Assessments for Historic Properties in the Barbers Point Solar Project Area

Site SIHP No. (50-80-12-)	Significance	Integrity	Recommendation[1]
01729	d	location, setting, materials, feeling, and association	Preservation
01733	d	location, design, setting, materials, workmanship, feeling, and association	Preservation / Data Recovery
01745	d	location, setting, materials, feeling, and association	Preservation / Data Recovery
05094	d	location, setting, materials, feeling, and association	Preservation/ Data Recovery
05099	d	location, setting, feeling, association	No Further Work
05100	c, d, e	location, design, setting, materials, workmanship, feeling, and association	Preservation
05106	d, e	location, design, setting, materials, workmanship, feeling, and association	Preservation / Data Recovery/ No Further Work
05107	d	location, setting, materials, feeling, and association	Preservation
XXXX (T-01)	d	location, design, setting, materials, workmanship, feeling, and association	Preservation / No Further Work
XXXX (T-02)	a, c, d	location, design, setting, materials, workmanship, feeling, and association	Preservation / No Further Work
XXXX (T-03)	d	location, setting, materials, feeling, and association	Preservation / Data Recovery
XXXX (T-07)	d	location, design, setting, materials, workmanship, feeling, and association	Preservation
XXXX (T-08)	a, d	location, design, setting, materials, workmanship, feeling, and association	No Further Work
XXXX (T-09)	a, c, d	location, design, setting, materials, workmanship, feeling, and association	Preservation
XXXX (T-10)	d	location, setting, materials, feeling, and association	Data Recovery

Site SIHP No. (50-80-12-)	Significance	Integrity	Recommendation[1]
XXXX (T-11)	d	location, setting, materials, feeling, and association	Data Recovery
XXXX (T-12)	d	location, setting, materials, feeling, and association	Data Recovery

[1] Each historic property site has one or more features associated with it. See Table 12 in the AIS (Appendix A) for a detailed list of features for each site and the associated significance assessment and recommended mitigation for each feature. Each feature is assigned one of three recommendations for mitigation (preservation, data recovery, or no further work) and detailed mitigation plans will be developed prior to Project construction.

The eight traditional Hawaiian historic properties (SIHP 50-80-12-01733, -01745, -05100, -05106, -05107, T-03, T-07, and T-12) are assessed as significant under Criterion "d", for providing information regarding patterns of pre-Contact and early post-Contact settlement and subsistence strategies related to seasonal farming on the lower and mid-elevations of the 'Ewa Plain. All unmodified limestone pits are also evaluated as significant under Criterion "d" for their potential to yield paleoenvironmental information important to the Hawaiian pre-Contact era. Specific features at SIHP 50-80-12-05100 are also assessed as significant under Criterion "c" because of the "vaulted" mounds and platform that embody a method of construction unique to this area. This historic property is also assessed as significant under Criterion "e" due to the ceremonial component to the site. Three possible ceremonial features at SIHP 50-80-12-05106 are also assessed as significant under Criterion "e" because these features (especially Feature 34), also assessed as significant under Criterion "c," is believed to be associated with the makahiki[13], and cultural practices once conducted at the site features are of great significance to Native Hawaiians.

All five of the U.S. military historic properties (Sites -05099, T-01, T-02, T-08, T-09) and U.S. military features included in SIHP 50-80-12-05106 are assessed as significant under Criterion "d" because the historic properties have the potential for yielding important information associated with the Navy's Carrier Aircraft Service Unit support facilities represented at Sites T-01 and T-02, T-08, T-09, and Cold War occupation and training on the 'Ewa Plain represented by archaeological features at SIHP 50-80-12-05106. Tuggle and Tomonari-Tuggle (1997, Appendix A:168) evaluated SIHP 50-80-12-05099 (the Seabee Camp) as lacking integrity. The site's diminished integrity was confirmed during the AIS fieldwork by the presence of only remnant utility features and a large berm on the eastern edge of the historic property that suggests the former Seabee Camp was nearly completely dismantled and a portion of the construction debris was consolidated into the berm or pushed into limestone pits. However, the location of this former camp near the revetments (Site T-02), its association with the development and dismantling of MCAS Ewa, and the setting and feeling of this location remain.

A selection of revetments and buildings included in Site T-02 are also assessed as significant under Criterion "a," for their associations with "a landmark historic event as the revetments were built specifically for the protection of aircraft following the December 7, 1941 attack," and under Criterion

[13] The makahiki began around the middle of October and lasted about four months with sports and religious festivities and kapu (prohibition) on war (see Appendix A for more information).

"c," because it "contains revetments and other structures that are important to the history of military engineering during World War II" (NRHP nomination form, Resnick et al. 2018). The sub-grade chambers at Site T-09 are also assessed as significant under Criterion "a," for their associations with post-December 7, 1941 activities and communications, and under Criterion "c" because they also reflect the history of military engineering relating to communications during the WWII era.

Project Effects

The Project will potentially impact 90 of the 438 total documented features. The following mitigation measures will be subject to review and concurrence by SHPD. The measures listed below would be implemented to avoid and minimize potential Project-related impacts to historical properties. With implementation of these measures, the Project would not be expected to result in significant adverse impacts to historical properties.

1) Historic Properties Recommended for Preservation

A total of 348 features from 12 historic properties are recommended for preservation. Five historic properties will be completely avoided and preserved (see Table 3-4) while features included in seven additional historic properties will also be avoided and preserved. Properties/features recommended for preservation include most of the traditional Hawaiian features (n=110) and limestone pits (n=188) in the Project area, six U.S. military bunkers in TMK 9-1-013:040 (T-01), the majority of buildings and contributing elements included in the proposed Revetments Area Historic District (Site T-02), and the underground chambers and associated features that make up Site T-09. The makahiki grounds (Feature 34 of Site 05106) is a significant cultural feature located outside the Project's proposed fence line (but within the Project area) and will be avoided and preserved. Opportunities for community engagement as part of the preservation of this site will be explored during the preparation of the Preservation Plan. All the aircraft revetments associated with Site T-02 are recommended for preservation and will be avoided and preserved by the Project. Full-time archaeological monitoring will be conducted during all ground-disturbing activities to ensure that all sites slated for preservation will be protected in accordance with an accepted Preservation Plan.

2) Historic Properties Recommended for Data Recovery

Data recovery is recommended for 42 features from seven of the historic properties. These include 34 unmodified limestone pits (SIHP 50-80-12-01733, -01745, -05094, -05106, T-03, T-10, and T-11), one modified limestone pit (SIHP 50-80-12-05106, Feature 2), two limestone mounds (SIHP 50-80-01733, Feature 6 and SIHP 50-80-12-05106, Feature 8), a limestone enclosure (SIHP 50-80-12-80-05106, Feature 70), three limestone wall sections (SIHP 50-80-12-05106, Feature 43, 71, and 99), and a subsurface cultural layer (T-12). These 42 features are recommended for data recovery because they will be impacted by the Project and data recovery investigations will be carried out to recover any significant archaeological or paleontological deposits from the features. The limestone pits are also culturally sensitive for the Native Hawaiian community, as previous investigations have identified limestone pits

that contain human remains near the project area. Data recovery in these instances will ensure that no human remains are adversely impacted by the proposed project.

3) Historic Properties Recommended for No Further Work

The remaining 48 potentially impacted features from six historic properties are recommended for no further work because sufficient archaeological data have been collected from the features during previous investigations and the current AIS. The documented features recommended for no further work consist of:

- All 27 structural remnants associated with the former U.S. Navy Seabee camp (SIHP 50-80-12-05099). These structures include mainly concrete features and metal elements representing underground utilities (sewer, water, and drainage) and asphalt surfaces once serving as roads and a tennis court (Feature 26). One of the features is a large soil and debris berm (Feature 23) formed during dismantlement and demolition of the former camp.
- 13 military training features included in SIHP 50-80-12-05106. These features consist of stone features, including one stone-masoned feature (Feature 28), associated with training and land modification that were once part of an active training area at NASBP. All military features in SIHP 50-80-12-05106 have been fully documented during the current AIS and the more obvious features (Features 1, 8, and 28) were recorded during previous investigations (Tuggle and Tomonari-Tuggle 1997; Wickler and Tuggle 1997; Beardsley 2001) and included subsurface testing and surface artifact collection at Feature 28. Feature 69 is a pre-Contact or early post-Contact modified sink that was previously excavated and all contents from within the sink were removed and analyzed (Beardsley 2001). Thus, all site data have been collected from the sink feature.
- One concrete curb associated with a military building foundation at Site T-01.
- The two military features at Site T-02 including a training C-shaped wall built into a revetment (Feature 56), and a quarry pit from which limestone was extracted to build the surrounding revetments.
- The four aviation-related features that comprise Site T-08 and were part of the former MCAS ‘Ewa airfield that postdate the December 7, 1941 attack. These four features consist of two parking aprons built between 1942 and 1944 (Feature 1), two plane tie-downs on the parking apron (Feature 2), a concrete utility box (Feature 3), and an irrigation ditch between the parking aprons (Feature 4).
- One concrete foundation at Site T-11.

Archaeological monitoring is recommended for the Project. Before initiation of any ground-disturbing activities related to Project construction, approval will be obtained from SHPD, including approval of a Project-specific Archaeological Monitoring Plan. The features recommended for No Further Work shall be called out in the Archaeological Monitoring Plan. Full-time archaeological monitoring is recommended during all ground-disturbing activities.

Pursuant to HAR §13-284-7 and subject to review and concurrence by SHPD, the effect determination for the Project is anticipated to be "effect, with proposed mitigation commitments."

3.6 Cultural Resources

3.6.1 Affected Environment

As part of the HRS Chapter 343 process, Pacific Legacy conducted a Cultural Impact Assessment (CIA) to evaluate the potential effect of the Project on cultural beliefs, practices, and resources, including traditional cultural properties. The methodology used in the preparation of the CIA followed the Environmental Review Program's Guidelines for Assessing Cultural Impacts and included archival research as well as ethnographic interviews.

Pacific Legacy, Inc. conducted extensive archival research including the compilations of historic maps from the Hawaiʻi State Survey office, previous archaeological studies from the Hawaiʻi State Historic Preservation Division Office, relevant cultural impact studies from the Environmental Review Program's online library. Information on mid-nineteenth-century Land Commission Awards (LCAs) was obtained from Waihona 'Aina Corporation's database (Waihona 'Aina 2000).

Scoping letters were sent to 15 individuals who are affiliated with a range of organizations. Contacted individuals included representatives of Native Hawaiian Organizations including the Office of Hawaiian Affairs, as well as local Native Hawaiian Organizations based in the moku of 'Ewa and the city of Kapolei. A total of six out of 15 people responded, with one providing e-mail correspondence and two kamaʻāina (Native-born) and/or kūpuna (elders) participating in formal interviews, as follows:

- Mr. Shad Kane - member of Kapolei Hawaiian Civic Club, Chair of the Oʻahu Council of Hawaiian Civic Clubs Committee on the Preservation of Historic Sites and Cultural Properties, Aliʻi Ai Moku of the Kapuāiwa Chapter of the Royal Order of Kamehameha Ekahi, and 'Ewa Moku Representative on the State Aha Moku Advisory Committee
- Ms. Keala Norman- kamaʻāina knowledgeable about 'Ewa
- Mr. Mana Caceres- 'Ewa representative on the Oʻahu Island Burial Council

On June 17, 2021, a site visit was organized. Three CIA participants came together to visit significant archaeological sites in portions of the project area. In addition, Pacific Legacy delivered an informational presentation to the Oʻahu Island Burial Council as part of the outreach for both the AIS and CIA for this project.

A summary of the discussion contained in the CIA report is provided below; a copy of the CIA report is contained in Appendix E.

The Barbers Point Solar Project area is within the ahupuaʻa of Honouliuli, in the moku of 'Ewa. The traditional name for Barbers Point is Kalaeloa. The results of archival research indicate that the general area of 'Ewa Plain has a long and rich cultural history. From the archaeological record, traditional stories and myths, and historic documents attributed to the vast plain, it is evident that these lands have been

the backdrop to many significant acts in Oʻahu's Pre- and Post-Contact history. Archival research indicated that a major feature of pre-Contact and early Contact Honouliuli, the Kualakaʻi Trail, passed near to the Project area. This prominent trail once connected Honouliuli Village to the coastal settlements of Oneʻula and Kualakaʻi, and would have been crucial to life on the ʻEwa Plain and its coast. Though the trail is no longer discernable within the Project area, cultural resources, such as archaeological features attributed to this trail, may exist beneath the plantation era soil. Numerous archaeological and architectural studies have been conducted within the Project area and surrounding region, and these studies highlight the intensive use of this area during the Pre-Contact period as well as the Post-Contact period, including extensive military development during the twentieth century.

Collectively, those interviewed through the CIA shared important moʻolelo (oral traditions) specific to the region and emphasized significant archaeological features, including the presence of trails, the use of limestone sinks/pits for the interment of iwi kupuna (human ancestral remains), gathering of limu (seaweed) and other coastal resources, and traditional agricultural practices that were carried out in the area. They also emphasized the dramatic changes to the landscape during the recent past. Based on information shared by Shad Kane, portions of the project area were used by Hawaiians for a variety of activities. For example, sinkholes in the larger general area were utilized as natural planters for kalo (taro, dry-land variety), temporary shelters, storage features, and sources of water. Shad Kane also recalls the existence of a kahua (an open place for sports), or makahiki grounds, as well as numerous trails in the area that connected to trails in the Kalaeloa Heritage Park.

No evidence was found of ongoing cultural practices in the Project area and the CIA participants did not identify and direct or indirect impacts that the Project will have on traditional or customary practices in the area. Cultural practices, including caring for archaeological features and natural resources, do occur adjacent to the Project area in the Kalaeloa Heritage Park. Ethnographic accounts suggest that iwi kupuna burial locations are present in the Project area vicinity in Honouliuli in karst or underground caves, and on the ground surface, covered with coral cobbles.

3.6.2 Ka Paʻakai Analysis

The archaeological record within the Project area provides insights into pre-Contact and post-Contact use of this area for dryland agricultural, habitation, and ceremonial activities. Many of the sites that have been identified in this area are reflective of the traditional land use practices. The identification of a kahua (makahiki grounds) within the project area and the wider region of the ʻEwa Plain in the Ahupuaʻa of Honouliuli provides a rare window into the annual makahiki ceremony in traditional Hawaiian culture as a highly significant ceremonial space. Flora and fauna that were identified in the Project area through the biological survey (Tetra Tech 2021a) may have been used for lāʻau lapaʻau in the past, but as of this writing, there are no known individuals who are currently engaged in traditional or customary gathering practices in the area.

The ʻEwa Plain and Honouliuli Ahupuaʻa hold much significance for Native Hawaiians, as demonstrated by ethnographic data as well as the archaeological record. Numerous moʻolelo attest to the traditional and

historic significance of the region, and cultural uses of the wider area continue to the present day. There are active initiatives to restore and reactivate many of the wahi kūpuna (ancestral sites), including those located within the Kalaeloa Heritage Park, directly adjacent to the Barbers Point Solar Project area. Although access to the wider area within which the Project is situated was limited due to the presence of NASBP during much of the twentieth century, cultural traditions centered on the care of archaeological sites, burial places, and natural resources in the area adjacent to the project area and throughout the *ahupuaʻa* reflect a continued connection to the land by cultural descendants in the area. The Project would not interfere with these activities or other cultural practices in the Project area vicinity.

3.6.3 Potential Impacts and Mitigation Measures

As a result of information gathered from the archival research and community outreach interviews, it has not been demonstrated that any cultural practices have been occurring presently in the Project area from the Pre-Contact era or Post-Contact era periods. Therefore, the Project is unlikely to affect cultural practices within the Project area. Community outreach interviews and extensive archaeological studies document significant archaeological features in the vicinity of the Project area, dating to the pre-Contact period (also see Draft AIS Report, Appendix A). The potential for limestone pit features in the area to contain ancestral burials (iwi kupuna) was a shared primary concern of those interviewed during community outreach efforts for the AIS and CIA. Archaeological monitoring during construction and development of an archaeological data recovery program is recommended. The cultural descendants who participated in the CIA should be further consulted to develop protocols for the appropriate protection and preservation of sites, and these protocols should be recognized in future land uses and transactions. Their manaʻo (thoughts, ideas, opinions) on procedures for clearing, caring for, and reactivating the kahua would be invaluable as well. Given the existence of Hawaiian burials in close proximity to the Project area, there is potential for natural limestone pit features to contain burials. Should a burial be identified during the construction of the Barbers Point Solar Project, an appropriate protocol for treatment will be developed in close consultation with DHHL, SHPD, the Oʻahu Island Burial Council and other key stakeholders. This protocol will be developed as part of an archaeological monitoring plan for the Project prior to its construction.

3.7 Land Use

3.7.1 Affected Environment

General Land Use

Since the closure of the NASBP, TMK parcels 9-1-013:038 and 9-1-013:040 were transferred from the U.S. Navy to DHHL in 1996 as part of a settlement agreement under the Hawaiian Home Lands Recovery Act (1996). The majority of the Project area is currently vacant and overgrown by kiawe and koa haole. There are large cleared, concrete and asphalt paved areas, as well as debris, bunkers, aircraft revetments and associated structures, and abandoned vehicles and equipment in the Project area. The

northern portion of the Project area is located within the ‘Ewa Battlefield Historical District and a portion of the Project area within TMK 9-1-013:038 is located in the proposed ‘Ewa Field Aircraft Revetment Historic District (see Figure 1-4). The majority of TMK 9-1-013:038 is currently unused by DHHL; however, an approximately 0.25-acre area located in the revetments is leased to FPS Painting Contractors. Portions of TMK 9-1-013:040 are leased to Ihilani Miller-Cummings for agricultural purposes and to Hawai‘i Explosives & Pyrotechnics, Inc for commercial/industrial purposes. The existing tenants currently have short-term rights-of-entry on approximately 9 acres (DHHL 2019). The Project site also encompasses portions of several existing road rights-of-way including Coral Sea Road, Roosevelt Avenue, and Roadway Lot 13083-B.

A private horse stable business operates in revetments located on TMK 9-1-013:164 immediately adjacent to and east of the Project area and the U.S. Navy’s former Northern Trap and Skeet Range and Southern Trap and Skeet Range are located on U.S. Navy owned parcels TMK 9-1-013:039 and 042 located north and east of TMK 9-1-013:040. Other surrounding land uses include the Kalaeloa Airport and industrial development to the west, several golf courses to the east and north, residential and urban development to the north and east and the Kalaeloa Renewable Energy Park located directly adjacent and to the west of the northern portion of TMK 9-1-013:038. The Kapolei community is located approximately 1 mile north of the Project area and encompasses a diverse mix of land uses, including residential, commercial, and recreational.

Project TMK 9-1-013:038 is located 0.4 miles east of Kalaeloa Airport’s Runway 22. Land uses adjacent to active runways are subject to FAA guidelines. FAA must be notified of any construction that may affect the National Airspace System under provisions of 14 CFR 77. Construction of structures require approval it they are over 200 feet tall or structures under 200 feet tall and near an airport (i.e., within 10,000 to 20,000 feet of a public use or military airport which exceeds a 50:1 to 100:1 surface from any point on the runway or within 5,000 feet of a public use heliport which exceeds a 25:1 surface).

Land Use Controls

Land use in Hawai’i is generally controlled by state land use and county land use designations. As the Project area lies within the HCDA Kalaeloa Community Development District (KCDD), the Project would be under land use jurisdiction of HCDA rather than City and County of Honolulu. However, DHHL lands are not subject to the land use controls of state or county agencies because the federal Hawaiian Homes Commission Act of 1921 (Act of July 9, 1921, c 42, 42 Stat 108) gives the Hawaiian Homes Commission exclusive land use authority over DHHL lands. As the Project is primarily located on DHHL land, it is not subject to state or county land use authority unless the Hawaiian Homes Commission voluntarily decides to subject itself to state or county land use controls for health and safety reasons. For the purposes of this Project, DHHL directed the Applicant to show compliance with and seek land use permits and approvals from the appropriate state and county agencies including KCDD. With this in mind, the relevant state land use designations are briefly described below and are further discussed in Section 5 along with an evaluation of the Project’s consistency with relevant planning documents including DHHL’s planning documents. .

DHHL

DHHL has developed a three-tiered planning system to guide planning of its land holdings and policies for resource management. The planning system includes:

- Tier 1 - over-arching General Plan;
- Tier 2 - Strategic Program Plans and Island Plans, including the Oʻahu Island Plan; and
- Tier 3 - Regional and Development Plans, such as the Kapolei Regional Plan for the Project area.

The Project area is designated as "Industrial" in the Oʻahu Island Plan (Figure 3-5, DHHL 2014) and "Mixed Use" in the Kapolei Regional Plan (DHHL 2010). Lands in the Kalaeloa area are not intended for residential development but rather are intended for revenue generation (DHHL 2010). The DHHL Hoʻomaluō Energy Policy presented in the Kapolei Regional Plan consists of five objectives. Objective 2 encourages DHHL's facilitation of diverse renewable energy resources (DHHL 2010).

State Land Use District

The Hawaiʻi State Land Use Law (HRS § 205) established the State Land Use Commission and granted the authority to classify all lands in the state into one of four land use districts: urban, rural, agricultural, and conservation. The entire Project area lies within the State Urban Land Use District (Figure 3-6). The Project area is unclassified by the Land Study Bureau's Detailed Classification System because it is not in the State Agricultural Use District. Per HRS § 205-2(b) the State Urban District shall include activities or uses as provided by ordinances or regulations of the county within which the urban district is situated. As the Project is located within the HCDA's KCDD, the State Land Use Commission relies on HCDA to determine allowed uses in the Project area.

HCDA

In July 2002, Act 184 of the Hawaiʻi State Legislature assigned the responsibility of redevelopment of the 3,700-acre KCDD to the HCDA. The KCDD includes all of the lands associated with the former NASBP which was closed in 1999. HCDA prepared a Kalaeloa Master Plan for redevelopment of the KCDD that was approved by the HCDA Board and the Governor in 2006 (Ewa Development Plan 2013, HCDA 2006). In 2012, HAR Chapter 15-215 was adopted for HCDA to carry out the visions and concepts of the Kalaeloa Master Plan by classifying and regulating the types and intensities of development and land uses allowed within the KCCD.

As discussed earlier, the Hawaiian Homes Commission has exclusive land use authority over DHHL lands and DHHL is not subject to the land use controls of other state or county agencies, including HCDA, unless it decides to subject itself to those controls for health and safety reasons. For the purposes of this Project, DHHL directed the Applicant to comply with and seek land use permits and approvals from HCDA.

As specified in the KCDD and shown in Figure 3-7, TMK 9-1-013:040 and the southern portion (Area 2) of TMK 9-1-013:038 are located within Transect Zone T2: Rural/Open Space Zone while the northern

portion of TMK 9-1-013:038 (Area 1) is located with Transect Zone T3: General Urban Zone. As discussed further in Section 5.9, the Project will require a Development Permit because it constitutes a man-made change on a lot greater than 40,000 square feet (0.92 acres) (per HAR § 15-215-78 of the CDD Rules). In addition, the Project will require a Conditional Use Permit (CUP) per HAR §15-215-79 of the CDD Rules, as solar facilities are within Zone T3 are an allowed use with an approved CUP (HCDA 2012).

3.7.2 Potential Impacts and Mitigation Measures

While the current land use would change to accommodate the solar energy generation and storage components, the Project would not have a significant adverse impact on land use.

In DHHL's approval of the Project's right-of-entry, it notes that it believes the Project is in the best interests of the DHHL Trust as it will generate a substantial revenue stream for the DHHL Trust over at least 25 years on land that lacks infrastructure, had use restrictions and limitations for [residential] development, and has not generated much revenue in the past (DHHL 2019). Furthermore, the Project is compatible with DHHL's General Plan (2002), Oʻahu Island Plan (DHHL 2014), Kapolei Regional Plan (DHHL 2010) and Hoʻomaluō Energy Policy. See Section 5.2 for more detailed discussion of the Project's compatibility with these plans. Barbers Point Solar, LLC is working in collaboration with DHHL and the existing tenants occupying portions of the Project area to explore alternative unencumbered areas within the Project parcels (e.g., revetment area) and/or off site locations to minimize impacts to the existing tenants so as to allow for safe construction or operation of the solar project. Therefore, any impacts to existing land use would be negligible.

The Project is also anticipated to be considered consistent with HCDA's Kalaeloa Masterplan and associated KCDD rules. See Section 5.9 for more detailed discussion of the Project's compatibility with these plans/rules.

The Project is not anticipated to impact (in short or long term) the current land uses in the areas adjacent to the Project area, because the neighboring land uses would not change or be limited in their current activities. FAA requires that land uses adjacent to or in the immediate vicinity of an airport be compatible with normal airport operations, including land and takeoff of aircraft (FAA Order 5190.6B). The Project's above ground infrastructure is located outside of the Runway Protection Zone for Runway 22 (HDOT 1998). The Applicant submitted a request for a Determination of No Hazard to Air Navigation to the FAA for the solar arrays and substation in compliance with 14 CFR 77. Project above ground components will be below the Kalaeloa airport height restrictions including the substation. An approximately 1.2-mile generation-tie line will extend from the Project's collector substation to the Project's interconnection point on an existing Hawaiian Electric 46-kV overhead transmission line located near the intersection of Roosevelt Avenue and Coral Sea Road. The first 0.5 mile of the generation-tie line extending west and north from the collector substation along Coral Sea Road is expected to be placed underground to comply with FAA clearance requirements/height restriction for placing structures within the runway approaches to the Kalaeloa Airport. A glint and glare analysis was

also conducted to support the Determination of No Hazard, see additional discussion in Section 3.12 Hazards. No significant impacts to airport operations are anticipated.

With the decommissioning and removal of Project facilities at the end of the Project's useful life (estimate 25 year) the land would be restored back to its existing use and would therefore have no long-term impacts. As a result, short-term impacts to land use would be minor and long-term impacts would be negligible.

3.8 Visual Resources

3.8.1 Affected Environment

The Project area is located on the lower slopes of the southern Waiʻanae Mountains and is surrounded by the ʻEwa Plain, which is an expansive plain extending from the base of the Waiʻanae Mountains to the shoreline. It is bordered by Tripoli Road to the south, Coral Sea Road to the west, and Geiger Road on the north. The Kalaeloa airport is located immediately west of the Project area and the Kalaeloa Renewable Energy Park utility scale solar facility borders the northeast portion of the Project area.

The majority of the Project area is vacant and overgrown by kiawe and koa haole. Some areas of the Project area are leased by DHHL to tenants for commercial and agricultural purposes. There are large cleared, concrete and asphalt paved areas, as well as debris, bunkers, aircraft revetments and associated structures, and abandoned vehicles and equipment in the Project area. A private horse stable business operates in revetments located on TMK 9-1-013:164 immediately adjacent to and east of the Project area and the U.S. Navy's former Northern Trap and Skeet Range. The former Northern and Southern Trap and Skeet Ranges are located on U.S. Navy owned parcels TMK 9-1-013:039 and TMK 9-1-013:042 located north and east of Project parcel TMK 9-1-013:040. These are vacant lands overgrown by kiawe, koa haole, buffel grass, and other weedy species (Department of Navy and Isla Botanica 2012).

The Project site is located approximately 0.35 miles north of the Pacific Ocean. The topography of the Project site is gently sloping in a south-westerly direction with elevations ranging between approximately 38 feet (12 meters) above mean sea level at the northeastern extent to approximately 10 feet (3 meters) above mean sea level at the southwestern extent of the Project site.

Despite the extent of urban development in the vicinity of the Project area, the visual setting of this region includes views of the Waiʻanae Mountains and the Pacific Ocean. Important public views and vistas in this region are identified in Table 3.2 of the ʻEwa Development Plan[14] (City and County of Honolulu 2020). These include:

- Views of the shoreline from the H-1 Freeway above the ʻEwa Plain;

[14] The ʻEwa Development Plan was originally adopted by the City Council in 1997 and was most recently revised in 2020 (Ordinance 20-46). It serves as the community development plan for the ʻEwa region and guides public policy, infrastructure investment and land use decision making over a 25-year planning horizon.

- Views of the ocean from Farrington Highway between Kahe Point and the boundary of the Waiʻanae Development Plan Area;
- Views of the Waiʻanae Range from H-1 Freeway between Kunia Road and Kaloʻi Gulch and from Kunia Road;
- Views of Nā Puʻu at Kapolei, Pālailai, and Makakilo;
- Mauka and makai views; and
- Views of central Honolulu and Diamond Head, particularly from Puʻu O Kapolei, Puʻu Pālailai, and Puʻu Makakilo.

The public views and vistas identified in the ʻEwa Development Plan most applicable to the Project area are views of the shoreline from the H-1 Freeway above the ʻEwa Plain and potential mauka (mountain) and makai (ocean) view planes from public access points that may have views of the Project.

3.8.2 Potential Impacts and Mitigation Measures

Visual

Visual impacts are generally defined in terms of a project's physical characteristics and potential visibility, as well as the extent to which the project's presence would change the perceived visual character and quality of the environment in which it would be located. To assess potential impacts on the visual character and quality of the environment, Barbers Point Solar, LLC contracted Tetra Tech to conduct a Visual Impact Analysis (see Appendix F). The analysis identified the viewsheds potentially affected by the Project (i.e., the viewshed assessment area), selected viewpoints within the viewshed assessment area to capture existing views (including existing vegetation and structures), created visual simulations of the proposed conditions view from each selected viewpoint, and analyzed potential visual impacts from each viewpoint.

As the DHHL, HCDA, and the City and County of Honolulu do not have a visual assessment guide or formal visual resource management system, Tetra Tech followed the contrast rating system used by the U.S. Bureau of Land Management to objectively measure potential changes to the visual environment[15]. The U.S. Bureau of Land Management's contrast rating system is commonly used by federal agencies to assess potential visual resource impacts from proposed projects.

Methodology

The viewshed is generally defined as the area that is visible from an observer's viewpoint and includes the screening effects of intervening vegetation, terrain, and/or structural features. The degree of visibility would depend on distance and view angle. Distance is only one of the factors that determine visibility of a site from a viewpoint. Terrain, vegetation, and structural features can obscure views that might otherwise be available at a certain distance. A detailed visual assessment considers intervening structures, vegetation, and terrain from selected viewpoints to assess where project components may

[15] See BLM Visual Resource Management System (BLM 1986).

be potentially visible and noticeable to the casual observer. The "casual observer" is considered an observer who is not actively looking or searching for the project components, but who is engaged in activities at locations with potential views of the project, such as walking or driving along a scenic road. If the project components are not noticeable to the casual observer, visual impacts can be considered minor to negligible.

Based on an initial field assessment of various viewsheds from different distances from the Project, Tetra Tech determined the Project would be discernable at locations adjacent or near the Project site but would not be viewable from surrounding areas due to the Project area's flat terrain and surrounding vegetation. Therefore, the visual assessment primarily focuses on potential impacts to viewsheds near the Project (i.e., the viewshed assessment area).

The detailed visual assessment includes the collection of photographs from selected viewpoints to capture existing views, a qualitative assessment of whether the view may or may not have an unobstructed view, and where appropriate, the creation of photo-realistic simulations. Viewpoints were selected:

- within the viewshed assessment area in locations where the Project components may be visible and noticeable to the casual observer,
- from public viewsheds (i.e., from public right of ways, parks), and
- based on spatial distribution.

The following specific viewpoint locations were identified for detailed visual assessment and creation of photo simulations. Four viewpoints represent views from public viewsheds (Figure 3-8 also see Appendix F):

- Viewpoint 1: 'Ewa Battlefield Proposed Visitor Center
- Viewpoint 2: 'Ewa Battlefield 1941 Runway
- Viewpoint 3: Coral Sea Road south of the intersection of Coral Sea Road and Casablanca Street
- Viewpoint 4: Coral Sea Road at Intersection of Coral Sea Road and HDOT ROW

Potential visual impacts were characterized by determining the level of visual contrast introduced by the Project based on comparing existing conditions and photo simulations. Visual contrast is a means to evaluate the level of modification to existing landscape features. Existing landscape is defined by the visual characteristics (form, line, color, and texture) associated with the landform (including water), vegetation, and existing development. The level of visual contrast introduced by a project can be measured by changes in the visual characteristics that would occur as a result of project implementation. The greater the difference between the character elements found within the existing landscape and with a proposed project, the more apparent the level of visual contrast. The following general criteria[16] were used when evaluating the degree of contrast:

[16] These criteria are based on the BLM Visual Resource Management System, a process using the concept of "contrast" to objectively measure potential changes to the landscape features.

- *None* – The contrast is not visible or perceived.
- *Weak* – The contrast can be seen but does not attract attention.
- *Moderate* – The element contrast begins to attract attention and begins to dominate the characteristic landscape.
- *Strong* – The element contrast demands attention, would not be overlooked, and is dominant in the landscape.

Construction Impacts

Short term visual effects would occur during construction activities on the Project site and the presence of equipment and crews. As described in Section 2.2, construction activities would include transport and delivery of Project equipment and materials, site preparation, equipment installation, and revegetation and landscaping. These activities would be visible to varying degrees from surrounding locations, including nearby roadways (such as Coral Sea Road).

In many areas intervening structures and vegetation screen views toward the Project area resulting in views that are either fragmented or blocked; however, unobstructed views would occur along Coral Sea Road Construction activities would be visible from these locations, but these impacts would be short term for travelers because they would only be paralleling the Project site for a limited time and their focus would be on the road ahead. Furthermore, visual impacts associated with construction activities would be short term, as construction equipment and crews would be removed from the Project area once construction is complete.

Scenic Vistas

The Project would not change visual landmarks and significant vistas identified in the ‘Ewa Development Plan (City and County of Honolulu 2020). These include panoramic views of the distant shoreline from the H-1 Freeway above the ‘Ewa Plain and mauka and makai views. Views from the H-1 Freeway were analyzed to determine if the Project would be visible from a public viewpoint. The Project is located approximately 3.4 miles south of the H-1 Freeway. Views of the Project to the casual observer from this location would be limited because of the distance and screening by terrain and vegetation. Where views of the Project are visible to the casual observer, the Project would blend in with the existing land use patterns and would not attract attention and would be a subordinate feature in the landscape setting. As the contrast is anticipated to be weak from H-1 Freeway, the visual impacts are considered minor.

Viewpoints

This section presents the results of the site-specific impact evaluation based on the visual simulations prepared in the Visual Impact Assessment Report (Appendix F also see Figures 3-9 through 3-12) for the 25-year operational span of the Project. Thereafter, decommissioning would include removal of all equipment associated with the Project and returning the Project area to substantially the same condition as existed prior to Project development, as required by HRS Chapter 205-4.5(a)(21). The discussion for each representative viewpoint includes a brief introduction identifying the representative

viewpoint location and setting, a description of the existing landscape conditions, and a summary of the Project conditions.

'Ewa Battlefield Proposed Visitor Center (Viewpoint 1) – This viewpoint is located on the 'Ewa Battlefield Proposed Visitor Center site (Louis Berger 2020). The photograph was taken from the Proposed Visitor Center site, looking southeast. The existing landscape setting is characterized by flat terrain with dense vegetation, limiting views to the immediate foreground. The primary vegetation includes dense stands of large kiawe trees with an understory of grasses and shrubs. The vegetation consists of irregular, organic forms: grasses are continuous with irregular clumps and dense irregular shaped trees. Existing structural features are limited to the remnants of the mooring apron and concrete barriers, consisting of horizontal lines and gray color.

The Project would introduce dark gray color, geometric shapes, and horizontal lines into the landscape setting. This viewpoint reflects the views of visitors to the 'Ewa Battlefield looking southeast. The Project would not be visible from this location by a casual observer because of the screening of the Project site by existing vegetation (see Figure 3-9); therefore, there would be no visual impacts from Viewpoint 1.

Ewa Battlefield 1941 Runway (Viewpoint 2) – This viewpoint is located on the 'Ewa Battlefield 1941 Runway. The photograph was taken from the 1941 Runway, looking southwest. The existing landscape setting is characterized by flat terrain with dense vegetation lining the remnants of the 1941 Runway, limiting views to either side of the runway. The primary vegetation includes dense stands of large kiawe trees with an understory of grasses and shrubs. The vegetation consists of irregular, organic forms: grasses are continuous with irregular clumps and dense irregular shaped trees. Existing structural features are limited to the 1941 Runway, consisting of horizontal lines and gray color.

The Project would introduce dark gray color, geometric shapes, and horizontal lines into the landscape setting; the colors, regular geometric forms and horizontal lines associated with the solar arrays and associated infrastructure would result in a visual contrast with the irregular, organic forms, and colors of the existing vegetation. However, views of the Project from this location by a casual observer would be limited because of the screening of the Project site by existing vegetation (see Figure 3-10). The portions of the Project that are visible would not attract attention and would be a subordinate feature in the landscape setting. This viewpoint reflects the views of visitors to the 'Ewa Battlefield 1941 Runway looking southwest. As the contrast is anticipated to be weak from Viewpoint 2, the visual impacts are considered minor.

Coral Sea Road south of the intersection of Coral Sea Road and Casablanca Street (Viewpoint 3) – This viewpoint is located at Coral Sea Road near the intersection of Coral Sea Road and Casablanca Street where the Project's southern site entrance will be constructed. The photograph was taken from the west side of Coral Sea Road, looking east. The existing landscape setting is characterized by flat terrain with dense vegetation limiting views to the immediate foreground. The primary vegetation includes dense stands of large kiawe trees with an understory of grasses and shrubs. Existing structural features include the roadway, fencing, and utility poles and lines. Dominant colors for the landscape are tans and greens while the structures are gray and brown. The vegetation consists of irregular, organic forms:

grasses are continuous with irregular clumps and dense irregular shaped trees. The linear and horizontal lines associated with the structures are visible and prominent from this viewpoint.

The Project would introduce dark gray color, geometric shapes, and horizontal lines into the landscape setting; the colors, regular geometric forms and horizontal lines associated with the solar arrays and infrastructure would result in a visual contrast with the irregular, organic forms, and colors of the existing vegetation. However, the structures in the vicinity, also possess gray color (roadway and fencing) and horizontal and vertical lines (roadway, fencing, and utility poles and lines). Additionally, views of the Project from this location by a casual observer would be limited because of the proposed screening of the Project site by Project landscaping. Note the contrast between the simulations of Viewpoint 3 with no landscaping (Figure 3-11a) and with proposed landscaping (Figure 3-11b). The portions of the Project that are visible would attract attention and would be a co-dominate feature in the landscape setting. This viewpoint reflects the views of drivers looking east from Coral Sea Road. As the contrast is anticipated to be moderate from Viewpoint 3, the visual impacts are considered moderate. These impacts would be short term for travelers because they would only be paralleling the Project site for a limited time and their focus would be on the road ahead.

Coral Sea Road at Intersection of Coral Sea Road and HDOT ROW (Viewpoint 4) – This viewpoint is located at Coral Sea Road at the intersection of Coral Sea Road and the HDOT Roadway Lot 13083-B. The photograph was taken from the west side of Coral Sea Road, looking northeast. The existing landscape setting is characterized by flat terrain with dense vegetation limiting views to the immediate foreground. The primary vegetation includes dense stands of large kiawe trees with an understory of grasses and shrubs. Large white rocks line the edge of the stand of trees. Dominant colors for the landscape are tans and greens. The vegetation consists of irregular, organic forms: grasses are continuous with irregular clumps and dense irregular shaped trees.

The Project would introduce dark gray color, geometric shapes, and horizontal lines into the landscape setting; however, the existing dense vegetation would screen views of the Project from this location. The Project would also introduce light gray color and horizontal lines associated with the Project access road into the landscape setting. A small portion of this access road would be visible from Coral Sea Road, however, this visual element would be similar to the existing Coral Sea Road, would not attract attention and would be a subordinate feature in the landscape setting (see Figure 3-12 and Appendix F). This viewpoint reflects the views of drivers looking east from Coral Sea Road. These impacts would be short term for travelers because they would only be paralleling the Project site for a limited time and their focus would be on the road ahead. As the contrast is anticipated to be weak from Viewpoint 4, the visual impacts are considered minor.

Summary of Impacts

During construction and operation, where visible and noticeable, the Project may introduce visual contrast and have the potential to create visual effects within the surrounding areas for the casual observer. If the Project components are not visible or perceived, no visual impact would occur. Based on a viewshed assessment (which considers terrain only and not existing vegetation or structures that may

obstruct the view), it is anticipated that views of the Project would be primarily from areas immediately adjacent to the Project site. The Project will not block mountain or ocean views.

The visual assessment includes an impact analysis of specific viewpoints from the adjacent public roadways and from locations within the ‘Ewa Battlefield. The visual impact analysis shows that in many cases the Project will be partially or fully screened by existing vegetation.

The Project is anticipated to be completely screened by terrain and existing vegetation at Viewpoint 1. The Project will introduce weak contrast to the landscape setting at Viewpoints 2 and 4 and a moderate contrast at Viewpoint 3.

After decommissioning, the Project site will be returned to substantially the same condition as existed prior to Project development. Considering all features, the Project is expected to have minimal or no significant impact on the City and County of Honolulu’s scenic and visual resources.

Glare

In addition to introducing new elements into the visual landscape, the Project also has the potential to produce glare.[17] In general, solar modules are designed to absorb rather than reflect sunlight and incorporate a surface material that allows sunlight to pass with minimal reflection. The modules also have an anti-reflective coating that further reduces reflectivity. Regardless, solar facilities still have the potential to result in some degree of glare.

To evaluate the potential for glare associated with the Project, Tetra Tech completed a glare analysis using the Solar Glare Hazard Analysis Tool (SGHAT) software through an online tool (GlareGauge) developed by Sandia National Laboratories and hosted by ForgeSolar. A copy of the Project’s Glare Analysis Report is included in Appendix G. The SGHAT software is considered an industry best practice and a conservative model that effectively models the potential for glare at defined receptors from solar energy generating facilities. It provides a quantitative assessment of (1) when and where glare has the potential to occur throughout the year for a defined solar array polygon, and (2) potential effects on the human eye at locations where glare is predicted. Based on the predicted retinal irradiance (intensity) and subtended angle (size/distance) of the glare source to receptor, GlareGauge categorizes potential glare where it is predicted by the model to occur in accordance with three tiers of severity (ocular hazards) that are shown by different colors in the model output. Red glare is glare that is predicted with a potential for permanent eye damage (retinal burn). Yellow glare is glare that is predicted with a potential for temporary after-image. Green glare is glare that is predicted with a low potential for

[17] As an industry standard, the term “glint and glare” analysis is typically used to describe an analysis of potential ocular impacts to defined receptors. As a point of clarification, ForgeSolar defines glint and glare in the following statement: “Glint is typically defined as a momentary flash of bright light, often caused by a reflection off a moving source. A typical example of glint is a momentary solar reflection from a moving car. Glare is defined as a continuous source of bright light. Glare is generally associated with stationary objects, which, due to the slow relative movement of the sun, reflect sunlight for a longer duration.” Based on the ForgeSolar definitions of glint and glare and the stationary nature of the solar photovoltaic modules (fixed tilt), the potential reflectance from the Project is referred to as glare.

temporary after-image. These categories of glare are calculated using a typical observer's blink response time, ocular transmission coefficient (the amount of radiation absorbed in the eye prior to reaching the retina), pupil diameter, and eye focal length (the distance between where rays intersect in the eye and the retina).

The Project Layout inputted into the GlareGauge model consists of six separate "PV Array Areas" (see Figure 1 of Appendix G), which are segmented polygons generally representative of the proposed Project layout. Segmentation of the Project layout allows GlareGauge to accurately represent potential ocular impacts as a result of the Project.

The glare analysis was conducted to analyze glare from different receptor characteristics and associated observation points. The analysis modeled the impact of potential glare on the Kalaeloa Airport Runways 22R and 22L that bisect PV Arrays 4 and 5 and on representative observations points (OP) from the Hoakalei Country Club (OP 1), Kalaeloa Rental Homes (OP 2), and Ka Makana Ali'i Mall (OP 3); and two segmented vehicular routes along the nearby Coral Sea Road and Tripoli Road (see Figure 2 of Appendix G). The OP locations were selected from Tetra Tech's comprehensive viewshed and line-of-sight analysis of representative proximal receptors. For the OPs, associated glare was analyzed at a first-floor view height (6 feet above ground surface) and for the vehicular traffic routes, glare was analyzed at 5 feet above ground surface (i.e., typical commuter vehicle receptor height).

The analysis also included six 2-mile final approach flight paths and one Airport Traffic Control Tower (ATCT) associated with Kalaeloa Airport, which is approximately 0.5 miles to the west of the Project, and eight 2-mile final approach flight paths and one ATCT associated with Daniel K. Inouye International Airport, which is approximately 6.5 miles to the east of the Project (see Figure 3 of Appendix G).

Based on the SGHAT results, no glare was predicted for the observation points or for Daniel K. Inouye International Airport. Limited amounts of green glare are predicted at Kalaeloa Airport Runways 22L and 22R and the potential occurrence of glare is limited (less than 7.2 percent of annual daylight hours). No yellow or red glare is predicted at any of the receptors. Table 3-5 represents the glare summary in annual minutes of glare predicted for Analysis Scenario 1. For these reasons, glare impacts associated with the Project are expected to be minimal.

As recommended by the FAA Notice Criteria Tool, the Project filed a request for a Determination of No Hazard to Air Navigation with the FAA Obstruction Evaluation Group for the Project's solar arrays and substation infrastructure. A copy of the Project's glare report was included in the submittal to FAA. In response, the FAA conducted an aeronautical study and concluded that the proposed structures do not exceed obstruction standards and would not be a hazard to air navigation provided the FAA Form 7460-2, Part 2 if filed within 5 days after construction reaches its greatest height (see FAA Determination of No Hazard forms in Appendix G). Once the Project is operational, in the unlikely event that it is determined that the Project is creating a hazardous condition for pilots, Barbers Point Solar, LLC would immediately mitigate the hazard upon notification by FAA and/or HDOT Airports Division. The glare analysis results are further discussed relative to applicable FAA requirements in Section 3.12.2.

Table 3-5. Analysis Scenario 1 Annual Minutes of Glare Summary

Receptor	Location	Green Glare	Yellow Glare	Red Glare
OP 1	Hoakalei Country Club	0	0	0
OP 2	Kalaeloa Rental Homes	0	0	0
OP 3	Ka Makana Ali'i Mall	0	0	0
Coral Sea Rd-1	-	0	0	0
Tripoli Road-1	-	0	0	0
JRF RWY 11	Kalaeloa Airport	0	0	0
JRF RWY 22L	Kalaeloa Airport	14,249	0	0
JRF RWY 22R	Kalaeloa Airport	4,653	0	0
JRF RWY 29	Kalaeloa Airport	0	0	0
JRF RWY 4L	Kalaeloa Airport	0	0	0
JRF RWY 4R	Kalaeloa Airport	0	0	0
5-ATCT	Kahului Airfield	0	0	0
HNL RWY 8L	Daniel K Inouye Intl Airport	0	0	0
HNL RWY 8R	Daniel K Inouye Intl Airport	0	0	0
HNL RWY 22L	Daniel K Inouye Intl Airport	0	0	0
HNL RWY 22R	Daniel K Inouye Intl Airport	0	0	0
HNL RWY 26L	Daniel K Inouye Intl Airport	0	0	0
HNL RWY 26R	Daniel K Inouye Intl Airport	0	0	0
HNL RWY 4L	Daniel K Inouye Intl Airport	0	0	0
HNL RWY 4R	Daniel K Inouye Intl Airport	0	0	0
5-ATCT	Kahului Airfield	0	0	0

3.9 Air Quality

3.9.1 Affected Environment

Air quality in the vicinity of the Project area is relatively good, due in part to trade winds which help disperse emissions. Pollutant air emissions in the vicinity of the Project are associated with airplane emissions at Kalaeloa Airport, industrial activities at Campbell industrial park, vehicles on Interstate H-1 and other nearby roadways, as well as dust and other air pollutants associated with construction and agricultural activities.

Under the Clean Air Act, the EPA has established nationwide air quality standards to protect public health and welfare. These National Ambient Air Quality Standards (NAAQS) represent the maximum allowable atmospheric concentrations for six criteria pollutants: carbon monoxide (CO), nitrogen dioxide (NO2), SO2, ozone, lead, and two types of particulate matter (respirable particulate matter that measures up to 10 micrometers in diameter [PM10] and respirable particulate matter that measures up to 2.5 micrometers in diameter [PM2.5]). NAAQS are based primarily on evidence of acute (short-term) and chronic (long-term) health effects. NAAQs are applicable to outdoor locations to which the general public has access. Primary standards relate to limits for protection of public health, whereas secondary standards relate to limits for protection of public welfare. The EPA designates attainment areas as having air quality equal to or better than NAAQS, based on measurements of ambient criteria pollutant

data. Areas with air quality worse than NAAQS are designated non-attainment. Hawai‘i has attainment status for all criteria pollutants[18] (DOH 2018).

Pursuant to HRS Chapter 342B (Air Pollution Control), the Clean Air Branch of the State of Hawai‘i Department of Health (DOH) is responsible for implementing air pollution control in the State. DOH has established Hawai‘i ambient air quality standards, which are sometimes more stringent than the NAAQS, or address pollutants that are not covered by the NAAQS. The Hawai‘i ambient air quality standards are based primarily on health effects data, but also reflect other considerations, such as protection of crops, protection of materials, or avoidance of nuisance conditions (such as objectionable odors). Both the federal and state ambient air quality standards are listed in Table 3-6.

Table 3-6. Federal and State Ambient Air Quality Standards

Air Pollutant	Averaging Time	Ambient Air Quality Standards		
		Hawai`i State Standard (ppm)	Federal Primary Standard (ppm)	Federal Secondary Standard
Carbon Monoxide (CO)	1-hour	9 ppm	35 ppm	--
	8-hour	4.4 ppm	9 ppm	--
Nitrogen Dioxide (NO_2)	1-hour	--	0.1 ppm	--
	Annual	0.04 ppm	0.053 ppm	0.053 ppm
PM_{10}	24-hour	150 µg/m³	150 µg/m³	--
	Annual	50 µg/m³	--	--
$PM_{2.5}$	24-hour	--	35 µg/m³	35 µg/m³
	Annual	--	12 µg/m³	15 µg/m³
Ozone (O_3)	8-hour	0.08 ppm	0.07 ppm	0.07 ppm
Sulfur Dioxide (SO_2)	1-hour	--	0.075 ppm	--
	3-hour	0.5 ppm	--	0.5 ppm
	24-hour	0.14 ppm	--	--
	Annual	0.03 ppm	--	--
Lead (Pb)	3-month (rolling)	1.5 µg/m³	0.15 µg/m³	0.15 µg/m³
Hydrogen Sulfide	1-hour	0.025 ppm	--	--

ppm = parts per million by volume; µg/m³ = micrograms per cubic meter of air
SOURCE: HAR §11-59 and *Code of Federal Regulations* (CFR), Title 40, Part 50.

DOH and EPA maintain air quality monitoring stations throughout Hawai’i. The station nearest to the project is in Kapolei. This air quality monitoring station is located inside the Kapolei Business Park, south of Malakole Street, about 3.5 miles southwest of the Project site. The Kapolei station was established in 2002 to monitor community exposure to air pollutants. All NAAQS and Hawai‘i ambient air quality standards pollutants are monitored at this station. Recent available data from the Kapolei station indicate that criteria pollutants do not exceed either the federal or State ambient air quality standards (DOH 2021).

[18] Air quality monitoring stations near Kilauea on the Island of Hawai‘i often measure exceedances in the NAAQS for SO_2 and occasionally measure exceedances of the NAAQS for $PM_{2.5}$. The volcano is a natural event; therefore, the State requests exclusion of these exceedances from the determination of attainment.

3.9.2 Potential Impacts and Mitigation Measures

During the construction phase, the Project would result in limited, short-term impacts to air quality, primarily from powered equipment, vehicle exhaust, and fugitive dust from soil disturbance. Construction activities that would generate air emissions at the Project include operating powered equipment, driving vehicles within the Project site, commuting to the Project site, and delivering construction materials and components to the Project site. These activities would result in emissions of air pollutants including carbon dioxide, nitrogen oxides, sulfur oxides, PM10, and PM2.5.

Construction-related emissions and impacts to air quality would be temporary and limited to the approximately 12 to 15-month construction period. Construction emissions would represent a small portion of the overall emissions in the region and would likely not affect attainment of the federal or state ambient air quality standards.

HAR §11-60.1, Air Pollution Control requires that the best practicable operation or treatment measures be employed during construction activities, so that no discharge of visible fugitive dust occurs beyond the property lot line. BMPs would be implemented to minimize adverse effects on air quality. With implementation of the BMPs listed below, construction-related impacts to air quality are expected to be less than significant.

- To the extent practicable, off-road and portable diesel-powered equipment would be fueled with motor vehicle diesel fuel (#2 diesel fuel). Examples of equipment include bulldozers, graders, cranes, loaders, scrapers, backhoes, generator sets, compressors, and auxiliary power units.
- Construction vehicles and equipment would be routinely maintained according to the manufacturer's specifications.
- To the extent practicable, the quantity of vehicles commuting to and operating within the project area would be limited.
- Construction site and access would be limited. Vehicle speeds would not exceed 25 mph on gravel, dirt, or other unpaved roads within the Project area.
- Idle times for vehicles and equipment would be limited so that unnecessary emissions would be reduced. A maximum idle time would be established (e.g., no more than 15 minutes idle time).
- All trucks hauling soil or other loose materials would be covered for containment purposes.
- Water trucks or sprinkler systems would be used to control fugitive dust within the Project area. No chemical additives would be used in the water trucks or sprinklers.
- Carpooling would be encouraged among construction workers to minimize emissions from commuting.
- Soils that have been temporarily disturbed during construction would be revegetated. The vegetation would be maintained to minimize the potential for erosion and fugitive dust.

Project operations would generate minor emissions associated with vehicle exhaust and fugitive dust from vehicles and equipment used to perform operation and maintenance activities in the Project area.

As described in Section 3.12 (Transportation and Traffic), it is estimated that four or fewer vehicle trips would be made per month for routine operations and maintenance of the solar facilities over the lifetime of the Project. None of the equipment associated with the solar facilities generate air emissions. The Project equipment includes solar arrays, battery units, inverters, control equipment, transformers, and switches. Therefore, it is anticipated that emissions associated with Project operations and maintenance would be low and effects to air quality would be less than significant. As discussed in Section 1.2 (Purpose and Need), the Project would provide a net benefit to air quality by offsetting energy generated by burning fossil fuels with renewable energy, thereby reducing emissions of air pollutants in the form of greenhouse gases.

At the end of its useful operational lifetime, the Project would be decommissioned. Upon decommissioning, Project equipment would be removed, and the site would be returned to a safe, useful condition that is similar to its original condition. Decommissioning activities would generate short-term impacts to air quality as a result vehicle exhaust, equipment emissions, and fugitive dust from disturbed soils. BMPs referenced in this section for construction would be implemented again for decommissioning to minimize these emissions. Decommissioning activities would be temporary. Impacts to air quality would be limited to the duration of decommissioning and mitigated with implementation of BMPs. Therefore, impacts to air quality during decommissioning are anticipated to be less than significant.

3.10 Noise

3.10.1 Affected Environment

The degree to which sound can be heard is dependent upon the relative level of sound in the existing acoustic environment. Existing noise sources in the vicinity of the Project area include traffic noise from the surrounding roads (Coral Sea Road, Tripoli Road, and Roosevelt Avenue/Gieger Road), aircraft noise from Kalaeloa Airport, and farm equipment noise from the nearby horse stables and onsite farm activities on Project TMK 9-1-013:040. TMK 9-1-013:038 is aligned with the Kalaeloa Airport runway approach path for Runways 22R and 22L and therefore aircraft passing overhead generates a significant amount of noise.

The Project area is immediately surrounded primarily by open space with the Kalaeloa Renewable Energy Park bordering the northeast portion of the Project area. Noise sensitive receptors in the immediate vicinity of the Project include the private horse stable located on TMK 9-1-013:164 (located adjacent to and east of TMK 9-1-013:038) and the Barber's Point Golf Course located east of the Project. The closest residential areas include Kalaeloa Rental Homes apartment complex (approximately 0.5 miles northwest of the closest solar array area) and the Ocean Pointe Neighborhood (approximately 0.5 miles east and southeast of the closest solar array area). The closest residential structure is located about 0.5 miles from the Project area. Other potential sensitive receptors in the vicinity of the Project area include Kapolei middle school (1 mile north of the nearest solar arrays) and the Hampton Inn & Suites O'ahu/Kapolei (0.7 mile north of the nearest solar arrays).

The ‘Ewa Battlefield Historical District is located north of the Project area and encompasses a small portion of the northernmost point of the Project area. No public access is currently allowed in the ‘Ewa Battlefield Historical District and therefore there are no existing sensitive receptors in this area. On behalf of the American Veteran Hawai‘i Service Foundation Corporation, conceptual plans for public access and installation of interpretive signs in the historic district were developed in 2020 (Berger 2020); however, no specific timeline of securing funding and implementing these plans have been identified.

Noise Standards

The State of Hawai‘i noise standards in HAR §11-46 (Community Noise Control) are administered by DOH. The purpose of the Hawai‘i noise standards is to provide noise prevention, control, and abatement from stationary noise sources and powered equipment. These standards establish maximum permissible sound levels per zoning district (Table 3-7). These noise limits are absolute (i.e., not relative to ambient conditions), are prescribed by receiving zoning class and time period, and are enforceable at the facility property boundaries. Zoning districts are determined by ordinances adopted by the applicable local, county or state government agencies. For mixed zoning districts, the primary land use designation is used to determine the applicable zoning district class and maximum permissible sound level. For instance, if a residential structure is surrounded by agricultural land, it may be considered Class A use on Class C land.

Table 3-7. Hawai’i Noise Standards

Receiving Zoning District	Maximum Permissible Sound Level (dBA)	
	Daytime (7:00 am–10:00 pm)	Nighttime (10:00pm–7:00 am)
Class A: All areas equivalent to lands zoned residential, conservation, preservation, public space, or similar type	55	45
Class B: All areas equivalent to lands zoned for multi-family dwellings, apartment, business, commercial, hotel, resort, or similar type	60	50
Class C: All areas equivalent to lands zoned agriculture, country, industrial, or similar type	70	70

Source: HAR §11-46, Community Noise Control.

The Project area and adjoining parcels are within the DHHL Industrial Land Use District, the State Urban district and KCDD T3 general urban or KCDD T2 rural/open space zoning districts (see Figure 3-7). Per HAR § 15-215-23, the T3 general urban zone is characterized by mixed use projects with a commercial interest and per HAR § 15-215-23, the T2 rural/open space zone shall consist primarily of open space, parks, and limited agricultural use. As the KCDD zoning districts allow a mix of uses, and the existing uses are either vacant, industrial, commercial, or agricultural, this assessment assumes, the areas immediately adjacent to the Project fall within either the Class B or Class C Receiving Zoning Districts. The nearest noise sensitive receptors are the horse stables immediately east of the Project area, the golf course 400 feet east of the Project area and multi-family residential homes 0.5 miles northwest of the Project area; these qualify as a Class B Receiving Zoning District. Noise levels in these Class B locations

cannot exceed 60 dBA during the day or 50 dBA at night, respectively, at the property limits. Industrial areas adjacent to and around the Project Area, including Kalaeloa Airport and the Kalaeloa Renewable Energy Park, qualify as the Class C Receiving Zoning District. Noise levels received in these Class C locations cannot exceed 70 dBA during the day or night at the property limits. Although there are currently no public uses in the ‘Ewa Battlefield Historical District is located north of the Project area, if future public amenities/access were constructed in this district, it could be considered a Class A Receiving Zoning District.

The noise standards are assumed to be independent of the existing acoustic environment; therefore, no baseline sound survey was conducted to assess conformity. Pursuant to HAR §11-46-7, a permit may be obtained for operation of an excessive noise source (e.g., construction equipment) beyond the maximum permissible sound levels. Under HAR § 11-46-7(j), noise permits for construction allow for activities emitting noise in excess of the limits but restrict these activities to the hours of 7:00 a.m. to 6:00 p.m. during weekdays and 9:00 am to 6:00 pm on Saturdays (no exceedances allowed on Sundays or holidays).

3.10.2 Potential Impacts and Mitigation Measures

Construction Impacts

The Project would have minor, short-term impacts on ambient noise levels during the construction period. However, construction activities would comply with State noise control regulations and no work that exceed the noise limits is anticipated outside the permitted working hours under HAR § 11-46-7(j).

Construction noise levels vary according to the type of powered equipment utilized, the equipment specifications, the operations being performed, and the age or condition of the equipment. Construction noise sources were evaluated based on data compiled for the Project from the EPA and the Federal Highway Administration Construction Noise Handbook (FHWA 2006). As shown in Table 3-8, various equipment that is typically used for construction of solar energy facilities was considered for each phase of construction.

Table 3-8. Summary of Anticipated Construction-Related Noise

Phase	Duration	Equipment Type	Model (Recommended)	L_{max} @ 50 feet (dBA, slow)
Construction Startup	Month 1-3 of Construction	Water Truck	-	84
		Excavator	Case 470	85
		Rock Truck	Cat 773	85
		Dozer	Cat D6	85
		Loader	Cat 980	80
		Grader	Cat 14H	85
		JLG	G10-55a	80
		Drill Rig	-	85
		Flat Deck Truck	-	84
		Rock Breaker Hammer	-	84
		Rock Screen	Chieftan Warrior Screen	105

Phase	Duration	Equipment Type	Model (Recommended)	L_{max} @ 50 feet (dBA, slow)
Construction Excavation	Month 2-7 of Construction	Trencher	Vermeer	82
		Excavator	Case 470	85
		Roller		85
		Rock Truck	Cat 773	85
		Water Truck	-	84
		Grader	Cat 14H	85
		Rock Breaker Hammer	-	90
		Rock Screen	Chieftan Warrior Screen	105
		Pile Driver	Vermeer PD10	84
		Drill Rig	-	85
		Blasting	-	94
		JLG	G10-55a	80
		Skid Steer	Cat 259b3	80
		Flat Deck Truck	-	85
		Concrete Mixer	-	85
Array Installation	Month 4-10 of Construction	Water Truck	-	84
		JLG	G10-55a	80
		Skid Steer	Cat 259b3	80
		Crane	RT 60	85
		Pile Driver	Vermeer PD10	84
		Flat Deck Truck	-	85
Cleanup/Commissioning/ Demobilization	Month 10-12 of Construction	Grader	Cat 14H	85
		Loader	Cat 980	80
		Flat Deck Truck	-	85

Construction sound for all equipment considered would attenuate with increased distance from the equipment. Other factors that were not included in this analysis can affect sound attenuation. These factors include vegetation, terrain, and structures that would act to further increase sound attenuation, thereby limiting the impact of construction noise. Noise levels would range depending on a variety of factors, including the type of construction activity, the type equipment used, and the distance between source and receiver. The power and usage of equipment also varies, creating further complexity in characterizing construction noise levels. This analysis assumes a scenario where all construction equipment is operating simultaneously within each construction phase. Equipment is not typically operated simultaneously or continuously, but this conservative assumption considers the cumulative noise impact.

Based on the anticipated construction-related noise levels listed in Table 3-8, construction noise would be intermittently audible at adjacent property locations and could potentially exceed HAR §11-46 Class A maximum permissible sound limits. However, increased noise levels are expected to be comparable to noise produced by other adjacent land uses, including airport activity at Kalaeloa Airport, traffic on Coral Sea Road/Tripoli Road/Roosevelt Ave, and construction activity from other development projects in the vicinity. Project-related traffic during construction from trucks and heavy equipment, would also generate noise and contribute to cumulative noise levels. However, as discussed in Section 3.12, construction related traffic would be minimal. Noise generated by traffic associated with the Project would be temporary and similar to existing noise levels on Kapolei Parkway, the H-1 Freeway, and other nearby road networks.

Construction activities would generate noise that would intermittently exceed ambient noise levels potentially cause a temporary and short-term disturbance. Efforts would be made to minimize the noise levels associated with Project construction to the extent practicable, including measures such as those listed below.

- Construction activities would occur on weekdays and Saturday between 7:00 am and 7:00 pm.
- Speed limits would be established and enforced during the construction period
- Using electrically-powered equipment instead of pneumatic or internal combustion powered equipment, where feasible;
- Loud procedures would be restricted to weekdays during daylight hours to minimize noise impacts;
- Material stockpiles, mobile equipment staging, parking, and maintenance areas would be located as far as practicable from noise-sensitive receptors;
- Noise-producing signals, including horns, whistles, alarms, and bells, would be used solely for safety or warning purposes; and
- Noise-producing construction equipment and vehicles would utilize mufflers, air-inlet silencers, and any other shrouds, shields, or other noise-reducing features, ensuring these items are in good operating condition that meet or exceed original factory specification.

Implementation of the measures listed above would mitigate significant construction related noise impacts and no long-term or otherwise significant noise impacts are anticipated as a result of Project construction. If necessary, a noise permit would be obtained during construction to allow for exceedances of the maximum permissible sound levels.

Operational Impacts

Noise sources considered in the acoustic analysis for Project operations include inverters and transformers associated with the solar arrays and the substation. The principal noise sources include the cooling fans on the PV-Coupled ESS units and transformers, the electrical components of the inverters, the step-up transformer associated with each power conversion station, and the main power transformer at the collector substation. Step-up transformers and power inverters like the ones proposed for the Project are considered a low-level source of sound. The solar modules are expected to generate low-level sound from the trackers but this sound is not expected to be detectable beyond the Project area boundary.

Transmission lines generate sound referred to as corona. The level of corona noise generated by a transmission line is highly dependent on weather conditions (i.e., foul weather), electrical gradient, altitude and condition of the conductor wires. The corona effect is initiated where the conductor's electric field is concentrated by imperfections in the conductor surface such as nicks or scratches, or by substances on the lines such as water droplets, dirt or dust, and/or bird droppings. Corona activity increases with increasing altitude, and with increasing voltage in the line, but is generally not affected by

system loading. Since the Project generation-tie line is only rated at 46 kV, it will produce minimal sound even during foul weather conditions.

Inverters at the PV-Coupled ESS Unit are estimated to produce a noise level of about 75 dBA, as heard at a distance of 50 feet. Transformers at the power conversion stations are estimated to produce a noise level of about 80 dBA, as heard at a distance of 50 feet. The location of the Project's power conversion systems and PV-Coupled ESS Units relative to noise sensitive receptors makes it unlikely that either the adjacent Class B or Class C Receiving Zoning District would be impacted by noise levels above the maximum permissible sound levels listed in Table 3-7. The closest noise sensitive receptor (the private horse stable) is approximately 450 feet from the closest power conversion system. At this distance inverter and transformer sound is anticipated to be below the 50/60 dBA Class B maximum permissible sound level. The 'Ewa Battlefield Historical District is located north of the Project area and the closest power conversion system to the portion of the District located outside the Project area and outside the Kalaeloa Renewable Energy Park is approximately 640 feet. At this distance inverter and transformer sound is anticipated to be below the 45/55 dBA Class A maximum permissible sound level.

The transformer at the Project substation is anticipated to produce a noise level of about 70/72 dBA at 50 feet. The location of the substation relative to noise sensitive receptors makes it unlikely that either the adjacent Class B or Class C Receiving Zoning District would be impacted by noise levels above the maximum permissible sound levels listed in Table 3-7. The closest noise sensitive receptor (the private horse stable) is approximately 2,700 feet from the substation and the closest residential noise sensitive receptor (Kalaeloa Rental Homes) is over 0.5 miles from the substation. At this distance transformer sound is anticipated to be below the 50/60 dBA Class B maximum permissible sound level.

Noise from Project operations is not expected to significantly impact any noise sensitive receptors, especially in the context of the existing acoustic environment, such as the Kalaeloa Airport. Operational noise impacts associated with the Project are expected to be below the maximum permissible sound levels for the Class A, B, and C Receiving Districts. Within the Project area, noise would be mitigated by health and safety controls such as hearing protection. Therefore, it is anticipated that noise impacts associated with the Project would be less than significant.

3.11 Hazardous Materials

3.11.1 Affected Environment

The Project area was historically used by the United States military, first as MCAS 'Ewa and later as NASBP. Prior to the closure of NASBP and disposal of real properties, the U.S. Navy was required to identify contaminated and uncontaminated areas of the NASBP in compliance with the Community Environmental Response Facilitation Act of 1992 (CERFA), Pub. L. 102-426, and the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), 42 U.S.C. §9601 *et seq*. The U.S. Navy conducted environmental baseline surveys at the NASBP from August to November 1993 and documented their findings in the *Environmental Baseline Survey (ESB) Report, NAS Barbers Point, Oahu, Hawaii* (Ogden 1994). Prior to the transfer of TMK 9-1-013:038 and TMK 9-1-013:040 to DHHL, the

U.S. Navy conducted all remedial actions necessary to protect human and health and the environments with respect to any hazardous substances remaining on the properties (Bureau of Conveyances 2003 and 2008). However, hazardous substances may still be present on the Project parcels and hazardous waste materials may be in use as some of the DHHL's currently leased areas. According to the quitclaim deeds associated with the property transfers from the U.S. Navy to DHHL, the asbestos-containing material and lead-based paint may be present in buildings on TMKs 9-1-013:038 and 9-1-013:040 (Bureau of Conveyances 2003 and 2008).

3.11.2 Potential Impacts and Mitigation Measures

The Project will not require extremely hazardous materials as defined by 40 CFR §355 – List of Extremely Hazardous Substances and Their Threshold Planning Quantities; no such substances will be produced, used, stored, transported, or disposed of as part of Project construction, operations and maintenance, or decommissioning phases. During the construction phase of the Project, some hazardous fuels (e.g., gasoline and diesel fuel) and lubricants, will be onsite. However, only a limited amount of these materials will be onsite and implementation of BMPs (e.g., proper storage procedures with secondary containment, routine inspection of vehicles for leaks, fueling vehicles and equipment offsite or within designated areas with secondary containment, etc.) will ensure there will be minimal or no significant effect on surface, underground and marine water resources and neighboring properties and surrounding flora and fauna. A spill prevention plan will be developed that describes measures that will be taken to avoid and minimize potential impacts associated with refueling, handling and storage of hazardous materials. Development and execution of the plan will reduce potential impacts to a less than significant level.

During operations, the Project does not require fuel or chemicals for the generation of electricity with the exception of an emergency backup generator as required by Hawaiian Electric in case utility back feed power is disrupted and the photovoltaic and battery system is not operating. The backup generator will have a double-wall fuel containment system. Oil-based products will also be stored within the Project area during operations as the transformers use oil for insulation and cooling. Although transformer oil is typically mineral oil or seed oil that is considered nontoxic and a non-hazardous substance, secondary containment measures will be put in place to ensure the potential for oil-related spills is minimal. Safety features will be integrated to prevent, detect, and suppress fires. Adherence to the applicable regulatory requirements will minimize potential hazards related to use, handling, transport, and disposal of batteries throughout Project operations and decommissioning. In the event a lithium-ion battery requires replacement (and at decommissioning), the battery system would be disconnected and de-energized to allow for battery removal and replacement; the old battery would be properly packaged and transported to an approved recycling facility. All stages of this process would be conducted in accordance with all relevant regulatory requirements in place at the time of replacement. In particular, transportation of the lithium-ion batteries would be conducted in accordance with U.S. Department of Transportation Pipeline and Hazardous Material Administration regulations, including 49 CFR 173.185 (Lithium Cells and Batteries). This regulation includes requirements related to

testing, proper packaging (such that the batteries are completely enclosed and are separated from contact from other equipment, devices, or conductive materials), and safety measures (including those related to preventing rupture, external short circuits, and reverse current flow).

No chemicals are expected to be used for ongoing maintenance of the solar panels. Solar arrays will be cleaned with a mild, biodegradable detergent, if or when necessary. Other more innovative water-less and dry brushing techniques will be explored as an option.

No existing buildings on TMKs 9-1-013:038 and 9-1-013:040 that may contain asbestos-containing material and lead-based paint will be altered or demolished; therefore, no abatement of these materials is anticipated to be needed.

Vegetation will be managed during operations to ensure vegetation does not overgrow the photovoltaic panels, preventing solar radiation from reaching them and to reduce fire risk. Vegetation control will employ BMPs and techniques that are most appropriate for the local environment based on factors such as compatibility with grazing and existing ranch operations and preventing runoff – thus reducing the need to use chemical herbicides. In rare circumstances where it is necessary to use herbicides, an effort will be made to minimize use and only apply bio-degradable, EPA-registered, organic solutions that are non-toxic to wildlife. Sustainable, long-term management practices and the promotion of healthy biodiversity within local ecosystems is a priority. Any herbicides used for vegetation management on the site will be selected and used in a manner that fully complies with all applicable laws and regulations. Herbicides, if used, will be governed by the Vegetation Management Plan. See Appendix B.

At the end of its operational life, the Project would be decommissioned, including removal of all Project equipment and returning the Project area to substantially the same condition as existed prior to Project development. As such, Project implementation would not be expected to result in any significant impacts related to hazardous materials.

3.12 Transportation and Traffic

3.12.1 Affected Environment

Harbors

There are two deep-draft harbors in O‘ahu that can accommodate container ships and associated bulk cargo: Honolulu Harbor and Kalaeloa Barbers Point Harbor (HDOT 2008). The Project area is located approximately 4 miles southeast of Kalaeloa Barbers Point Harbor and approximately 12 miles west of Honolulu Harbor. Both harbors are heavy lift facilities that can accommodate delivery, unloading, and temporary storage of equipment and materials for the Project.

Roadways

Roadway access is available to the Project area and its surrounding state, county, and privately-owned roadways. The key roadways used to access the Project area include the following.

Interstate H-1 Freeway:

Operated by the HDOT, Highways Division, the H-1 Freeway is generally an east-west, two-way divided freeway which begins to the west of the Palailai Interchange then extends 27.1 miles through Kapolei, ʻEwa, Waipahu, Airport Industrial Area, and Central Honolulu before terminating in East Honolulu, where it meets with Kalaniana'ole Highway. In the Project are vicinity, the H-1 Freeway is a two-way, six-lane divided highway which provides three lanes in each direction. The H-1 Freeway in the vicinity of the Project has a posted speed limit of 60 mph.

Fort Barrette Road:

Operated by HDOT, Highways Division, Fort Barette Road is a state-owned roadway, which extends from Makakilo Drive in the north to Roosevelt Avenue in the south. From Makakilo Drive to Farrington Highway, Fort Barrette Road is a 4-lane undivided roadway with turn lanes at Farrington Highway. South of Farrington Highway, Fort Barrette Road transitions into a two-way, undivided roadway. Fort Barrette Road is signalized at all intersections. The posted speed limit is 25 mph near Roosevelt Avenue and 40 mph near Farrington Highway.

Roosevelt Avenue:

Operated by HDOT, Highways Division, Roosevelt Avenue is a two-way, two-lane undivided, state-owned roadway extending from Kamokila Boulevard in the west to Geiger Road in the east. Roosevelt Avenue is signalized at the Ka Makana Alii driveway. All other intersections along Roosevelt Avenue are stop-controlled and have turn lanes. The posted speed limit is 25–35 mph.

Coral Sea Road:

Coral Sea Road is a two-way, undivided, state-owned roadway extending from Roosevelt Avenue to the north to just past Kalaeloa Airport to the south. All intersections are stop-controlled. There are no crosswalks or sidewalks along Coral Sea Road in the vicinity of the Project area, with the exception of a crosswalk at Bougainville Avenue. There are no bike facilities provided. The posted speed limit is 25 mph.

Nimitz Highway (Route 36):

Operated by the State of Hawaii, Nimitz Highway is a principal arterial road extending from Pearl Harbor Interchange to the west and transitioning into Ala Moana Boulevard to the east. Nimitz Highway runs beneath the H-1 Freeway between the Pearl Harbor Interchange and the Keehi Interchange. Most of the intersections along Nimitz Highway are signalized in the Project area vicinity. Near Sand Island Access Road, Nimitz Highway is a six-lane divided roadway. An eastbound lane is used in the morning peak hour to facilitate a contraflow lane to allow for four Honolulu-bound lanes. The morning contraflow lane uses the inside westbound lane until just past Alakawa Street. Left turns are prohibited in the westbound direction at certain intersections during the morning peak hour

Sand Island Access Road:

Operated by the State of Hawaii, Sand Island Access Road is a four-lane, divided roadway extending from Nimitz Highway in the north, transitioning to Sand Island parkway south of the bridge to Sand Island. Crosswalks and sidewalks are intermittently located along Nimitz Highway. A striped bicycle lane is available for use. Posted speed limits range from 25–35 mph.

Existing Traffic

A TIAR (Appendix H) prepared for the Project collected data regarding existing traffic volumes. Based on the traffic data, the weekday morning and afternoon peak hours of traffic were between 7:15am and 8:15am and between 3:15pm and 4:15pm, respectively. The TIAR established levels of service (LOS) for six existing intersections in the vicinity of the Project area: Fort Barette Road at Farrington Highway, Fort Barette Road at Kamaaha Avenue, Fort Barette Road at Kapolei Parkway, Fort Baratte Road at Roosevelt Avenue, Roosevelt Avenue at Coral Sea Road, and Nimitz Highway at Sand Island Access Road. LOS is a qualitative analysis system used to describe the effectiveness of traffic flow and roadway conditions. LOS values range from free-flow conditions with little to no delays (LOS A) to congested conditions with heavy delays (LOS F). LOS values are summarized below in Table 3-9 for the six study intersections surveyed in the TIAR (SSFM 2021).

Table 3-9. Level of Service Values

TIAR Intersection	LOS Morning Peak	LOS Evening Peak
Fort Barrette Rd at Farrington Hwy	C	E
Fort Barrette Rd at Kamaaha Ave	C	C
Fort Barrette Rd at Kapolei Pkwy	B	B
Fort Barrette Rd at Roosevelt Ave	Unsignalized	Unsignalized
Roosevelt Ave at Coral Sea Rd	Unsignalized	Unsignalized
Nimitz Hwy at Sand Island Access Rd	C	C

Public Transit

Public transit services on O‘ahu include TheBus and TheHandi-Van, both of which are operated by a contractor for the City and County of Honolulu, O‘ahu Transit Services, Inc. TheBus provides service to the Project vicinity via Bus Route 41, which runs between Kapolei and ‘Ewa Beach. The closest bus stop to the Project area is located at intersection of Roosevelt Avenue and Coral Sea Road. TheHandi-Van, which is a public transit service for persons with disabilities, provides all-day service in areas located within 0.75 mile of Bus Route 40.

Honolulu Rail Transit, a rapid transit system that will connect West O‘ahu with downtown Honolulu and Ala Moana Center, is in the process of being constructed. The system will include approximately 20 miles of elevated guideway and 21 rail stations. The route runs along Kualaka‘i Parkway and parallel to Farrington Highway, approximately one mile north of the Project area. The nearest station to the Project area will be the East Kapolei Station, approximately 1 mile north of the Project area adjacent to

Kualakaʻi Parkway. These facilities are currently under construction; the segment from East Kapolei to Aloha Stadium is expected to open for passenger service in December 2021 (KITV 2021).

Bicycle and Pedestrian Facilities

There are currently no designated bicycle or pedestrian crosswalk facilities in the immediate vicinity of the Project area. The nearest crosswalk is located at the intersection of Coral Sea Road and Bougainville Avenue. During the TIAR traffic counts, bicyclists and pedestrians were observed using the sidewalk and/or shoulder lane during the morning and evening peak hours at the TIAR's study intersections including: Fort Barrette Road at Farrington Highway, Fort Barrette Road at Kamaaha Avenue, Fort Barrette Road at Kapolei Parkway, Fort Barrette Road at Roosevelt Avenue, Roosevelt Avenue at Coral Sea Road, and Nimitz Highway at Sand Island Access Road. Two bicycles were observed in the AM peak hours at Coral Sea Road at San Juacinto Street (SSFM 2021).

The 2019 Oʻahu Bike Plan Update shows planned improvements for shared use bicycle paths in the vicinity of the Project area along Coral Sea Road and non-motorized travel in the vicinity of the Project, including a buffered bike lane along Makakilo Loop (a proposed extension of Makakilo Drive connecting to Kualakaʻi Parkway), and a bike lane and shared used path extending from H-1 Freeway south along Kualakaʻi Parkway (DTS 2019). These projects are identified as Priority 2 projects; however, the timing for implementation is unknown.

Airports

The nearest airport to the Project area is Kalaeloa Airport (JRF), located approximately west of the Project area, on the west side of Coral Sea Road. As part of the airport system for the State of Hawaiʻi, Kalaeloa Airport serves as a general aviation reliever airport for the Daniel K. Inouye International Airport. Kalaeloa Airport provides air traffic control from 6:00am to 10:00pm daily but is always available as an alternate facility. Daniel K. Inouye International Airport (HNL), the state's largest airport, is located approximately 5 miles southeast of the Project area (HDOT 2021). There are no privately-owned runways on Oʻahu. Several military airfields are located outside the Project area vicinity on Oʻahu, including Wheeler Army Airfield, Hickam Air Force Base, and Marine Corps Base Hawaiʻi Kaneohe Bay, and Dillingham Airfield.

3.12.2 Potential Impacts and Mitigation Measures

Harbors

It is anticipated that the equipment and materials required for Project construction would be transported by container barge to Honolulu Harbor. The equipment and materials would be offloaded from the barges and transferred to trucks for delivery to the Project area. In general, the equipment and materials required for the Project would be expected to be handled as general containerized bulk cargo and would not be expected to place an unusual demand on the harbor facilities.

Roadways/Traffic

Construction

A maximum of 65 vehicles would be expected to operate or make deliveries at the Project area each day. This maximum represents peak construction traffic, including trucks and commuting vehicles. Trucks would access the Project site after morning peak hours, where possible. If necessary, heavy load trucks and wide load trucks would access the Project outside of daily peak hours of traffic, and would have negligible to no effect on commuter traffic. The future roadway lane configuration during construction will remain the same as the existing condition with the addition of the driveways to the Project area. A detailed comparison of the anticipated future LOS at each study intersection under a "future without-Project conditions" scenario and a "future with project construction conditions" scenario for the year 2021 is provided in the TIAR (see Appendix H). During construction, all movements at the studied intersections would operate at a LOS of D or better; however, some individual movements at the studied intersections would operate at LOS E or F under both with-Project and without-Project future conditions (See Appendix H). At some intersections, a few individual movements would operate under a reduced level of service under future with-Project conditions compared to future without-Project conditions, as described below.

The intersection of Fort Barrette Road and Farrington Highway would operate at LOS C or E in the morning and evening, respectively, under both future without-Project, and future with-Project conditions. Individual movements at this intersection would have the same LOS in both future scenarios.

The intersection of Fort Barrette Road and Kamaaha Avenue would operate at LOS D during the morning and evening peak hours under both with-Project and without-Project future conditions. Three individual movements would have a reduced level of service under the with-Project condition, compared to the without Project condition in the evening peak hours; Fort Barette Road Northbound through would change from LOS B to E, Kamaaha Avenue Eastbound through would change from LOS E to F and Kamaaha Avenue Westbound left turn would change from LOS E to F. All other individual movements would have the same LOS under both future conditions.

Fort Barrette Road at Kapolei Parkway would operate at LOS C during the morning peak hours under both with-Project and without Project future conditions. During the evening Peak hours, the LOS at this intersection is reduced from B to C under the with-Project condition. Two individual movements would have reduced level of service under the with-Project condition compared to the without-Project condition; However, all individual movements at this intersection would operate at LOS C or better.

The intersection of Fort Barrette Road and Roosevelt Avenue is unsignalized. Individual movements would operate at LOS C to F under both with-Project and without-Project future conditions. There would be no reduction in LOS as a result of the project for any individual movements at this intersection. A future roadway widening improvement and traffic improvements project along Fort Barrette Road from Farrington Highway to Roosevelt Avenue is planned at this intersection but is not expected to begin before Project construction.

The Roosevelt Avenue intersection with Coral Sea Road is unsignalized. Individual movements at this intersection would have the same LOS under both with-Project and without Project future conditions. LOS for individual movements at this intersection ranges from A to F. Nimitz Highway at Sand Island Access Road would operate at LOS C during the morning and evening peak hours under both with-Project and without-Project future conditions. Individual movements at this intersection would have the same LOS under both with-Project and without Project future conditions. LOS for individual movements at this intersection ranges from B to F.

To mitigate delays during construction, vehicles would be staggered to depart and arrive at the Project area at different times. Truck access to the Project area would be limited during peak hours, thereby causing less vehicular delay. At the Coral Sea Road driveway access points, stop signs and stop bars would be added to improve safety and traffic flow.

Based on the results of the TIAR, Project construction is not expected to measurably affect overall LOS at the signalized intersections adjacent to the Project area. However, construction could result in minor, localized impacts to traffic and the roadway network. A Traffic Management Plan would be prepared prior to construction, which would describe the potential impacts to the surrounding roadway network and would detail the measures that would be implemented to avoid, minimize and mitigate potential impacts based on Complete Streets principles. It is expected that the measures would include the following:

- Scheduling delivery of construction materials and equipment in oversized or overweight trucks during off-peak traffic hours. Other deliveries of construction materials and equipment would be scheduled for off-peak traffic hours to the extent practicable.
- Timing of deliveries would be coordinated to minimize cumulative traffic-related impacts. If any construction projects are planned to occur on nearby properties during the same time frame, deliveries would be coordinated and staggered to reduce impacts to traffic.
- Notification of necessary parties regarding Project construction and potential traffic impacts would be conducted. Local area representatives, the neighborhood board, area residents, businesses, emergency personnel, and public transit services would be notified as appropriate.
- Repair of existing roadways or sidewalks, as applicable to the Project. Any roads or sidewalks damaged by the Project construction would be repaired in accordance with current design standards.
- Maintenance of existing pedestrian, bicycle and vehicle facilities shall be safely maintained. If roadway, sidewalk, or crosswalk closures are necessary, alternate routes would be provided for vehicles, pedestrians, and bicyclists. Alternate routes would be clearly marked for increased safety.
- Coordination with local agencies would be conducted. The Traffic Management Plan would be submitted to HDOT, the City and County of Honolulu Department of Transportation Services, and City and County of Honolulu Department of Planning and Permitting for review and approval prior to Project construction.
- Installation of stop signs and stop bars at Project driveway entrances, as required.

With implementation of these mitigation measures, construction-related impacts to traffic and the roadway network are expected to be less than significant.

Operations and Maintenance Activities

Once operational, it is anticipated that the Project would have up to four employees regularly visiting the site for operations activities. Therefore, the Project would generate up to four trips during the morning and evening peak hours of operation. However, the Project does not require full-time staff to be on-site every day. Upon completion of the Project, the two studied signalized intersections in the Project area vicinity are projected to operate at the same overall and individual movement LOS as the baseline without-project conditions as described in this section. Therefore, Project operations would not be expected to measurably impact traffic on roads within the Project area vicinity. Additional detail regarding the LOS for the without-Project conditions and with-Project conditions for the year 2023 is provided in the TIAR (see Appendix H).

Decommissioning Activities

The Project is expected to operate for approximately 25 years (through 2048). At the end of the PPA term, the Project may be repowered under a renegotiated PPA or other contract (with subsequent permits/approvals) or decommissioned. Decommissioning will involve removal of all equipment associated with the Project and returning the area to substantially the same condition as existed prior to Project development. Decommissioning will occur within 12 months of the conclusion of Project operation. Transportation routes to and from the Project site are anticipated to be the same as during construction and similar to the construction phase, a maximum of 65 vehicles would be expected to operate at the Project area each day. Similar to the evaluation of construction impacts, decommissioning activities are not expected to measurably affect overall LOS at the signalized intersections adjacent to the Project area. However, construction could result in minor, localized impacts to traffic and the roadway network. A Traffic Management Plan would be prepared prior to decommissioning, which would describe the potential impacts to the surrounding roadway network and would detail the measures that would be implemented to avoid, minimize and mitigate potential impacts based on Complete Streets principles.

Public Transit

Public transit services in the vicinity of the Project include TheBus, TheHandi-Van and the future Honolulu Rail Transit. The nearest public transit facilities include a bus stop 0.5 miles north of the Project area and rail transit station 2.5 miles northwest of the Project area. Implementation of the Project is not expected to affect these facilities or transit services directly or indirectly.

Bicycle and Pedestrian Facilities

As there are currently no pedestrian facilities in the vicinity of the Project area, no Project-related impacts would occur. Bicycle facilities planned in the vicinity of the Project area would not be affected by access on Coral Sea Road.

Airports

As required by FAA, land uses adjacent to or in the immediate vicinity of an airport must be compatible with normal airport operations, including land and takeoff of aircraft (FAA Order 5190.6B). The State of Hawai‘i Office of Planning issued a Technical Assistance Memorandum (TAM-2016-1) to provide guidance for development and activities that may pose hazards including wildlife attraction hazards, glint and glare hazards, or aerial obstruction hazards. This guidance identifies specific concerns related to the potential hazards posed by solar photovoltaic facilities to flight paths, including:

- Physical penetrations of navigable airspace from power towers that extend into imaginary surfaces, terminal instrument procedures surfaces, or the path of radio emitting navigational aids;
- Potential glare and glint caused by parabolic troughs and heliostats, which may cause temporary loss of vision to pilots on arrival or departure, or to Air Traffic Control personnel in the control tower;
- Electromagnetic interference with airport radar systems that may pick up a false signal from the metal components of the mirrors with impacts that can vary based on solar tracking activity; and
- Thermal plumes emitted by the power tower that produce unexpected upward moving air columns into navigable air space.

The Project would not include parabolic troughs, heliostats, mirrors or tall structures that would impede imaginary surfaces. Therefore, none of the identified concerns would occur as a result of the Project. However, the Project will follow TAM-2016-1 recommendations for filing Form 7460-1 with the FAA pursuant to CFR Title 14 Part 77.9 if the Project is within 3 nautical miles of an airport or has a footprint approaching 1 acre. On August 17, 2021, the Applicant received no hazard determinations from the FAA for each of the solar arrays and for the substation. See Determination of No Hazard to Air Navigation forms in Appendix G.

<u>Glare</u>

The FAA has determined that “glint and glare from solar energy systems could result in an ocular impact to pilots and/or air traffic control (ATC) facilities and compromise the safety of the air transportation system” (78 FR 63276). FAA recommends glare analyses be performed for solar facilities on a site-specific basis using SGHAT as the standard for measuring potential ocular impact as a result of solar facilities (78 FR 63276;). The FAA has developed criteria for analysis of solar energy projects located on jurisdictional airports as follows: (1) no potential for glint or glare in the existing or planned ATCT cab; and (2) no potential for glare or “low potential for after-image” along the final approach path. This

guidance specifically applies to solar facilities located on federally-obligated airport property, and is not mandatory for proposed solar installations that are not within an airport. Consultation with FAA via Form 7460 is considered an industry best practice for solar facilities near airports.

The FAA Notice Criteria Tool (NCT) reports whether a proposed structure is in proximity to a jurisdictional air navigation facility and whether a formal submission to the FAA Obstruction Evaluation Group under CFR Title 14 Part 77.9 (Safe, Efficient Use, and Preservation of the Navigable Airspace) is recommended. The NCT also identifies approach flight paths that may be considered vulnerable to impacts to navigational signal reception from a proposed structure. The FAA NCT was utilized to determine that the Project is located within an FAA-identified impact area based on the Project boundaries and height above ground surface. The FAA NCT Report referenced Kalaeloa Airport and Daniel K. Inouye International Airport (Honolulu International). Based on this information, these airport facilities were included in the SGHAT analysis conducted for the Project (see Section 3.8.2.1).

The SGHAT analysis included six 2-mile final approach flight paths and one ATCT associated with Kalaeloa Airport, which is approximately 0.1 miles to the southwest of the Project, and eight 2-mile final approach flight paths and one ATCT associated with Daniel K Inouye International Airport, which is approximately 5 miles to the east of the Project. The analysis was conducted under two scenarios for the tracking specifications of the arrays: one with no backtracking and one with backtracking at 5 degrees.

No glare was predicted for the observation points or for Daniel K. Inouye International Airport. Limited amounts of green glare are predicted at Kalaeloa Airport Runways 22L and 22R. However, the potential occurrence of glare is extremely limited to less than 7.2% of the annual daylight hours (Appendix G Glare Analysis Report). Therefore, the Project was expected to meet the FAA criteria and this was confirmed by the FAA in the issuance of Determination of No Hazard to Air Navigation forms for each solar array (see Appendix G).

Radio Frequency Interference

Solar photovoltaic systems may emit radio frequency interference to aviation-dedicated radio signals, which can disrupt the reliability of air-to-ground communications. The Federal Communications Commission (FCC) regulates radio frequency (RF) devices contained in electronic-electrical products that are capable of emitting radio frequency energy. These products can cause interference to radio services operating within 9 kHz to 3000 GHz RF range.

Nearly all electronic-electrical devices are capable of emitting radio frequency energy. Most, of these products must be tested to demonstrate compliance to the FCC rules for each type of electrical function by the device. Typically, devices that are designed to contain circuitry that operates in the RF spectrum need to demonstrate compliance using the applicable FCC equipment authorization procedure. Compliance is demonstrated by means of a Supplier's Declaration of Conformity or Certification, as specified in the FCC rules for each type of device. An RF device must be approved using the appropriate equipment authorization procedure before it can be imported, marketed, or used in the United States.

Regulatory responsibility for radio spectrum allocation is divided between the FCC (for non-Government uses) and the National Telecommunications and Information Administration (for use by Government agencies). As of 2021, only frequency bands between (1) 9 kHz and 275 GHz and (2) 2200–2290 have been allocated for restricted use by terrestrial or space radiocommunication services. FCC's Table of Frequency Allocations, which is a compilation of allocations, is codified at Section 2.106 of the Commission's Rules.

All RF devices associated with the Project would comply with FCC regulations. Project RF devices would operate only within designated frequency bands. No interference with aviation communication frequency is expected due to use of Project RF devices. In the extremely unlikely event of an unexpected radio frequency interference situation and notification by either FAA or HDOT Airports Division, the Project's wireless communication system would be disabled and investigated to ensure it does not create a hazardous condition.

3.13 Natural Hazards

3.13.1 Affected Environment

Natural hazards that can affect Oʻahu include flooding, tsunami inundation, and wildfire. Flood hazard areas are identified by the Federal Emergency Management Agency (FEMA) National Flood Insurance Program and are mapped on the Flood Insurance Rate Maps (FIRM). The maps classify land into zones according to the potential for flood inundation. The FIRM flood zone classification for the proposed Project site was obtained from the Hawaiʻi National Flood Insurance Program (NFIP) Flood Hazard Assessment Tool (DLNR 2021b). Based on NFIP information, the Project area and vicinity is located entirely within an area that has been designated as Flood Zone D, where analysis of flood hazards has not been conducted and flood hazards are undetermined (Figure 3-13). No portion of the Project area is within a special flood hazard zone.

Tsunami evacuation maps prepared by the City and County of Honolulu, Hawaiʻi Emergency Management Agency identify the hazard risk associated with tsunami inundation throughout Hawaiʻi (DEM 2015). These maps define both the tsunami and extreme tsunami evacuation zones. Tsunami evacuation zones are based on tsunami events that have impacted Hawaiʻi during the past 100 years. Extreme tsunami evacuation zones are planned for a tsunami that may exceed the historic distant events. As shown on Figure 3-14, the Project area is outside the tsunami evacuation zone (which ends at Tripoli Street). Solar Areas 2 and 3 are located within the Extreme Tsunami Evacuation Zone while Area 1 is located within the Safe Zone.

Wildfires occur throughout Hawaiʻi and have been on the rise in recent years due to increased ignition events. Human activity is the primary cause of wildfires, but they may also be caused by natural events such as lightning strikes. Effects of wildfires include damage to people, property, and the environment. Hawaiʻi's native ecosystems are not adaptive to wildfire, which can result in extinction of native species and increased coverage of nonnative or invasive species. Other environmental effects include soil erosion, increased runoff and decreased water quality (Pacific Fire Exchange 2014).

3.13.2 Potential Impacts and Mitigation Measures

The Project would not affect geologic or natural processes and would not result in an increased risk of natural hazards in the Project vicinity. As the Project area is not located within a flood hazard zone or a tsunami evacuation zone, it is extremely unlikely that conditions associated with flood or tsunami inundation would occur within the site, nor would the Project contribute to increased risk of flooding or inundation. The Project is in an extreme tsunami evacuation zone, but extreme tsunamis are rare, and the Project is likely to not be affected.

The Project would incorporate fire prevention and suppression measures designed in accordance with the National Fire Protection Association (NFPA) and NEC requirements for fire prevention. Fire prevention mitigation measures to be employed at the Project area include installation of fire breaks and vegetation management in the Project area. Consultations with the Honolulu Fire Department regarding the Project's approach for fire code compliance has occurred as evidenced by the cover letter to the Project's Vegetation Management Plan in Appendix B. As described in Appendix B, operations staff would manage vegetation growth on a regular schedule.

Electrical wiring would be elevated or enclosed to prevent interaction between circuits and flammable materials, and battery systems would be fully contained. Each PCS unit will include and incorporate multiple layers of protection to avoid failures and risks of fire. Battery containers would be equipped with fire mitigation equipment, including temperature, smoke, and fire sensors, alarms, as well as a fire suppression system. Alarms and sensors would alert staff and emergency personnel in the event of a system issue. Consultation with the Honolulu Fire Department would be continued as part of the Project planning and design process. Barbers Point Solar, LLC will develop an emergency response plan with the appropriate agencies, including Honolulu Fire Department. The emergency response plan will establish protocols for minimizing risk of fire ignition and providing fire response (should it be needed) during construction and/or operations and maintenance. In the event of an emergency, local fire and police stations will be notified immediately.

With implementation of the mitigation measures in this section, Project impacts associated with natural hazards are considered to be less than significant.

3.14 Public Facilities and Service

3.14.1 Police, Medical, and Fire Protection Services

Affected Environment

Police and fire services on O'ahu are provided by the City and County of Honolulu. The Project area obtains police protection from the Honolulu Police Department, District 8 Kapolei Station, located about 2.5 miles from the Project solar array area. Fire control services would be provided by the Honolulu Fire Department, Fire Station 43 East Kapolei or Fire Station 24 Ewa Beach, located about 1 mile and 2 miles, respectively, from the Project solar array area.

The primary health service provider in the vicinity of the Project area is Queen's Medical Center- West O'ahu, approximately 4 miles northeast of the Project solar array area. Emergency services are provided at this facility. Other medical health centers and clinics in the vicinity of the Project area include Kapolei Health Care Center and Kaiser Permanente Kapolei Clinic in Kapolei. Honolulu Emergency Medical Services has 20 advanced life support ambulances, one of which is stationed in the East Kapolei Fire Station.

Potential Impacts and Mitigation Measures

The Project could result in short-term impacts to public safety services during construction, as the transport of equipment and materials to and from the site, the increased activity at the site and on surrounding roads, and the increased presence and activity of site personnel would increase the potential for traffic accidents, injuries, and fires, which would require police, medical, and/or fire protection services. However, these short-term impacts are expected to be minor with the implementation of BMPs.

The long-term operation of the solar Project would not be expected to significantly impact the current service levels. Consistent with requirements articulated by the Honolulu Fire Department, the existing access road as well as service roads within the Project site would be able to accommodate fire apparatus; it is anticipated that the Project does not need to provide water supply for fire flow as no occupied buildings would be constructed within the Project site. Furthermore, as discussed in Section 3.13, the Project would incorporate multiple layers of fire prevention and suppression measures. It is being designed in accordance with the National Fire Protection Association (NFPA) 1 and NEC requirements for fire prevention for large-scale solar, including installation of fire breaks throughout the Project area. The Honolulu Fire Department was initially consulted as part of the pre-assessment scoping process (see Appendix B and Appendix K) and consultation will continue during the design of the Project, with on-site training and orientation prior to commercial operation. Additionally, maintenance (e.g., servicing, inspection and repair) of mechanical and electrical systems will be conducted on a routine basis to decrease the risk of an emergency, including fire.

The Project is also not expected to create additional demand for police or emergency medical services. During operations, the facilities would be adequately secured and are not expected to require additional security on a regular basis. With the implementation of these measures and observance of safe working practices during operations, impacts to public safety services from operation of the Project would be negligible.

3.14.2 Educational Facilities

Affected Environment

The nearest school to the Project area is Kapolei Middle School, which is approximately 0.9 miles to the northwest of the solar array areas. Several other schools occur within a larger radius, primarily to the

north and east of the Project area; these include Kapolei Elementary School, Kapolei High School, Ho'okele Elementary School, Barbers Point Elementary School, 'Ewa Makai Middle School, 'Ewa Beach Elementary School, 'Ilima Intermediate School, among others.

Potential Impacts and Mitigation Measures

Some short-term indirect impacts to educational facilities in the vicinity of the Project site may occur due to Project-related traffic during construction; however, this impact would be temporary and minor. See Section 3.12 for discussion of mitigation measures for minimizing traffic impacts from construction. The Project would not directly impact the existing educational facilities, nor would it increase the need for educational facilities, therefore, no mitigation is proposed.

3.14.3 Recreational Facilities

Affected Environment

There are no existing recreational areas within the Project area. The Project area is located west of a private horse stables, the Barbers Point Golf Course, the Hoakalei Country Club and is north of the Kalaeloa Beach Park and White Plains Beach. Recreational activities in the vicinity of the Project include swimming, surfing, fishing, boating, fishing, golfing, horseback riding, running and walking. The Kalaeloa Master Plan identifies Coral Sea Road as a potential bicycle trail that would connect the coastline to Roosevelt Avenue and Kapolei Parkway.

Potential Impacts and Mitigation Measures

Some short-term indirect impacts to recreational resources in the vicinity of the Project site may occur due to Project-related traffic during construction; however, this impact would be temporary and minor. Construction of the Project would also create noise that may affect nearby recreational facilities including the private horse stables located on TMK 9-1-013:164, Barbers Point Golf Course, Hoakalei Country Club, Kalaeloa Beach Park, and White Plains Beach. Construction noise, however, would be temporary, intermittent, and would likely have a minor to negligible effect on these recreational resources.

The Project will coordinate with HCDA regarding conformance with the Kalaeloa Master Plan guidelines, as applicable, for any Project improvements along Coral Sea Road, including considerations for a potential future bicycle trail. No Project infrastructure would be placed within any existing recreation resource area. No long-term direct or indirect impacts to recreational resources are anticipated from construction or operations of the proposed Project, therefore, no mitigation is proposed.

3.15 Utility Infrastructure

3.15.1 Affected Environment

The affected environment of utility infrastructure includes services such as electric, gas, telephone, sanitary sewer, domestic water, stormwater, and solid waste management.

Electricity and Telecommunications

TMK 9-1-013:038 is currently undeveloped and no existing electrical or telecommunication utility connections are located on the parcel. TMK 9-1-013:040 is generally undeveloped with the exception of the two sub-lease areas associated with DHHL's current tenants. No existing electrical or telecommunication utility connections are located on the parcel outside of these subleased areas. An existing 46-kV sub-transmission line jointly owned by the U.S. Coast Guard and Aloha Solar is located near the Project area along Coral Sea Road.

Water and Wastewater

No water nor wastewater systems currently service the Project area. The existing water and wastewater systems in the KCDD is owned by the U.S. Navy. The water distribution system is currently operated by the U.S. Navy but is in a relatively poor state. New development will require installation of new water infrastructure that meets current City and County of Honolulu Bureau of Water Services standards (HCDA 2006). The existing wastewater system is operated, under license, by the City and County of Honolulu Department of Environmental Services. An existing 18-inch sewer force main along the western edge of Coral Sea Road conveys wastewater from Kalaeloa Airport to the City treatment plant two (2) miles northeast of the Project (Department of Navy 1999b). The existing wastewater system is not intended to serve development in the general area.

Stormwater Drainage

Stormwater runoff within Kalaeloa is discharged into an extensive system of more than 250 drywells, most of which are located in the downtown area of Kalaeloa (HCDA 2006). These drywells, though permitted through the State DOH, do not currently conform to City standards (HCDA 2006). There are no permitted discharges to surface waters within Kalaeloa. Runoff is also allowed to pond in various locations, where it eventually infiltrates into the coral underlayer (HCDA 2006). No stormwater drainage facilities or dry wells are located within or adjacent to the Project area.

Solid Waste

Solid waste on O'ahu is handled at one of two landfills – Waimanalo Gulch Sanitary Landfill, which is managed by the City and County of Honolulu Department of Environmental Services, and the PVT Landfill, which is privately owned. The Waimanalo Sanitary Landfill is the island's only municipal solid

waste landfill. The PVT Landfill is designated exclusively for construction and demolition waste (City and County of Honolulu 2021).

3.15.2 Potential Impacts and Mitigation Measures

Electricity and Telecommunications

As described in Section 2.1.4, the Project would interconnect with the existing Hawaiian Electric grid via an approximately 1.2-mile generation-tie line (combination of overhead and underground) extending from the Project's collector substation to a new interconnection point into the existing Hawaiian Electric 46 kV overhead transmission line located near the intersection of Roosevelt Avenue and Coral Sea Road. Once operational, the Project would provide up to 15 MW of solar energy and 60 MWh of battery storage, which is enough electricity for approximately 6,200 O'ahu homes (Hawaiian Electric 2020c). The Project battery storage would improve electric grid stability by enabling solar energy to be dispatched as needed. Overall, the Project would provide a benefit by directly contributing to the state's renewable energy goals, fulfilling approximately 0.56 percent of Hawaiian Electric's RPS, and 0.43 percent to Hawaiian Electric's consolidated RPS over the PPA term (Hawaiian Electric 2020c).

The Project would require telecommunication circuits (via fiber optic cable in the overhead generation tie line) to connect the Project with the existing Hawaiian Electric grid. Communications circuits would include primary and back-up lines for SCADA, primary and back-up lines for protective relaying and direct transfer trip (if applicable), primary and back-up lines for fault recording and power quality metering and an analog telephone line for metering. Coordination with Hawaiian Electric and Hawaiian Telecommunications will continue through design and construction.

Water and Wastewater

Water would be required during Project construction and operation for dust control and temporary landscape irrigation. Total water consumption for both construction and operation of the Project would be minimal. Water trucks would provide water to the Project site and water would be purchased from the Board of Water Supply or other supplier. No connection to the domestic water system is expected to be required.

The Project facilities would not generate any sanitary wastewater, as operation of the facilities would not require full-time, on-site staff. No sanitary wastewater system would be installed. Instead, portable sanitation units would be used on-site during construction, and as needed. Therefore, the Project is not expected to affect either the domestic water system or the municipal wastewater system.

Stormwater Drainage

No stormwater drainage facilities are located within or adjacent to the Project area. As discussed in Section 3.3.2, the Project would result in the addition of minimal amounts of impervious surfaces. However, the Project area vicinity contains sufficient permeable ground surface to allow for natural

infiltration. The Project would incorporate stormwater retention features to temporarily capture and treat stormwater in areas with increased impervious surfaces associated with the Project infrastructure to increase groundwater infiltration within the Project area. The Project would incorporate multiple stormwater BMPs both during construction and throughout operation. As the Project would not contribute stormwater flows to the stormwater drainage system and would minimize the potential for increased discharge of sediment or other pollutants through BMPs, significant impacts to the stormwater drainage system are not anticipated. Accordingly, it is expected that the Project would be in compliance with the City and County of Honolulu's Rules Relating to Water Quality and Storm Drain Standards. No significant impacts to stormwater drainage facilities are anticipated.

Solid Waste

Project construction would not generate a significant amount of solid waste. During construction, all waste would be temporarily stored on-site and periodically transported and properly disposed of in a permitted landfill. Materials would be recycled to the greatest extent possible.

Little to no waste would be generated during Project operations. Waste generated during operations would be handled in accordance with applicable regulations including HAR §11-273, and disposed of at authorized landfills, such as the PVT landfill.

At the end of its useful lifetime, the Project would be decommissioned. Prior to decommissioning Barbers Point Solar LLC will assess the remaining useful life in order to determine the viability of the equipment being reused or repurposed near the Project location. Decommissioning would involve removal of Project equipment from the Project site. As described in Section 2.4, decommissioning would be conducted according to industry standards. All equipment and materials would be managed according to the highest and best use. Reuse and recycling of equipment and materials will be prioritized over disposal to retain the most recycled value from the core materials. Recycling programs, especially for PV and battery energy storage system (BESS)-related equipment, are advancing every year as it is an area of great focus in the solar industry. As Hawaiʻi does not currently have a facility for recycling or processing PV panels and BESS, nor is one of a suitable capacity anticipated to be in place during the operating term of the Project, all equipment, batteries, and chemicals will be shipped, likely to the mainland, for recycling or disposal in accordance with applicable federal and state laws. Remaining materials would be disposed of at authorized landfills on Oʻahu, in accordance with applicable laws including HAR §11-273. Only a small portion of the Project components would be disposed of as solid waste; therefore, Project impacts related to solid waste disposal are expected to be less than significant.

3.16 Economic Resources

3.16.1 Affected Environment

The Project area is located on undeveloped land within the 'Ewa region of O'ahu and is surrounded by urban, residential, and recreational development to the north and east and the Kalaeloa Airport and

James Campbell Industrial Park to the west. The closest communities to the Project site include Kapolei, ‘Ewa Villages, Ocean Pointe, Kalaeloa, and ‘Ewa Beach. Employment in the region is largely industrial, commercial and retail.

According to the 2019 American Community Survey, the resident population of people in 2019 in Kapolei numbered 21,674, ‘Ewa Villages numbered 6,585, Ocean Pointe Beach numbered 14,989, Kalaeloa numbered 6, and ‘Ewa Beach numbered 14,479. Combined, this is approximately 5.9 percent of the total population of the City and County of Honolulu, which was estimated at 984,821 in 2019 (U.S. Census Bureau 2021).

Most of the approximately 163-acres Project area is currently unused by DHHL, with 9 acres leased to tenants for commercial and agricultural purposes (DHHL 2019). All DHHL lands in Kalaeloa, including the DHHL lands in the Project area, are designated “Industrial” in the O‘ahu Island Plan (DHHL 2014) and are not intended for residential homestead use due to the lack of infrastructure and abundance of other DHHL land in Kapolei for residential development. Rather these lands are intended for revenue generation (DHHL 2010).

3.16.2 Potential Impacts and Mitigation Measures

Short-term impacts to socio-economics would result from the conversion of the approximately 9 acres of land leased on TMK 9-1-013:040 for commercial and agricultural purposes, to a solar energy facility use. Barbers Point Solar, LLC is working in collaboration with DHHL and the existing tenants occupying approximately 9 acres on TMK 9-1-013:040 to explore alternative unencumbered areas within the Project parcels (e.g., revetment area) and/or off site locations to minimize impacts to the existing tenants so as to allow for safe construction or operation of the solar project. Therefore, any impacts to existing industry would be negligible.

The Project will have positive direct and indirect economic impacts for DHHL, the City and County of Honolulu, and the State of Hawai‘i. The Project will employ Hawaii-based workers during construction, as well as provide secondary (induced[19]) benefits elsewhere in the regional economy. During construction, an estimated average of 70 people will be employed for the Project, with an estimated maximum of 140 employees. Most construction workers will be employees of construction and equipment manufacturing companies under contract with Barbers Point Solar, LLC. The construction workers will comprise of a majority of locally-hired workers, including a limited number of specialized workers as required for specific construction tasks (for example, construction management). Barbers Point Solar, LLC will primarily solicit experienced Hawai‘i-based contractors with the intention of recruiting a proportionally high local workforce. During operations, the Project will hire local contractors to assist with operations and maintenance activities such as vegetation management and equipment inspection or repair.

[19] Induced economic benefits are generated by household spending (e.g., use of worker incomes to purchase groceries and other household goods and services).

It is estimated that the renewable energy supplied by the Project will potentially save Hawaiian Electric, and therefore customers, millions of dollars in total avoided fuel costs over the term of the PPA. The Project will also put downward pressure on electricity rates and, as a locally produced energy source, will help Hawaiʻi to avoid the negative economic effects of volatile oil prices.

The mission of DHHL is to effectively manage the Hawaiian Home Lands Trust and to develop and deliver lands to native Hawaiians. The DHHL has identified lands not suitable for homestead leasing, that can be leased for renewable energy projects with the objective of generating revenue from these lands and providing benefits for the impacted communities (DHHL 2018). The Project site was identified in DHHL's 2014 Island Plan as having desirable conditions for solar energy generation (DHHL 2014). DHHL may use revenues developed from industrial leasing of these available lands in east Kalaeloa to develop new homesteads in suitable residential areas throughout the state.

The Kalaeloa Master Plan identifies the land in the Project area and the relatively arid climate and proximity to ocean as offering the potential for alternative energy development including solar, aimed at reducing Hawai'i's dependence on fossil fuels (HCDA 2006). The City and County of Honolulu General Plan (City and County of Honolulu 2002) includes development polices to support the development of new, economical, and environmentally sound energy supplies using renewable resources, including solar energy. The Project supports HCDA's and City and County of Honolulu's economic goals and policies.

Indeed, the Project's economic contribution through job creation, tax payments, and other secondary benefits are increasingly important to the State of Hawaiʻi considering the current COVID-19 pandemic and associated economic downturn. The Public Utility Commission provided a statement on March 24, 2020 stating that "clean energy development can accelerate Hawaiʻi's recovery from [the COVID-19] crisis" (PUC 2020).

Overall, Project construction and operation will have a positive economic impact on the City and County of Honolulu and the State of Hawaiʻi, and no adverse economic effect is anticipated as a result of the Project's construction, operations and maintenance, or decommissioning.

3.17 Indirect and Secondary Impacts

Indirect and secondary impacts are defined in HAR §11-200.1-2 as those which are caused by the action and are later in time or farther removed in distance but are still reasonably foreseeable. Indirect effects 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.

Potential indirect effects of the Project are generally described throughout Section 3. The environmental resources that could be indirectly impacted by implementation of the Project include (1) water resources as a result of erosion and sedimentation, (2) air quality as a result of temporary construction activities, (3) noise as a result of temporary construction activities, and (4) traffic as a result of temporary construction activities. However, with implementation of BMPs (as described in the respective sections), these indirect impacts are all expected to be less than significant.

The Project will employ workers from Hawaiʻi during construction, as well as provide secondary (induced) benefits elsewhere in the regional economy. While the construction and operation expenditures associated with the Project would provide a direct economic benefit, employees are expected to be existing Hawaiian residents and nor result in population growth in the ʻEwa District; therefore, the Project would not result in adverse secondary impact.

3.18 Cumulative Impacts

The ongoing and reasonably foreseeable actions considered in the cumulative impacts analysis are those that would overlap in time and space with the effects of construction and/or operation of the Project. The ʻEwa Development Plan (City and County of Honolulu 2020) describes actions related to the development of a second urban center for O'ahu in the Kapolei area that includes: the City of Kapolei becoming a nucleus; development of new residential areas; job centers created in resort areas and industrial areas nearby; and promotion of tourism at Ko Olina and Ocean Pointe. Additionally, the Kapolei Regional Plan notes that Kapolei is the "fastest growing region in the State of Hawaiʻi (DHHL 2010) and the Kalaeloa Master Plan describes actions related to the development of the KCDD, such as residential and commercial development, improvements to the road network, and development of bicycle trails and a mass transit corridor (HCDA 2006).

Specific past, present and foreseeable future actions in the Project Area include Kalaeloa Barbers Point Harbor Fuel Pier & Harbor Improvements; Kalaeloa Barbers Point Harbor dredging; Kapolei Harborside Industrial Park; Kapolei Business Park; Kapolei West; Ko Olina, Makaiwa Hills; Kalaeloa Harbor Access Road; Kapolei Interchange Complex; Kapolei Parkway Improvements; Kalaeloa Boulevard Improvements; Honolulu Rail Transit project- East Kapolei Station; the Western Kapolei Regional Drainage; the Hawaiki Submarine Fiber Optic cable; the Kalaeloa Renewable Energy Park solar facility; the Aloha Solar project; and the University of Hawaiʻi West Oʻahu Campus.

The resources and issues that have been evaluated for potential cumulative impacts in this section include: air quality; biology; climate; noise; roadways and traffic; socioeconomics; aesthetic/visual resources; hazardous materials and solid waste; water quality; public safety; and recreation. The resource and issues that are considered to not create impacts outside the Project footprint are not discussed further in this section and include: land uses; topography and geology; soils; and natural hazards. In all resource areas evaluated, minor cumulative impacts are anticipated to result from construction and operations of the proposed Project.

Air pollutant and GHG emissions may increase in the Kapolei region due to higher vehicle traffic, construction equipment and addition of homes and tourist developments. The increases in emissions may be ameliorated by improved operational efficiencies, equipment, and technology; use of cleaner-burning fuels; adherence to pollution control rules and regulations. While the Project would increase emissions associated with air quality and GHG impacts during construction, these impacts would be temporary and localized and would not substantially affect regional or global greenhouse gas levels. During operation, the Project would have a beneficial effect on climate change and air quality by

reducing the use of fossil fuels and GHG emissions, as such would not contribute negatively to cumulative impacts on climate and air quality.

Noise due to non-Project traffic in the Kapolei region may increase in the future. As construction noise would be temporary in nature, and with implementation of the measures listed in Section 3.10.2, no long-term or otherwise significant noise impacts are anticipated as a result of Project construction. During operation, the Project would not create significant noise impacts. The Project will not contribute significantly to cumulative noise impacts in the Project Area.

Traffic volumes in the Kapolei region will likely increase over time due to population, recreational, and business growth in the area. The Project will not increase traffic beyond a temporary increase during construction and will not contribute significantly to cumulative impacts to roadways and traffic.

Solid waste from development and construction sites on the island of Oʻahu including in the Kapolei region will place additional demands on construction debris disposal facilities on the Island. Construction waste from the Project will contribute to demand on solid waste management temporarily, but is not expected to contribute significantly to cumulative impacts.

The visual and aesthetic character of the Kapolei region has been rapidly changing from sugarcane fields, as late as the mid-1990s, to urban and industrial development. The proposed Project will change the visual character of the Project Area from largely undeveloped land to fields supporting solar arrays, but as the Project is largely screened by existing vegetation, the visual impact will be minor, the Project's contribution to cumulative impact on visual resources will be minor.

Hazardous material impacts in the Kapolei region may increase with continued growth in the region. Given strict adherence to rules and regulations, hazardous materials handling rules, BMPs, and a Spill Prevention, Containment, and Countermeasure Plan, the Project's contribution to cumulative impacts will be minor.

Water quality may be affected by the continued development of the Kapolei region as there will be an increase in impervious surfaces, reduced infiltration through the soils, in combination with potentially increasing storm water runoff and introducing sediment and other pollutants to the nearshore environment. The Project will implement BMPs to control, treat, or reduce runoff before entering nearby surface waters and the ocean as such the Project's contribution to cumulative impacts will be minor.

The cumulative demands on public safety services of developments in the Kapolei region over time will generate the need for additional police, fire and medical services. However, increases in public services and related facilities have been and continue to be planned for in accordance with these developments. As the Project is not expected to have any long-term impacts on public services, it will not contribute to the cumulative impact created by other projects in the region.

Demand on recreational facilities in the Kapolei region will likely increase due the future development of resort and residential communities. The Project will not eliminate any recreational facilities or affect demand for or access to recreational facilities and as such will not contribute to cumulative impact.

Socio-economics in the Kapolei region have and will continue to change due to past, present and future actions, specifically planned residential, tourism, commercial development and population growth. The project will not adversely impact socio-economic components, instead will create benefits through temporary employment opportunities during construction and long-term through reduction of electricity rates and provision of revenue to DHHL for DHHL projects.

Terrestrial and marine biological resources, including vegetation, birds, invertebrates, mammals, and their habitats, coral reef resources, and sea turtles are continuously being negatively impacted by anthropogenic and natural activities throughout the Hawaiian Islands. The growth and development in the Kapolei region will contribute to impacts to sensitive biological resources through such factors as decreases in quality of habitat, increases in noise, and direct injury. However, impacts from any given project are not easily measurable, and many impacts are likely minor. The Project's contribution to the cumulative impacts to biological resources in the area is anticipated to be minor, especially considering the Project's commitment to implement avoidance and minimization measures outlined in Section 3.4.2.

4.0 ALTERNATIVES TO THE PROPOSED PROJECT

This section discusses alternatives to the proposed Project described in Section 2. The range of alternatives addressed include the following: (1) No Action Alternative, (2) use of alternative technologies, (3) alternative Project locations, and (4) alternative Project size. Each of these alternatives were eliminated from further consideration; a summary of the rationale for dismissing each alternative is provided in the discussion below.

4.1 No Action Alternative

The No Action Alternative is the baseline against which other alternatives are measures. This alternative represents the probable future site conditions that would likely result should the Project not proceed.

Under the No Action alternative, the proposed solar photovoltaic and battery energy storage system would not be constructed at the DHHL property. As it is unknown if DHHL would pursue other potential uses at this site in the future, it is assumed that the site would remain predominately vacant and overgrown by vegetation, with a small amount of acreage leased for commercial and agricultural purposes.

In the absence of constructing the solar photovoltaic and battery energy storage facility, the No Action alternative would not result in the production of clean, renewable energy for the island of Oʻahu, and thus would not support the goals of the HCEI nor contribute to the state's RPS. The other benefits of the Project, including reducing greenhouse gases and other pollutants, minimizing long-term volatility in energy prices, increasing stability of the electric grid, and providing a revenue stream for DHHL to develop new homesteads in suitable residential areas throughout the state, would not be realized. As such, the No Action alternative would not achieve the Project's purpose and need and would not be consistent with the state's renewable energy policies and goals.

4.2 Alternative Location

As described in Section 1.1, Hawaiian Electric issued an RFP in 2019, which established a competitive bidding process for projects to provide grid-scale renewable generation to their electrical system. Barbers Point Solar, LLC proposed the development of a 15 MW solar photovoltaic and 60 MW-hour battery energy storage system on DHHL land located in east Kalaeloa. The proposal was one of the six Oʻahu based projects selected by Hawaiian Electric.

The Project site was identified in DHHL's 2014 Island Plan as having desirable conditions for solar energy generation and as intended for revenue generation as the land was considered not suitable for residential development. DHHL will use revenues developed from industrial leasing of the available lands in east Kalaeloa to develop new homesteads in suitable residential areas throughout the state. At this time, there are no other alternative site option within the Kalaeloa district that would provide the opportunity to create a public-private partnership between Barbers Point Solar, LLC and DHHL as the landowner.

4.3 Alternative Technology

Concentrated solar power (CSP) is an alternative technology to PV. CSPs generate power by using mirrors to concentrate, or focus, the sun's light energy and convert it into heat to create steam to drive a turbine that generates electrical power. There are various CSP systems including parabolic troughs, reflectors, solar dishes, or a solar power tower. The CSP technology is not a viable option economically because the cost of building PV facilities is much less than that of CSP facilities as the price of PV modules continues to decrease.

Wind-based power generation uses airflows to run wind turbines and drive electrical generators. As the wind speed rises, power output increases up to the maximum capacity of the turbine. Wind turbines range in height, with typical multi megawatt turbines have tubular steel towers with a height of 70 meters to 120 meters, well above Kalaeloa airport height restrictions, making wind generated energy infeasible in this location.

Geothermal energy (heat from the earth) taps the volcanically-heated water and steam that occurs naturally in certain areas in Hawaii, particularly the younger islands of Maui and Hawaiʻi where volcanic activity has been most recent. Three things are needed to produce geothermal energy: heat; a working fluid such as water or steam; and permeable rocks which allow the working fluid to move within the geothermal reservoir, picking up heat which can be brought to the surface through a geothermal well. The Kilauea East Rift Zone, thus far the only region developed for geothermal energy in Hawaii, has all three of these attributes. Sufficient geothermal energy resources have yet to be found near Oʻahu, and it is not currently a feasible alternative for renewable energy development (Hawaiʻi State Energy Office 2021a).

Ocean energy created by ocean thermal energy conversion or marine hydrokinetics are still in the developmental stages and not currently a feasible alternative for renewable energy development (Hawaiʻi State Energy Office 2021b).

4.4 Delayed Implementation

As part of the RFP process, Hawaiian Electric required that all selected renewable energy projects for the island of Oʻahu commence commercial operation by 2025. Furthermore, the Project's PPA with Hawaiian Electric requires Barbers Point Solar, LLC to establish a commercial operation date no later than December 2023. As such, Barbers Point Solar, LLC is not considering a delayed development schedule for the project.

5.0 CONSISTENCY WITH APPLICABLE PLANS, POLICIES AND RULES

5.1 Hawaiʻi State Planning Act, Chapter 226, HRS

The Hawaiʻi State Planning Act (HRS Chapter 226) establishes a set of goals, objectives, and policies that serve to guide the long-term growth and development of the State. The Project supports the state's stated goals under HRS § 226-4 which relate to achieving a strong economy, a desired physical environment, and individual and family physical, social, and economic wellbeing. In particular, the Project would serve to provide a clean source of renewable energy that reduces the state's use of fossil fuels, while providing economic benefits to Honolulu City & County and the state at-large.

There are three Parts to the Hawaiʻi State Planning Act:

- Part I. Overall Theme, Goals, Objectives and Policies (HRS § 226-1 through 27);
- Part II. Planning Coordination and Implementation (HRS § 226-51 through 65); and
- Part III. Priority Guidelines (HRS § 226-101 through 109).

Only Parts I and III have applicability to the Project as Part II concerns the state's administrative functions and implementation process. Table 5-1 and Table 5-2 provide an assessment of the Project's applicability to and consistency with Parts I and III of the Hawaiʻi State Planning Act (respectively). For a discussion of the applicable state functional plans, see Section 5.1.1.

5.1.1 Functional Plans

In addition to establishing goals, objectives, and policies for the State of Hawaiʻi, HRS § 226 also directs state agencies to prepare state functional plans for statewide priority issues. A total of 13 functional plans have been developed related to: agriculture, conservation lands, education, employment, energy, health, higher education, historic preservation, housing, human services, recreation, tourism and transportation. The plan most relevant to the Project is the energy functional plan; a brief discussion of the Project's consistency with this plan follows.

Table 5-1. Project Consistency with the Objectives and Policies of the Hawai‘i State Planning Act

Objectives	Assessment of Consistency with Objectives and Policies
226-5. Population: *It shall be the objective in planning for the State's population to guide population growth to be consistent with the achievement of physical, economic, and social objectives contained in this chapter.*	Although the Project is not anticipated to affect population growth, it would be consistent with HRS § 226-5, particularly with the following policies: *(2) Encourage an increase in economic activities and employment opportunities on the neighbor islands consistent with community needs and desires.* *(3) Promote increased opportunities for Hawai‘i's people to pursue their socio-economic aspirations throughout the islands.* The Project will have positive direct and indirect economic impacts for the City and County of Honolulu and the State of Hawai‘i through job creation, tax payments, and other secondary benefits. See Section 3.16.2 for a discussion of the Project’s economic benefits.
226-6. Economy - In General: *Planning for the State's economy in general shall be directed toward achievement of the following objectives:* *(1)Increased and diversified employment opportunities to achieve full employment, increased income and job choice, and improved living standards for Hawai‘i’s people, while at the same time stimulating the development and expansion of economic activities capitalizing on defense, dual-use, and science and technology assets, particularly on the neighbor islands where employment opportunities may be limited.* *(2)A steadily growing and diversified economic base that is not overly dependent on a few industries and includes the development and expansion of industries on the neighbor islands.*	The Project would be consistent with the stated objectives and policies of HRS § 226-6, particularly the following policies: *(7) Expand existing markets and penetrate new markets for Hawai‘i's products and services.* *(12) Encourage innovative activities that may not be labor-intensive, but may otherwise contribute to the economy of Hawai‘i.* The Project would contribute to Hawai‘i’s growing renewable energy market and would provide employment opportunities for Hawai‘i residents, particularly during construction. Although operations would not include many labor-intensive activities, the Project would positively contribute to Hawai‘i‘s economy, by potentially saving Hawaiian Electric, and therefore customers, millions of dollars in total avoided fuel costs over the term of the PPA and through putting downward pressure on electricity rates and, as a locally produced energy source, will help Hawai‘i to avoid the negative economic effects of volatile oil prices. See Section 3.16.2 for a discussion of how the Project will have positive direct and indirect economic impacts for the City and County of Honolulu and the State of Hawai‘i.
226-7. Economy – Agriculture: *Planning for the State's economy with regard to agriculture shall be directed towards achievement of the following objectives:* *(1) Viability of Hawai‘i’s sugar and pineapple industries.* *(2) Growth and development of diversified agriculture throughout the State.* *(3) An agriculture industry that continues to constitute a dynamic and essential component of Hawai‘i’s strategic, economic, and social well-being.*	This objective is not applicable, as the Project would not have an effect on agriculture. Most of the approximately 163 acre Project area is currently unused by DHHL, with 9 acres leased to tenants for commercial and agricultural purposes. Barbers Point Solar, LLC is working in collaboration with DHHL and the existing tenants occupying approximately 9 acres on TMK 9-1-013:040 to explore alternative unencumbered areas within the Project parcels (e.g., revetment area) and/or off site locations to minimize impacts to the existing tenants so as to allow for safe construction or operation of the solar project. In addition, DHHL’s long term plan for the two Project parcels is industrial use.
226-8. Economy – Visitor Industry: *Planning for the State's economy with regard to the visitor industry shall be directed towards the achievement of the objective of a visitor industry that constitutes a major component of steady growth for Hawai‘i’s economy.*	This objective is not applicable as the Project would not have any effect on the economy as it relates to the visitor industry.

Objectives	Assessment of Consistency with Objectives and Policies
226-9. Economy – Federal Expenditures: *Planning for the State's economy with regard to federal expenditures shall be directed towards achievement of the objective of a stable federal investment base as an integral component of Hawai'i's economy.*	This objective is not applicable as the Project does not involve any federal expenditure.
226-10. Economy - Potential Growth and Innovative Activities: *Planning for the State's economy with regard to potential growth and innovative activities shall be directed towards achievement of the objective of development and expansion of potential growth and innovative activities that serve to increase and diversify Hawai'i's economic base.*	The Project would be consistent with the stated objective and policies of HRS § 226-10, particularly the following policies: *(1) Facilitate investment and employment growth in economic activities that have the potential to expand and diversify Hawai'i's economy, including but not limited to diversified agriculture, aquaculture, renewable energy development, creative media, health care, and science and technology-based sectors.* *(8) Accelerate research and development of new energy-related industries based on wind, solar, ocean, underground resources, and solid waste.* *(9) Promote Hawai'i's geographic, environmental, social, and technological advantages to attract new or innovative economic activities into the State.* The Project would contribute to and further diversify Hawai'i's economy through its contribution to Hawai'i's renewable energy market. See Section 3.16.2 for a discussion of how the Project will have positive direct and indirect economic impacts for the City and County of Honolulu and the State of Hawai'i.
226-10.5. Economy - Information Industry: *Planning for the State's economy with regard to telecommunications and information technology shall be directed toward recognizing that broadband and wireless communication capability and infrastructure are foundations for an innovative economy and positioning Hawai'i as a leader in broadband and wireless communications and applications in the Pacific Region.*	This objective is not applicable as the Project would not have any effect on the economy as it relates to telecommunication and information technology.
226-11. Physical Environment - Land-based, Shoreline, and Marine Resources: *Planning for the State's physical environment with regard to land-based, shoreline, and marine resources shall be directed towards achievement of the following objectives:* *(1) Prudent use of Hawai'i's land-based, shoreline, and marine resources.* (2) *Effective protection of Hawai'i's unique and fragile environmental resources.*	The Project would be consistent with the stated objectives and policies of HRS § 226-11, particularly the following policies: *(1) Exercise an overall conservation ethic in the use of Hawai'i's natural resources.* *(3) Take into account the physical attributes of areas when planning and designing activities and facilities.* *(4) Manage natural resources and environs to encourage their beneficial and multiple use without generating costly or irreparable environmental damage.* *(5) Consider multiple uses in watershed areas, provided such uses do not detrimentally affect water quality and recharge functions.* *(8) Pursue compatible relationships among activities, facilities, and natural resources.* The Project area is composed of highly disturbed land dominated by non-native plant and wildlife species. Previous military activities and current commercial and agricultural activities have reduced the number and abundance of native species and habitats suitable for native species. However, despite the dominance of non-native species, some native plant species and listed and native animal species are present. The Project has been designed to avoid sensitive biological resources to the extent practicable. BMPs will be

Objectives	Assessment of Consistency with Objectives and Policies
	implemented to minimize stormwater run-off and impacts to land-based, shoreline, and marine resources. See Section 3.4 for more information regarding the Project's protection of sensitive environmental resources.
226-12. Physical Environment - Scenic, Natural Beauty, and Historic Resources: *Planning for the State's physical environment shall be directed towards achievement of the objective of enhancement of Hawai'i's scenic assets, natural beauty, and multi-cultural/historical resources.*	The Project would be consistent with the stated objective and policies of HRS § 226-12, particularly the following policies: *(1) Promote the preservation and restoration of significant natural and historic resources.* *(3) Promote the preservation of views and vistas to enhance the visual and aesthetic enjoyment of mountains, ocean, scenic landscapes, and other natural features.* Barbers Point Solar, LLC has conducted an AIS (Appendix A) and CIA (Appendix E) and is coordinating with SHPD. Seventeen historic properties were identified within the Project area and included features used for habitation, agriculture, ceremonial, and recreational activities, as well as historic buildings and features used for a variety of military activities from World War II onwards. Using the information in the AIS, the Project will be carefully sited to avoid or minimize impacts to historic resources. See Section 3.5 for a discussion of archaeological and historic resources. A visual impact analysis of the Project shows that in many cases the Project will be partially or fully screened by existing vegetation. Where the Project is visible from certain viewpoints, the Project infrastructure would introduce new visual elements within the landscape but would not attract attention and would be a subordinate feature in the landscape setting. The Project would not block mauka-to-makai and makai-to-mauka view planes, or significant vistas or landmarks in the 'Ewa Development Plan. See Section 3.8 for a discussion of visual impacts.
226-13. Physical Environment - Land, Air, and Water Quality: *Planning for the State's physical environment with regard to land, air, and water quality shall be directed towards achievement of the following objectives:* *(1) Maintenance and pursuit of improved quality in Hawai'i's land, air, and water resources.* (2) *Greater public awareness and appreciation of Hawai'i's environmental resources.*	The Project would be consistent with the stated objectives and policies of HRS § 226-13, particularly the following policies: *(2) Promote the proper management of Hawai'i's land and water resources.* *(3) Promote effective measures to achieve desired quality in Hawai'i's surface, ground, and coastal waters.* *(4) Encourage actions to maintain or improve aural and air quality levels to enhance the health and well-being of Hawai'i's people.* BMPs would be implemented to avoid and minimize impacts to land, air, and water quality during Project construction and operation. Solar energy produced by the Project will replace a portion of electricity that is currently generated by burning fossil fuels, thus substantially reducing greenhouse gas emissions and other forms of pollution that are detrimental to the environment and human health. See Sections 3.1, 3.3, 3.7, and 3.9 for more information and discussion regarding the Project's potential impacts to climate, water, land, and air and how these impacts will be less than significant.

Objectives	Assessment of Consistency with Objectives and Policies
226-14. Facility Systems – In General: *Planning for the State's facility systems in general shall be directed towards achievement of the objective of water, transportation, waste disposal, and energy and telecommunication systems that support statewide social, economic, and physical objectives.*	The Project would be consistent with the stated objectives and policies of HRS § 226-14, particularly the following policies: *(2) Encourage flexibility in the design and development of facility systems to promote prudent use of resources and accommodate changing public demands and priorities.* *(3) Ensure that required facility systems can be supported within resource capacities and at reasonable cost to the user.* The Project will help Hawai'i meet its renewable energy demands by providing up to 15 MW of solar energy and 60 MWh of battery energy storage. Furthermore, it is estimated that the renewable energy supplied by the Project will potentially save Hawai'i Electric, and therefore customers, millions of dollars in total avoided fuel costs over the term of the PPA. Additionally, the Project will also help to improve electric grid stability by enabling Hawai'i Electric to utilize stored solar energy to meet peak demand. See Section 1.2 for a more detailed discussion of the Project's benefits to the state's energy system.
226-15. Facility Systems – Solid and Liquid Wastes: *Planning for the State's facility systems with regard to solid and liquid wastes shall be directed towards the achievement of the following objectives:* *(1) Maintenance of basic public health and sanitation standards relating to treatment and disposal of solid and liquid wastes.* (2) *Provision of adequate sewerage facilities for physical and economic activities that alleviate problems in housing, employment, mobility, and other areas.*	The Project would be consistent with the stated objectives and policies of HRS § 226-15, particularly the following policy: *(2) Promote reuse and recycling to reduce solid and liquid wastes and employ a conservation ethic.* Construction and operation of the Project would generate very little waste. At the end of operations, the Project would be decommissioned, and as much material removed from the site will be recycled as feasible. See Sections 3.15 for more information regarding the Project's minimal solid and liquid wastes.
226-16. Facility Systems – Water: *Planning for the State's facility systems with regard to water shall be directed towards achievement of the objective of the provision of water to adequately accommodate domestic, agricultural, commercial, industrial, recreational, and other needs within resource capacities.*	This objective is not applicable as the Project would not have an effect on Hawai'i's facility systems related to water. The Project will require water during construction primarily for dust control and will only use a negligible amount of water during operations. See Section 3.3 for more information regarding the Projects minimal use of water.
226-17. Facility Systems – Transportation: *Planning for the State's facility systems with regard to transportation shall be directed towards the achievement of the following objectives:* *(1) An integrated multi-modal transportation system that services statewide needs and promotes the efficient, economical, safe, and convenient movement of people and goods.* (2) *A statewide transportation system that is consistent with and will accommodate planned growth objectives throughout the State.*	This objective is not applicable as the Project would not have an effect on Hawai'i's facility systems related to transportation. See Section 3.12 for a discussion of the Project's potential impacts to roadways and traffic; no significant adverse impacts are anticipated.
226-18. Facility Systems – Energy: *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;*	The Project would be consistent with the stated objectives and policies of HRS § 226-18, particularly the following policies: *(1) Support research and development as well as promote the use of renewable energy sources.* *(2) Ensure that the combination of energy supplies and energy-saving systems is sufficient to support the demands of growth;*

Objectives	Assessment of Consistency with Objectives and Policies
(2) Increased energy security and self-sufficiency through the reduction and ultimate elimination of Hawai'i's dependence on imported fuels for electrical generation and ground transportation; *(3) Greater diversification of energy generation in the face of threats to Hawai'i's energy supplies and systems;* *(4) Reduction, avoidance, or sequestration of greenhouse gas emissions from energy supply and* (5) *Utility models that make the social and financial interests of Hawai'i's utility customers a priority.*	*(3) Base decisions of least-cost supply-side and demand-side energy resource options on a comparison of their total costs and benefits when a least-cost is determined by a reasonably comprehensive, quantitative, and qualitative accounting of their long-term, direct and indirect economic, environmental, social, cultural, and public health costs and benefits;* *(5) Ensure, to the extent that new supply-side resources are needed, that the development or expansion of energy systems uses the least-cost energy supply option and maximizes efficient technologies.* *(8) Support actions that reduce, avoid, or sequester greenhouse gases in utility, transportation, and industrial sector applications;* The Project will help Hawai'i meet the state's need for renewable energy by providing up to 15 MW of solar energy and 60 MWh of battery energy storage. Hawaiian Electric's energy planning consists of the analysis of supply-side and demand-side resources, where candidate plans are compared relative to their long-term economic benefit (net present value of revenue requirements over the 25-year planning period), as well as analysis of indirect, tangible and intangible benefits, environmental benefits, and other benefits. The planning process was approved by the PUC and directly addresses state policy objective HRS § 226-18(c)(3). In addition, Hawaiian Electric's energy plan, the PSIP in this case, has been reviewed and approved by the PUC. The need for more renewable energy supply-side resources was identified in the PSIP. Hawaiian Electric based its competitive procurement process on the PSIP, and the Project was selected by Hawaiian Electric based on its alignment with the PSIP and compliance with the competitive RFP criteria. As a renewable energy project, the Project will promote the use of renewable energy sources in Hawaiian Electric estimates that the Project will fulfill an average of 0.56% of Hawaiian Electric's RPS over the 25-year term of the PPA. The Project is expected to offset approximately 1,139,396 barrels of fossil fuel consumption by Hawaiian Electric's generating units and reduce net lifecycle greenhouse gas emissions by approximately 455,598 metric tons of carbon dioxide equivalents over its lifecycle. Furthermore, it is estimated that the renewable energy supplied by the Project will potentially save Hawaiian Electric, and therefore customers, millions of dollars in total avoided fuel costs over the term of the PPA. See Section 1.2 for a more detailed discussion of the Project's benefits to the state's energy system.
226-18.5. Facility Systems – Telecommunications: *Planning for the State's telecommunications facility systems shall be directed towards the achievement of dependable, efficient, and economical statewide telecommunications systems capable of supporting the needs of the people.*	This objective is not applicable as the Project would not have any effect on facility systems related to telecommunications.
226-19. Socio-Cultural Advancement - Housing: *Planning for the State's socio-cultural advancement with regard to housing shall be directed toward the achievement of the following objectives:*	The Project would be consistent with the stated objectives and policies of HRS § 226-19, particularly the following policies: *(1) Effectively accommodate the housing needs of Hawaii's people.*

Objectives	Assessment of Consistency with Objectives and Policies
(1) Greater opportunities for Hawai'i's people to secure reasonably priced, safe, sanitary, and livable homes, located in suitable environments that satisfactorily accommodate the needs and desires of families and individuals, through collaboration and cooperation between government and nonprofit and for-profit developers to ensure that more rental and for sale affordable housing is made available to extremely low-, very low-, lower-, moderate-, and above moderate-income segments of Hawai'i's population. *(2) The orderly development of residential areas sensitive to community needs and other land uses.* (3) *The development and provision of affordable rental housing by the State to meet the housing needs of Hawai'i's people.*	This Project is not located in an area zoned for residential uses and would not involve the loss of housing or the generation of population resulting in a demand for housing; therefore, will not impact housing. The Project will assist DHHL's mission to effectively manage the Hawaiian Home Lands Trust and to develop and deliver lands to native Hawaiians. The DHHL has identified lands not suitable for homestead leasing, that can be leased for renewable energy projects with the objective of generating revenue from these lands and providing benefits for the impacted communities (DHHL 2018). The Project site was identified in DHHL's 2014 Island Plan as having desirable conditions for solar energy generation (DHHL 2014). DHHL will use revenues developed from industrial leasing of these available lands in east Kalaeloa to develop new homesteads in suitable residential areas throughout the state.
226.20. Socio-Cultural Advancement – Health: *Planning for the State's socio-cultural advancement with regard to health shall be directed towards achievement of the following objectives:* *(1) Fulfillment of basic individual health needs of the general public.* *(2) Maintenance of sanitary and environmentally healthful conditions in Hawai'i's communities.* (3) *Elimination of health disparities by identifying and addressing social determinants of health.*	This objective is not applicable, as the Project would not have an effect on health.
226-21. Socio-Cultural Advancement – Education: *Planning for the State's socio-cultural advancement with regard to education shall be directed towards achievement of the objective of the provision of a variety of educational opportunities to enable individuals to fulfill their needs, responsibilities, and aspirations.*	This objective is not applicable, as the Project would not have an effect on education.
226-22. Socio-Cultural Advancement – Social Services: *Planning for the State's socio-cultural advancement with regard to social services shall be directed towards the achievement of the objective of improved public and private social services and activities that enable individuals, families, and groups to become more self-reliant and confident to improve their well-being.*	This objective is not applicable, as the Project would not have an effect on social services.
226-23. Socio-Cultural Advancement – Leisure: *Planning for the State's socio-cultural advancement with regard to leisure shall be directed towards the achievement of the objective of the adequate provision of resources to accommodate diverse cultural, artistic, and recreational needs for present and future generations.*	This objective is not applicable, as the Project would not have any effect on leisure activities.
226-24. Socio-Cultural Advancement – Individual Rights and Personal Well-Being: *Planning for the State's socio-cultural advancement with regard to individual rights and personal well-being shall be directed towards achievement of the objective of increased opportunities and protection of individual rights to enable individuals to fulfill their socio-economic needs and aspirations.*	This objective is not applicable, as the Project would not have an effect on individuals' rights and personal well-being as it relates to increasing (or decreasing) an individual's ability to fulfill their socio-economic needs and aspirations.

Objectives	Assessment of Consistency with Objectives and Policies
226-25. Socio-Cultural Advancement – Culture: *Planning for the State's socio-cultural advancement with regard to culture shall be directed toward the achievement of the objective of enhancement of cultural identities, traditions, values, customs, and arts of Hawai'i's people.*	This objective is not applicable, as the Project would not have an effect on culture. With regard to traditional cultural practices, Barbers Point Solar, LLC has conducted a CIA (Appendix E) to assess the potential direct and indirect effects of the proposed Project on the traditional cultural practices within the Honouliuli ahupua'a. The CIA involved extensive consultation with community members. Knowledgeable individuals were identified and contacted via email, mailed letters, and phone calls. With implementation of identified avoidance and mitigation measures, impacts to cultural resources are expected to be negligible. See section 3.6 for more information.
226-26. Socio-Cultural Advancement – Public Safety: *Planning for the State's socio-cultural advancement with regard to public safety shall be directed towards the achievement of the following objectives:* *(1) Assurance of public safety and adequate protection of life and property for all people.* *(2) Optimum organizational readiness and capability in all phases of emergency management to maintain the strength, resources, and social and economic well-being of the community in the event of civil disruptions, wars, natural disasters, and other major disturbances.* (3) *Promotion of a sense of community responsibility for the welfare and safety of Hawai'i's people.*	This objective is not applicable, as the Project would not have any effect on state's public safety programs. See Sections 3.11 and 3.14 for more information regarding the Project's BMPs for ensuring public safety.
226-27. Socio-Cultural Advancement – Government: *Planning the State's socio-cultural advancement with regard to government shall be directed towards the achievement of the following objectives:* *(1) Efficient, effective, and responsive government services at all levels in the State.* (2) *Fiscal integrity, responsibility, and efficiency in the state government and county governments.*	This objective is not applicable, as the Project would not have any effect on government.

Table 5-2. Project Consistency with the Priority Guidelines of the Hawai‘i State Planning Act

Priority Guidelines	Assessment of Consistency with Priority Guidelines
HRS § 226-103. Economic Priority Guidelines	
(a) Priority guidelines to stimulate economic growth and encourage business expansion and development to provide needed jobs for Hawai‘i’s people and achieve a stable and diversified economy.	The Project would be consistent with HRS § 226-103(a) priority guidelines to stimulate economic growth, particularly the following: *(1) Seek a variety of means to increase the availability of investment capital for new and expanding enterprises.* *(A) Encourage investments which:* *(i) reflect long-term commitments to the State.* *(iii) diversify the economy.* *(v) are sensitive to community needs and priorities.* The Project would accelerate the State of Hawai’i’s growing renewable energy industry, helping to both diversify Hawai‘i’s economy and provide job opportunities to residents. The power generated by the Project would be sold to Hawaiian Electric and will potentially save Hawaiian Electric, and therefore customers, millions of dollars in total avoided fuel costs over the term of the Project’s 25-year PPA. See Section 1.2 and 3.16 for more information regarding the Project’s economic benefits to the state. Barbers Point Solar, LLC has conducted extensive community outreach and is sensitive to the community’s concerns. See Section 7.1 for a summary of the community outreach efforts conducted to date.
(b) Priority guidelines to promote the economic health and quality of the visitor industry.	This guideline is not applicable as the Project will have no effect on the visitor industry.
(c) Priority guidelines to promote the continued viability of the sugar and pineapple industries.	This guideline is not applicable as the Project will have no effect on the sugar and pineapple industries.
(d) Priority guidelines to promote the growth and development of diversified agriculture and aquaculture.	This guideline is not applicable as the Project area is not zoned for agricultural use. Most of the approximately 163 acres Project area is currently unused by DHHL, with 9 acres leased to tenants for commercial and agricultural purposes. Barbers Point Solar, LLC is working in collaboration with DHHL and the existing tenants occupying approximately 9 acres on TMK 9-1-013:040 to explore alternative unencumbered areas within the Project parcels (e.g., revetment area) and/or off site locations to minimize impacts to the existing tenants so as to allow for safe construction or operation of the solar project.
(e) Priority guidelines for water use and development.	This guideline is not applicable as the Project will have no effect on water use and development as no connection to the domestic water system is expected to be required. See Section 3.3 for more information.
(f) Priority guidelines for energy use and development.	The Project would be consistent with the HRS § 226-103(f) priority guidelines for energy use and development, particularly the following: *(1) Encourage the development, demonstration, and commercialization of renewable energy sources.* The Project will help Hawai’i meet the state’s need for renewable energy by providing up to 15 MW of solar energy and 60 MWh of battery storage. Furthermore, it is estimated that the renewable energy supplied by the Project will potentially save Hawaiian Electric, and therefore customers, millions of dollars in total avoided fuel costs over the term of the PPA. See Section 1.2 for a more detailed discussion of the Project’s benefits to the state’s energy system.

Priority Guidelines	Assessment of Consistency with Priority Guidelines
(g) Priority guidelines to promote the development of the information industry.	This guideline is not applicable as the Project will have no effect on the information industry.
HRS § 226-104. Population Growth and Land Resources Priority Guidelines	
(a) Priority guidelines to effect desired statewide growth and distribution.	This guideline is not applicable as the Project will have no effect on statewide growth and distribution.
(b) Priority guidelines for regional growth distribution and land resource utilization.	The Project would be consistent with HRS § 226-104(b) priority guidelines for regional growth distribution and land resource utilization, particularly the following guidelines: *(2) Make available marginal or nonessential agricultural lands for appropriate urban uses while maintaining agricultural lands of importance in the agricultural district.* *(3) Ensure that adequate support services and facilities are provided to accommodate the desired distribution of future growth throughout the State.* *(9) Direct future urban development away from critical environmental areas or impose mitigating measures so that negative impacts on the environment would be minimized.* The Project is consistent with priority guideline HRS § 226-104(b)(2) as the Project does not propose using lands in the agricultural district or removing agricultural land of importance from the agricultural district. The Project is consistent with priority guideline HRS § 226-104(b)(3) as it provides additional renewable energy capacity to the Hawaiian Electric grid thus supporting future growth in the county and state. The Project is consistent with priority guideline HRS § 226-104(b)(9) as the area the Project is sited on is composed of highly disturbed land dominated by non-native plant and wildlife species. Some native plant species and listed and native animal species are present and the Project has been designed to avoid sensitive biological resources to the extent practicable. BMPs will be implemented to minimize impacts to land-based, shoreline, and marine resources. See Section 3.4 for more information regarding the Project's protection of sensitive environmental resources.
HRS § 226-105. Crime and Criminal Justice Priority Guideline	
Priority guidelines in the area of crime and criminal justice	This guideline is not applicable as the Project will have no effect on crime and criminal justice.
HRS § 226-106. Affordable Housing Priority Guideline	
Priority guidelines for the provision of affordable housing	The Project would be consistent with HRS § 226-106 priority guidelines for the provision of affordable housing, particularly the following guidelines: (1) Seek to use marginal or nonessential agricultural land, urban land, and public land to meet housing needs of extremely low-, very low-, lower-, moderate-, and above moderate-income households. This Project is not located in an area zoned for residential uses and would not involve the loss of housing or the generation of population resulting in a demand for housing; therefore, will not impact housing. The Project will assist DHHL's mission to effectively manage the Hawaiian Home Lands Trust and to develop and deliver lands to native Hawaiians. The DHHL has identified lands not suitable for homestead leasing, that can be leased for renewable energy projects with the objective of generating revenue from these lands and providing benefits for the impacted communities (DHHL 2018). The Project site was identified in DHHL's 2014 Island Plan as having desirable conditions for solar energy generation (DHHL 2014). DHHL will use revenues developed from industrial leasing of these available lands in east Kalaeloa to develop new homesteads in suitable residential areas throughout the state.

Priority Guidelines	Assessment of Consistency with Priority Guidelines
HRS § 226-107. Quality Education Priority Guidelines	
Priority guidelines to promote quality education	This guideline is not applicable as the Project will have no effect on quality education.
HRS § 226-108. Sustainability Priority Guidelines	
Priority guidelines to promote sustainability.	The Project would be consistent with HRS § 226-108 priority guidelines to promote sustainability, particularly the following: *(1) Encouraging balanced economic, social, community, and environmental priorities.* *(2) Encouraging planning that respects and promotes living within the natural resources and limits of the State.* *(3) Promoting a diversified and dynamic economy.* *(4) Encouraging respect for the host culture.* *(5) Promoting decisions based on meeting the needs of the present without compromising the needs of future generations.* The Project supports the state's guideline for balancing economic, social, community, and environmental priorities by providing clean, renewable solar energy with minimal adverse effects on the environment and archaeological and cultural resources. The Project will have positive direct and indirect economic impacts for the City and County of Honolulu and the State of Hawai'i through job creation, tax payments, and other secondary benefits.
HRS § 226-109. Climate Change Adaptation Priority Guidelines	
Priority guidelines to prepare the State to address the impacts of climate change, including impacts to the areas of agriculture; conservation lands; coastal and nearshore marine areas; natural and cultural resources; education; energy; higher education; health; historic preservation; water resources; the built environment, such as housing, recreation, transportation; and the economy	The Project would be consistent HRS § 226-109 priority guidelines concerning impacts to climate change, particularly the following: *(10) Encourage planning and management of the natural and built environments that effectively integrate climate change policy.* The Project would involve generation and storage of clean, renewable solar energy, thus reducing the state's dependence on imported fossil fuels and increase the state's locally produced energy capacity. In response to these statewide needs, Hawaiian Electric's PSIP and associated RFP process establishes the need for development and implementation of new renewable energy projects on O'ahu. The Project directly responds to the state's need as it will help meet the State's RPS and Hawaiian Electric's PSIP by providing up to 15 MW of solar energy and 60 MWh of battery energy storage, which is enough to provide electricity for approximately 6,200 O'ahu homes. In doing so, the Project will fulfill an average of 0.56 percent of Hawaiian Electric's RPS over the 25-year term of the PPA and 0.43 percent to Hawaiian Electric's consolidated RPS (Hawaiian Electric 2020c).

Energy Functional Plan. The energy functional plan was published in 1991 and describes an overall objective of achieving dependable, efficient and economical statewide energy systems capable of supporting the needs of the people and increasing energy self-sufficiency. The plan specifically identifies the need to reduce dependence on imported fossil fuels such as oil and the state's vulnerability to supply disruptions (DBEDT 1991). The plan establishes policies and actions to promote energy conservation and efficiency, displace fossil fuel consumption, support public education and legislation on energy, improve the development and management of energy, and assist with energy emergency preparedness. The following polices and actions are applicable to the Project:

- ***Policy B(1):*** *Displace oil and fossil fuel consumption through the application of appropriate alternate and renewable energy resources and technologies.*
- ***Action B(1)(l):*** *Expand upon the existing 20 kW photovoltaic utility-scale application*[20]

The Project would provide up to 15 MW of solar energy and 60 MWh of battery storage, which is enough electricity for approximately 6,200 O'ahu homes, thus offsetting the use of approximately 1,139,396 fewer barrels of fuel (Hawaiian Electric 2020c). The Project is directly responsive to the need for development of renewable energy sources and displacement of fossil fuel consumption; as such, the Project is consistent with the Energy State Functional Plan.

5.2 DHHL Plans

DHHL has developed a three-tiered planning system to guide planning of its land holdings and policies for resource management. The planning system includes:

- Tier 1 - over-arching General Plan;
- Tier 2 - Strategic Program Plans (such as the Hoʻomaluō Energy Policy) and Island Plans (such as the Oʻahu Island Plan); and
- Tier 3 - Regional and Development Plans (such as the Kapolei Regional Plan).

DHHL's General Plan (DHHL 2002) provides the following mission statement:

> *Our mission is to manage the Hawaiian Home Lands trust effectively and to develop and deliver lands to native Hawaiians. We will partner with others towards developing self-sufficient and healthy communities.*

Barbers Point Solar, LLC is partnering with DHHL to help it achieve this mission by providing a valuable revenue stream over the 25-year term of the Project. In DHHL's approval of the Project's right-of-entry, DHHL notes that the Project is in the best interests of the DHHL Trust as it will generate a substantial revenue stream over at least 25 years on land that lacks infrastructure, had use restrictions and limitations for [residential] development, and has not generated much revenue in the past (DHHL 2019).

[20] The application referred to in this action is a 20kW PVUSA system on Maui that was designed to demonstrate photovoltaics in a utility setting.

The DHHL General Plan also lists goals and objectives. Table 5-3 provides a list of the goals and objectives applicable to the Project and an assessment of how the Project is consistent with each.

Table 5-3. Project Consistency DHHL General Plan

Goal and Objective	Assessment of Consistency
Land Use Planning	
Goals: • Utilize Hawaiian Home Lands for uses most appropriate to meet the needs and desires of the beneficiary population.	The Project will assist DHHL's mission to effectively manage the Hawaiian Home Lands Trust and to develop and deliver lands to native Hawaiians. The DHHL has identified lands not suitable for homestead leasing, that can be leased for renewable energy projects with the objective of generating revenue from these lands and providing benefits for the impacted communities (DHHL 2018). The Project site was identified in DHHL's 2014 Island Plan as having desirable conditions for solar energy generation (DHHL 2014). DHHL will use revenues developed from industrial leasing of these available lands in east Kalaeloa to develop new homesteads in suitable residential areas throughout the state.
Objectives: • Provide space for and designate a mixture of appropriate land uses, economic opportunities, and community services in a native Hawaiian-friendly environment.	
Land and Resource Management	
Goals: • Be responsible, long-term stewards of the Trust's lands and the natural, historic, and community resources located on these lands.	Barbers Point Solar, LLC has conducted an AIS (Appendix A) and CIA (Appendix E) and is coordinating with SHPD. Seventeen historic properties were identified within the Project area and included features used for habitation, agriculture, ceremonial, and recreational activities, as well as historic buildings and features used for a variety of military activities from World War II onwards. Using the information in the AIS, the Project will be carefully sited to avoid or minimize impacts to historic resources. A preservation plan for the 352 historic features that are recommended for preservation will be developed and submitted to SHPD prior to the commencement of project construction. Access for traditional and cultural practices will be determined in collaboration with DHHL and access procedures will be outlined in the preservation plan. See Section 3.5 for a discussion of archaeological and historic resources and Section 3.6 for a discussion of Cultural Resources. The Project area is composed of highly disturbed land dominated by non-native plant and wildlife species. Previous military activities and current commercial and agricultural activities have reduced the number and abundance of native species and habitats suitable for native species. However, despite the dominance of non-native species, some native plant species and listed and native animal species are present. The Project has been designed to avoid sensitive biological resources. BMPs will be implemented to minimize impacts to land-based, shoreline, and marine resources. See Section 3.4 for more information regarding the Project's protection of sensitive environmental resources. The Project area is not within a floodplain zone and is not subject to coastal hazards. The Project is in an extreme tsunami evacuation zone, but extreme tsunamis are rare, and the Project is likely to not be affected. The Project would be designed and constructed in compliance with all applicable Federal, State, and local environmental protection, design, and building standards and regulations, including the Federal Flood Insurance Program, and would not contribute to coastal flooding.
Objectives: • Preserve and protect significant natural, historic and community resources on Trust lands. Manage interim land dispositions in a manner that is environmentally sound and does not jeopardize their future uses. • Allow native Hawaiian use of natural resources on Trust lands for traditional and cultural purposes • Enforce governmental health and safety standards and protect life and property from the effects of natural hazards and disaster on Hawaiian home lands.	

Goal and Objective	Assessment of Consistency
Economic Development	
Goals: • Generate significant revenue to provide greater financial support towards fulfilling the Trust's mission.	The Project will provide a valuable revenue stream to DHHL over the 25-year period of the Project's operations.

DHHL's Hoʻomaluō Energy Policy (DHHL 2009) is a strategic program plan that consists of five objectives:

- Objective 1. Mālama ʻāina: Respect and protect our native home lands.
- Objective 2. Koʻo: Facilitate the use of diverse renewable energy resources.
- Objective 3. Kūkulu pono: Design and build homes and communities that are energy efficient, self-sufficient and sustainable.
- Objective 4. Kōkua nō i nā kahu: Provide energy efficiency, self-sufficiency, and sustainability opportunities to existing homesteaders and their communities.
- Objective 5. Hoʻonaʻauao: Prepare and equip beneficiaries to promote a green, energy efficient lifestyle in and around communities.

The Project will directly support Objective 2 of the Hoʻomaluō Energy Policy through the leasing of DHHL lands for production of solar energy. Furthermore, in support of DHHL's Hoʻomaluō Energy Policy, DHHL and Hawaiian Electric signed an Energy Partnership Charter in 2009 memorializing an agreement between the two entities to collaborate and achieve critical energy objectives. One of the action items listed in this charter is "Identifying suitable renewable energy projects for the Department's available lands" (DHHL, Hawaiian Electric 2009). In direct response of this charter and in support of the Hoʻomaluō Energy Policy, DHHL issued a public notice for disposition of Hawaiian Home Lands by general leases for renewable energy projects on Oʻahu and Maui on December 21, 2018 (DHHL 2018) and TMKs 9-1-013:038 and :040 were included in this notice. DHHL selected the Barbers Point Solar, LLC Project for lease of these two parcels.

DHHL's Oʻahu Island Plan (DHHL 2014) provides recommendations for the future uses of the lands owned by DHHL on Oʻahu to meet beneficiary and department needs over a 20-year planning period. The Oʻahu Island Plan categorizes the DHHL lands into ten land uses, four associated with homesteading designations and six associated with non-homesteading designations utilized to generate revenue in support of DHHL. The DHHL parcels that make up the Project area are designated as "Industrial" in the Oʻahu Island Plan (see Figure 3-5, DHHL 2014). The Oʻahu Island Plan notes that lands acquired from the former NASBP were automatically excluded for residential designation due to the proximity to active runways at Kalaeloa Airport restricting long-term occupancy residential development.

The Kapolei Regional Plan (DHHL 2010) provides DHHL and the affected homestead community opportunities to assess land use development factors, identify issues and opportunities, and identify the region's top priority projects slated for implementation within the next three (3) years. The Kapolei Regional Plan designates the Project DHHL parcels as "Mixed Use" and notes that the lands in the Kalaeloa area are not intended for residential development but rather for revenue generation (DHHL

2010). The Project complies with the land use designations in both the O‘ahu Island Plan and Kapolei Regional Plan as it is a non-residential use that will generate revenue in support of DHHL.

5.3 Land Use Commission Rules, Chapter 205, HRS

The Hawai‘i State Land Use Law (HRS § 205) established the State Land Use Commission and granted the authority to classify all lands in the state into one of four land use districts: urban, rural, agricultural, and conservation. The entire Project area lies within the State Urban Land Use District (Figure 3-6). The Project area is unclassified by the Land Study Bureau’s Detailed Classification System because it is not in the State Agricultural Use District. Per HRS § 205-2(b) the State Urban District shall include activities or uses as provided by ordinances or regulations of the county within which the urban district is situated. As the Project is located within the HCDA’s KCDD, the State Land Use Commission relies on HCDA to determine allowed uses in the Project area. However, it should be noted that per the federal Hawaiian Homes Commission Act of 1921, DHHL is not subject to the land use controls of other state or county agencies unless it decides to subject itself to those controls for health and safety reasons. For the purposes of this Project, DHHL directed the Applicant to comply with and seek land use permits and approvals from HCDA.

5.4 Coastal Zone Management Program, Chapter 205A, HRS

Under the authority of the federal Coastal Zone Management Act (16 U.S.C. 1451-1456), the Hawai‘i Coastal Zone Management (CZM) Program was enacted as HRS § 205A and is administered by the Hawai‘i Department of Business, Economic Development and Tourism (DBEDT) Office of Planning. The purpose of the Hawai‘i CZM program is to provide for the effective management, beneficial use, protection, and development of the coastal zone. It is designed to integrate decisions made by state and county agencies to provide greater coordination and compliance with existing laws and rules. The CZM area encompasses the entire state. The objectives of the Hawai‘i CZM Program are listed in Table 5-4 with a brief statement regarding the consistency of the Project with each of the objectives and associated policies.

Table 5-4. Project Consistency with the Objective and Policies of the Hawai‘i CZM Program

Objectives	Assessment of Consistency
Recreational Resources: Provide coastal recreational opportunities accessible to the public.	The Project Area does not support coastal nor any other type of recreational resources. The Project would not impair access to the shoreline, degrade the quality of coastal waters, or otherwise affect coastal recreational opportunities.
Historic Resources: 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.	An AIS was conducted for the Project, including detailed background research and a 100 percent pedestrian inspection of the Project area. The AIS identified 17 historic properties within the Project area, containing 438 component features. Identified historic properties included features used for habitation, agriculture, ceremonial, and recreational activities, as well as historic buildings and features used for a variety of military activities from World War II onwards. Recommendations for the treatment of each of these features are summarized in the AIS. Of the 17 historic properties that were identified, six will be completely avoided and preserved. Features included in six additional historic properties will also be avoided and preserved. In total, 352 of the features documented during this study are recommended for preservation.

Objectives	Assessment of Consistency
	The proposed project design will potentially impact 88 of the 438 documented features. The impacts to 39 of these 86 features will be mitigated through data recovery prior to construction. Archaeological monitoring is recommended during construction and the remaining 48 features that will be impacted and these will be called out in the monitoring plan. The AIS adequately documents the informational content of these 48 features and, therefore, any impacts to these features have been adequately mitigated. Barbers Point Solar, LLC intends to obtain SHPD's review of the AIS and concurrence with the effect determination prior to the HCDA hearing for the CUP application.
Scenic and Open Space Resources: Protect, preserve, and where desirable, restore or improve the quality of coastal scenic and open space resources.	As discussed in Section 3.8, the Project would be visible to varying degrees from surrounding areas; however, it would not block mauka-to-makai and makai-to-mauka view planes, or significant vistas or landmarks in the 'Ewa Development Plan. The visual impact analysis shows that in many cases the Project will be partially or fully screened by existing terrain or vegetation. Portions of the Project that will be visible would appear as a subordinate feature in the landscape setting.
Coastal Ecosystems: Protect valuable coastal ecosystems, including reefs, from disruption and to minimize adverse impacts on all coastal ecosystems.	The Project would not involve work within any valuable coastal ecosystems. Ground disturbance during construction could temporarily increase the amount of sediment and other pollutants in stormwater runoff, which could affect water quality in receiving waters. However, BMPs would be implemented such that no adverse impacts to coastal ecosystems are anticipated. In addition to the typical stormwater management BMPs, Project design will implement LID techniques to minimize stormwater runoff. The Project will meet City and County of Honolulu requirements for stormwater management and drainage and minimize adverse impacts to coastal ecosystems.
Economic Uses: Provide public or private facilities and improvements important to the State's economy in suitable locations.	The Project is not a coastal-dependent development. It would involve construction and operation of a solar energy generation facility, within the State urban land use district. The Project will assist DHHL's mission to effectively manage the Hawaiian Home Lands Trust and to develop and deliver lands to native Hawaiians. The DHHL has identified lands not suitable for homestead leasing, that can be leased for renewable energy projects with the objective of generating revenue from these lands and providing benefits for the impacted communities (DHHL 2018). The Project site was identified in DHHL's 2014 Island Plan as having desirable conditions for solar energy generation (DHHL 2014). DHHL will use revenues developed from industrial leasing of these available lands in east Kalaeloa to develop new homesteads in suitable residential areas throughout the state.
Coastal Hazards: Reduce hazard to life and property from tsunami, storm waves, stream flooding, erosion, subsidence, and pollution.	The Project area is not within a floodplain zone and is not subject to coastal hazards. The Project is in an extreme tsunami evacuation zone, but extreme tsunamis are rare, and the Project is likely to not be affected. The Project would be designed and constructed in compliance with all applicable Federal, State, and local environmental protection, design, and building standards and regulations, including the Federal Flood Insurance Program, and would not contribute to coastal flooding.
Managing Development: Improve the development review process, communication, and public participation in the management of coastal resources and hazards.	Barbers Point Solar, LLC began conducting community engagement and public outreach activities during the early stages of the Project's development process and continues to engage with the community with Project updates and coordination on community benefits. Barbers Point Solar, LLC and its consultants have held nearly 100 meetings with individuals, community organizations, businesses, and government officials. Barbers Point Solar, LLC has also held two public open houses. The discretionary permitting process for the HCDA Conditional Use Permit will also include opportunities for public participation.
Public Participation: Stimulate public awareness, education, and participation in coastal management.	The Project does not contain a public participation component for programmatic coastal management issues. Project-specific input has and will continue to be sought through the permitting and Project development process.

Objectives	Assessment of Consistency
Beach Protection: Protect beaches for public use and recreation.	The Project would be located inland and would not involve placement of any structures within the shoreline setback area or otherwise affect erosion or natural shoreline processes.
Marine Resources: Promote the protection, use, and development of marine and coastal resources to assure their sustainability.	The Project would not be located near the shoreline and would not directly or indirectly affect any marine resources.

Key components of the Hawaiʻi CZM Program include (1) regulation of development within the Special Management Area, a designated area extending inland from the shoreline, (2) restrictions within the shoreline setback area, which serves as a buffer against coastal hazards and erosion and to protect viewplanes, and (3) a Federal Consistency provision, which requires that federal activities, permits, and financial assistance be consistent with the enforceable policies of the Hawaiʻi CZM program, to the maximum extent practicable. The Project area is not within either the Special Management Area or the shoreline setback area, nor would it involve a federal activity or permit requiring federal consistency review.

5.5 Hawaiʻi State Environmental Policy, Chapter 344, HRS

HRS Chapter 344 establishes a state policy to encourage productive and enjoyable harmony between people and their environment, promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of humanity, and enrich the understanding of ecological systems and natural resources important to the people of Hawaiʻi. Table 5-5 summarizes the Project's consistency with the specific guidelines identified in HRS Chapter 344.

Table 5-5. Project Consistency with Hawaiʻi State Environmental Policy

Guideline	Assessment of Consistency
Population	
Recognize population impact as a major factor in environmental degradation and adopt guidelines to alleviate this impact and minimize future degradation;	The Project would not have any effect on population.
Recognize optimum population levels for counties and districts within the State, keeping in mind that these will change with technology and circumstance, and adopt guidelines to limit population to the levels determined.	
Land, Water, Mineral, Visual, Air, and Other Natural Resources	
Encourage management practices which conserve and fully utilize all natural resources;	The Project has been designed to minimize ground disturbance and maintain natural open space surrounding the Project facilities. Impacts to natural resources would be avoided and minimized to the extent possible through implementation of BMPs.
Promote irrigation and waste water management practices which conserve and fully utilize vital water resources;	This guideline is not applicable as the Project will have no effect on domestic water system or the municipal wastewater system. as no connection to these systems are expected to be required. See Section 3.3 for more information.
Promote the recycling of waste water;	The Project would not generate any waste water.
Encourage management practices which conserve and protect watersheds and water sources, forest, and open space areas;	The Project will avoid surface water features and will implement BMPs to control, treat, or reduce runoff before entering nearby surface and nearshore waters and minimize the potential discharge of pollutants to nearshore waters.

Guideline	Assessment of Consistency
Establish and maintain natural area preserves, wildlife preserves, forest reserves, marine preserves, and unique ecological preserves;	The Project would not involve any activities within a natural area preserve, wildlife preserve, forest reserve, marine preserve, or unique ecological preserve.
Maintain an integrated system of state land use planning which coordinates the state and county general plans;	The Project would be consistent with relevant state and county plans, as discussed in Section 5 of this EA.
Promote the optimal use of solid wastes through programs of waste prevention, energy resource recovery, and recycling so that all our wastes become utilized.	Construction and operation of the Project would generate very little waste. As part of Project decommissioning, all Project equipment would be removed; it is anticipated that most materials would be either salvaged or recycled. Only a small portion of the Project equipment would be disposed of as solid waste; disposal would be at authorized sites in accordance with applicable laws.
Flora and Fauna	
Protect endangered species of indigenous plants and animals and introduce new plants or animals only upon assurance of negligible ecological hazard	The Project area is composed of highly disturbed land dominated by non-native plant and wildlife species. Previous military activities and current commercial and agricultural activities have reduced the number and abundance of native species and habitats suitable for native species. However, despite the dominance of non-native species, some native plant species and listed and native animal species are present. The Project has been designed to avoid sensitive biological resources. BMPs will be implemented to minimize impacts to land-based, shoreline, and marine resources. See Section 3.4 for more information regarding the Project's protection of sensitive environmental resources.
Foster the planting of native as well as other trees, shrubs, and flowering plants compatible to the enhancement of our environment	Landscaping would be installed for soil stabilization and erosion control purposes and to provide visual screening of Project equipment from adjacent areas to the extent practicable. It is anticipated that the landscaping would incorporate suitable plant material in key locations, and would include native species that are ecologically and culturally appropriate for this location.
Parks, Recreation, and Open Space Guidelines	
Establish, preserve and maintain scenic, historic, cultural, park and recreation areas, including the shorelines, for public recreational, educational, and scientific uses	The Project area does not support coastal nor any other type of recreational resources, nor would it affect recreational opportunities. The Project is not located along the shoreline, nor would it affect shoreline structures or processes. Barbers Point Solar, LLC has conducted an AIS (Appendix A) and CIA (Appendix E) and is coordinating with SHPD. Seventeen historic properties were identified within the Project area and included features used for habitation, agriculture, ceremonial, and recreational activities, as well as historic buildings and features used for a variety of military activities from World War II onwards. Using the information in the AIS, the Project will be carefully sited to avoid or minimize impacts to historic resources. See Section 3.6 for a discussion of archaeological and historic resources. A visual impact analysis of the Project shows that in many cases the Project will be partially or fully screened by existing vegetation. Where the Project is visible from certain viewpoints, the Project infrastructure would introduce new visual elements within the landscape but would not attract attention and would be a subordinate feature in the landscape setting. The Project would not block mauka-to-makai and makai-to-mauka view planes, or significant vistas or landmarks in the 'Ewa Development Plan. See Section 3.8 for a discussion of visual impacts.
Protect the shorelines of the State from encroachment of artificial improvements, structures, and activities	
Promote open space in view of its natural beauty not only as a natural resource but as an ennobling, living environment for its people	

Guideline	Assessment of Consistency
Economic Development Guidelines	
Encourage industries in Hawaiʻi which would be in harmony with our environment	The Project would contribute to the growing renewable energy industry in Hawaiʻi by providing solar energy for the island of Oʻahu, with minimal environmental impacts. It would be expected to positively impact the economy by creating local employment opportunities, as well as providing a source of revenue for the State. In addition to generating and storing renewable energy, the Project would incorporate compatible agricultural activities. It would not include any aquacultural activities, nor involve a visitor destination area.
Promote and foster the agricultural industry of the State; and preserve and conserve productive agricultural lands;	
Encourage federal activities in Hawaiʻi to protect the environment;	
Encourage all industries including the fishing, aquaculture, oceanography, recreation, and forest products industries to protect the environment;	
Establish visitor destination areas with planning controls which shall include but not be limited to the number of rooms;	
Promote and foster the aquaculture industry of the State; and preserve and conserve productive aquacultural lands.	
Transportation Guidelines	
Encourage transportation systems in harmony with the lifestyle of the people and environment of the State	Transportation system improvements are not included as part of the Project. As discussed in Section 3.12, the Project would not significantly contribute to traffic congestion. Recognizing that construction could result in minor, localized impacts to traffic and the roadway network, recommendations in the Project's TIAR (Appendix H) would be implemented to avoid, minimize and mitigate potential impacts.
Adopt guidelines to alleviate environmental degradation caused by motor vehicles	
Encourage public and private vehicles and transportation systems to conserve energy, reduce pollution emission, including noise, and provide safe and convenient accommodations for their users	
Energy Guidelines	
Encourage the efficient use of energy resources	The Project would help to meet the state's need for renewable energy by providing up to 15 MW of solar energy and 60 MWh of battery storage. Further, the Project includes a battery storage system that would allow Hawaiian Electric to dispatch energy as needed to offset night-time customer demand.
Community Life and Housing Guidelines	
Foster lifestyles compatible with the environment; preserve the variety of lifestyles traditional to Hawaiʻi through the design and maintenance of neighborhoods which reflect the culture and mores of the community	This Project is not located in an area zoned for residential uses. The Project will assist DHHL's mission to effectively manage the Hawaiian Home Lands Trust and to develop and deliver lands to native Hawaiians. The DHHL has identified lands not suitable for homestead leasing, that can be leased for renewable energy projects with the objective of generating revenue from these lands and providing benefits for the impacted communities (DHHL 2018). The Project site was identified in DHHL's 2014 Island Plan as having desirable conditions for solar energy generation (DHHL 2014). DHHL will use revenues developed from industrial leasing of these available lands in east Kalaeloa to develop new homesteads in suitable residential areas throughout the state. The Project would benefit community life by generating clean, renewable energy to replace a portion of 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. The Project would represent Hawaii's commitment to achieving of 100 percent renewable energy sources by 2045.
Develop communities which provide a sense of identity and social satisfaction in harmony with the environment and provide internal opportunities for shopping, employment, education, and recreation	
Encourage the reduction of environmental pollution which may degrade a community	
Foster safe, sanitary, and decent homes	
Recognize community appearances as major economic and aesthetic assets of the counties and the State; encourage green belts, plantings, and landscape plans and designs in urban areas; and preserve and promote mountain-to-ocean vistas	
Education and Culture Guidelines	
Foster culture and the arts and promote their linkage to the enhancement of the environment	The Project would not affect existing or future educational or cultural programs.
Encourage both formal and informal environmental education to all age groups	

Guideline	Assessment of Consistency
Citizen Participation Guidelines	
Encourage all individuals in the State to adopt a moral ethic to respect the natural environment; to reduce waste and excessive consumption; and to fulfill the responsibility as trustees of the environment for the present and succeeding generations	The HRS Chapter 343 environmental review process provides opportunity for public input at various stages, including pre-assessment consultation and public review of the Draft EA. In addition, the land use permitting process under HCDA also includes opportunity for public input regarding the Project.
Provide for expanding citizen participation in the decision-making process so it continually embraces more citizens and more issues	

5.6 2050 Sustainability Plan

The Hawaiʻi 2050 sustainability plan serves as the State's climate and sustainability action plan to determine future actions guiding the coordination and implementation of Hawaiʻi's sustainability and climate adaptation goals, principles, and policies, and to define and implement state goals, objectives, policies, and priority guidelines based on the objectives and guidelines established in HRS Chapter 226.

The long-term strategy in the Hawaiʻi 2050 Sustainability Plan is based on the definition of sustainability as respect for culture, character, beauty, and history of the State's island communities; balance among economic, community, and environmental priorities; and an effort to meet the needs of the present without compromising the future generations to meet their own needs. The plan identifies five goals toward a sustainable Hawaiʻi accompanied by strategic actions for implementation and indicators to measure success or failure. The goals relate to way of life, the economy, environment and natural resources, community and social well-being, and Kanaka Maoli culture and island values. Strategic actions that are applicable to the Project include:

- Goal 2, Strategic Action 1: Develop a more diverse and resilient economy
    - Provide incentives that foster sustainability-related industries, which include, but aren't limited to renewable energy, innovation and science-based industries, and environmental technologies.
- Goal 3, Strategic Action 1: Reduce reliance on fossil (carbon-based) fuels
    - Expand renewable energy opportunities

The Project would help to meet the state's need for renewable energy by providing up to 15 MW of solar energy and 60 MWh of battery storage, which is enough electricity for approximately 6,200 homes on Oʻahu (based on average energy use). It is expected to offset the use of approximately 1,139,396 barrels of fuel and reduce net lifecycle greenhouse gas emissions by approximately 455,598 metric tons of carbon dioxide equivalents over its lifecycle (Hawaiian Electric 2020c). As such, the Project is directly responsive to the strategic actions identified in the 2050 Sustainability Plan.

5.7 Hawaiʻi Clean Energy Initiative

The HCEI was launched in 2008 when the State of Hawaiʻi and U.S. Department of Energy signed a Memorandum of Understanding to collaborate on the reduction of Hawaiʻi's heavy dependence on imported fossil fuels. In 2008, the state estimated that 60-70 percent of future energy needs could be fulfilled by local, clean, renewable energy sources. In 2014, HCEI renewed Hawaiʻi's commitment to setting clean energy goals that include:

- Achieving the nation's first-ever 100 percent RPS by the year 2045.
- Reducing electricity consumption by 4,300 gigawatt-hours by 2030, enough electricity to power every home on Oʻahu, Maui, Molokai, Lanai and Hawaiʻi Island for more than two years
- Reducing petroleum use in Hawaii's transportation sector which accounts for two-thirds of the state's overall energy usage (HCEI 2021).

The Project will help Hawaiʻi meet the state's need for renewable energy by providing up to 15 MW of solar energy and 60 MWh of battery energy storage. As a renewable energy project, the Project will promote the use of renewable energy sources in Hawai'i. Hawaiian Electric estimates that the Project will fulfill an average of 0.56% of Hawaiian Electric's RPS over the 25-year term of the PPA. The Project is expected to offset approximately 1,139,396 barrels of fossil fuel consumption by Hawaiian Electric's generating units and reduce net lifecycle greenhouse gas emissions by approximately 455,598 metric tons of carbon dioxide equivalents over its lifecycle. Furthermore, it is estimated that the renewable energy supplied by the Project will potentially save Hawaiian Electric, and therefore customers, millions of dollars in total avoided fuel costs over the term of the PPA. See Section 1.2 for a more detailed discussion of the Project's benefits to the state's energy system.

5.8 State of Hawaiʻi Office of Planning, Technical Assistance Memorandum-2016-1 / HRS Chapter 262, Airport Zoning Act

The Office of Planning Technical Assistance Memorandum (TAM)-2016-1 provides technical assistance to state and county agencies in administering FAA Order 5190.6B, to address the compatibility of land uses adjacent to or in the immediate vicinity of Hawaiʻi's airports. TAM-2016-1 identifies specific land uses that may attract hazardous wildlife and may also be a glint/glare hazard or an aerial obstruction hazard to existing flight paths. These land uses include photovoltaic solar panels and utility poles and lines.

Per HRS Chapter 262, the Airport Zoning Act, the creation, maintenance, or establishment of an airport hazard is a public nuisance and an injury to the community served by the airport in question; therefore, it is necessary in the interest of the public health, public safety, and general welfare that the creation, maintenance, or establishment of airport hazards be prevented.

The Project has been designed to comply with FAA Order 5190.6B, TAM-2016-1, and HRS Chapter 262, and will not create an airport hazard. See Section 3.12.2 for further discussion.

5.9 HCDA Plans

As noted in Section 3.7, Act 184 of the Hawai‘i State Legislature assigned the responsibility of redevelopment of the 3,700-acre KCDD to the HCDA. The KCDD includes all of the lands associated with the former NASBP which was closed in 1999. HCDA prepared a Kalaeloa Master Plan for redevelopment of the KCDD that was approved by the HCDA Board and the Governor in 2006 (HCDA 2006). In 2012, HAR Chapter 15-215 was adopted for HCDA to carry out the visions and concepts of the Kalaeloa Master Plan by classifying and regulating the types and intensities of development and land uses allowed within the KCCD. The Project's compliance with the Kalaeloa Master Plan and the KCDD rules under HAR Chapter 15-215 are discussed below.

5.9.1 Kalaeloa Master Plan

The Kalaeloa Master Plan serves as the principal policy and planning document for HCDA's use in coordinating with federal, state, and county government agencies, developers, private landowners, and the community. The Kalaeloa Master Plan (1) reviews the closure of NASBP and past planning efforts; (2) provides a conceptual land use plan; (3) describes desired land uses and provides design guidelines; and (4) discusses the issues surrounding the successful implementation of the Master Plan (HCDA 2006).

The Kalaeloa Master Plan identifies opportunities that define the conceptual framework for the area's future land use plan, including creating social value, providing new economic development and employment opportunities, balancing development, addressing regional traffic congestion, protecting open space and cultural and natural resources, and integrating the possibility of military reuse. Renewable energy development and specifically solar is identified as having development potential in Kalaeloa.

The Project would meet the objectives of the Kalaeloa Master Plan through providing environmentally compatible development that provides renewable energy for O‘ahu, protects open space and cultural and natural resources, and provides new economic development and employment opportunities.

The Project area's land use designations under the Kalaeloa Master Plan for TMK 9-1-013:038 are Eco-Industrial (Open Space Overlay) (portion) and Recreation/Cultural (portion) and for TMK 9-1-013:040 is Recreation/Cultural.

The Eco-Industrial land use is defined as: "… environmentally compatible industries that benefit the entire population of O‘ahu. Potential industries such as solar or hybrid energy generation, bio-filtration, or other such technologies are compatible in these parcels. These industries require large land areas and are located within the airport's accident potential zones where height restrictions limit development" (HCDA 2006). As a solar development, the Project is compatible with the Eco-Industrial land use designation. The northernmost portion of the Project area (solar array Area 1) is within the "Eco-Industrial (Open Space Overlay)". Under Section 4.1.8.1 of the Kalaeloa Master Plan, it calls out this area as being previously designed as regional open space and therefore there remains potential that all or part of these areas may be accepted by the City and County of Honolulu as a regional park and the plan's designation accommodates this use. As the Project will be decommissioned at the end of its

useful life, future use as a regional park would not be excluded and therefore the Project is compatible with this land use designation in the Kalaeloa Master Plan.

The remainder of the Project area is designated by the Kalaeloa Master Plan as Recreation/Cultural. This land use designation indicates that this area as a relatively high density of cultural and archaeological sites that may limit active recreational uses and may function well for passive open space opportunities. The Project's protection of historical, archeological, cultural and natural resources (see Sections 3.4, 3.5, and 3.6), complies with the intent of land use designation.

5.9.2 KCDD Land Use Designations and Permit Requirements

In 2012, HCDA adopted the KCDD Rules under HAR §15-215. The KCDD Rules include land use regulations which implement the Kalaeloa Master Plan by classifying and regulating the types and intensities of development and land uses within the KCDD.

As specified in the KCDD Rules and shown in Figure 3-7, TMK 9-1-013:040 and the southern portion (Area 2) of TMK 9-1-013:038 are located within Transect Zone T2: Rural/Open Space Zone and the northern portion of TMK 9-1-013:038 (Area 1) is located with Transect Zone T3: General Urban Zone. Because the Project constitutes a man-made change on a lot greater than 40,000 square feet (0.92 acres) within the KCDD, it will require a Development Permit within any zone, per § 15-215-78 of the KCDD Rules (HCDA 2012). Per HAR §15-215-79 of the KCDD Rules, within Zone T2, solar facilities are "permitted by right" such that a Conditional Use Permit (CUP) is not required. Within Zone T3, solar facilities are an allowed use with an approved CUP (HCDA 2012). Therefore, Barbers Point Solar, LLC will be requesting a Development Permit and CUP from HCDA.

Per Figure 1.3 Development Standards Summary in the KCDD Rules (HCDA 2012), the following development standards apply to the T2 and T3 Transect Zones.

- Front Yard Setback: 5' to 15" in both T2 and T3
- Side and Rear Yard Setback: 0' in both T2 and T3
- Maximum Height: 28' in T2; 60' in T3

The KCDD Rules (HCDA 2012) also include a Thoroughfare Plan. A copy of this plan is shown in Figure 5-1. Per the Thoroughfare Plan in the KCDD Rules (HCDA 2012), a future extension of the Kualakai Parkway is envisioned to extend south from Roosevelt Avenue, through a portion of the Project area on TMK 9-1-013:038, connecting to Keoneula Boulevard. However, Barbers Point Solar LLC understands HCDA has no current funding to design, permit, and construct this parkway extension and the timing of such a road infrastructure project is not determined. In addition, the road alignment may conflict with the 'Ewa Battlefield Historical District (which was officially listed on the NRHP in 2016) and may impact listed 'akoko plants on TMK 9-1-013:039. These potential impacts to historic properties and listed species would likely extend the permitting process for the proposed road extension and may require the road extension alignment to be reconsidered. Therefore, Barbers Point Solar LLC anticipates that the Project's operational period would conclude prior to the potential implementation of the

Keoneula Boulevard extension shown in the KCDD Rules Thoroughfare Plan (Figure 5-1). Additionally, HCDA is currently undergoing a review of the Kalaeloa Master Plan and discussion regarding potential historical and biological conflicts with the parkway alignment has been raised. Barbers Point Solar will continue to consult with HCDA regarding the thoroughfare plan prior to and during the Project's CUP and Development Permit process.

Additional development standards applicable to the Project include:

- Per HAR §15-215-44, all required yards shall be landscaped; new plantings should be selected from the preferred plant species list. Landscaping will have automatic irrigation system.
- Per HAR §15-215-46, all parcels in the district shall provide 10% of the lot as open space.
- Per HAR §15-215-43(c), fence heights are restricted to 3 feet in front yard, 6 feet in side/rear yard.
- Per HAR §15-215-43(f), in the T3, T4, and T5 transect zones, utilities and service elements that are visible from thoroughfares shall not be visually intrusive and shall be incorporated in the building structure through use of the following strategies:
    A. Burying the utilities and service elements underground
    B. Constructing a utility room to enclose the utilities and service elements
    C. Screening the utilities and service elements behind the building; or
    D. Clustering the utilities and service elements on the roof within a mechanical enclosure.

The Project anticipates meeting all of these development standards with the exception of the yard fence height requirements. As noted in Section 2.1, the Project's DC and AC collector lines will primarily be installed underground. Portions of the AC line along Coral Sea Road may need to be overhead depending on coordination with HDOT. Also, in cases where subsurface conditions make it difficult or too costly to trench, other portions of the collection system may go overhead similar to a transmission line. Portions of the Project gen-tie line will be overhead but will be combined with an existing transmission line along Coral Sea Road. In addition, the anticipated Project overhead lines along Coral Sea Road are not in the T3, T4, or T5 transect zones and are therefore not subject to the design standard under HAR §15-215-43(f). Barbers Point Solar, LLC anticipates seeking a variance from this standard to allow for a fence height of 7 feet. Barbers Point Solar, LLC may also seek relieve through a variance to the irrigation requirement for landscaping as it intends to plant drought tolerant species that will not require irrigation once established.

5.10 City and County of Honolulu Plans

5.10.1 General Plan

Adopted by resolution in October 2002 (Resolution 02-205), the revised edition of the General Plan for the City and County of Honolulu is a policy guidance document that presents the long-range objectives

for the island of Oʻahu (City and County of Honolulu 2002). It is the foundation of a comprehensive planning process that addresses the physical, cultural, social, economic and environmental concerns, and is intended to provide direction for future growth on Oʻahu.

Overall, the proposed Project is consistent with the various objectives and policies contained in the proposed revised General Plan. The proposed Project would not impact objectives and policies related to population, housing and communities, transportation and utilities, public safety and community resilience, health and education, and government operations and fiscal management. As a result, these objectives and policies are not discussed further. The proposed Project is consistent with the applicable objectives and policies of the City and County of Honolulu General Plan described below.

Economy

Objective A **To promote economic opportunities that enable all the people of Oʻahu to attain meaningful employment and a decent standard or living.**

Policy 1 Support a strong, diverse and dynamic economic base resilient to changes in global conditions.

Policy 3 Pursue opportunities to grow and strategically develop non-polluting industries such as trade, communications, media, medical, life sciences, and technology in appropriate locations that contribute to Oʻahu's long-term environmental, economic, and social sustainability.

Discussion: The Project would contribute to Hawaiʻi's growing renewable energy market and would provide employment opportunities for Hawaiʻi residents, particularly during construction. Although operations would not include many labor-intensive activities, the Project would positively contribute to Hawaiʻiʻs economy, by potentially saving Hawaiian Electric, and therefore customers, millions of dollars in total avoided fuel costs over the term of the PPA and through putting downward pressure on electricity rates and, as a locally produced energy source, will help Hawaiʻi to avoid the negative economic effects of volatile oil prices. See Section 3.16.2 for a discussion of how the Project will have positive direct and indirect economic impacts for the City and County of Honolulu and the State of Hawaiʻi.

Natural Environmental and Resource Stewardship

Objective A **To protect and preserve the natural environment.**

Policy 1 Protect Oʻahu's natural environment, especially the shoreline, valleys, ridges, and watersheds, from incompatible development.

Policy 4 Require development projects to give due consideration to natural features and hazards such as slope, inland and coastal erosion and flood hazards, water-recharge areas, and existing vegetation, as well as to plan for coastal hazards that threaten life and property.

Policy 6 Design and maintain surface drainage and flood-control systems in a manner which will help preserve natural and cultural resources.

Policy 7 Protect the natural environment form damaging levels of air, water, and noise pollution.

Policy 8 Protect plants, birds, and other animals that are unique to the State of Hawai‘i and O‘ahu, and protect their habitats.

Policy 12 Plan and prepare for the impacts of climate change on the natural environment, including strategies of adaptation.

Objective B To preserve and enhance natural landmarks and scenic views of O‘ahu for the benefit of both residents and visitors as well as future generations.

Policy 1 Protect the Island’s significant natural resources: its mountains and craters; forests and watershed areas; marshes, rivers, and streams; shorelines, fishponds, and bays; and reefs and offshore islands.

Policy 2 Protect O‘ahu’s scenic views, especially those seen from highly developed and heavily traveled areas.

Policy 3 Locate and design public facilities, infrastructure, and utilities to minimize the obstruction of scenic views.

Discussion: The Project area is composed of highly disturbed land dominated by non-native plant and wildlife species. Previous military activities and current commercial and agricultural activities have reduced the number and abundance of native species and habitats suitable for native species. However, despite the dominance of non-native species, some native plant species and listed and native animal species are present. The Project has been designed to avoid sensitive biological resources to the extent practicable. BMPs will be implemented to minimize stormwater run-off and impacts to land-based, shoreline, and marine resources. See Section 3.4 for more information regarding the Project’s protection of sensitive environmental resources.

A visual impact analysis of the Project shows that in many cases the Project will be partially or fully screened by existing vegetation. Where the Project is visible from certain viewpoints, the Project infrastructure would introduce new visual elements within the landscape but would not attract attention and would be a subordinate feature in the landscape setting. The Project would not block mauka-to-makai and makai-to-mauka view planes, or significant vistas or landmarks in the ‘Ewa Development Plan. See Section 3.8 for a discussion of visual impacts.

Energy

Objective A To increase energy self-sufficiency and maintain an efficient, reliable, resilient, and cost-efficient energy system.

Policy 1 Encourage the implementation of a comprehensive plan to guide and coordinate energy conservation and renewable energy development and utilization programs.

Policy 2 Support and encourage programs and projects, including economic incentives, regulatory measures, and educational efforts, which will reduce O‘ahu’s dependence on fossil fuels as its primary source of energy.

Policy 7 Manage our resources and the development of our communities in line with the long-term goals of net zero to net positive performance in areas of energy, carbon emissions, waste streams, all utilities, and food security.

Policy 9 Consider health, safety, environmental, cultural, and aesthetic impacts, as well as resource limitations, land use patterns, and relative costs in all major decisions on renewable energy.

Objective B To conserve energy through the more efficient management of its use and through more energy-efficient technologies.

Policy 5 Encourage the implementation of an adaptable and reliable electrical grid, energy transmission, energy storage, and energy generation technologies.

Objective C To foster an ethic of energy conservation that inspires residents to engage in sustainable practices.

Policy 4 Provide communities with timely, relevant, and accurate information concerning renewable energy facilities proposed in their area.

Discussion: The Project would help to meet the state’s goal of 100 percent renewable energy sources by 2045 by providing up to 15 MW of solar energy and 60 MWh of battery storage, which is enough electricity for approximately 6,200 O‘ahu homes (Hawaiian Electric 2020c). Hawaiian Electric estimates that the Project will fulfill an average of 0.56% of Hawaiian Electric’s RPS over the 25-year term of the PPA. The Project is expected to offset approximately 1,139,396 barrels of fossil fuel consumption by Hawaiian Electric’s generating units and reduce net lifecycle greenhouse gas emissions by approximately 455,598 metric tons of carbon dioxide equivalents over its lifecycle. Furthermore, it is estimated that the renewable energy supplied by the Project will potentially save Hawaiian Electric, and therefore customers, millions of dollars in total avoided fuel costs over the term of the PPA.

The EA review process would inform the public of the proposed renewable energy facility and provide opportunity for input at various stages, including the pre-assessment consultation process and the Draft EA 30-day public comment period. Additional opportunities for input would occur during the subsequent discretionary permitting process.

Physical Development and Urban Design

Objective A To coordinate changes in the physical environment of O‘ahu to ensure that all new developments are timely, well-designed, and appropriate for the areas in which they will be located.

Policy 10 Discourage uses which are major sources of noise, air, and light pollution.

Policy 11 Encourage siting and design solutions that seek to reduce exposure to natural hazards, including those related to climate change and sea level rise.

Policy 13 Promote opportunities for the community to participate meaningfully in planning and development processes, including new forms of communication and social media.

Discussion: The Project would be designed to minimize impacts related to noise, air, and light pollution during construction and operation, and is not anticipated to be a major source of these pollutants. As detailed in Section 3.13 and as shown in Figures 3-13 and 3-14, the Project would not be located in a flood hazard zone or tsunami evacuation zone, and would not be expected to increase exposure to natural hazards. Once constructed, the Project would generate clean renewable energy which would replace the burning of fossil fuel for the production of electricity, thus offsetting greenhouse gas emissions and providing a beneficial impact relative to climate change. As noted above, the EA and discretionary permitting processes include opportunities for meaningful community input.

Culture and Recreation

Objective B To protect, preserve, and enhance O‘ahu’s cultural, historic, architectural, and archaeological resources.

Policy 2 Identify and, to the extent possible, preserve and restore buildings, sites, and areas of social, cultural, historic, architectural, and archaeological significance.

Discussion: An AIS was conducted for the Project, including detailed background research and a 100 percent pedestrian inspection of the Project area. The AIS identified 17 historic properties within the Project area, containing 438 component features. Identified historic properties included features used for habitation, agriculture, ceremonial, and recreational activities, as well as historic buildings and features used for a variety of military activities from World War II onwards. Recommendations for the treatment of each of these features are summarized in the AIS. Of the 17 historic properties that were identified, five will be completely avoided and preserved. Features included in seven additional historic properties will also be avoided and preserved. In total, 348 of the features documented during this study are recommended for preservation.

The proposed project design will potentially impact 90 of the 438 documented features. The impacts to 42 of these 90 features will be mitigated through data recovery prior to construction. Archaeological monitoring is recommended during construction and the 48 features that are recommended for no further work will be called out in an archaeological monitoring plan that will be approved by SHPD prior to construction. The AIS adequately documents the informational content of these 48 features and, therefore, any impacts to these features have been adequately mitigated.

Barbers Point Solar, LLC intends to obtain SHPD’s review of the AIS and concurrence with the effect determination prior to the HCDA hearing for the CUP application.

5.10.2 ‘Ewa Development Plan

The General Plan for the City and County of Honolulu requires that community development plans be adopted by the City Council for each of the eight planning areas in the City and County. These development plans are intended to provide detail for the elements presented in the General Plan and emphasize those elements most relevant to the issues and conditions of the specific area plan in order to guide public policy, infrastructure investment and land use decision making over the next 25 years. The ‘Ewa Development Plan was originally adopted by the City Council in 1997 and was most recently revised in 2020 (Ordinance 20-46).

The revised ‘Ewa Development Plan (City and County of Honolulu 2020) maintains the vision for:

- Providing a secondary employment center with its nucleus in the City of Kapolei to supplement the Primary Urban Center and divert commuter traffic from the Primary Urban Center;
- Concentrating primary employment activities at industrial and resort areas and at government service and higher education centers around the City of Kapolei so that regional office and retail activities are attracted to the City of Kapolei;
- Providing significant residential development throughout ‘Ewa, consistent with the General Plan, to meet the needs of O‘ahu's citizens;
- Providing for a variety of housing types from affordable units and starter homes to mid-size and larger multi-family and single-family units;
- Promoting diversified agriculture on prime agricultural lands along Kunia Road and surrounding the West Loch Naval Magazine in accordance with the General Plan policy to support agricultural diversification in all designated agricultural areas on O‘ahu;
- Providing a secondary resort area at Ko Olina;
- Helping relieve urban development pressures on rural and urban fringe Sustainable Communities Plan (SCP) areas (Wai‘anae, North Shore, Ko‘olau Loa, Ko‘olau Poko, and East Honolulu) so as to preserve the "country" lifestyle of the rural areas and sustain the stable, low density residential character of the urban fringe areas; and
- Providing, along with the PUC, a focus for directed and concentrated public and private infrastructure investment to support growth.

The Ewa Development Plan identifies the former NASBP as Kalaeloa and designates it as a Special Area. After the closure of the former NASBP in 1999, the Kalaeloa Redevelopment Plan was prepared for Kalaeloa in December 2000 by the Barbers Point Naval Air Station Redevelopment Commission and accepted as the Kalaeloa Special Area Plan by the City Council (Res. 01-86, April 2001). The ‘Ewa Development Plan acknowledges that HCDA prepared the Kalaeloa Master Plan, which was approved by the HCDA Board and Governor in 2006, but notes that the Kalaeloa Master Plan still needs to be submitted for acceptance by the City Council as the Special Area Plan for Kalaeloa (replacing the 2000 Kalaeloa Redevelopment Plan) (City and County of Honolulu 2020). Formal adoption is still pending.

The Project site land use classifications under the ‘Ewa Development Plan for TMK 9-1-013:038 and :040 is Industrial. Kalaeloa is designated as a Special Area under the ‘Ewa Development Plan. In 2002, the State Legislature transferred redevelopment responsibility for Kalaeloa to the HCDA. Approval for all development projects in Kalaeloa should be based on the extent to which the Project supports the polices and guidelines of the ‘Ewa Development Plan but is ultimately guided by the Kalaeloa Master Plan and regulated by the KCDD. The Project is consistent with the ‘Ewa Development Plan land use classification and is compliant with the Kalaeloa Master Plan, see discussion in Section 5.9.

5.10.3 Land Use Ordinance

The City & County of Honolulu’s Land Use Ordinance (Revised Ordinances of Honolulu Chapter 21) regulates land use by identifying the uses that are considered appropriate in each zoning district and the minimum standards and conditions that must be met if those uses are to be permitted. The purpose of the Land Use Ordinance is to regulate land use in a manner that will encourage orderly development in accordance with adopted land use policies, including the O‘ahu General Plan and community development plans.

However, it should be noted that per the federal Hawaiian Homes Commission Act of 1921, DHHL is not subject to the land use controls of other state or county agencies unless it decides to subject itself to those controls for health and safety reasons. In addition, as the Project is located within the HCDA’s KCDD, HCDA determines allowed uses in the Project area rather than City and County of Honolulu. For the purposes of this Project, DHHL directed the Applicant to comply with and seek land use permits and approvals from HCDA.

5.11 Permits Anticipated to be Required

Table 5-6 provides a list of the permits and approvals that are expected to be required for construction and operation of the Project, along with the current status of each item.

Table 5-6. Anticipated Permits and Approvals Required for Project

Permit/Approval	Regulating Agency	Status
HRS Chapter 343 Compliance	DHHL (approving agency)	Draft EA published for public review
Development Permit	HCDA	Application to be submitted following HRS Chapter 343 EA process
Variance	HCDA	Application to be submitted following HRS Chapter 343 EA process
CUP	HCDA	Application to be submitted following HRS Chapter 343 EA process
HRS Chapter 6E Compliance (Historic Preservation Review)	State Historic Preservation Division (SHPD)	Draft AIS submitted to SHPD for review on September 8, 2021
NPDES Permit	Department of Health (DOH), Clean Water Branch	To be obtained prior to construction
Community Noise Permit	DOH, Indoor and Radiological Health Branch	To be obtained prior to construction

Permit/Approval	Regulating Agency	Status
Building Permit	Department of Planning and Permitting	To be obtained prior to construction
Grading and Grubbing Permit	Department of Planning and Permitting	To be obtained prior to construction
Use and Occupancy Permit	HDOT	To be obtained prior to construction, as applicable
Permit to Perform Work Upon State Highways	HDOT	To be obtained prior to construction, as applicable
Weekly Lane Closure Form	HDOT	To be obtained prior to construction, as applicable
Permit to Operate or Transport Oversize and/or Overweight Vehicles and Loads	HDOT	To be obtained prior to construction, as applicable
Movement of Oversize and/or Overweight Vehicles and Loads Permit	Department of Transportation Services	To be obtained prior to construction, as applicable
Notice of Proposed Construction or Alteration (Form 7460-1)	Federal Aviation Administration (FAA)	To be submitted prior to construction
Notice of Actual Construction or Alteration (Form 7460-2, Part 2)	Federal Aviation Administration (FAA)	To be submitted within 5 days after construction reaches its greatest height

6.0 SUMMARY OF FINDINGS AND ANTICIPATED DETERMINATION

6.1 Significance Criteria

The HRS Chapter 343 environmental review process requires that the sum of the effects of a proposed action on the quality of the environment be considered as part of the determination of significance. In determining whether the action may have a significant effect on the environment, specific significant criteria are identified in HAR §11-200.1-13. These significance criteria are listed below, with an assessment of the Project relative to each criterion. As detailed throughout this document, the Project would incorporate a variety of mitigation measures such that no significant impacts are anticipated for the identified environmental resources.

(1) Irrevocably commit a natural, cultural, or historic resource

Natural, cultural, and historical resources have been documented in Project specific studies including a Biological Resources Survey Report and Supplemental ‘Akoko Survey (Appendix C), an AIS (Appendix A), and CIA (Appendix E).

The Project area is dominated by non-native vegetation and has been disturbed by past military use. At the end of its useful life, the Project would be decommissioned, with all Project-related equipment removed and the Project area returned to substantially the same condition as existed prior to development. As detailed in Section 3.4.2, measures would be implemented during construction and operations to avoid or minimize impacts to natural resources.

With respect to historic resources, the AIS identified 17 historic properties within the Project area, containing 438 component features. Identified historic properties included features used for habitation, agriculture, ceremonial, and recreational activities, as well as historic buildings and features used for a

variety of military activities from World War II onwards. Of the 17 historic properties that were identified, five will be completely avoided and preserved. Features included in seven additional historic properties will also be avoided and preserved. In total, 348 of the features documented during this study are recommended for preservation. Implementation of the Project would potentially impact 90 of the 438 documented features; however, impacts to 42 of these 90 features will be mitigated through data recovery prior to construction. Archaeological monitoring is recommended during construction and the 48 features that are recommended for no further work will be called out in an archaeological monitoring plan that will be approved by SHPD prior to construction. The AIS adequately documents the informational content of these 48 features and, therefore, any impacts to these features have been adequately mitigated. Based on the conclusions regarding the significance and documentation to date, pursuant to HAR §13-284-7 and subject to review and concurrence by SHPD, the effect determination for the Project is anticipated to be "effect, with proposed mitigation commitments."

As detailed in Section 3.6, the CIA did not identify any cultural practices as currently existing within the Project area. Therefore, the Project is unlikely to affect cultural practices within the Project area. Based on this analysis, implementation of the Project would not be expected to result in an irrevocable commitment to loss or destruction of important natural, historical, or cultural resources.

(2) Curtail the range of beneficial uses of the environment

The range of beneficial uses of the environment is determined by the physical setting and the land use controls that define its use. The majority of the Project area is currently vacant and overgrown by kiawe and koa haole. There are large cleared, concrete and asphalt paved areas, as well as debris, bunkers, aircraft revetments and associated structures, and abandoned vehicles and equipment in the Project area. The northern portion of the Project area is located within the 'Ewa Battlefield Historical District and a portion of the Project area within TMK 9-1-013:038 is located in the proposed 'Ewa Field Aircraft Revetment Historic District. The majority of TMK 9-1-013:038 is currently unused by DHHL; however, small portions are leased for agricultural and commercial/industrial purposes.

In DHHL's approval of the Project's right-of-entry, it notes that it believes the Project is in the best interests of the DHHL Trust as it will generate a substantial revenue stream for the DHHL Trust over at least 25 years on land that lacks infrastructure, has use restrictions and limitations for [residential] development, and has not generated much revenue in the past (DHHL 2019). Furthermore, the Project is compatible with DHHL's General Plan (DHHL 2002), O'ahu Island Plan (DHHL 2014), Kapolei Regional Plan (DHHL 2010) and Ho'omaluo Energy Policy. The Project is also anticipated to be considered consistent with HCDA's Kalaeloa Masterplan and associated KCDD rules. See Section 5.9 for more detailed discussion of the Project's compatibility with these plans. Barbers Point Solar, LLC is working in collaboration with DHHL and the existing tenants occupying portions of the Project area to explore alternative unencumbered areas within the Project parcels (e.g., revetment area) and/or off site locations to minimize impacts to the existing tenants so as to allow for safe construction or operation of the solar project.

Furthermore, the Project would be decommissioned at the end of its useful life, with Project-related equipment removed and the Project area returned to substantially the same condition as existed prior to development, thus preserving the full range of potential future land uses. As the Project would provide clean renewable energy while allowing for ongoing agricultural activities and would not preclude any future land use following decommissioning, it would not be expected to curtail the range of beneficial uses of the environment.

(3) Conflict with the State's environmental policies or long-term environmental goals established by law;

The Project would not conflict with the State's environmental policies or long-term environmental goals, which are specified in HRS Chapter 344. A detailed discussion of the Project's consistency with these policies and goals is provided in Section 5.5.

(4) Have a substantial adverse effect on the economic welfare, social welfare, or cultural practices of the community and State;

As discussed in Section 3.16, the Project would be expected to positively impact the economic and social welfare of the community by creating local employment opportunities, as well as providing a source of revenue for the DHHL Trust. The Project's economic contribution through job creation, tax payments, and other secondary benefits are increasingly important to the State of Hawaiʻi considering the current COVID-19 pandemic and associated economic downturn. In addition, the energy produced by the Project would be sold over the 25-year PPA term at a fixed price that is less than the current cost of fossil fuel power, thus helping to hedge against long-term price volatility. It would also help to improve electric grid stability by enabling Hawaiian Electric to utilize stored solar energy to meet peak demand.

Based on information gathered from the cultural and historical background, as well as community consultation conducted as part of the CIA, with implementation of biological avoidance and minimization measures listed in Section 3.4.2 and BMPs listed in Section 3.3.2 for protection of surface and groundwater resources, the Project would not be expected to significantly affect cultural or natural resources identified as existing within the Project area. Contemporary cultural practices occur in the adjacent Kalaeloa Heritage Park parcel, which involve caring for archaeological features and natural resources. The Project would not interfere with these, or other cultural practices in the Project area vicinity. As such, Project implementation would not result in a substantial adverse effect on the economic welfare, social welfare, or cultural practices of the community and State.

(5) Have a substantial adverse effect on public health;

The Project would be consistent with existing land uses and would not be expected to directly affect public health. Project implementation would result in short term impacts related to air quality as a result of dust emissions and noise from construction vehicles and equipment; these impacts would be minimized through BMPs in compliance with State and County requirements. Over the long term, operation of the Project would generate clean renewable energy that would replace a portion of

electricity that is currently generated by burning fossil fuels, thus reducing GHG emissions and other forms of pollution that are detrimental to human health.

(6) Involve adverse secondary impacts, such as population changes or effects on public facilities;

While the construction and operation expenditures associated with the Project may provide a direct benefit to the local economy, the amounts are relatively too small to cause significant secondary effects in the local economy. The Project would not induce changes in land use, development, or population size in the ʻEwa District. Public facilities would not be adversely affected, nor would additional use of public facilities occur as a result of Project implementation.

(7) Involve a substantial degradation of environmental quality;

The Project would not involve substantial degradation of environmental quality. The Project area has been extensively modified by previous activities and is dominated by non-native habitat. Noise levels and airborne dust would likely increase as a result of Project construction and decommissioning, but these effects would be short term and minimized through implementation of BMPs such that impacts would be minimal. BMPs would also be implemented to minimize the potential discharge of pollutants associated with stormwater runoff during both construction and throughout operations, as well as during decommissioning. Following decommissioning, the Project area would be returned to substantially the same condition as existed prior to development. All aspects of Project implementation would comply with applicable federal, state and local environmental regulations.

(8) Be individually limited but cumulatively have substantial adverse effect upon the environment or involves a commitment for larger actions;

The proposed Project does not involve a commitment to a larger action; although it would provide electricity for the island of Oʻahu and would replace energy that is currently generated by fossil fuels. However, it would not be a precursor for other future projects. When considered in combination with other actions, the Project could potentially contribute to cumulative impacts, including those related to stormwater, noise, air quality, and traffic. However, avoidance and minimization measures would be implemented, such that cumulative impacts would be less than significant.

(9) Have a substantial adverse effect on a rare, threatened, or endangered species, or its habitat;

None of the plant species observed in the Project area are federal or state listed threatened, endangered, proposed listed, or candidate plant species. As the Project area is dominated by non-native vegetation, measures would be implemented to avoid or minimize impacts to the wiliwili trees on the site and the endangered ʻakoko known to occur nearby (off site), implementation of the Project is not expected to have a significant impact on vegetation.

Most of the wildlife in the Project area is non-native to the Hawaiian Islands, and native habitats have been disturbed by previous activities and the introduction of invasive species, which has reduced the presence of native wildlife. The state listed pueo was observed within the Project area, and Hawaiian stilts were seen flying over the Project area during the biological surveys. Several other threatened and

endangered wildlife species could occur within or traverse over the Project area. Consistent with recommendations provided by DOFAW, the Project would incorporate measures specifically intended to avoid and minimize impacts to these species. With implementation of these measures, the Project would not be expected to have a substantial adverse effect on these listed species or their habitat.

(10) Have a substantial adverse effect on air or water quality or ambient noise levels;

Project implementation would result in minimal, short term impacts related to air and water quality, as well as ambient noise levels; mitigation measures would be implemented to minimize these impacts. The Project would also include permanent BMPs to provide long term retention and filtration of stormwater within the Project area. No substantial adverse water quality or air quality impacts are anticipated over the long term. Operation of the Project would generate some noise, primarily associated with the inverters and transformers within the solar arrays and substation; however, operational noise is expected to fall below the maximum permissible sound levels and is not expected to significantly impact any noise sensitive receptors, especially in the context of the airport activities in the Project vicinity.

(11) Have a substantial adverse effect on or be likely to suffer damage by being located in an environmentally sensitive area such as a flood plain, tsunami zone, sea level rise exposure area, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters;

As the Project area is not located within a flood hazard zone or a tsunami evacuation zone, it is extremely unlikely that conditions associated with flood or tsunami inundation would occur within the site, nor would the Project contribute to increased risk of flooding or inundation. The Project is in an extreme tsunami evacuation zone, but extreme tsunamis are rare, and the Project is likely to not be affected. The Project would be designed and constructed in compliance with all applicable federal, state, and local environmental protection, design, and building standards and regulations, including the Federal Flood Insurance Program, and would not contribute to coastal flooding. Implementation of the Project would not affect any environmentally sensitive area, nor would the Project be affected by environmental hazards associated with any such area.

(12) Have a substantial adverse effect on scenic vistas and viewplanes, during day or night, identified in county or state plans or studies; or

Based on a viewshed assessment (which considers terrain only and not existing vegetation or structures that may obstruct the view), it is anticipated that views of the Project would be primarily from areas immediately adjacent to the Project site. The Project will not block mountain or ocean views. From viewpoints from the adjacent public roadways and from locations within the ‘Ewa Battlefield, the visual impact analysis shows that in many cases the Project will be partially or fully screened by existing vegetation. Where the Project is visible along Coral Sea Road, the visual contrast will be mitigated with the addition of Project landscaping. After decommissioning, the Project site will be returned to substantially the same condition as existed prior to Project development. Considering all features, the

Project is expected to have minimal or no significant impact on the City and County of Honolulu's scenic and visual resources.

(13) Require substantial energy consumption or emit substantial greenhouse gases.

Construction of the Project would use some energy for site preparation and equipment installation. However, once installed, the Project would function to generate clean renewable energy, thus providing a net increase in energy and reducing emissions of GHG by replacing a portion of the electricity that is currently generated by burning fossil fuels.

6.2 Determination

Based upon the preliminary analysis and findings presented in this document, implementation of the Project is not expected to result in a significant adverse direct, indirect, or cumulative impact on the quality of the environment. As such, a FONSI is anticipated in accordance with HRS Chapter 343. This assessment is based on an evaluation of the Project impacts in relation to the significance criteria specified in HAR §11-200.1-13, as detailed above.

The anticipated determination is based on the preliminary analysis and findings of the environmental review process to date, as presented herein. Additional information and input obtained through the Draft EA public review process will be considered in finalizing the EA. A final determination will be made based on the analysis in the Final EA and published accordingly.

7.0 COORDINATION AND CONSULTATION

Barbers Point Solar, LLC began conducting community engagement and public outreach activities during the early stages of the Project's development process and continues to engage with the community with Project updates and coordination on community benefits. Barbers Point Solar, LLC and its consultants have held nearly 100 meetings with individuals, community organizations, businesses, and government official and also held two public open houses. The Project's overall community outreach and agency coordination activities are described further in Section 7.1. A description of the Project's community engagement approach and a detailed description of stakeholder consultation conducted to date and feedback received is included in the Project's Community Outreach and Engagement Report in Appendix I. Consultation conducted specifically for the HRS Chapter 343 environmental review process is described in Section 7.2.

7.1 Community Outreach and Agency Coordination

The Project's goal for community outreach and engagement is to achieve open, two-way communication between the Barbers Point Solar, LLC and its parent company Innergex and community members, stakeholders, regulators, and policy makers. The engagement process helps Barbers Point Solar, LLC share information with the local communities, understand local values, and discover areas of mutual interest. It also provides an opportunity to work through an iterative process with local

communities to identify opportunities and concerns and take measures to address them in a cooperative way where commercially reasonable and possible.

In order to gain an understanding of the local area that surrounds the Project site, a process was undertaken in 2019 to identify and group the local stakeholders into several different "Local Communities" that are differentiated based on the anticipated level of interest (stake) that they have in, and impact that the proposed Project may have on them. Throughout the early engagement process, Barbers Point Solar continually worked to increase the awareness of the Project and provide information and channels to have discussions with the Project team.

Barbers Point Solar has engaged in extensive outreach and engagement with community members and organizations by conducting one-one-one and small group meetings and attending and speaking at various organization meetings.

In January 2019, Innergex responded to an RFP issued by DHHL for a solar project to be located on two parcels of its industrial land in Kalaeloa. DHHL selected Innergex's Barbers Point Solar Project proposal and initiated the steps to sign a Right of Entry to develop the parcels and bid into the pending Hawaiian Electric Company RFP. On March 21, 2019, DHHL and Innergex hosted a beneficiary consultation meeting on the proposed Project from 6:00 pm – 8:00 pm at the Kapolei Middle School. The meeting was advertised through DHHL mailed invitation letters to 1,453 Lessees and Applicants that reside in the Kapolei (96707) and a notice on DHHL's website. Ten (10) beneficiaries participated in the consultation meeting and one (1) beneficiary emailed written comments. Refer to Appendix I for more details on this meeting and for a summary of feedback received from the community.

In accordance with the terms of the Hawaiian Electric RFP, a Public Open House was held on July 8, 2020. Due to COVID-19 restrictions, the meeting was held virtually via the WebEx platform. The meeting was advertised through the Project website, newspaper advertisements (refer to Section 2.3 above), and email and letter invites to various stakeholders and area homesteaders. Approximately 32 people attended the virtual the open house. The Public Open House was attended by a broad cross-section of Oʻahu residents and stakeholders. Attendees included residents of Oʻahu, DHHL, PUC, and Hawaiian Electric. Refer to Appendix I for more details on this meeting and for a summary of feedback received from the community.

Kapolei Community Development Corporation (KCDC) and the Kapolei Homestead Associations in collaboration with Barbers Point Solar hosted a Kapolei Homestead Project Update Meeting on November 10, 2020. Due to COVID-19 restrictions, the meeting was held virtually via the WebEx platform. The meeting was advertised through the KCDC website and Facebook page, Project website, and invites to various stakeholders and area homesteaders. The Community Update Meeting included information on the State of Hawaii's renewable energy and Project information, including timelines, preliminary study results, permitting, equipment/construction, visual simulations, decommissioning, and benefits presented by Barbers Point Solar including a PowerPoint presentation. Barbers Point Solar and its consultants were also in attendance to answer questions. Refer to Appendix I for more details on this meeting and for a summary of feedback received from the community.

Table 7-1 includes a list of Local Communities that have been engaged throughout the consultation process the community engagement activities conducted to date. In addition to the meetings listed in Table 7-1, the Project's outreach team has been coordinating with elected official and other stakeholders through phone calls, emails, and other communication methods. See Appendix I for a detailed list of key stakeholders and outreach methods conducted as part of the overall Project community engagement efforts.

Based on the feedback received to date, the broader community of Kapolei residents remain supportive of the Project. In regard to the Kapolei homestead communities, the KCDC Board has been consulted with extensively. The KCDC Board consists of community leaders from the Kapolei homestead communities – Maluʻohai, Kaupeʻa, Kauluokahaʻi and Kānehili. The President of the KCDC has provided a letter of support and reconfirmed support for the Project during the November 10, 2020 community virtual Project update meeting to the KCDC board and Kapolei homesteaders, which states.

> *"KCDC supports the solar project at Kalaeloa, because it aligns with DHHL's guiding documents but more importantly because this project provides DHHL, its beneficiaries, KCDC and the Kapolei homesteads with the resources for a sustainable future."* Scott Abrigo – President of Kapolei Community Development Corporation.

A copy of this letter is included in an appendix to the Project Community Consultation Report (Appendix I).

Table 7-1. Summary of Community Stakeholders Engaged with to Date

Local Community Type	Stakeholder	Date	Description of Engagement
Public Open House	Public Meeting	July 8, 2020	Virtual open house
	Public Meeting	November 10, 2020	Virtual community update meeting
Government Agencies	DHHL	March 21, 2019	Beneficiary consultation meeting hosted by DHHL and Innergex (held virtually)
		July 8 – 9, 2019	Hawaiian Homes Commission Meeting /Public Hearing
		Aug-Sept 2019	Meeting with DHHL Site Tenants at Project area
		September 16, 2019	Hawaiian Homes Commission meeting
		February 5, 2020	Meeting with DHHL
		April – May 2020	Meeting with DHHL Site Tenants at Project area (ongoing consultations occurring, not every correspondence listed in table)
		May 26, 2020	Meeting with DHHL & SHPD Staff
		July 1, 2020	Meeting with DHHL & SHPD
		October 2, 2020	Meeting with HCDA and DHHL
		October 28, 2020	Meeting with DHHL Chair and Planning Staff
		January 21, 2021	Meeting with DHHL Chair and Planning Staff
		January 29, 2021	Site visit with DHHL tenant manager.
		February 18, 2021	Meeting with DHHL & SHPD
		March 18, 2021	Meeting with DHHL Land & Planning Staff
		March 31, 2021	Meeting with DHHL Land & Planning Staff
		April 20, 2021	Meeting with DHHL staff
		May 5, 2021	Meeting with DHHL Chair and Land & Planning Staff
		June 10, 2021	Meeting with SHPD (Administrator and staff) and DHHL (Chair and Land & Planning Staff)
		June 29, 2021	Meeting with DHHL staff
	Hawaii Community Development Authority	October to present	Meetings with HCDA to provide project updates and request input on Project
		June 10, 2021	Participated in HCDA Kalaeloa Stakeholders meeting
		July 14, 2021	Attended HCDA Master Plan & Rules Update meeting
	State Historic Preservation Division	May 26, 2020	Meeting with DHHL & SHPD Staff
		July 1, 2020	Site visit with DHHL & SHPD
		September 11, 2020	Meeting with SHPD
		October 28, 2020	Site Visit with Branch Chief Dr. Susan Lebo and Architectural Historian Julia Flauaus
		January 22, 2021	Meeting with SHPD Staff

Local Community Type	Stakeholder	Date	Description of Engagement
		February 18, 2021	Meeting with DHHL & SHPD staff
		April 19, 2021	Meeting with SHPD staff
		June 10, 2021	Meeting with SHPD (Administrator and staff) and DHHL (Chair and Land & Planning Staff)
	Department of Land & Natural Resources- Division of Forestry and Wildlife (DOFAW)	October 30, 2020	Meeting with DOFAW and USFWS staff
		November 13, 2020	Meeting with DOFAW staff
	U.S. Fish and Wildlife Services - Pacific Islands Fish and Wildlife Office (USFWS)	October 30, 2020	Meeting with DOFAW and USFWS staff
	Hawaii Department of Transportation	August 26, 2020	Meeting with Airport Manager – Kalaeloa Airport (JRF) & Kawaihapai-Dillingham Airfield (HDH) -State of Hawaii DOTA O'ahu District and Civil Air Patrol members
		September 26, 2020	Meeting with Kalaeloa Airport, Airport Manager & Pilots
	Neighborhood Board #34 (Makakilo, Kapolei, Honokai Hale)	August 27, 2020	Attended meeting with Chair and Board Members, Neighborhood Board #34 (Makakilo/Kapolei)
		September 26, 2020	Presentation to Neighborhood Board #34, Board
Neighboring and Adjacent Property Owners/Lessees	Kapolei Community Development Corporation (KCDC) (KCDC Board consists of community leaders from the Kapolei homestead communities – Malu'ohai, Kaupe'a, Kauluokaha'i and Kānehili)	October 18, 2018	Community meeting with President of KCDC
		March 1, 2019	Community meeting with President of KCDC
		August 21, 2019	Meeting with President and Board Members of KDCD
		October 7, 2019	Meeting with Board Members and DHHL Ewa Homestead Association Boards leadership, KCDC
		June 25, 2020	Meeting with President of KCDC
		July 6, 2020	Meeting with Kaupe'a Homestead Association Representative, KCDC
		October 1, 2020	Meeting with President of KCDC
		October 23, 2020	Meeting with President of KCDC
		November 10, 2020	Presentation to KCDC board and Kapolei homesteaders
		November 13, 2020	Meeting with Co-founder and member of KCDC / President of Malu'ohai Homestead, Aunty Homelani Schneider
		January 29, 2021	Meeting with KCDC board representatives
		June 11, 2021	Meeting with KCDC, President
	DHHL Lessee on Project parcel: Kalaeloa Ranch	November 18, 2020	Site visit Kalaeloa Ranch, President – Ihilani Cummings
	DHHL Lessee on Project parcel: Hawaii Explosive & Fireworks	November 23, 2020	Site visit with Hawaii Explosives & Fireworks (Stephanie Pascua)
	DHHL Lessee on Project parcel: FPS Painting	July 7 and 9, 2021	Site visit with FPS Painting

Local Community Type	Stakeholder	Date	Description of Engagement
	Barbers Point Riding Club	December 9, 2020	Site visit with Riding Academy Manager
		April 30, 2021	Meeting with Riding Academy, Manager
	Hunt Company	December 28, 2020	Meeting with HUNT Development and DHHL tenants
		January 22, 2021	Meeting with HUNT Development
		January 27, 2021	Meeting with HUNT Development and Navy
	Ewa Beach Community Based Development Organization	September 28, 2020	Meeting with Ewa Beach Community Based Development Organization
	US Navy/ NAVFAC	January 27, 2021	Meeting with HUNT Development and Navy
		February 24, 2021	Meeting with Navy staff
		March 4, 2021	Meeting with Navy staff
	Kalaeloa Heritage Park (HCDA)	November 9, 2020	Meeting with ʻAha Moku ʻEwa Representative / Kalaeloa Heritage Park & Legacy Foundation, Director
Environmental and Conservation Groups	Earth Justice	August 18, 2020	Meeting with Managing Attorney, Earth Justice
	Sierra Club	August 18, 2020	Meeting with Chapter Director, Sierra Club
Other Community and Business Organizations	Council for Native Hawaiian Advancement (CNHA)	September 23 – 24, 2019	Meeting with staff and convention
		October 3, 2019	Meeting with Program Manager, CNHA and President, Mākaha Hawaiian Cultural & Training Center
		November 2019 – February 2020	CNHA and Mākaha Learning Center – curriculum development and scheduling of the solar training course
		June 26, 2020	Meeting with Office Manager, CNHA
		June 27, 2020	Meeting with President & CEO, CNHA
		August 17, 2020	Meeting with Program Manager, CNHA
		September 21, 2020	Discussion with Mākaha Learning Center, President
		September 22, 2020	Meeting with CNHA Program Manager, Rona Kekauoha
		October 26, 2020	Meeting with president of Mākaha Learning Center
		January 12, 2021	Attend Solar Training Program class to talk to students re Job Fair and CNHA, Programs Manager
		February 4, 2021	Supported a Solar Job Fair for graduates of the CNHA Solar Trades Academy
		March 26, 2021	Meeting with Makaha Learning Center Staff
	ʻAhahui Siwila Hawaiʻi O Kapolei (Kapolei Hawaiian Civic Club)	July 28, 2020	Meeting with Former President, ʻAhahui Siwila Hawaiʻi O Kapolei (Kapolei Hawaiian Civic Club)/ President of the Board for CNHA
	Prince Kuhio Hawaiian Civic Club	July 29, 2020	Meeting with Member, Prince Kūhiō Hawaiian Civic Club
	Rotary Club of Kapolei	July 7, 2020	Meeting with Board Members & Community Members, Rotary Club of Kapolei
		September 6, 2020	Meeting with Rotary Club of Kapolei, Club Members

Local Community Type	Stakeholder	Date	Description of Engagement
	Rotary Club of Kapolei Sunset	August 6, 2020	Meeting with President and Members, Rotary Club of Kapolei Sunrise
		September 28, 2020	Meeting with Rotary Club of Kapolei Sunset, Club members
	Wai'anae Gold 'Āina Bars	August 17, 2020	Meeting with founder Vince Dodge
		September 15, 2020	Meeting with founder
		October 17, 2020	Meeting with founder
	Ka Makana Ali'i Mall	August 5, 2020	Meeting with Mall Manager
	Pacific Links – Hawaii	July 7, 2020 and July 29, 2020	Meeting with former COO Pacific Link Hawaii/CEO of Hawaii Community Foundation
Cultural Groups and Leaders	Aha Moku 'Ewa Representative Shad Kane	November 9, 2020	Interview for CIA; shared project design and AIS findings
		June 17, 2021	Site visit with 'Aha Moku 'Ewa Representative/ Kalaeloa Heritage Park and Legacy Foundation Director, Shad Kane, and other CIA participants
	O'ahu Island Burial Council	September 9, 2020	Presentation to Burial Council
		June 17, 2021	Site visit with 'Ewa representative, Mana Caceres, and other CIA participants
	Office of Hawaiian Affairs	June 16, 2021	Meeting with Office of Hawaiian Affairs staff
	Correspondences with Cultural Descendant	September 24-27, 2020	Correspondences with Cultural Descendant Carolyn Keala Norman
		June 17, 2021	Site visit with Cultural Impact Assessment participants
Historical Groups	Mr. John Bond, MCAS Ewa Field Historian	July 15, 2019	Meeting
		January 8, 2020	Meeting
		December 21, 2020	Site visit with John Bond, Kanehili Cultural Hui; Daniel Martinez, Pearl Harbor National Memorial, and staff
		January 25, 2021	Site visit with John Bond, Kanehili Cultural Hui and Ross Stephenson, Hawaiian Railway Society
		March 5, 2021	Site visit with John Bond, Kanehili Cultural Hui
	Kanehili Cultural Hui (Save Ewa Field) Hawaiian Cultural Consultants	December 21, 2020	Site visit with John Bond, Kanehili Cultural Hui; Daniel Martinez, Pearl Harbor National Memorial, and staff
		January 25, 2021	Site visit with John Bond, Kanehili Cultural Hui and Ross Stephenson, Hawaiian Railway Society
		March 5, 2021	Site visit with John Bond, Kanehili Cultural Hui
	Hawaiian Railway Society	January 25, 2021	Site visit with John Bond, Kanehili Cultural Hui and Ross Stephenson, Hawaiian Railway Society
	Historic Hawaii Foundation	July 7, 2020	Meeting with Executive Director, Kirsten Faulkner, Historic Hawaii Foundation
	Pearl Harbor National Memorial	December 21, 2020	Site visit with John Bond, Kanehili Cultural Hui; Daniel Martinez, Pearl Harbor National Memorial, and staff
	Hoakalei Cultural Foundation	October 6, 2020	Site visit with Kimberly Kalama, Hoakalei Cultural Foundation

Local Community Type	Stakeholder	Date	Description of Engagement
Education & Schools	Kapolei Charter School	July 17, 2020	Instructor, Trainer focus, Kapolei Charter School
	Kapolei High School	August 21, 2020	Principal, Kapolei High School
	University of Hawaii - West O‘ahu	August 3, 2020	Instructor – Facilities Management Program, University of Hawaii West O‘ahu
		September 3, 2020	UH West O’ahu, Instructor, Facilities Management

7.1.1 Community Benefits

As discussed in Section 1.2, the Project will contribute to DHHL & Hawaii's renewable energy goals as called out in the DHHL Hoʻomaluō Energy Policy (DHHL 2009) and the State's RSP and will potentially offer benefits listed below:

- Lower Cost, More Equitable, Stable-Priced Energy Feeding the Grid. Early community feedback from residents emphasized that the cost of electricity is a prevalent concern. Projects like the Barbers Point Solar Project are intended to contribute to lowering electricity bills over the long term. The proposed price is less than Hawaiian Electric's current cost of generating power with fossil fuel and the price will be fixed for 25 years.
- Battery Energy Storage Can Reduce Curtailment. The recently publicized curtailment of other wind and solar projects has been viewed by residents as a waste of energy generation—and investment—by the utility. These concerns underscore the importance of energy storage systems for projects like Barbers Point Solar in reducing curtailment. The stored power can be dispatched in the morning or evening—when rooftop solar is not available—can help meet demands of residents returning home to deal with dinner, baths, washing, and other tasks or during emergencies.
- Experience and Capacity. As a mature and experienced global company, Barbers Point Solar LLC's parent company Innergex brings necessary resources, capital, and expertise in the field of renewable solar energy. In addition, Innergex has a track record of working with indigenous and multi-cultural communities and shaping a win-win outcome with them. As captured in its core values, Innergex engages with a community, not as a developer, but as a long-term community partner for the life of the project.
- An Opportunity for Workforce and Local Business. Throughout the life of the project, Innergex commits to using the local workforce and local companies wherever feasible, maximizing the investment in Oʻahu. These opportunities provide invaluable experiences for workers and companies in an ever-expanding energy sector in Hawaii.
- A Clean Power Future with Less Vulnerability. A great deal of concern exists among residents regarding Oʻahu's vulnerability to external threats because of its reliance on imported fuel. Harsh memories of shipping strikes, world oil prices, and geo-political forces stoke fears of the disruption these events could again cause to daily lives. Knowing that the sun is a readily available reliable resource, Oʻahu residents are supportive of the utility harnessing a renewable resource to improve the island's energy stability and grid resiliency.
- Project location. The Project is sited in a relatively remote and industrial area that has already been determined by Hawaiian Electric to be a prime site for energy generation. The Project is located in an area of Kalaeloa that is not immediately adjacent to any existing or planned residential communities. DHHL selected these two industrial sites because they do not have infrastructure or facilities required for commercial development. Leasing this land to a solar project accommodates DHHL's long-term plans for commercial/industrial development. The

Project is compatible with zoning and land use classifications, including KCDD/KCDA rules and standards. The Project Area is designated as "Industrial" in the Oʻahu Island Plan (DHHL 2014) and "Mixed Use" in the Kapolei Regional Plan (DHHL 2010). Lands in the Kalaeloa area are not intended for residential development but rather are intended for revenue generation (DHHL 2010). Solar development therefore complies with this land use requirement.

In addition to the above stated Project benefits, the Project will also provide direct community benefits through the development of a community benefit package. Barbers Point Solar, LLC and its parent company Innergex is committed to applying its expertise, resources, and dedication to the good of the planet in actively addressing Oʻahu's unique challenges. The community benefit package is under development; however, the initial components of the package include the following. More detailed information is provided in Appendix I.

- Dedicated Funding to Kapolei Heritage Center. Innergex has committed dedicated funds (1 percent of the actual gross project revenues) for the Kapolei Heritage Center, which will provide funds for the operations and maintenance of the center. The Innergex team will also work with the Kapolei Heritage Center Board to provide in-kind services to implement this financial support for the expansion plans for the center.
- Support Solar Training Program. Conversations with the Center for Native Hawaiian Advancement (CNHA) President and the Innergex team have taken place to outline creative ways to help the native Hawaiian community benefit from renewable energy projects. One of CNHA's priorities is to train its constituents so that they can become employable in new and expanding fields (e.g., solar project installation) and further career advancement in areas requiring skilled trades. In October 2019, Innergex connected the CNHA Training Program Manager with the President of Makaha Learning Center, which teaches apprenticeship and certificate programs primarily to native Hawaiians in the Makaha-Waianae communities. In 2020, Makaha Learning Center developed a focused curriculum for this course in collaboration with the CNHA team and held their first solar training program. Innergex has provided support for this program and sponsored a job fair for the graduating students at the conclusion of the program where they could directly meet and talk with solar contractors. To watch a video on the solar training program please visit the project website. Partnership with Waiʻanae Gold to generate local food opportunities. Innergex has partnered with Waiʻanae Gold to make the kiawe pods on the project site available to be collected so that they can be turned into kiawe bean pod flour and ʻĀina Bars. To watch a video where Waiʻanae Gold's Vince Kanaʻi Dodge shows the behind the scenes of kiawe bean pod flour production and discusses the importance of partnerships like with Barbers Point to generate local food opportunities please visit the project website.
- Working in Collaboration with Existing Tenants & DHHL. Innergex is working in collaboration with DHHL and the existing tenants to explore alternative unencumbered areas within the parcels (e.g., revetment area) and/or off site locations to minimize impacts to the three existing tenants so as to allow for safe construction or operation of the solar project.

- Local Employment & Contracting. Construction and operation phases will create benefits in terms of new employment opportunities, as well as the use of local suppliers. Preference would be given to retaining local persons, consultants, businesses and contractors throughout the development of the project.
- Sponsorships and memberships to various community organizations. Innergex is committed to evaluating sponsorships annually and providing support to a variety of events and causes. Through memberships in various community organizations, Innergex will participate in specific programs that support the missions of the organization and help to advance mutually held values and goals.

7.2 HRS Chapter 343 Scoping and Public Review Process

In addition to the general community outreach and agency coordination described in Section 7.1, additional consultation has been conducted specifically for the HRS Chapter 343 environmental review process. These efforts have included consultation with DHHL as the approving agency for the EA, as well as pre-assessment scoping and distribution of the Draft EA for public comment, in accordance with the requirements of HRS Chapter 343 and HAR §11-200.1. The various agencies, elected officials, community organizations and interested individuals contacted as part of the pre-assessment scoping and Draft EA public review process are listed in Table 7-2. Additional detail regarding the pre-assessment scoping and the Draft EA review process, including the comments received, is provided the following sections.

Table 7-2. Agencies, Organizations and Individuals Involved in HRS Chapter 343 Scoping and Public Review Process

Stakeholder	Pre-Assessment Scoping Letter		Draft EA		Final EA
	Letter Sent[1]	Comment Received[1]	Notice of Availability	Comment Received	Notice of Availability
Federal Agencies					
U.S. Geological Survey	•		•		
U.S. Fish and Wildlife Service	•		•		
National Marine Fisheries Service	•		•		
National Parks Service	•		•		
National Resources Conservation Service	•		•		
U.S. Army Corps of Engineers	•		•		
Department of the Navy	•		•		
Federal Aviation Administration	•		•		
Federal Transit Administration	•		•		
Federal Highways Administration	•		•		
U.S. Coast Guard	•		•		
U.S. Coast Guard, Air Station Barbers Point	•		•		
Environmental Protection Agency	•		•		
State Agencies					
Department of Agriculture	•		•		

Stakeholder	Pre-Assessment Scoping Letter		Draft EA		Final EA
	Letter Sent[1]	Comment Received[1]	Notice of Availability	Comment Received	Notice of Availability
Dept. of Accounting and General Services (DAGS)	•	•	•		
DAGS Archives Division	•		•		
Dept. of Business, Economic Development and Tourism (DBEDT)	•		•		
DBEDT Research Division Library	•		•		
DBEDT Strategic Industries Division	•		•		
DBEDT Office of Planning	•		•		
Land Use Commission	•		•		
Hawai'i State Energy Office	•	•	•		
Hawai'i Community Development Authority	•	•	•		
Hawai'i Emergency Management Agency	•		•		
Department of Education	•	•	•		
Department of Hawaiian Homelands	•		•		
Department of Health (DOH) Environmental Health Administration	•		•		
DOH Solid and Hazardous Waste Branch	•[2]		•		
Department of Land and Natural Resources (DLNR) - Chairperson	•		•		
DLNR Land Division	•	•	•		
DLNR Engineering Division	•		•		
DLNR Division of Forestry and Wildlife (DOFAW)	•	•	•		
DLNR Commission on Water Resource Management	•		•		
State Historic Preservation Division	•		•		
Dept. of Transportation Highway Division	•	•	•		
Dept. of Transportation Airports Division	•	•	•		
UH Office of Capital Improvement	•		•		
UH Water Resources Research Center	•	•[3]			
UH Environmental Center	•	•[3]			
Office of Hawaiian Affairs	•		•		
City & County of Honolulu Agencies					
Board of Water Supply	•	•	•		
Department of Customer Services Municipal Library	•		•		
Department of Design and Construction	•	•	•		
Department of Environmental Services	•		•		
Department of Facilities Maintenance	•	•	•		
Honolulu Fire Department	•	•	•		
Department of Community Services	•	•	•		
Department of Accounting and General Services	•	•	•		
Department of Planning and Permitting	•	•	•		
Department of Parks and Recreation	•	•[4]			
Honolulu Police Department	•	•	•		

Stakeholder	Pre-Assessment Scoping Letter		Draft EA		Final EA
	Letter Sent[1]	Comment Received[1]	Notice of Availability	Comment Received	Notice of Availability
Department of Transportation Services	•	•	•		
Office of Climate Change, Sustainability and Resiliency	•		•		
Oahu Transit Services, Inc (The Bus and Handi-Van)			•		
Elected Officials					
U.S. Senator Brian Schatz	•		•		
U.S. Senator Mazie Hirono	•		•		
U.S. Representative Ed Case	•		•		
State Senator Kurt Fevella	•		•		
State Senator Mike Gabbard	•		•		
State Representative Maile S.L. Shimabukuro	•		•		
State Representative Stacelynn K.M. Eli	•		•		
Mayor Rick Blangiardi	•		•		
Councilmember Andria Tupola	•		•		
Jack Legal, Makakilo/Kapolei/Honokai Hale Neighborhood Board No. 34 Chair	•		•		
Mitchelle Tynanes, Ewa Neighborhood Board No. 23 Chair	•		•		
Organizations and Interested Individuals					
Hunt Companies Hawaii	•		•		
Barbers Point Riding Club	•		•		
Kapolei Chamber of Commerce	•		•		
National Trust for Historic Preservation	•		•		
Tom Berg	•		•		
John Bond	•	•	•		
Villages of Kapolei Community Association	•		•		
Hoakalei Country Club at Ocean Pointe	•		•		
Haseko Development, Inc.	•		•		
Goodwill Hawaii	•		•		
Hoakalei Cultural Foundation	•		•		
Easter Seals Hawaii- Kapolei Home & Community Based Services, Early Intervention Program, ABA Program	•		•		
Habitat for Humanity- Leeward Oʻahu & ReStore	•		•		
Prince Kuhio Hawaiian Civic Club	•		•		
Hawaii Chamber of Commerce	•		•		
Aha Moku ʻEwa Representative Shad Kane	•	•	•		
Council for Native Hawaiian Advancement (CNHA)	•		•		
Rotary Club of Kapolei	•		•		
Historic Hawaii Foundation	•	•	•		
Kalaeloa Heritage Park & Legacy Foundation	•		•		
Sierra Club	•		•		
Earth Justice	•		•		

Stakeholder	Pre-Assessment Scoping Letter		Draft EA		Final EA
	Letter Sent[1]	Comment Received[1]	Notice of Availability	Comment Received	Notice of Availability
Ewa by Gentry Community Association	•		•		
Pacific War Memorial Association	•[5]				
Kapolei Community Development Corporation	•		•		
Sovereign Council of Hawaiian Homestead Associations (SCHHA)			•		
Kaupeʻa Homestead Association	•		•		
Kānehili Homestead Association			•		
Malu'ohai Homestead Association			•		
Kauluokaha'i Homestead Association			•		
Hawaiian Railway Society	•		•		
Hawaiian Aviation Preservation Society	•		•		
O'ahu Island Burial Council	•		•		
Native Hawaiian Church	•		•		
Carolyn Keala Norman	•		•		
Kepo'o Keli'ipa'akaua	•		•		
Jan Becket	•	•	•		
Manuel Kuloloio	•		•		
Leina'ala Vedder	•		•		
Keona Mark	•		•		
Daniel Martinez	•		•		
McD Philpotts	•		•		
Hawaii Wildfire Management Organization			•		
Libraries					
Hawaiʻi State Library, Hawaiʻi Documents Center			•		
Kapolei Public Library			•		
UH West Oʻahu James & Abigail Campbell Library			•		
Legislative Reference Bureau Library			•		
Kapolei High School			•		
Kapolei Charter School			•		
Island Pacific Academy			•		
Kapolei Middle School			•		
Kapolei Elementary			•		
American Renaissance Academy			•		
Kalaeloa Youth Challenge Academy			•		
Barbers Point Elementary School			•		
Kalaeloa Preschool Kamaaina Kids			•		
University of Hawaiʻi, West Oʻahu			•		
News Media					
Honolulu Star Advertiser			•		
Honolulu Civil Beat			•		

Stakeholder	Pre-Assessment Scoping Letter		Draft EA		Final EA
	Letter Sent[1]	Comment Received[1]	Notice of Availability	Comment Received	Notice of Availability
Honolulu Magazine			•		
Pacific Business New			•		
Howzit Kapolei			•		
The Voice of Kapolei			•		
Westside Stories			•		

NOTES:
[1] Copies of the pre-assessment scoping letter and comments received are provided in Appendices J and K.
[2] Consultation letter sent July 9, 2021 in response to comments from Hawaii State Energy Office.
[3] The University of Hawaii Environmental Center has been discontinued and the Water Resources Research Center no longer has ability to review environmental documents.
[4]City and County of Honolulu Parks and Recreation Department requested to be removed from the distribution list for the remainder of the Project's EA process.
[5]Pre-consultation letter returned; organization dissolved in June 2021.

7.2.1 Pre-Assessment Scoping

HAR §11-200.1-18 requires early consultation seeking the advice and input of the county agency responsible for implementing the county's general plan and other agencies having jurisdiction or expertise, as well as those citizen groups and individuals that may be affected by the proposed action. Pursuant to these requirements, as part of the scoping process for the Draft EA, the governmental agencies, elected officials, organizations and individuals that may have a specific interest or could otherwise be affected by the Project were identified. These parties, which are listed in Table 7-3, were sent a scoping letter containing preliminary Project information and were asked to provide comments and related information for consideration in preparing the Draft EA. A copy of the pre-assessment scoping letter is provided in Appendix J.

A total of 21 comment letters were received in response to the pre-assessment scoping request. The comments are summarized in Table 7-3, with copies of the comment letters and the responses provided in Appendix K. In accordance with the intent of HAR §11-200.1, the information and input received through the pre-assessment process was considered in the preparation of the Draft EA.

Table 7-3. Summary of Comments Received in Response to Scoping Request

Commenting Party	Date of Comment	Summary of Comments
Aha Moku 'Ewa Representative Shad Kane	Email dated June 1, 2021	There are excellent Hawaiian cultural structures in the area.
John Bond	Email dated June 3, 2021	1. Where will the main electrical facilities, batteries, etc. be located. 2. Is there now no plan to use any part of the 1941-42 MCAS Ewa Field properties? 3. Will the project use any part of the 1942 aircraft revetments? 4. Will the project use any part of the 1944-1965 Navy SeaBee Camp and Navy interim housing facility? 5. Are there specific diagrams of solar arrays? 6. How will the historic and cultural sites be protected?

Commenting Party	Date of Comment	Summary of Comments
		7. Is the project considering putting the Coral Sea Road powerline underground?
City and County of Honolulu Dept. of Community Services	Letter dated June 4, 2021	States the Project will not impact any of the Department's activities or project in the surround neighborhood.
City and County of Honolulu Dept. of Planning and Permitting	Letter dated June 7, 2021	States that they have no comments at this time, but they look forward to reviewing the Draft EA.
City and County of Honolulu Police Department	Letter dated June 8, 2021	States that they recommend safety equipment be installed and maintained by the contractor during the construction phase of the project to avoid impacts to vehicular traffic.
State of Hawaiʻi Dept. of Accounting and General Services	Letter dated June 8, 2021	No comment at this time as Project does not impact any of the Department's projects or existing facilities.
Jan Becket	Email dated June 14, 2021	Asks that best practices be observed and that none of the pre-contact structures near Ordy Pond or in other parcels be impacted by the solar project.
Honolulu Fire Department	Letter dated June 14, 2021	Summarizes requirements for fire department access roads, water supply to provide fire flow, fire apparatus access roads, and fire code requirements for photovoltaic and battery storage systems; requests submittal of civil drawings for review by Honolulu Fire Department
DLNR Division of Forestry and Wildlife	Letter dated June 24, 2021	1. Recommends surveys for endangered plant species and buffer zones if they occur. 2. Recommends twilight pre-construction pueo surveys prior to clearing vegetation; if pueo nests are present, a buffer zone should be established in which no clearing occurs until nesting ceases, and DOFAW staff should be notified. 3. Recommend coordinating with Hawai'i Wildfire Management Organization on wildfire prevention. 4. All construction activities within 100 feet of State listed waterbirds should cease until bird leaves of its own accord. If a nest is discovered, contact the O'ahu DOFAW. 5. Recommends avoidance of removing or disturbing woody vegetation during the birthing and pupping season and avoidance of installation of barbed wire. 6. Recommends measures to minimize impacts to seabirds: (1) all lights be fully shielded and directed to avoid reflecting off the panels; and (2) nighttime work that requires outdoor lighting should be avoided during the fledging season. 7. Recommends minimizing the movement of plant or soil material between worksites, such as in fill.
Board of Water Supply	Letter dated June 15, 2021	States they don't have water facilities in the proposed project area. Water service and fire protection should be provided by the private water system.
City and County of Honolulu Dept. of Facility Maintenance	Letter dated June 15, 2021	States during construction and upon completion of the project, any damages/deficiencies along the roadway on Tripoli Street shall be repaired to City standards and accepted by the City and at no cost to the City and County of Honolulu.
Hawaii Community Development Authority	Letter dated June 15, 2021	1. The Project will require a development permit and the contested case public hearing process. 2. The Project may require variances regarding fencing, landscaping, irrigation, frontages and setbacks. 3. HAR 15-215, Kalaeloa Rules require new electrical infrastructure to be underground unless it will be installed on the existing electrical poles.
State of Hawaiʻi Department of Transportation	Letter dated June 16, 2021	Airports Division

Commenting Party	Date of Comment	Summary of Comments
		1. Project should read the Technical Assistance Memorandum (TAM) for guidance with development and activities that may require further review and permits. 2. Project requires the submittal of FAA Form 7460-1 Notice of Proposed Construction or alteration. 3. A glint and glare analysis must be attached to the PV submittal of FAA Form 7460-1. 4. Owner of the PV system shall be prepared to immediately mitigate the RFI hazard upon notification by the HOOT-A and/or FAA. 5. Due to the proximity to the airport, the developer should be aware of potential noise and air pollution from aircraft operations 6. Project shall have sufficient firefighting/fire suppressant ability to prevent potential smoke obstruction in the protected air space. Highways Division 1. Any work within State ROW requires a Permit to Perform Work Upon State Highways and a Traffic Management Plan. Submit construction plans to HDOT-HWY Oʻahu District for review and approval. 2. The HOOT-HWY ROW Branch review and consultation of proposed changes to the existing Innergex Use and Occupancy Permit required. 3. Include a discussion of potential construction-phase and decommission-phase impacts on regional traffic. 4. The operational impacts of the solar facility on State roads would not be significant; however, the EA should include a discussion of existing and future traffic, transit, pedestrian routes, and bikeways in the vicinity. 5. Describe other proposed Kalaeloa Master Plan development sharing the project's access driveways or require additional access driveways on Coral Sea Road. 6. HDOT-HWY encourages joint-use, single-pole construction at locations where more than one utility or type of facility is involved. 7. Recommend consulting with the USCG on the status of their project, and opportunities for co-location of overhead facilities. 8. Describe the existing utility infrastructure, any proposed removal/decommissioning of existing electrical infrastructure, and Project consistency with Kalaeloa Master Plan utility infrastructure. 9. HDOT-HWY permit is required to transport oversized and/or overweight vehicles and loads on HDOT roadways. 10. No additional discharge of surface water run-off onto State ROW is permitted
City and County of Honolulu Dept. of Design and Construction	Letter dated June 24, 2021	No comment at this time
State of Hawaiʻi Dept. of Education	Letter dated June 24, 2021	States that Project will not impact any Department of Education schools or facilities
Historic Hawai'i Foundation	Letter dated June 30, 2021	1. The HRS 343-5 triggers for environmental review including the proposed use within any historic site as designated in the National or Hawaiʻi Registers of Historic Places. 2. Portions of TMK: 9-1-013:038, Area 1 is contained within the ʻEwa Plain Battlefield. 3. Also within the DHHL parcel, between Areas 1 and 2, is an eligible historic district of World War II aircraft revetments (ʻEwa Field South Revetment Dispersal Area). 4. Historic Hawaiʻi Foundation is generally supportive of Hawaii's Renewable Energy Mandate in cases where such improvements are

Commenting Party	Date of Comment	Summary of Comments
		located, designed and implemented to avoid, minimize or mitigate effects to historic properties and cultural resources. 5. HHF expects that the scope of the Draft Environmental Assessment will include discussion, evaluation and recommendations for project components located within and/or adjacent to both the ʻEwa Plain Battlefield District and the WWII Revetment District. 6. HHF also expects to see identification and evaluation of any other cultural resources that may be present, including properties to which Native Hawaiians attach religious and cultural significance.
Hawaii State Energy Office	Letter dated June 30, 2021	HSEO recommends the DEA 1. state how the Project would contribute to the State's and Oʻahu's renewable energy portfolio and support the retirement of these fossil fuel units. The DEA should identify any other benefits such as grid stabilization, long-term resiliency, and energy self-reliance; 2. incorporate the Hawaiʻi Greenhouse Gas Emissions Report for 2017; 3. provide the projected estimated value of the Project including the estimated savings to Hawaiian Electric customers over the Project lifetime; 4. identify the public outreach activities conducted by Innergex for the Project, summarize the public input received, and identify the responses to this input including appropriate Project modifications and/or mitigation measures; 5. identify all community benefit commitments associated with the Project; 6. consultation with the DOH Solid and Hazardous Waste Branch regarding the appropriate disposal of the solar panels, as well as other electronic items and batteries, at their end of life; 7. identify how the Project will directly benefit DHHL beneficiaries.
City and County of Honolulu Department of Transportation Services	Letter dated June 30, 2021	1. Area representatives should be kept apprised of the details and status throughout the project and the impacts that the project may have on the adjoining local street area network. 2. A street usage permit from the Department of Transportation Services should be obtained for any construction-related work that may require the temporary closure of any traffic lane or pedestrian mall on a City street. 3. Construction materials and equipment should be transported to and from the project site during off-peak traffic hours (8:30 a.m. to 3:30 p.m.). 4. Any existing pedestrian, bicycle and vehicle access/crossing shall be maintained with the highest safety measures during construction. 5. Project plans should be reviewed and approved by DCAB to ensure full compliance with Americans with Disabilities Act requirements.
DLNR Land Division	Letter dated July 2, 2021	The owner of the project property and/or their representative is responsible to research the Flood Hazard Zone designation for the project and comply with applicable rules and regulations related to flood hazards.
DLNR Division of Forestry and Wildlife	Letter dated July 15, 2021	1. If any *Euphorbia skottsbergii* var. *Skottsbergii* are observed during the construction and operation of the proposed solar project, DOFAW supports the U.S. Fish and Wildlife guidelines and 100 meters avoidance buffer. 2. Recommend coordinating with Hawai'i Wildfire Management Organization on wildfire prevention. 3. Avoid and do not damage any Wiliwili (*Erythrina sanwichensis*) trees. 4. Recommends twilight pre-construction pueo surveys prior to clearing vegetation; if pueo nests are present, a buffer zone should be established in which no clearing occurs until nesting ceases, and DOFAW staff should be notified.

Commenting Party	Date of Comment	Summary of Comments
University of Hawai'i, Mānoa	Letter dated July 22, 2021	The Environmental Center at the University of Hawai'i at Mānoa, which for a time was linked to the Water Resources Research Center (WRRC), has been discontinued. As a result of the closure of the Environmental Center, WRRC no longer has the capacity to review environmental documents.
City and County of Honolulu Department of Parks & Recreation	Letter dated July 29, 2021	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 as a consulted party to the balance of the Environmental Assessment process.

7.2.2 Public Review of Draft EA

HAR §11-200.1 requires publication of a Draft EA in the Environmental Review Program's bimonthly bulletin, *The Environmental Notice*, followed by a 30-day public review period. In accordance with these requirements, the Draft EA was published in The Environmental Notice on October 8, 2021, with the 30-day public review period running from the publication date through November 8, 2021. Notice of the Draft EA publication and public review period, including instructions for submitting comments was sent to the entities listed in Table 7-2. Comments received on the Draft EA (postmarked on or before November 8, 2021) will be considered and incorporated into the Final EA, as appropriate.

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FIGURES

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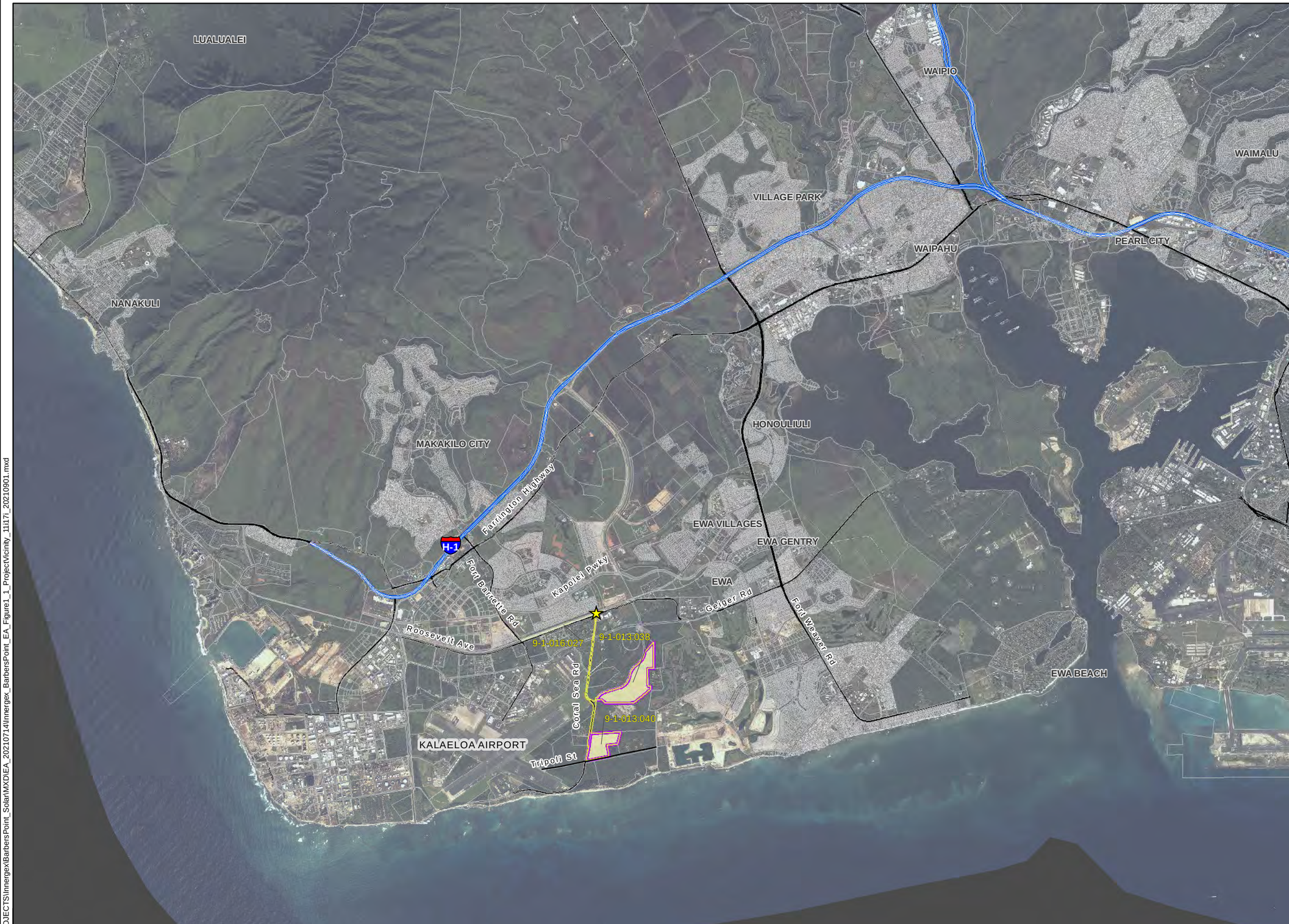
Barbers Point Solar Project

Figure 1-1
Project Vicinity

CITY AND COUNTY OF HONOLULU

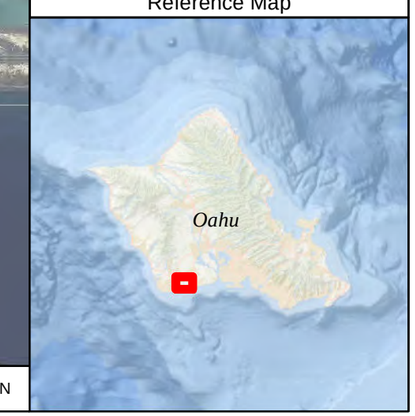


Project Area
Project TMK
DHHL Lands
TMK Boundary
Interstate Highway
State Highway
County Road

TETRA TECH

Barbers Point Solar LLC

Reference Map



1:65,000 WGS 1984 UTM Zone 4N

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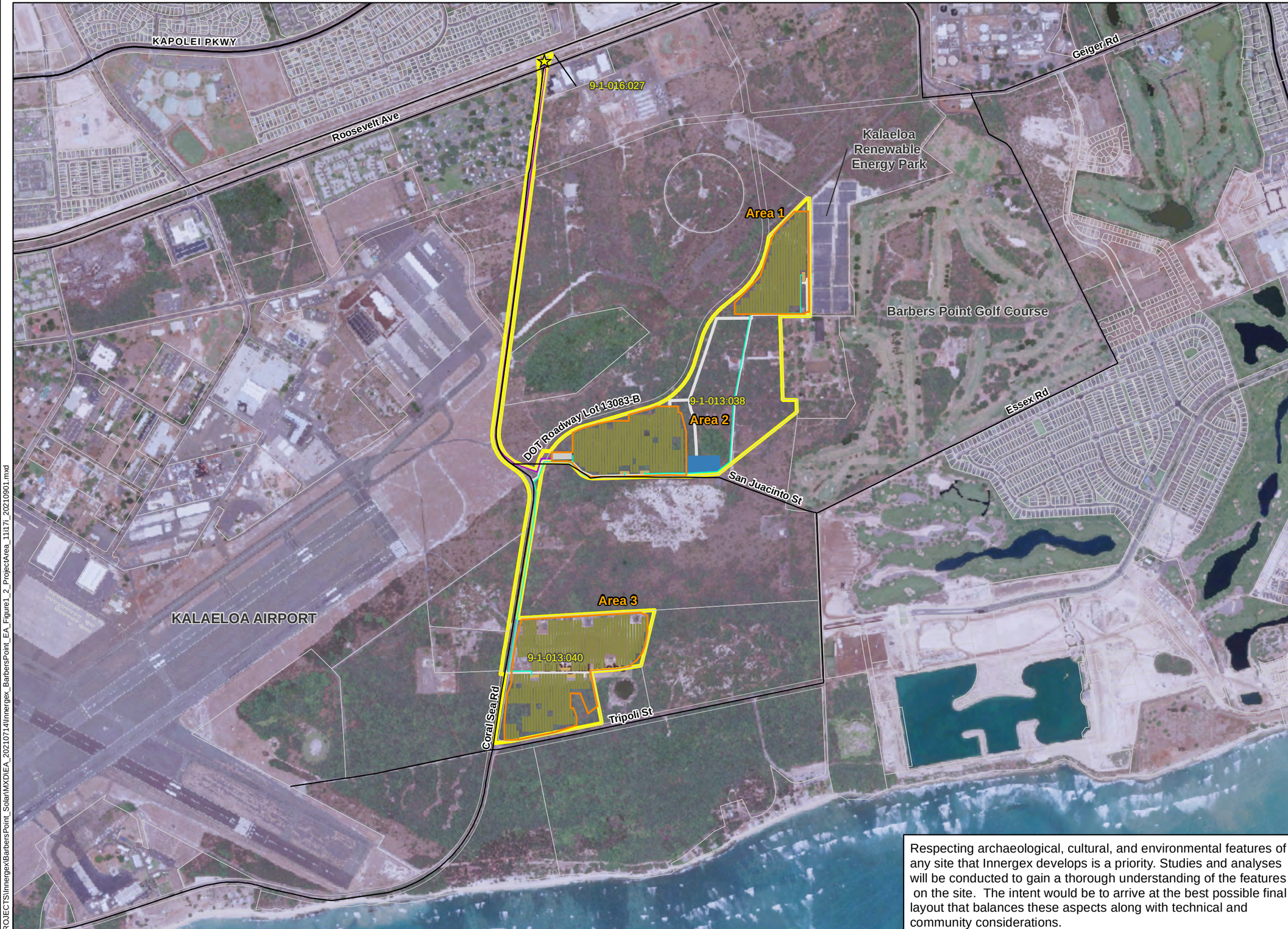
Barbers Point Solar Project

Figure 1-2
Project Area

CITY AND COUNTY OF HONOLULU



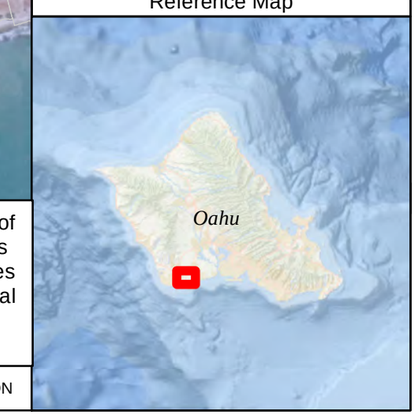
Respecting archaeological, cultural, and environmental features of any site that Innergex develops is a priority. Studies and analyses will be conducted to gain a thorough understanding of the features on the site. The intent would be to arrive at the best possible final layout that balances these aspects along with technical and community considerations.

- Project Area
- TMK Boundary
- Road
- Overhead Gen-Tie Line Termination Point at Existing HECO 46-kV Transmission Line
- Security Fence
- Solar Array
- Collector Line
- Project Substation
- Power Conversion System
- Temporary Laydown (Staging) Area
- Site Access Road & Collector Line
- 46-kV Transmission Line (Overhead and Underground)

TETRA TECH

Barbers Point Solar LLC

Reference Map



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0 0.25 0.5 1 Miles

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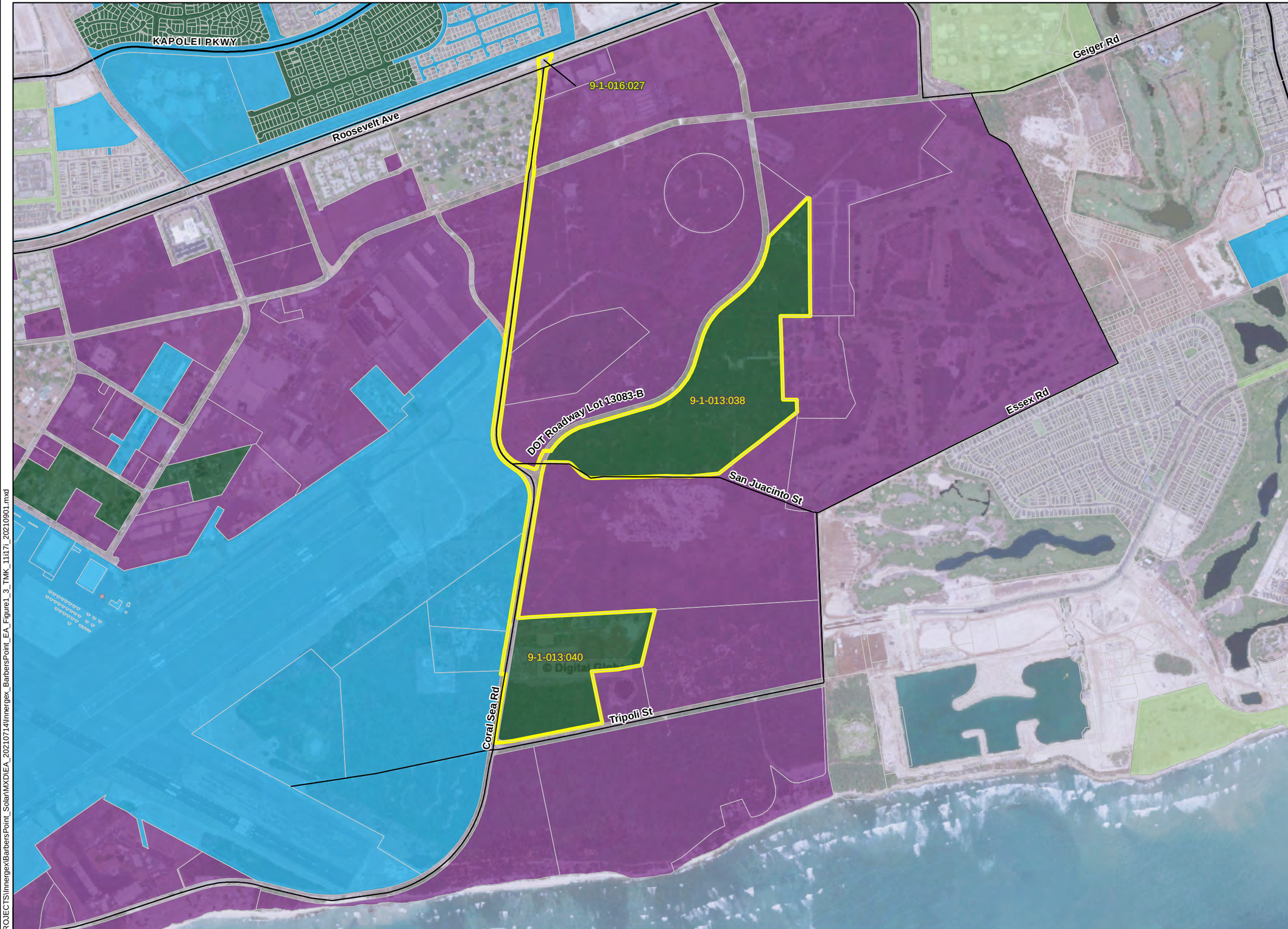
Barbers Point Solar Project

Figure 1-3
Tax Map Key Boundaries and Land Ownership

CITY AND COUNTY OF HONOLULU

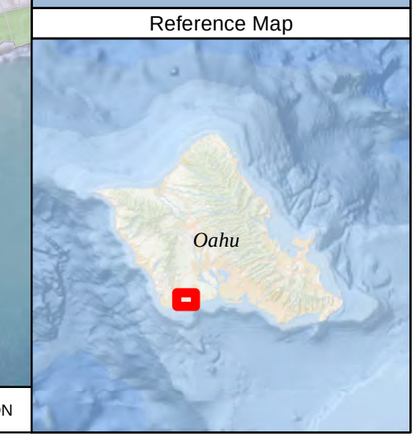


Project Area
TMK Boundary
Road
Govt. County of Honolulu
Govt. Federal
Govt. State
Govt. State DHHL
Private Land

TETRA TECH

Barbers Point Solar LLC

Reference Map



1:14,000 WGS 1984 UTM Zone 4N

0 0.25 0.5 1 Miles

NOT FOR CONSTRUCTION

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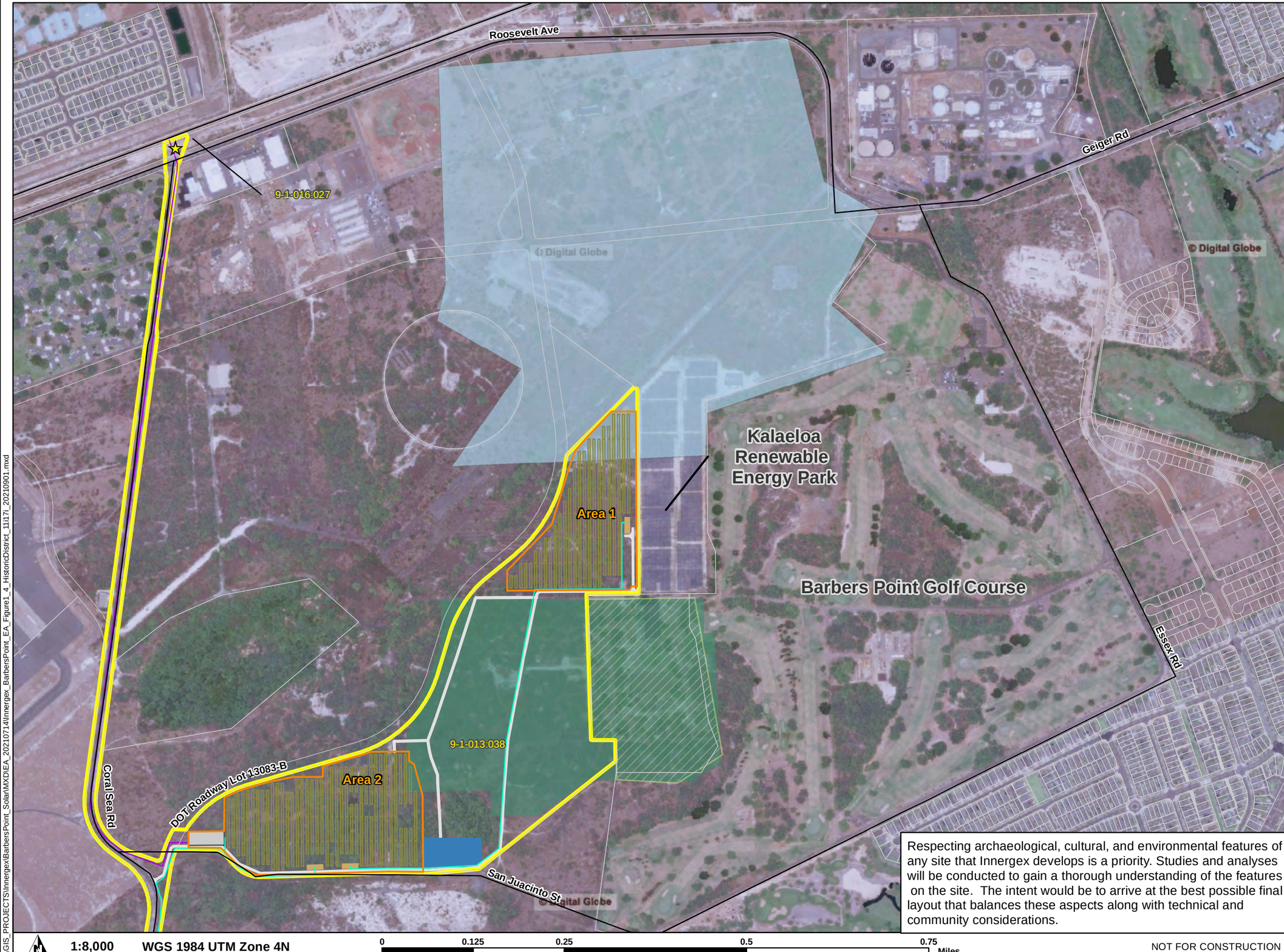
Barbers Point Solar Project

Figure 1-4
Historic Districts

CITY AND COUNTY OF HONOLULU

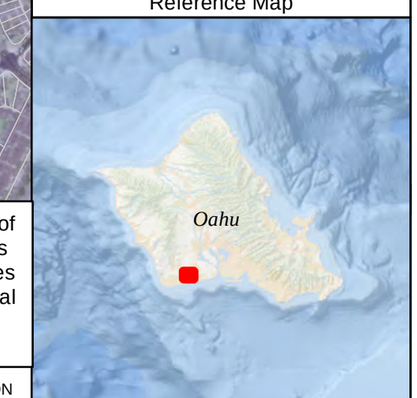


- Project Area
- TMK Boundary
- Overhead Gen-Tie Line Termination Point at Existing HECO 46-kV Transmission Line
- Security Fence
- Solar Array
- Collector Line
- Project Substation
- Power Conversion System
- Temporary Laydown (Staging) Area
- Site Access Road & Collector Line
- 46-kV Transmission Line (Overhead and Underground)
- Ewa Battlefield Historic District
- Proposed Ewa Field South Revetment District (Resnick et al. 2018)
- Proposed Revetment District (Yoklavich 1997)

TETRA TECH

Barbers Point Solar LLC

Reference Map



Respecting archaeological, cultural, and environmental features of any site that Innergex develops is a priority. Studies and analyses will be conducted to gain a thorough understanding of the features on the site. The intent would be to arrive at the best possible final layout that balances these aspects along with technical and community considerations.

1:8,000 WGS 1984 UTM Zone 4N

0 0.125 0.25 0.5 0.75 Miles

NOT FOR CONSTRUCTION

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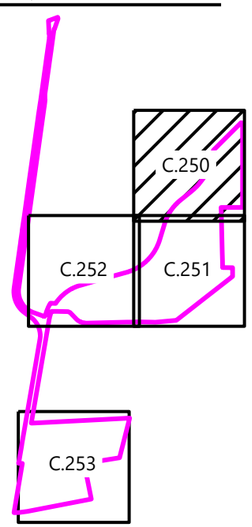
LEGEND:

- PROJECT BOUNDARY
- PROPOSED SOLAR ARRAY
- PROPOSED ACCESS ROAD
- PROPOSED IMPROVED ACCESS ROAD AND COLLECTOR LINE
- PROPOSED SECURITY FENCE
- PROPOSED POWER CONVERSION SYSTEM
- PROPOSED FACILITIES
- HISTORIC PROPERTY AVOIDANCE AREA
- RIGHT-OF-WAY LINES
- NON-PARTICIPATING PROPERTY
- 15' TMK SETBACK
- EX. TMK BOUNDARIES
- PROPOSED DETENTION / INFILTRATION BASINS

KEY MAP:



Westwood

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Middleton, WI 53562
westwoodps.com

Westwood Professional Services, Inc.

PREPARED FOR:

INNERGEX

1225 rue Saint-Charles Ouest
10e étage, Québec J4K 0B9

REVISIONS:

#	DATE	COMMENT
A	08/31/2021	Issued for Permit

0' 200' 400' 600'

Barbers Point Solar Project

O'ahu, Hawaii

Figure 2-1a: Site Plan

ISSUED FOR PERMIT

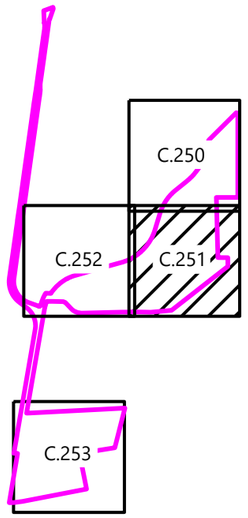
DATE: 08/31/2021

SHEET: C.001

LEGEND:

- PROJECT BOUNDARY
- PROPOSED SOLAR ARRAY
- PROPOSED ACCESS ROAD
- PROPOSED IMPROVED ACCESS ROAD AND COLLECTOR LINE
- PROPOSED SECURITY FENCE
- PROPOSED POWER CONVERSION SYSTEM
- PROPOSED FACILITIES
- HISTORIC PROPERTY AVOIDANCE AREA
- RIGHT-OF-WAY LINES
- NON-PARTICIPATING PROPERTY
- 15' TMK SETBACK
- EX. TMK BOUNDARIES
- PROPOSED DETENTION / INFILTRATION BASINS

KEY MAP:



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1225 rue Saint-Charles Ouest
10e étage, Québec J4K 0B9

REVISIONS:

#	DATE	COMMENT
A	08/31/2021	Issued for Permit

0' 200' 400' 600'

Barbers Point Solar Project

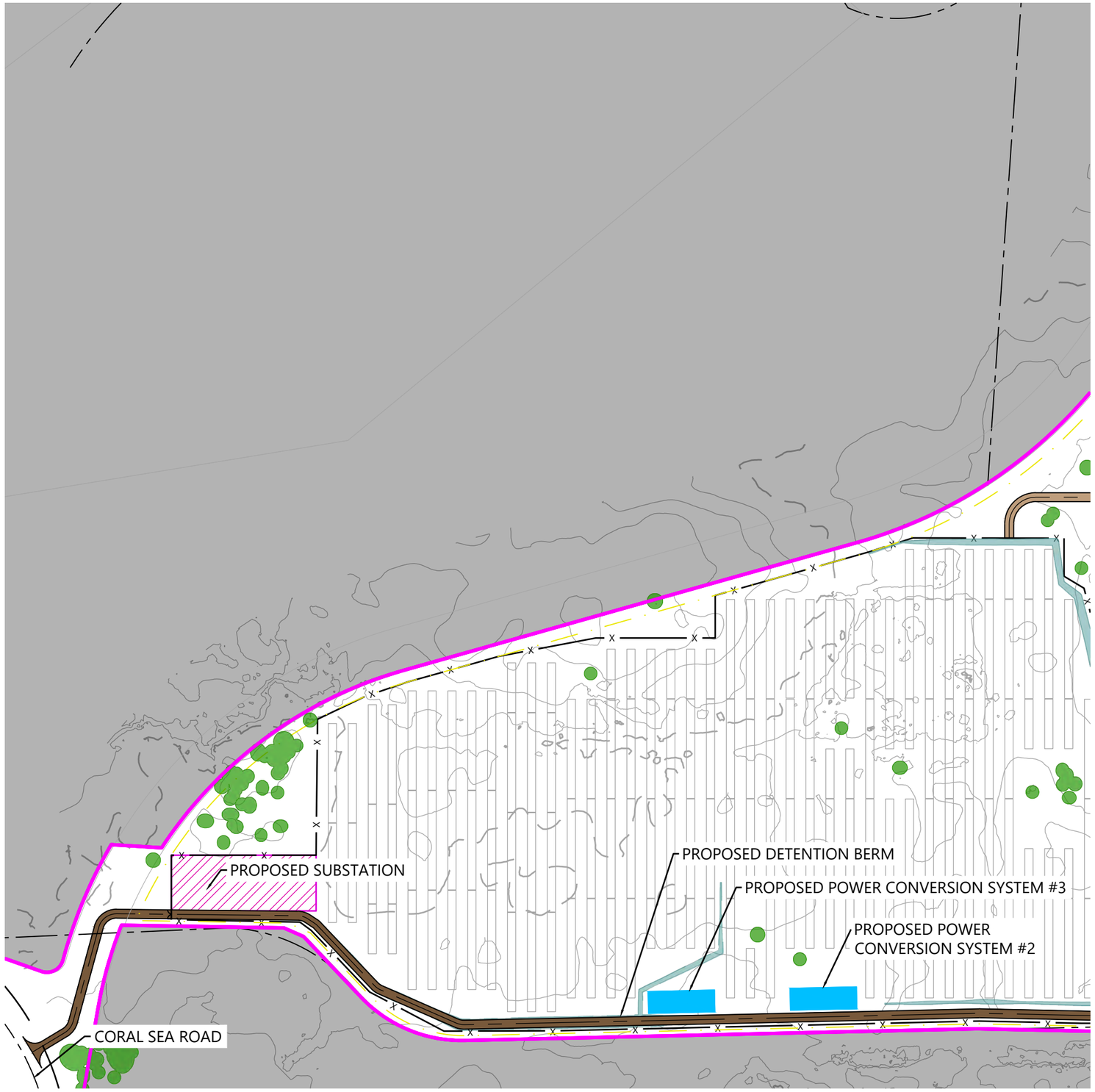
O'ahu, Hawaii

Figure 2-1b: Site Plan

ISSUED FOR PERMIT

DATE: 08/31/2021

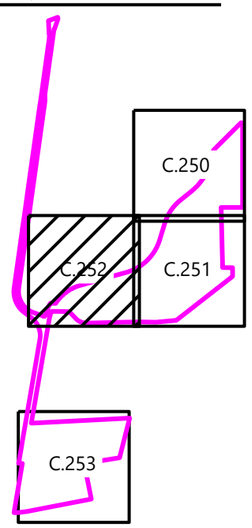
SHEET: C.002



LEGEND:

- PROJECT BOUNDARY
- PROPOSED SOLAR ARRAY
- PROPOSED ACCESS ROAD
- PROPOSED IMPROVED ACCESS ROAD AND COLLECTOR LINE
- PROPOSED SECURITY FENCE
- PROPOSED POWER CONVERSION SYSTEM
- PROPOSED FACILITIES
- HISTORIC PROPERTY AVOIDANCE AREA
- RIGHT-OF-WAY LINES
- NON-PARTICIPATING PROPERTY
- 15' TMK SETBACK
- EX. TMK BOUNDARIES
- PROPOSED DETENTION / INFILTRATION BASINS

KEY MAP:



Westwood

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westwoodps.com

Westwood Professional Services, Inc.

PREPARED FOR:

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1225 rue Saint-Charles Ouest
10e étage, Québec J4K 0B9

REVISIONS:

#	DATE	COMMENT
A	08/31/2021	Issued for Permit

0' 200' 400' 600'

Barbers Point Solar Project

O'ahu, Hawaii

Figure 2-1c: Site Plan

ISSUED FOR PERMIT

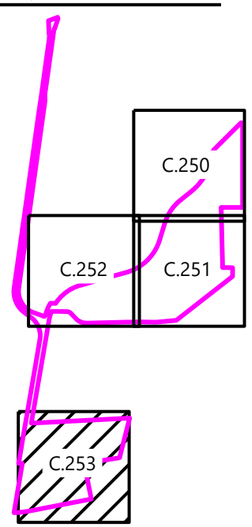
DATE: 08/31/2021

SHEET: C.003

LEGEND:

- PROJECT BOUNDARY
- PROPOSED SOLAR ARRAY
- PROPOSED ACCESS ROAD
- PROPOSED IMPROVED ACCESS ROAD AND COLLECTOR LINE
- PROPOSED SECURITY FENCE
- PROPOSED POWER CONVERSION SYSTEM
- PROPOSED FACILITIES
- HISTORIC PROPERTY AVOIDANCE AREA
- RIGHT-OF-WAY LINES
- NON-PARTICIPATING PROPERTY
- 15' TMK SETBACK
- EX. TMK BOUNDARIES
- PROPOSED DETENTION / INFILTRATION BASINS

KEY MAP:



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Westwood Professional Services, Inc.

PREPARED FOR:

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1225 rue Saint-Charles Ouest
10e étage, Québec J4K 0B9

REVISIONS:

#	DATE	COMMENT
A	08/31/2021	Issued for Permit

0' 200' 400' 600'

Barbers Point Solar Project

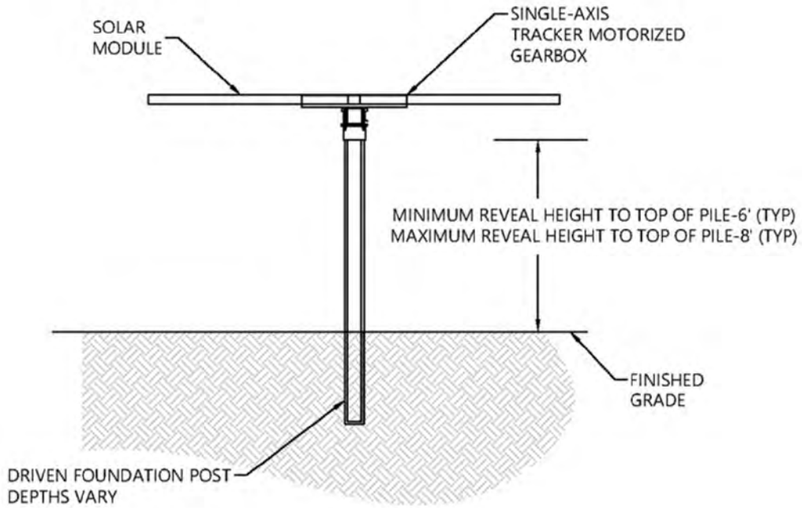
O'ahu, Hawaii

Figure 2-1d: Site Plan

ISSUED FOR PERMIT

DATE: 08/31/2021

SHEET: C.004



NOTES:
1. SEE STRUCTURAL DESIGN PROVIDED BY OTHERS

Figure 2-2a. Schematic of Solar PV Module and Racking System (typical, not to scale)

Figure 2-2b. Schematic of PV-Coupled ESS Unit

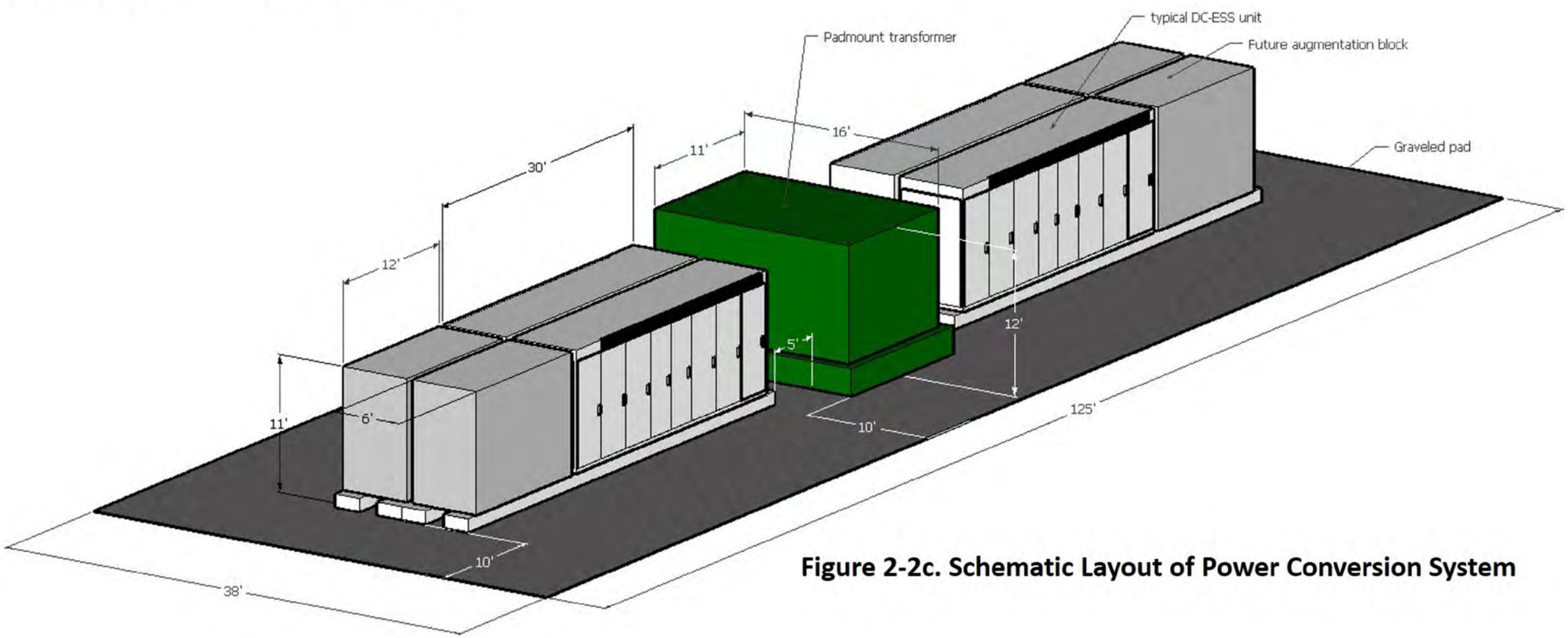


Figure 2-2c. Schematic Layout of Power Conversion System

Barbers Point Solar Project

Figure 2-2 Schematics of Project Components

TETRA TECH

Barbers Point Solar LLC

Reference Map

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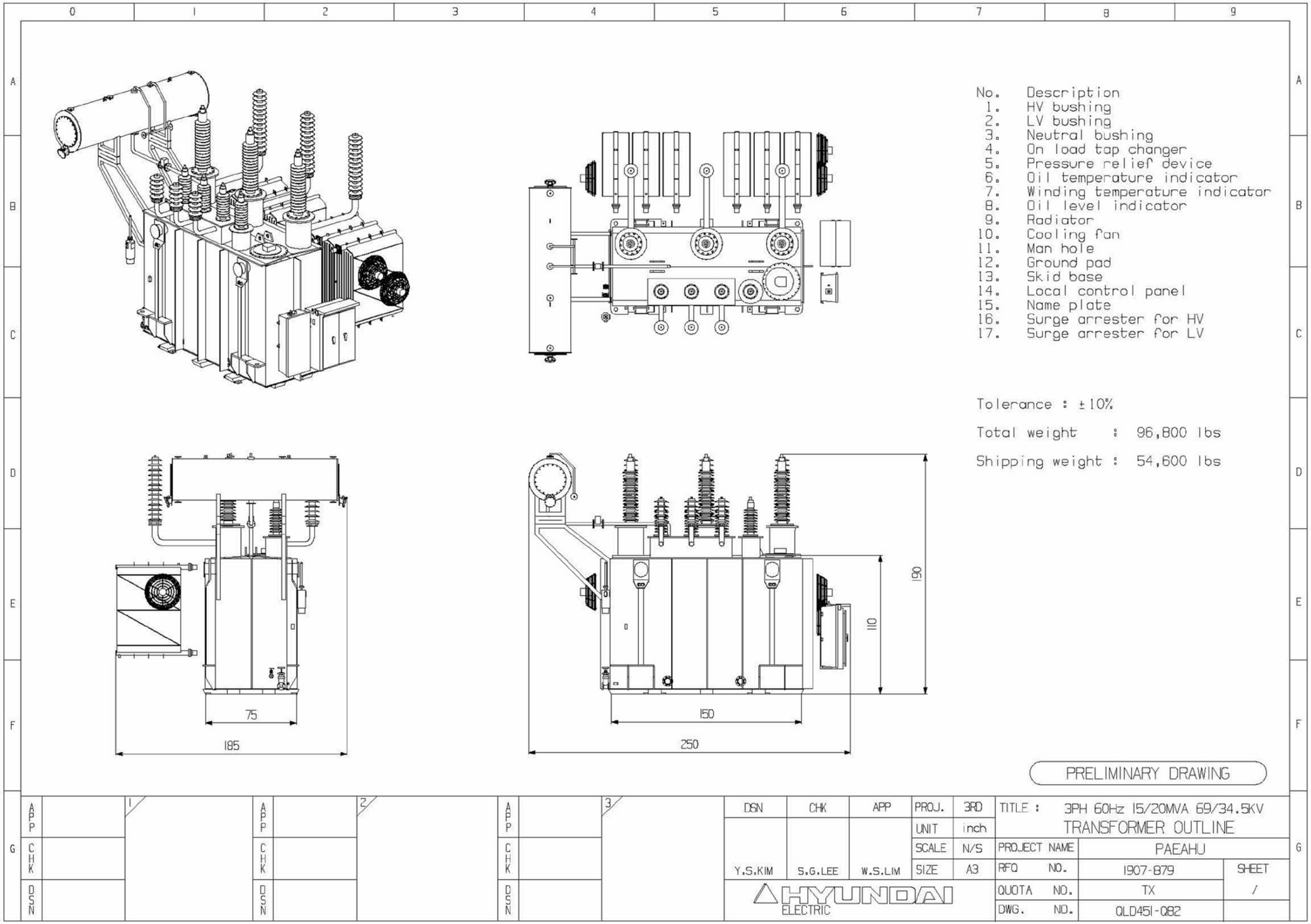


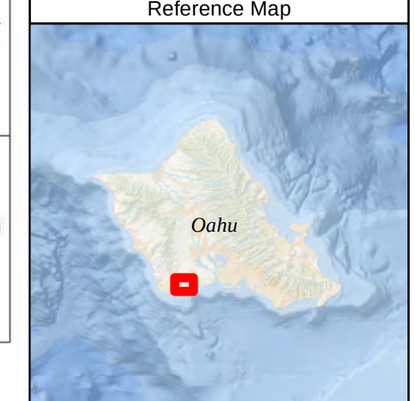
Barbers Point Solar Project

Figure 2-3
Schematic of Step-Up Transformers

TETRA TECH

Barbers Point Solar LLC

Reference Map



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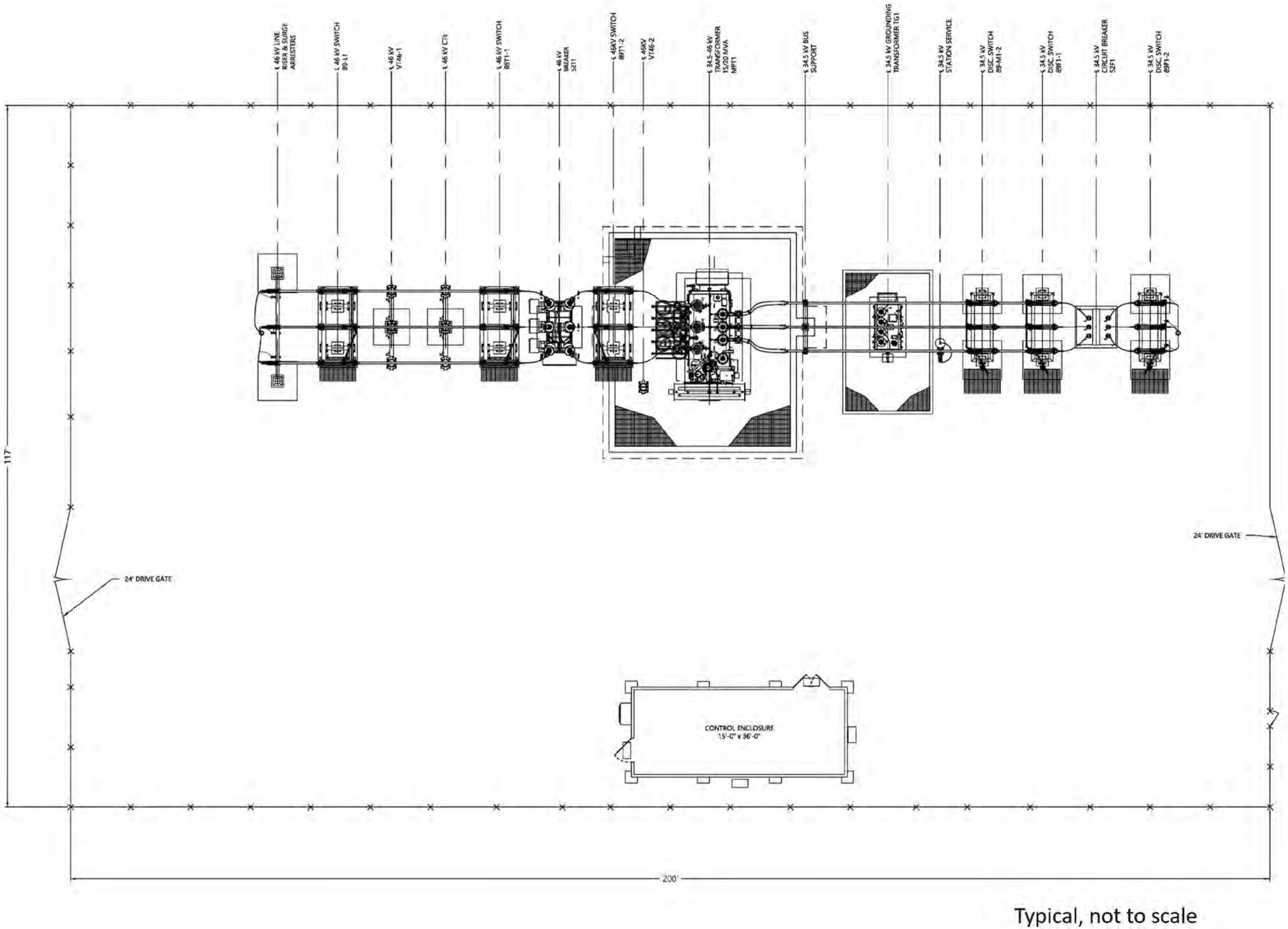

Typical, not to scale

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Barbers Point Solar Project

Figure 2-4 Schematic of Project Collector Substation Layout

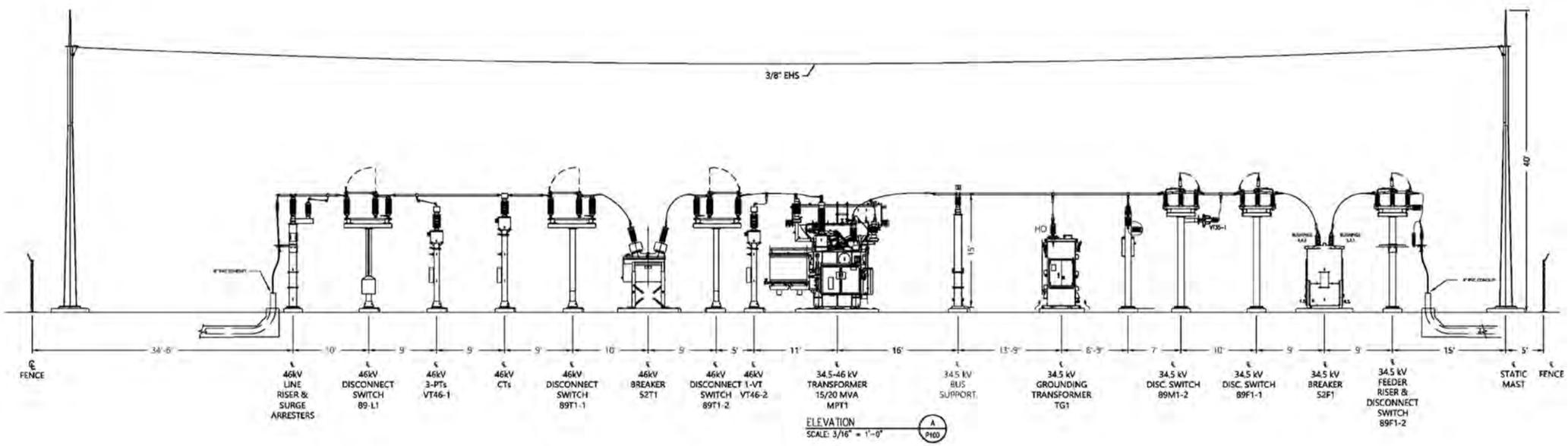
TETRA TECH

Barbers Point Solar LLC

Reference Map

Barbers Point Solar Project

Figure 2-5
Schematic of Project Collector Substation Profile



Typical, not to scale

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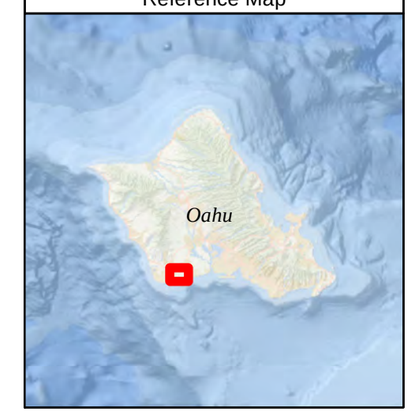
Barbers Point Solar LLC

Reference Map



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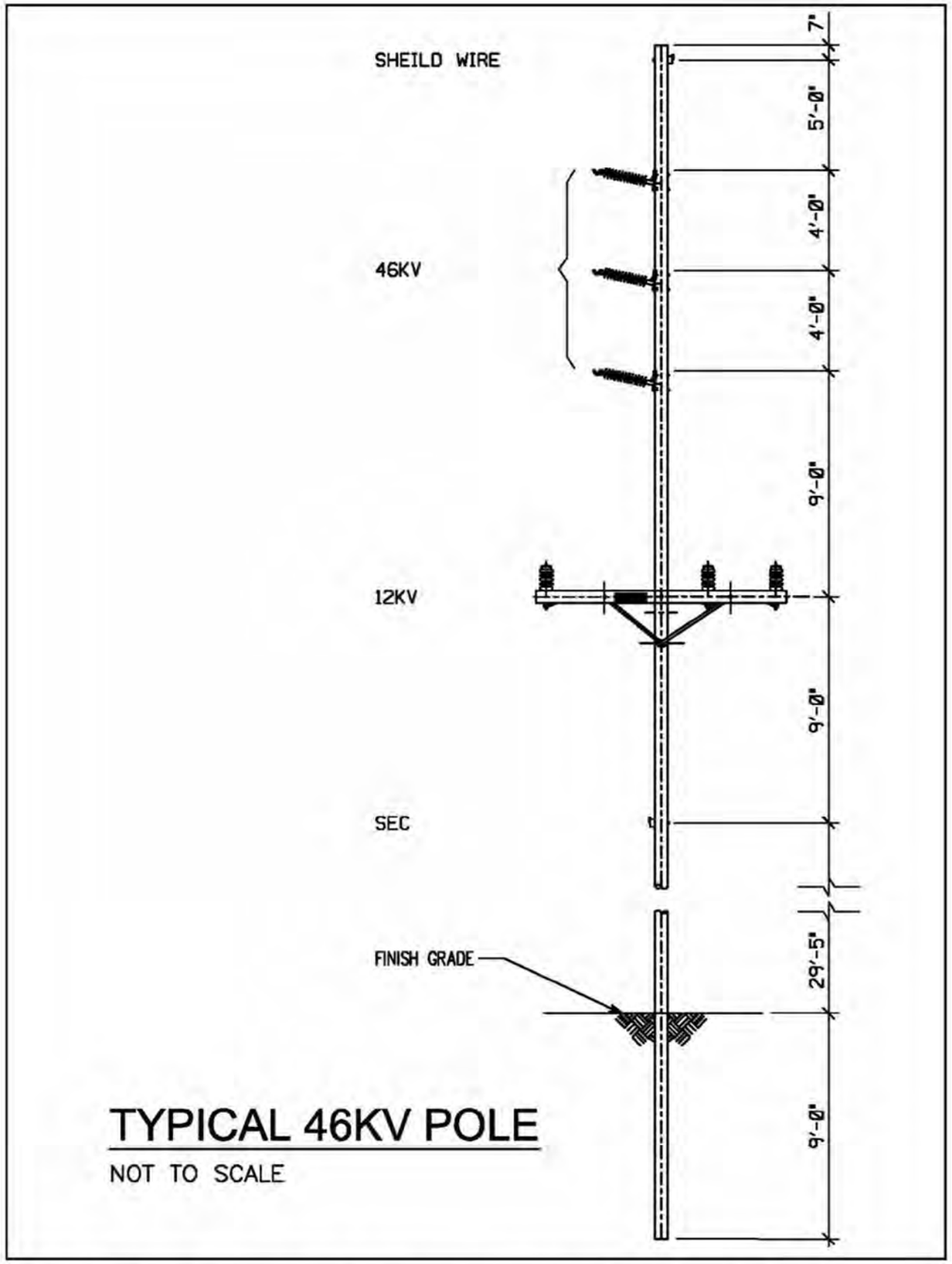

Figure 2-6a. Schematic of Overhead Generation-Tie Line Mono-Pole Structure (Typical)

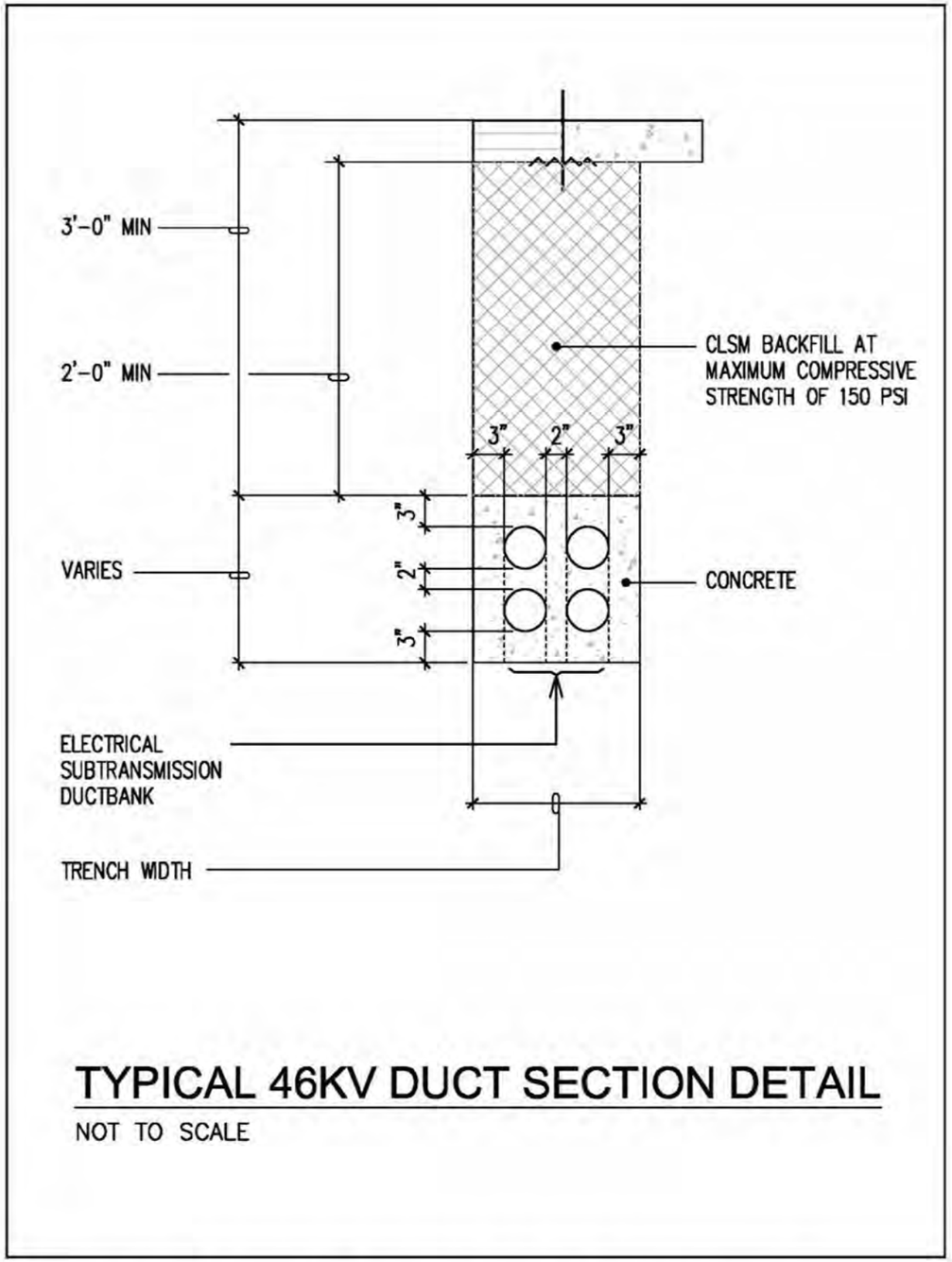

Figure 2-6b. Schematic Section Detail of Underground Generation-Tie Line Duct (Typical)

Barbers Point Solar Project

Figure 2-6 Schematic of Generation-Tie Line Structures and Ducts

TETRA TECH

Barbers Point Solar LLC

Reference Map

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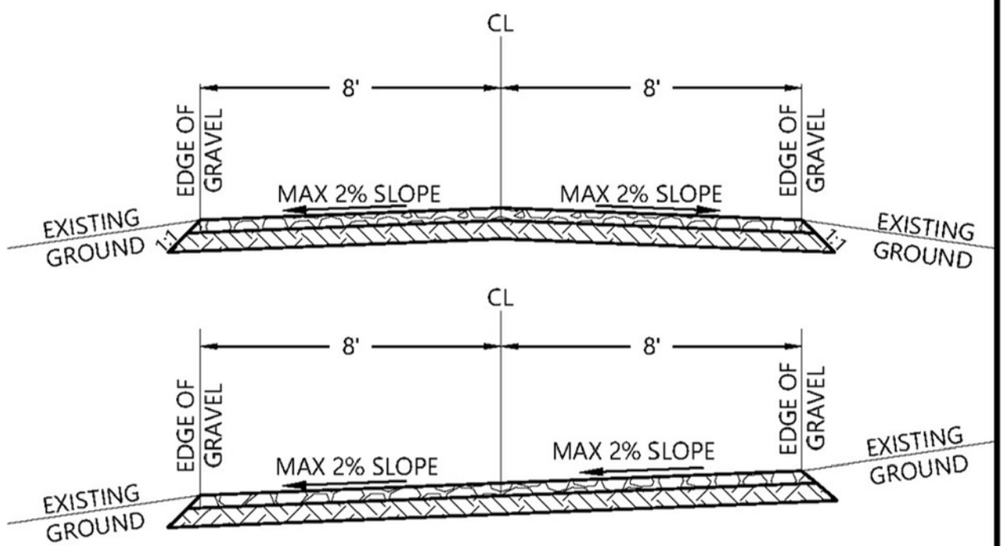
Barbers Point Solar Project

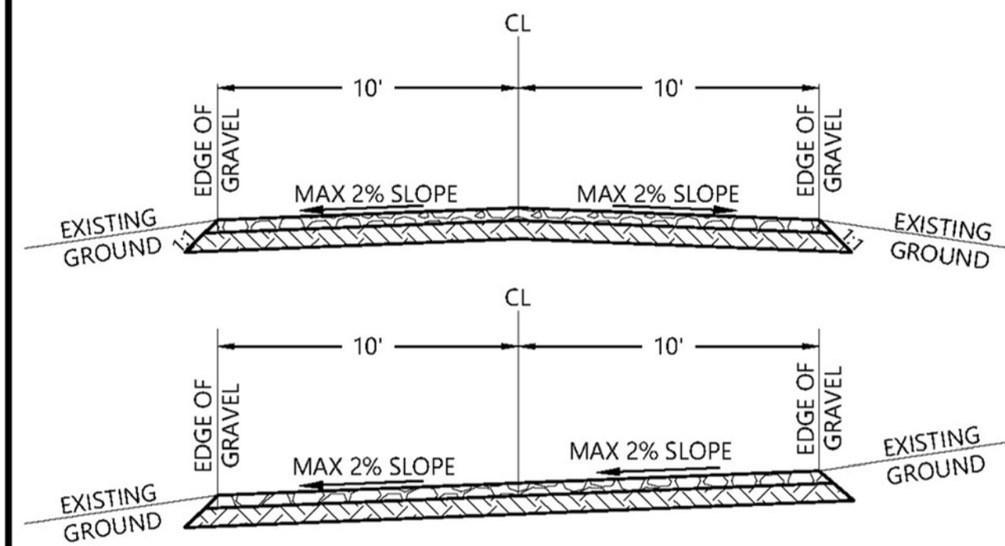
Figure 2-7
Schematic of Typical Access Road



16' ACCESS ROADWAY

NOTES:
1. CONTRACTOR SHALL CONSTRUCT CROSS-SLOPE ROAD SECTION WHERE ACCESS ROADS ARE CONSTRUCTED ON A SIDE SLOPE, AND WHERE OTHERWISE NOTED ON PLANS, TO ENSURE THAT ROADS AND SHOULDERS REMAIN WELL DRAINED AT ALL TIMES.

Westwood	TYPICAL SOLAR ACCESS ROAD	05



20' ACCESS ROADWAY

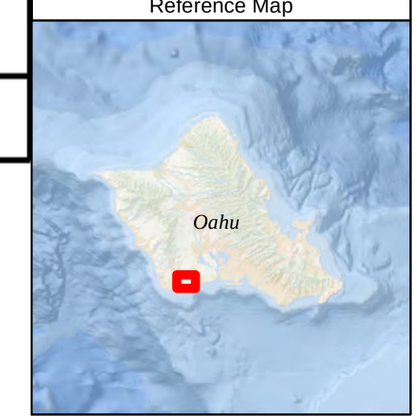
NOTES:
1. CONTRACTOR SHALL CONSTRUCT CROSS-SLOPE ROAD SECTION WHERE ACCESS ROADS ARE CONSTRUCTED ON A SIDE SLOPE, AND WHERE OTHERWISE NOTED ON PLANS, TO ENSURE THAT ROADS AND SHOULDERS REMAIN WELL DRAINED AT ALL TIMES.

Westwood	TYPICAL SOLAR SUBSTATION ACCESS ROAD	06

TETRA TECH

Barbers Point Solar LLC

Reference Map



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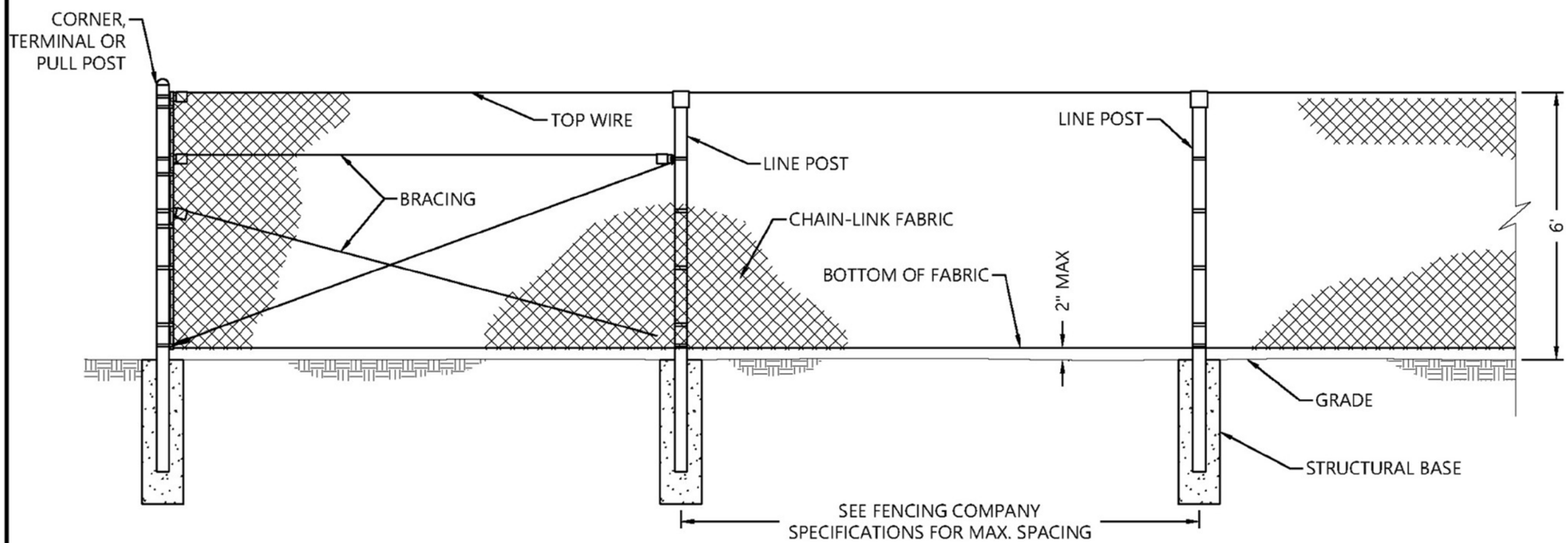
Barbers Point Solar Project

Figure 2-8
Schematic of Typical Fence Design



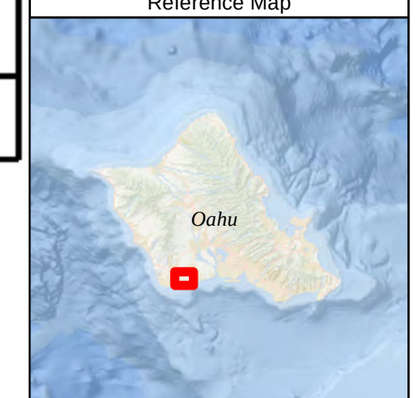
NOTES:
1. FENCE AND GATE TYPE TO BE APPROVED BY OWNER PRIOR TO CONSTRUCTION
2. STRUCTURAL DESIGN TO BE PROVIDED BY FENCE SUPPLIER
3. DIMENSIONS AND INFORMATION SHOWN ABOVE ARE FOR REFERENCE ONLY. ACTUAL DIMENSIONS AND INFORMATION TO BE PROVIDED BY MANUFACTURER/SUPPLIER

Westwood	CHAIN-LINK SECURITY FENCE DETAIL (NOT TO SCALE)	03

TETRA TECH

Barbers Point Solar LLC

Reference Map



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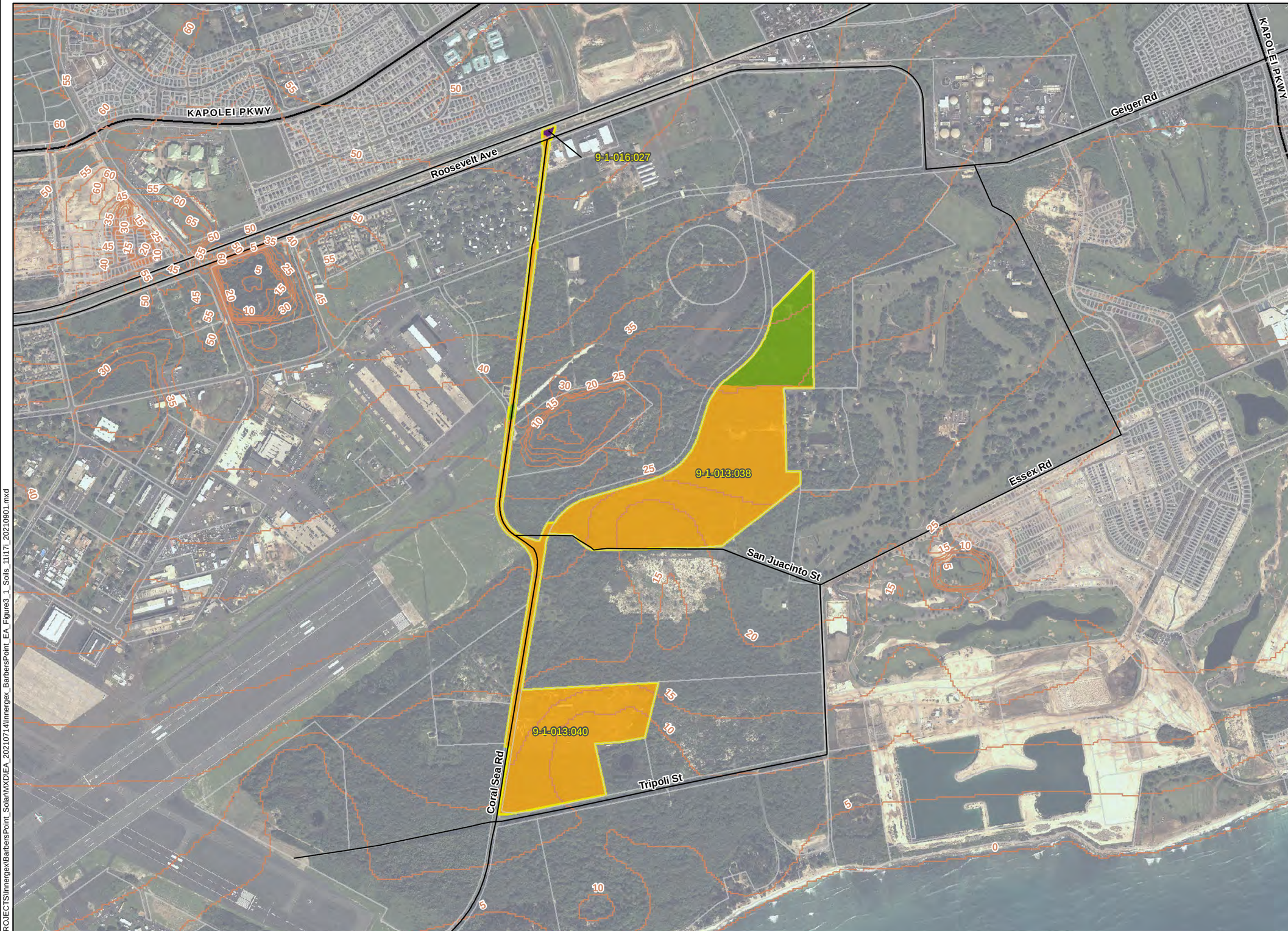
Barbers Point Solar Project

Figure 3-1
Topography and Soils

CITY AND COUNTY OF HONOLULU



Project Area
TMK Boundary
Road
5-ft Contour

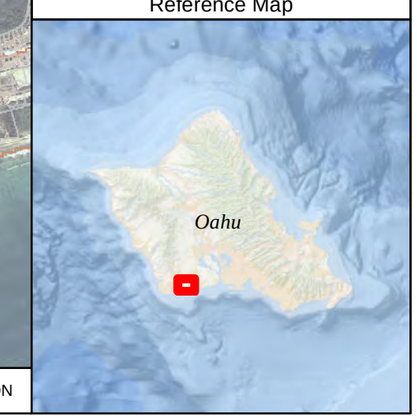
Map Unit Name

Coral outcrop
Fill land, mixed
Mamala stony silty clay loam, 0 to 12 percent slopes

TETRA TECH

Barbers Point Solar LLC

Reference Map



1:14,000 WGS 1984 UTM Zone 4N

0 0.25 0.5 1 Miles

NOT FOR CONSTRUCTION

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Barbers Point Solar Project

Figure 3-2
Water Resources

CITY AND COUNTY OF HONOLULU

Project Area
TMK Boundary
Road

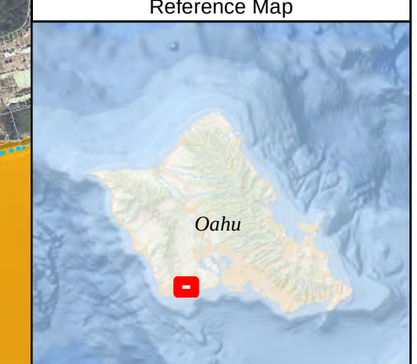
Water Resources

Stream (DAR)
Artificial Path (NHD)
Canal Ditch (NHD)
Coastline (NHD)
Perennial Stream (NHD)
Waterbody (NHD)
Estuarine and Marine Deepwater (NWI)
Estuarine and Marine Wetland (NWI)
Freshwater Emergent Wetland (NWI)
Freshwater Forested/Shrub Wetland (NWI)
Freshwater Pond (NWI)

TETRA TECH

Barbers Point Solar LLC

Reference Map



1:14,000 WGS 1984 UTM Zone 4N

0 0.25 0.5 1 Miles

NOT FOR CONSTRUCTION

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Barbers Point Solar Project

Figure 3-3
Critical Habitat

CITY AND COUNTY OF HONOLULU

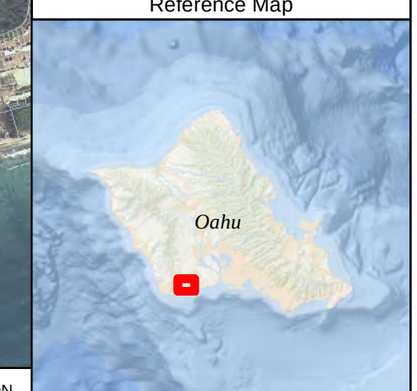
Project Area
TMK Boundary
Road

Critical Habitat
Oahu Lowland Dry - Unit 11

TETRA TECH

Barbers Point Solar LLC

Reference Map



1:14,000 WGS 1984 UTM Zone 4N

0 0.25 0.5 1 Miles

NOT FOR CONSTRUCTION

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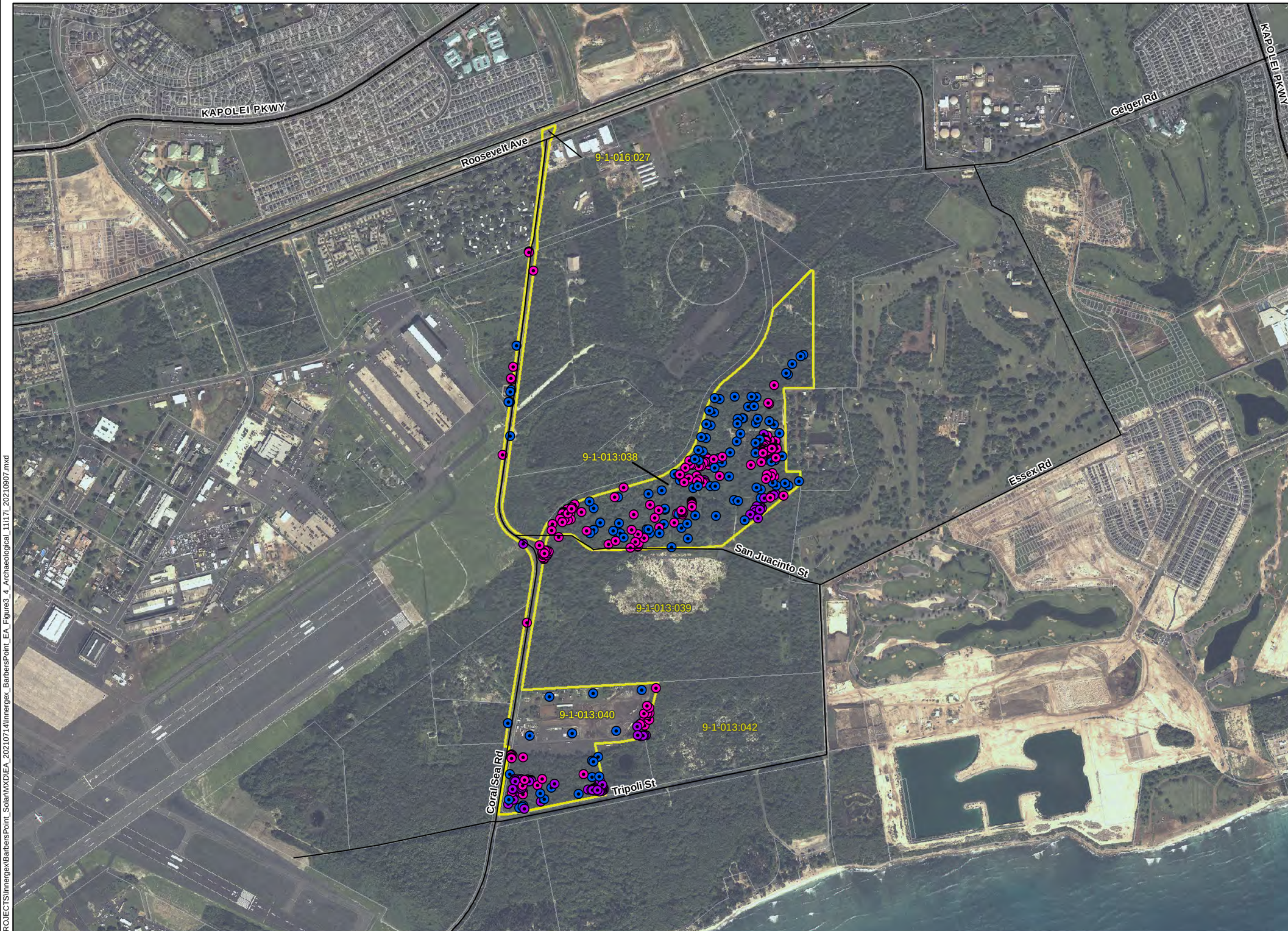
Barbers Point Solar Project

Figure 3-4
Locations of Archaeological Features Identified During the AIS

CITY AND COUNTY OF HONOLULU

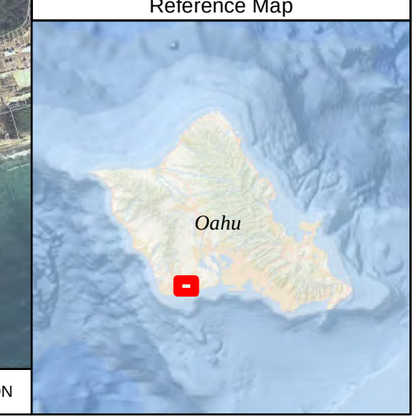


- Project Area
- TMK Boundary
- Road
- Historic/Non-Hawaiian Sites
- Pre-Contact/Hawaiian Site
- Unmodified limestone pit

TETRA TECH

Barbers Point Solar LLC

Reference Map



1:14,000 WGS 1984 UTM Zone 4N

0 0.25 0.5 1 Miles

NOT FOR CONSTRUCTION

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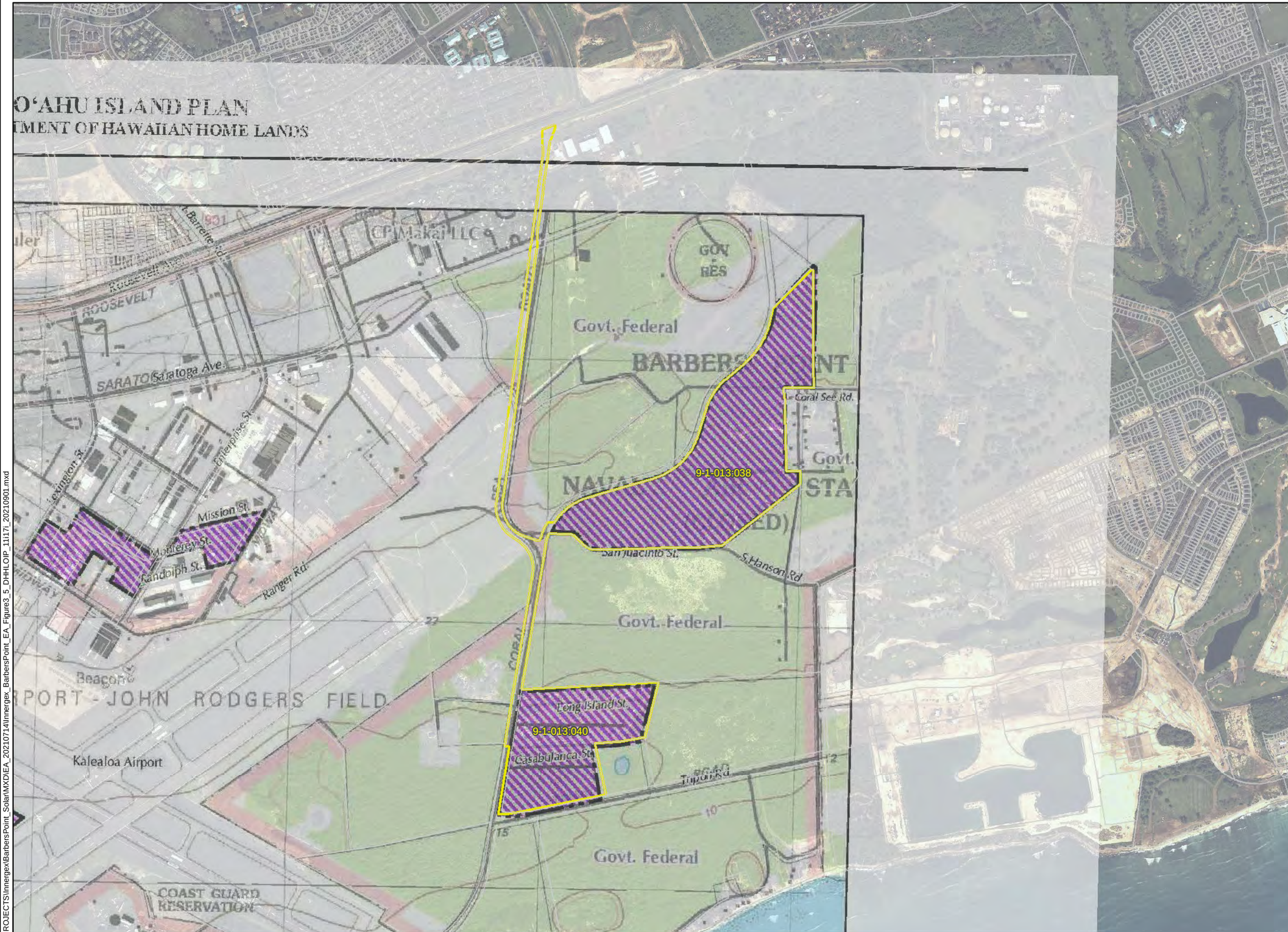
Barbers Point Solar Project

Figure 3-5
DHHL
Oahu Island Plan

CITY AND COUNTY OF HONOLULU



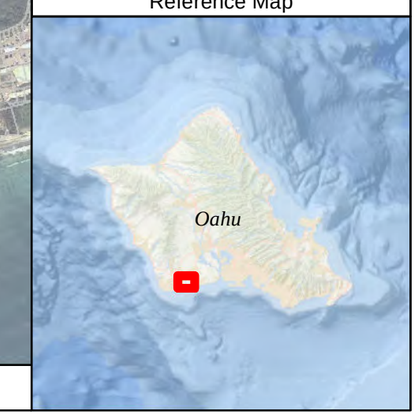
Project Area
TMK Boundary

Legend
- DHHL Parcels
- Commercial
- Community Use
- Conservation
- Industrial
- General Agriculture
- Special District
- Homestead - Existing Residential
- Homestead - Proposed Residential
- Homestead - Existing Subsistence Agricultural
- Homestead - Proposed Subsistence Agricultural
- Road
- TMK Parcels

TETRA TECH

Barbers Point Solar LLC

Reference Map



1:14,000 WGS 1984 UTM Zone 4N

0 0.25 0.5 1 Miles

NOT FOR CONSTRUCTION

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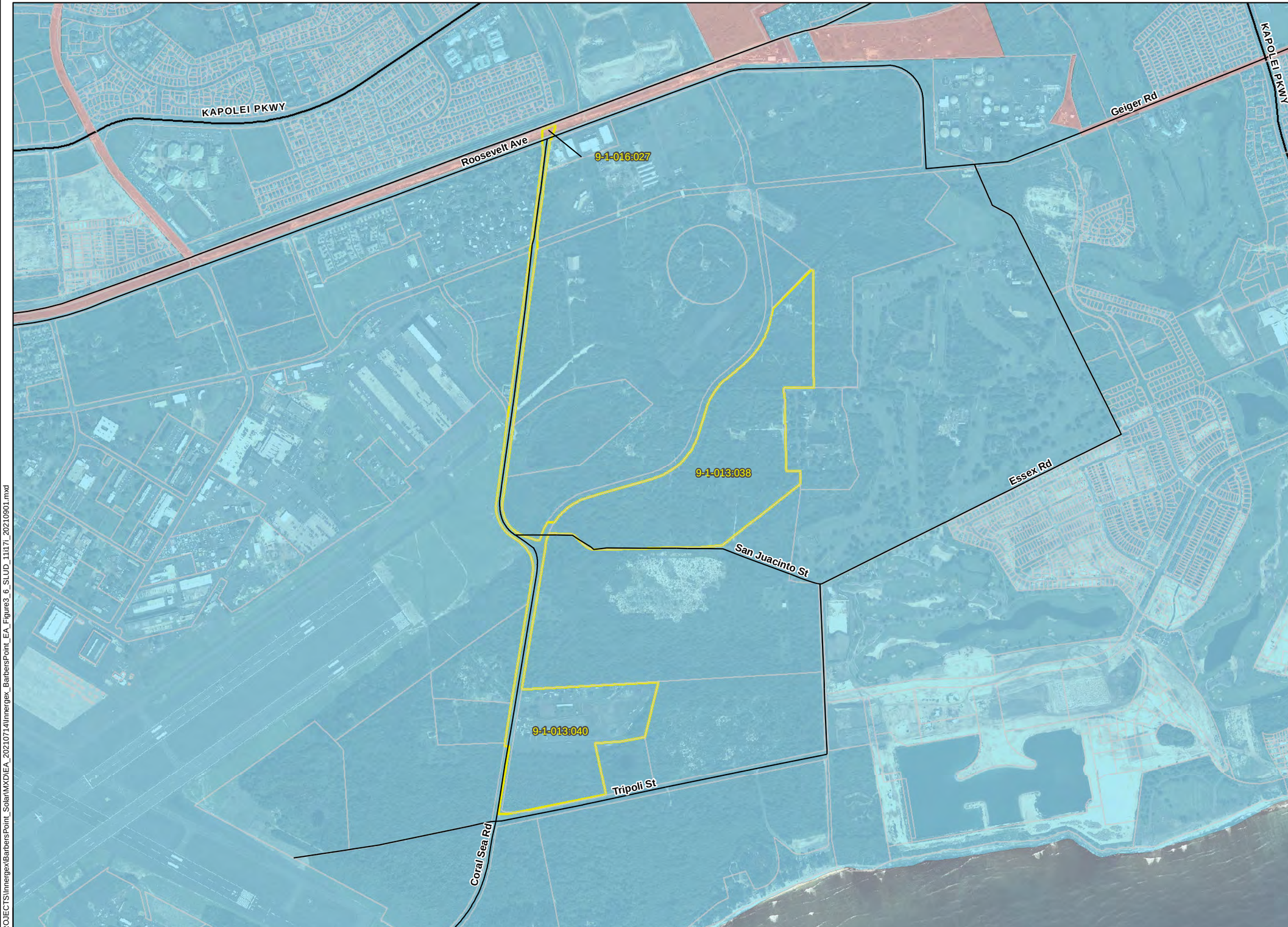


Barbers Point Solar

Figure 3-6
State Land Use Districts

CITY AND COUNTY OF HONOLULU

- Project Area
- TMK Boundary
- Road

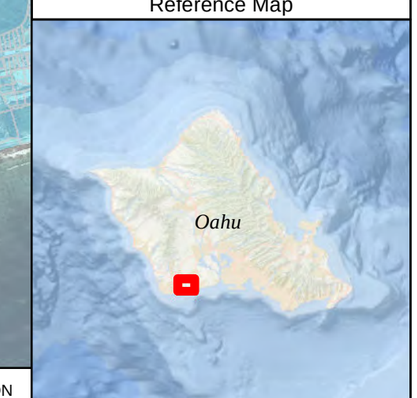
State Land Use Districts

- Agricultural Land Use District
- Urban Land Use District

TETRA TECH

Barbers Point Solar LLC

Reference Map



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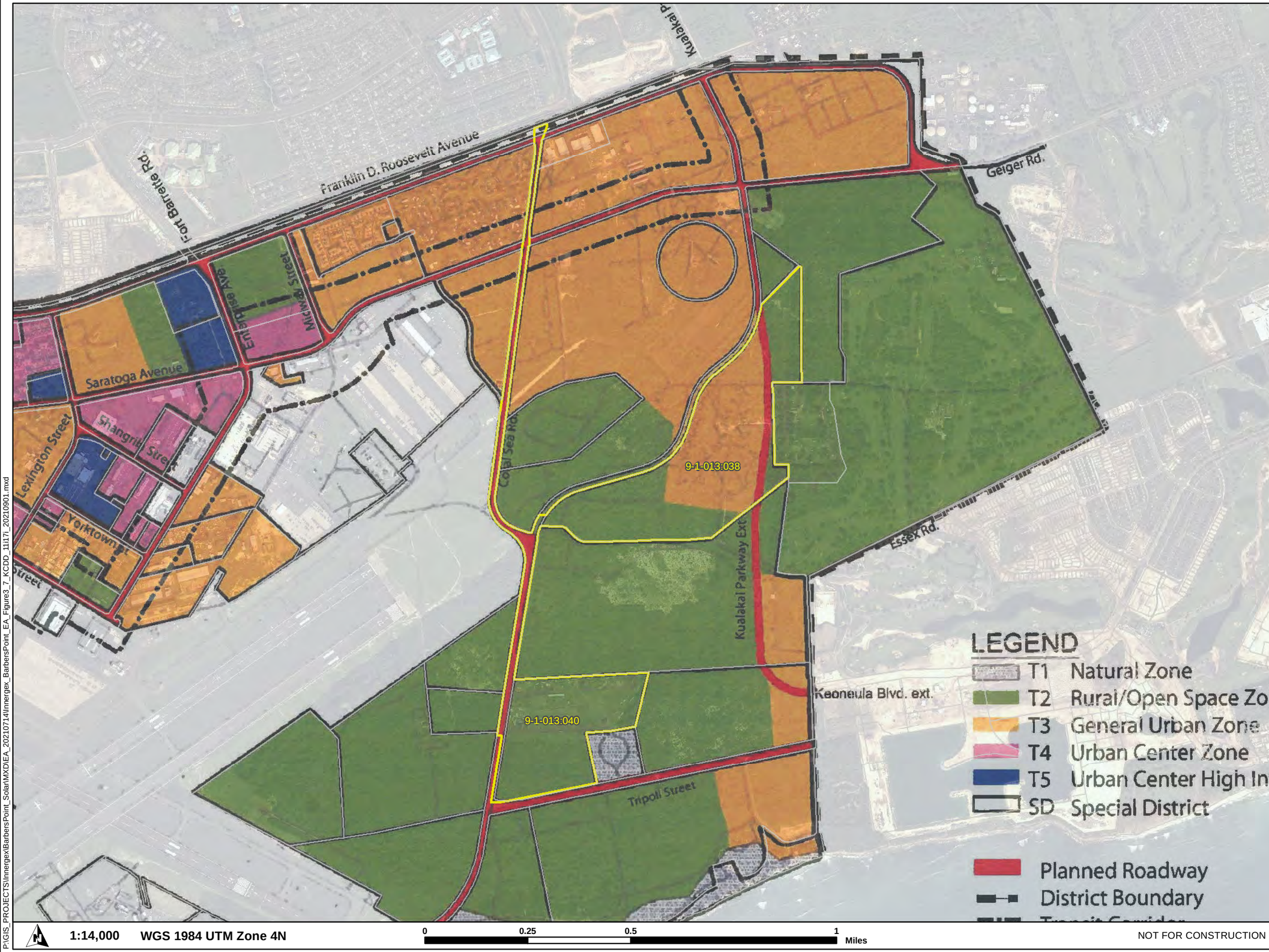
Barbers Point Solar Project

Figure 3-7
HCDA Kalaeloa Community Development District Regulating Plan

CITY AND COUNTY OF HONOLULU



Project Area
TMK Boundary

LEGEND
- T1 Natural Zone
- T2 Rural/Open Space Zone
- T3 General Urban Zone
- T4 Urban Center Zone
- T5 Urban Center High Intensity
- SD Special District

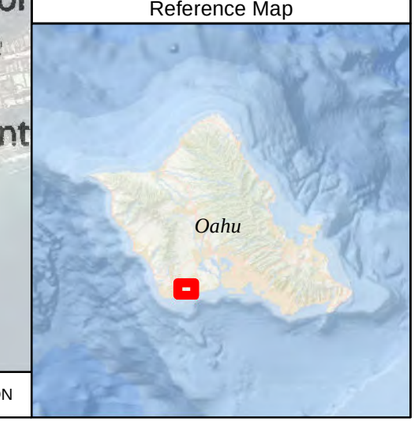
- Planned Roadway
- District Boundary
- Transit Corridor
- Emergency Access

Source: HCDA Regulating Plan, see HAR Chapter 15-215-22

TETRA TECH

Barbers Point Solar LLC

Reference Map



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Barbers Point Solar Project

Figure 3-8 Viewpoints

CITY AND COUNTY OF HONOLULU

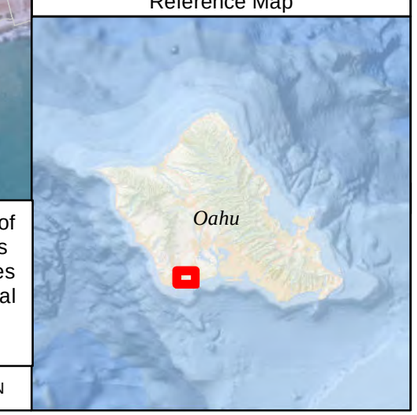
Respecting archaeological, cultural, and environmental features of any site that Innergex develops is a priority. Studies and analyses will be conducted to gain a thorough understanding of the features on the site. The intent would be to arrive at the best possible final layout that balances these aspects along with technical and community considerations.

- Project Area
- TMK Boundary
- Road
- Overhead Gen-Tie Line Termination Point at Existing HECO 46-kV Transmission Line
- Security Fence
- Solar Array
- Collector Line
- Project Substation
- Power Conversion System
- Temporary Laydown (Staging) Area
- Site Access Road & Collector Line
- 46-kV Transmission Line (Overhead and Underground)
- Viewpoint
- Ewa Battlefield Historical District

TETRA TECH

Barbers Point Solar LLC

Reference Map



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BARBERS POINT SOLAR PROJECT

Figure 3-9
PHOTO SIMULATION

Viewpoint 1:
Ewa Battlefield
View From
Proposed Visitor Center

Existing Conditions

Simulated Conditions

Photograph Information

Time of photograph:	3:38 PM
Date of photograph:	12/07/2020
Weather condition:	Partly Cloudy
Viewing direction:	Southeast
Latitiude:	21.326572°
Longitude:	-158.047383°

INNERGEX

BARBERS POINT SOLAR PROJECT

Figure 3-10

PHOTO SIMULATION

Viewpoint 2:
Ewa Battlefield

View From
Historic Runway

Existing Conditions

Simulated Conditions

Photograph Information

Time of photograph:	1:24 PM
Date of photograph:	12/07/2020
Weather condition:	Partly Cloudy
Viewing direction:	Southwest
Latitiude:	21.326148°
Longitude:	-158.043643°

INNERGEX

BARBERS POINT SOLAR PROJECT

Figure 3-11a

PHOTO SIMULATION

Viewpoint 3:
Coral Sea Road
No Landscaping

Existing Conditions

Simulated Conditions

Photograph Information

Time of photograph:	2:55 PM
Date of photograph:	12/11/2020
Weather condition:	Partly Cloudy
Viewing direction:	East
Latitiude:	21.309562°
Longitude:	-158.056263°

INNERGEX

BARBERS POINT SOLAR PROJECT

Figure 3-11b

PHOTO SIMULATION

Viewpoint 3:
Coral Sea Road
With Proposed Landscaping

Existing Conditions

Simulated Conditions

Photograph Information

Time of photograph:	2:55 PM
Date of photograph:	12/11/2020
Weather condition:	Partly Cloudy
Viewing direction:	East
Latitiude:	21.309562°
Longitude:	-158.056263°

INNERGEX

BARBERS POINT SOLAR PROJECT

Figure 3-12

PHOTO SIMULATION

Viewpoint 4:
Coral Sea Road

Near San Juacinto Street

Existing Conditions

Simulated Conditions

Photograph Information

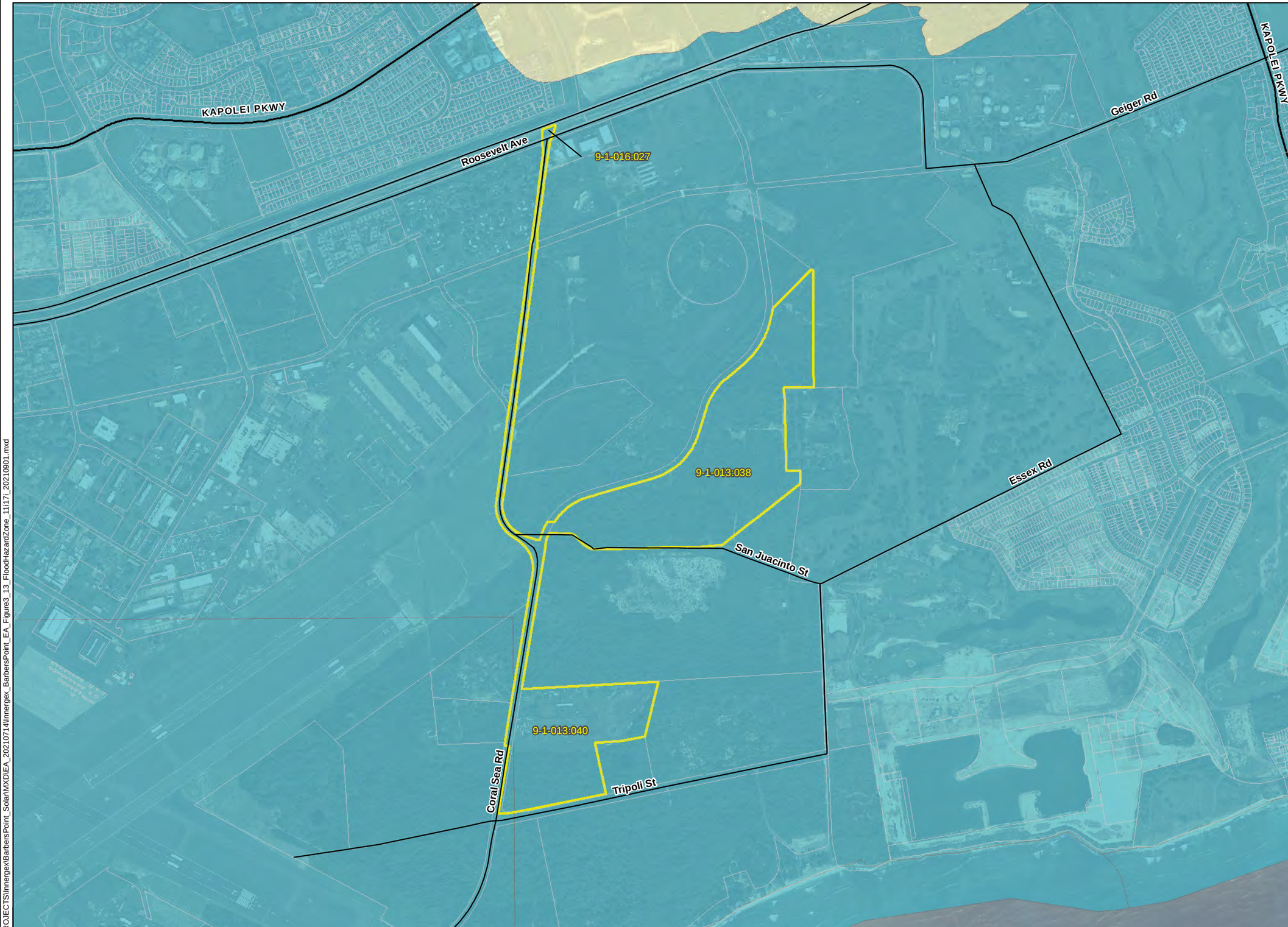
Time of photograph:	4:15 PM
Date of photograph:	12/11/2020
Weather condition:	Partly Cloudy
Viewing direction:	Northeast
Latitiude:	21.314886°
Longitude:	-158.055408°

INNERGEX

Barbers Point Solar Project

Figure 3-13
Flood Hazard Zones

CITY AND COUNTY OF HONOLULU



Project Area
TMK Boundary
Road

Flood Zone (FEMA)

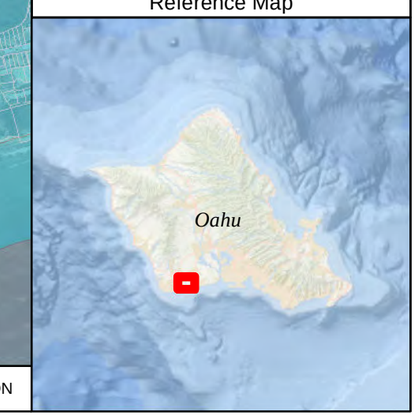
*Zone D**
Zone X
(Area of Minimal Flood Hazard)

* Unstudied area where flood hazards are undetermined, but flooding is possible. No mandatory flood insurance purchase apply, but coverage is available in participating communities.

TETRA TECH

Barbers Point Solar LLC

Reference Map



1:14,000 WGS 1984 UTM Zone 4N

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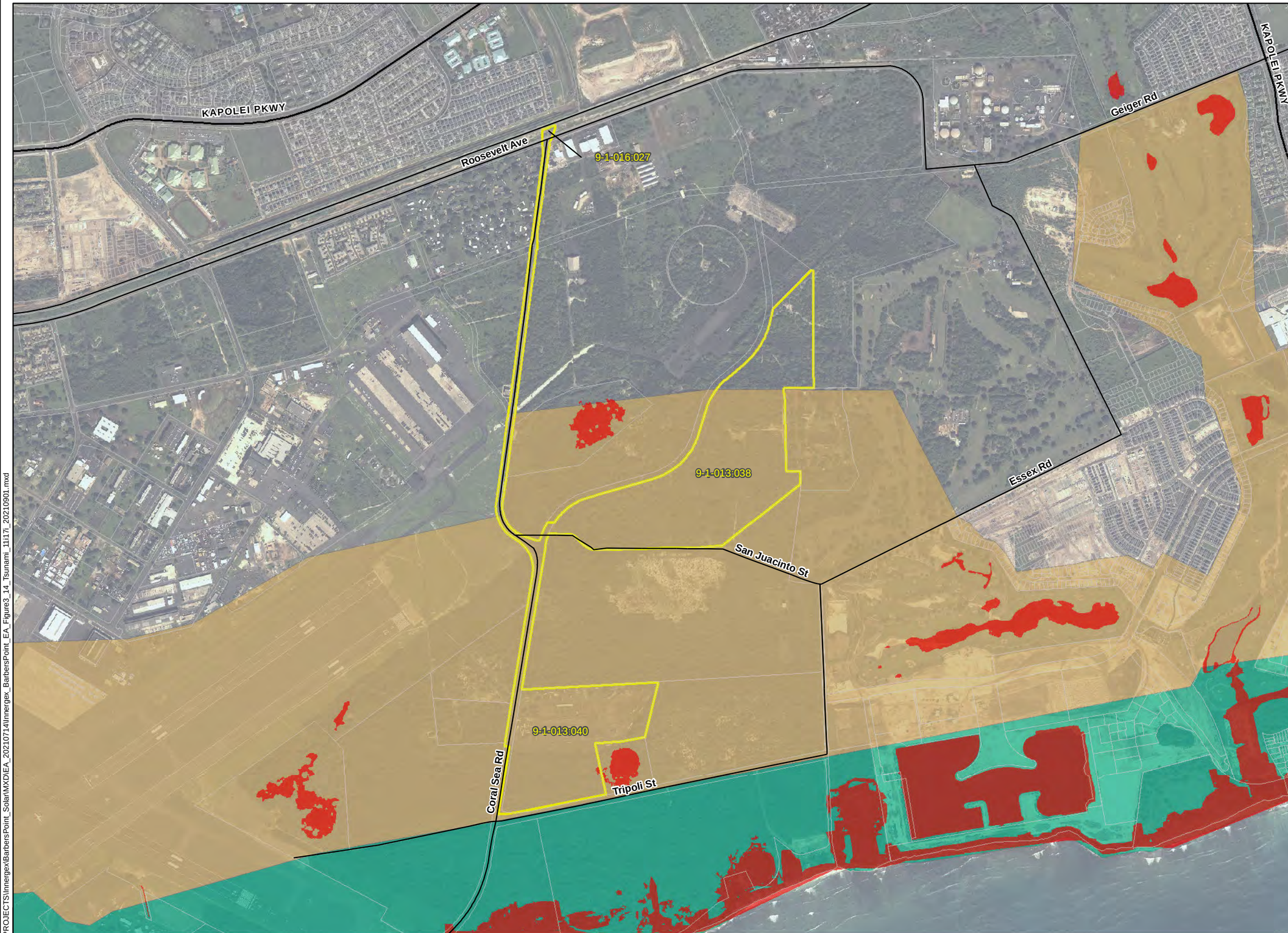
Barbers Point Solar Project

Figure 3-14
Tsunami Evacuation Zones

CITY AND COUNTY OF HONOLULU



- Project Area
- TMK Boundary
- Road
- Sea Level Rise Exposure Area - 3.2 feet

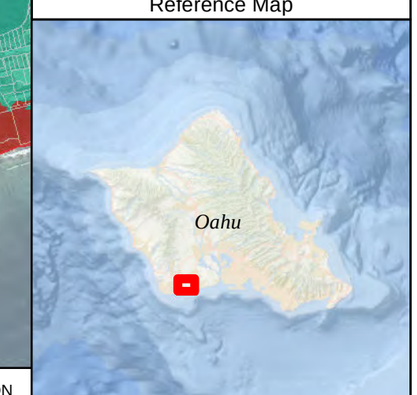
Tsunami Evacuation Zones

- Extreme Tsunami Evacuation Zone
- Tsunami Evacuation Zone

TETRA TECH

Barbers Point Solar LLC

Reference Map



1:14,000 WGS 1984 UTM Zone 4N

0 0.25 0.5 1 Miles

NOT FOR CONSTRUCTION

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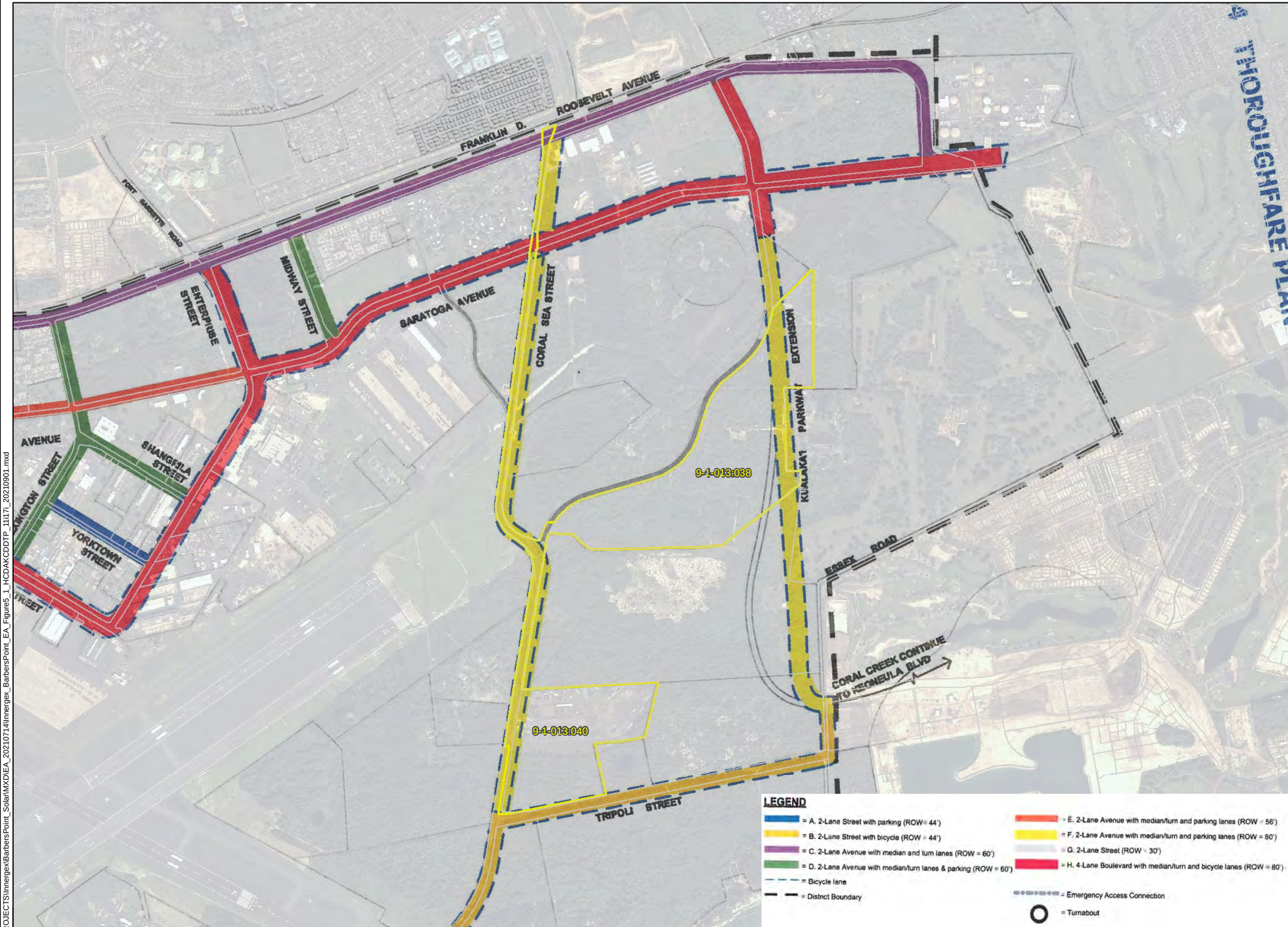
Barbers Point Solar Project

Figure 5-1
HCDA Kalaeloa Community Development District Thoroughfare Plan

CITY AND COUNTY OF HONOLULU



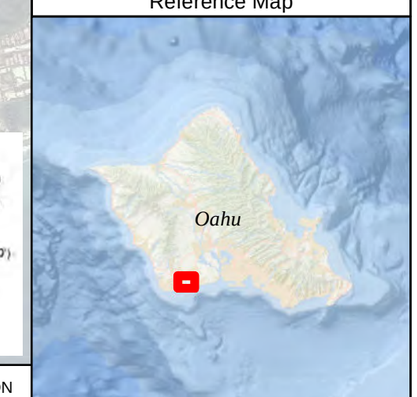
Project Area
TMK Boundary

Source: HCDA Thoroughfare Plan, see HAR Chapter 15-215-24

TETRA TECH

Barbers Point Solar LLC

Reference Map



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APPENDIX A. DRAFT ARCHAEOLOGICAL INVENTORY SURVEY

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Pacific Legacy

Historic Preservation

DRAFT

ARCHAEOLOGICAL INVENTORY SURVEY OF THE PROPOSED BARBERS POINT SOLAR PROJECT IN THE AHUPUA‘A OF HONOULIULI, DISTRICT OF ‘EWA, ISLAND OF O‘AHU

[TMK: (1) 9-1-013:038; (1) 9-1-013:040; AND 9-1-016:027 (POR.)]

Pacific Legacy: Exploring the past, informing the present, enriching the future.

CULTURAL RESOURCES CONSULTANTS

Hawai‘i Office:
Kailua, O‘ahu

California Offices:
Bay Area
Sierra/Central Valley

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DRAFT

ARCHAEOLOGICAL INVENTORY SURVEY OF THE PROPOSED BARBERS POINT SOLAR PROJECT IN THE AHUPUA‘A OF HONOULIULI, DISTRICT OF ‘EWA, ISLAND OF O‘AHU

[TMK: (1) 9-1-013:038; (1) 9-1-013:040; AND 9-1-016:027 (POR.)]

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September 2021

ABSTRACT

At the request of Barbers Point Solar LLC, Pacific Legacy, Inc. conducted an archaeological inventory survey of approximately 163 acres of lands for the Barbers Point Solar Project (Project). The Project will be primarily located on tax map keys (TMK) 9-1-013:038 and 9-1-013:040, which are owned by Department of Hawaiian Home Lands (DHHL). Project electrical collector and transmission lines will also be located within rights-of-way owned by Hawaiʻi Department of Transportation (HDOT) (Coral Sea Road and Roosevelt Avenue), as well as within a portion of TMK 9-1-016:027 (owned by Kapolei Infrastructure, LLC). The project area is located within the *ahupuaʻa* of Honouliuli in the *moku* of ʻEwa on the island of Oʻahu [TMK: (1) 9-1-013: 038 and 040]. The survey area is the site of a proposed solar project and is east of Kalaeloa Airport.

The present survey was conducted to assist Barbers Point Solar LLC in preparing construction permits to support their proposed development of the project area for the Barbers Point Solar Project. The entirety of this 163-acre survey area had been surveyed by archaeologists previously (Welch 1987; Haun 1991; Tuggle and Tomonari-Tuggle 1997; Wickler and Tuggle 1997; Beardsley 2001; Dye 2008; Morrison and Chamber 2018). However, previous archaeological investigations had varying levels of detail and/or did not utilize GPS technology. Subsurface testing was conducted along the proposed electrical collector and transmission lines in the project area.

The current archaeological inventory survey resulted in the identification and recording of 17 historic properties containing 438 component features. Identified historic properties included features used for habitation, agriculture, ceremonial, and recreational activities, as well as historic buildings and features used for a variety of military activities from WWII onwards. The subsurface testing documented a subsurface feature associated with a complex of limestone pits (Site T-03) and a newly identified subsurface pre-Contact or early post-Contact cultural deposit (Site T-12).

These historic properties have been assessed for integrity and site significance in accordance with Hawaiʻi Administrative Rules (HAR) §13-284-6.

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Note: In this report, the spellings and the use of diacritical marks (glottal stops and macrons) follow conventions issued by Pukui and Elbert (1986) and Pukui et al. (1976) with limited exceptions – spellings and diacritical marks are used as the original sources used them in quotations, titles, and proprietary names.

Cover photo: *SIHP 50-80-12-05100, Feature 5, habitation platform.*

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1.0 INTRODUCTION

At the request of Barbers Point Solar LLC, Pacific Legacy, Inc. conducted an archaeological inventory survey (AIS) in the area traditionally known as Kalaeloa (a.k.a. Barbers Point), located on the ʻEwa Plain of southwestern Oʻahu Island. The project area is within the traditional land division of Honouliuli Ahupuaʻa and broader *moku* (district) of ʻEwa (Figure 1).

The AIS focused on approximately 163 acres, of which a portion will be the location of the proposed Barbers Point Solar Project. The Project will be primarily located on tax map keys (TMK) 9-1-013:038 and 9-1-013:040, which are owned by Department of Hawaiian Home Lands (DHHL). Project electrical collector and transmission lines will also be located within rights-of-way owned by Hawaiʻi Department of Transportation (HDOT) (Coral Sea Road and Roosevelt Avenue), as well as within a portion of TMK 9-1-016:027 (owned by Kapolei Infrastructure, LLC). For locational reference, the subject parcels will be referred to in this report by their shortened parcel numbers: Parcel 38, Parcel 40, and TMK 9-1-016:027 at the system interconnection point on the north side of Roosevelt Avenue (.

The project is subject to historic preservation review under Hawaiʻi Revised Statutes (HRS) Chapter 6E-8.

1.1 PROJECT DESCRIPTION

Barbers Point Solar LLC is proposing to build and operate the Barbers Point Solar Project that will consist of a 15-megawatt (MW) solar photovoltaic (PV) system coupled with a 4-hour, 15-MW, 60-megawatt-hour (MWh) PV-coupled battery energy storage system. Presented below (Section 1.2) is a brief description of the components of the proposed project.

The project area is located on the ʻEwa Plain which encompasses the southeast point of Oʻahu, also known as Kalaeloa or Barbers Point. It lies immediately east of Kalaeloa Airport and is bordered by Tripoli Road on the south, Coral Sea Road on the west, and Kalaeloa Renewable Energy Park on the northeastern side. Portions of the project area are under Right-of-Entry agreements with Ihilani Miller-Cummings and Hawaii Explosives & Pyrotechnics, Inc. in Parcel 40 and to FPS Painting Contractors, LLC in Parcel 38. The remainder of the project area is vacant and heavily overgrown with non-native vegetation.

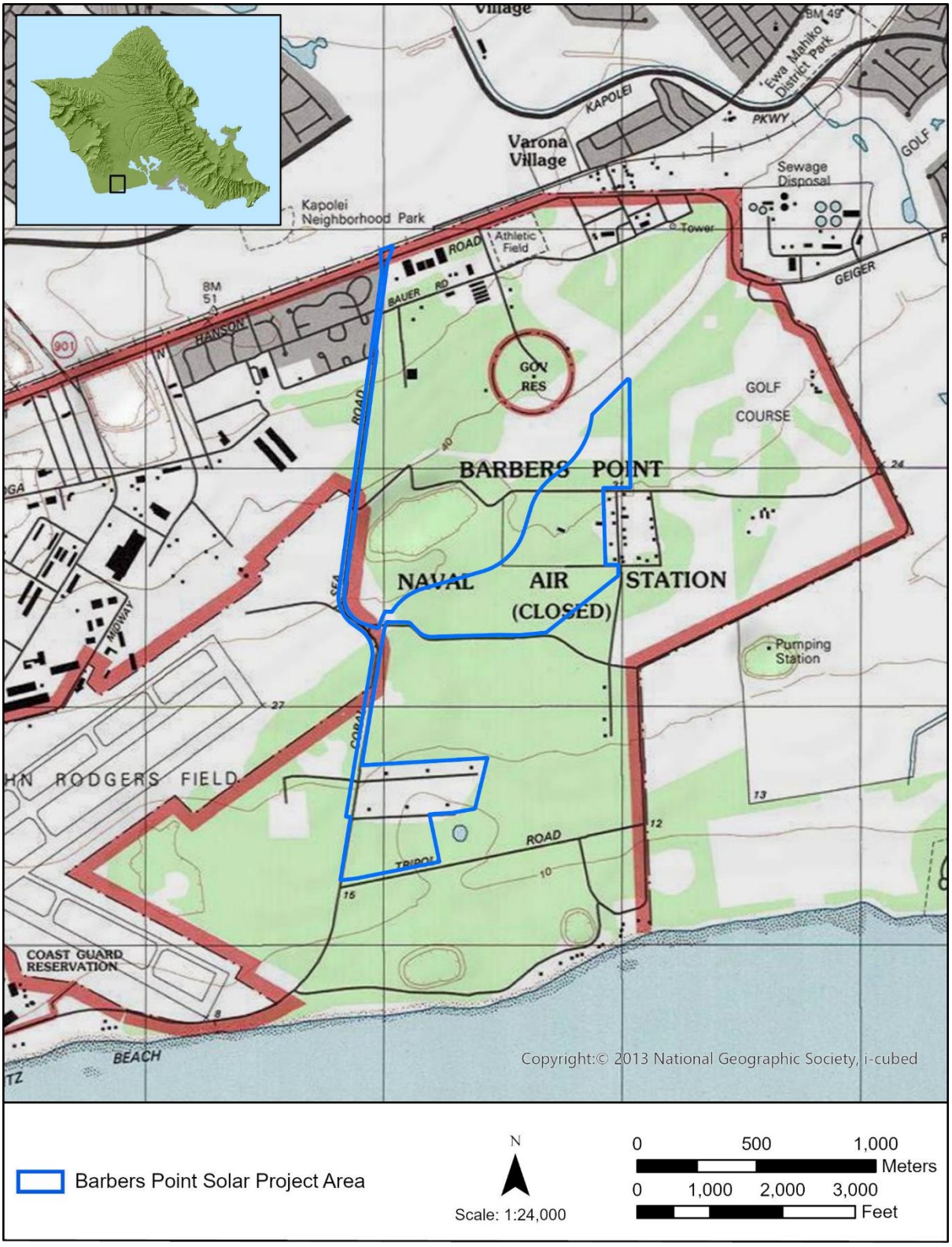

Figure 1. Portion of U.S. Geological Survey 7.5 Minute Ewa Quadrangle showing Barbers Point Solar Project Area location (USGS Ewa Quadrangle 1998).

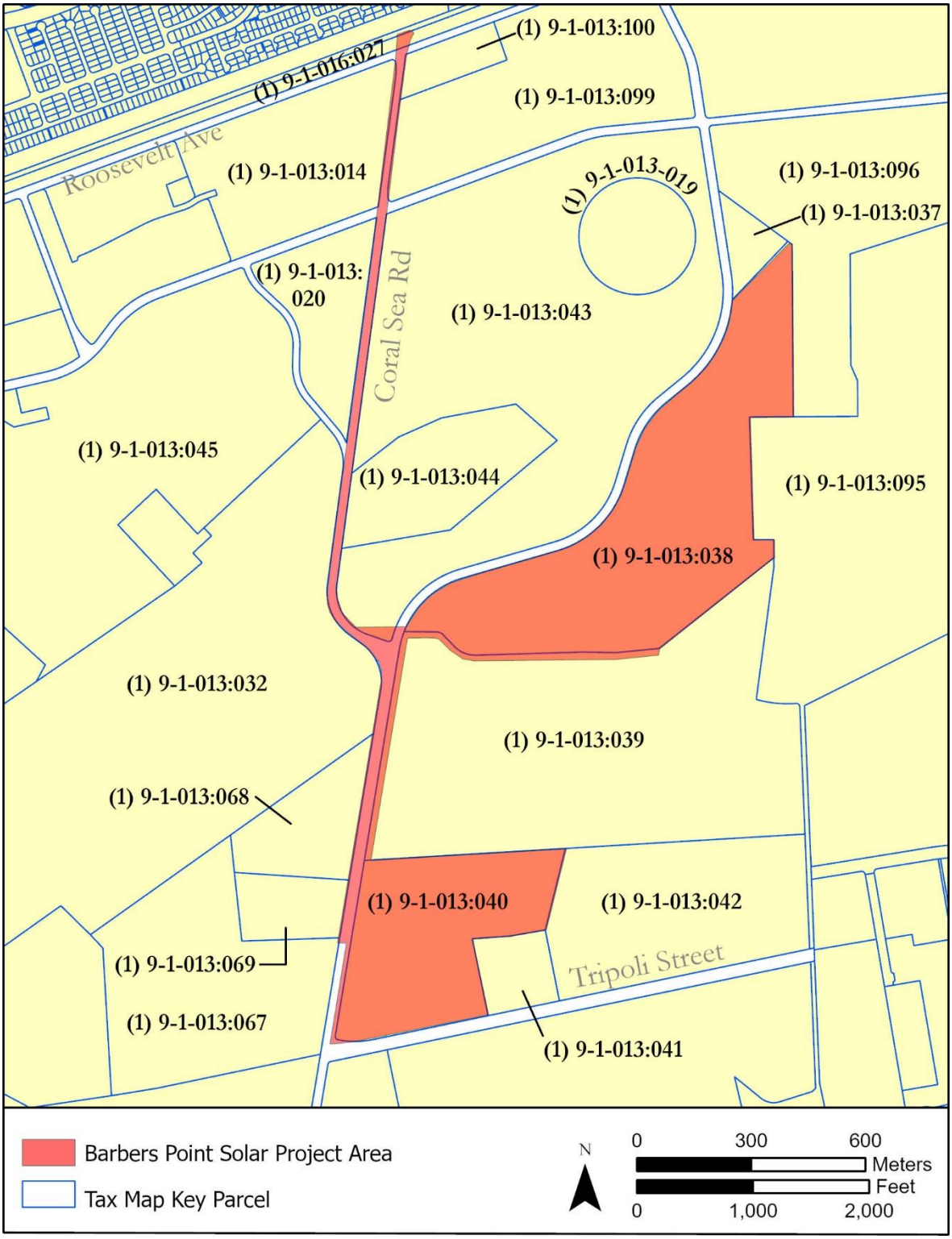

Figure 2. Barbers Point Solar Project Area showing TMKs within and adjacent to the project area (Source: Hawaii Statewide GIS Program, 2021).

1.2 PROJECT AREA

The Barbers Point Solar Project area defined in this AIS includes the entirety of parcels 38 and 40, as well as rights-of-way (ROWs) owned by Hawai'i Department of Transportation (HDOT) (Coral Sea Road and Roosevelt Avenue) as well as within a portion of TMK: (1) 9-1-016:027 (owned by Kapolei Infrastructure, LLC). Within Parcel 38, there is a large area that has been excluded from the project design. Even though this area will not be impacted by the Barbers Point Solar Project, it was subjected to a 100% pedestrian survey as part of this AIS. This area contains the proposed Revetment Historic District (Yoklavich 1997) and archaeological and cultural resource areas that will be avoided by this project.

The Project consists of construction and operation of a 15 MW solar photovoltaic system coupled with a 15 MW, 4-hour (60MWh) PV-Coupled ESS as well as related interconnection and ancillary support infrastructure (Figure 3. The major components of the Project will include the following:

- **Solar Panels:** The solar PV system would include a series of panels arranged into arrays consisting of evenly spaced rows. The panels would be mounted on a racking system installed on posts. The Project's solar arrays will include three areas: Area 1 in the northern portion of TMK 9-1-013:038, Area 2 in the southern portion of TMK: 9-1-013:038, and Area 3 located on TMK 9-1-013:040.

- **Battery Energy Storage System:** The photovoltaic coupled battery energy storage system (PV-Coupled ESS) would be distributed across the Project area and would include a self-contained standalone unit that combines a lithium-ion battery system, inverter, and controller. The PV-Coupled ESS units would incorporate several layers of protection to avoid failures, contain potential hazardous substances, and to prevent fires.

- **Collector Lines:** The solar panels and PV-Coupled ESS would connect with a Project substation primarily via underground electrical collector lines. The collector line connecting the solar arrays on TMK 9-1-013:040 to the collector substation on TMK: 9-1-013:038 will run along Coral Sea Road. Portions of this line may need to be overhead depending on final site design and ROW constraints. Also, in cases where subsurface conditions make it difficult or too costly to trench, other portions of the collection system may go overhead similar to a transmission line.

- **Substation:** A project collector substation would be constructed on DHHL TMK: 9-1-013:038 and will function to increase the voltage from the PV system to 46 kV in order to match the voltage of the Hawaiian Electric electrical grid. The Project collector substation and associated interconnection infrastructure will include equipment such as medium voltage bus structure, circuit breakers and switches, a main power transformer, and associated underground electrical lines.

- **Generation Tie-Line:** An approximately 1.5-mile generation tie-line (combination of overhead and underground) will extend underground from the Project's collector substation, north along Coral Sea Road and transition to overhead at the existing 12 kV Hawaii Electric overhead transmission line. The 46 kV will be overbuilt on top of the 12 kV transmission line and terminate to the existing Hawaiian Electric 46-kV overhead transmission line located on TMK: 9-1-016:027 (owned by Kapolei Infrastructure, LLC) near the intersection of Coral Sea Road and Roosevelt Avenue.

- **Access Roads and Fencing:** Access to solar array Areas 1 and 2 on TMK 9-1-013:038 will be provided by a new driveway off Coral Sea Road. This driveway will be located within an existing HDOT ROW associated with Roadway Lot 13083. Access to DHHL's parcel 9-1-013:40 is currently via an existing driveway on Coral Sea Road (and Casablanca Street). Access within the Project's two solar array parcels will be provided through a network of existing and new on-site access roads. Improvements to existing roads may include drainage upgrades, smoothing, and graveling as needed to accommodate construction vehicles. New access roads may require excavation and fill to achieve acceptable grades.

  All major components will be located within the Project fence line with the exception of the generation tie-line, select access roads, and portions of the collector lines located in the public ROWs.

- **Temporary Laydown Area:** An approximately 2-acre temporary laydown (i.e., staging) area will be established in the southern portion of TMK 9-1-013:038. Other laydown areas may be established within the solar array footprint as the Project is built out. Some grading may be needed to level the ground surface, with geotextile materials and compacted gravel installed as needed.

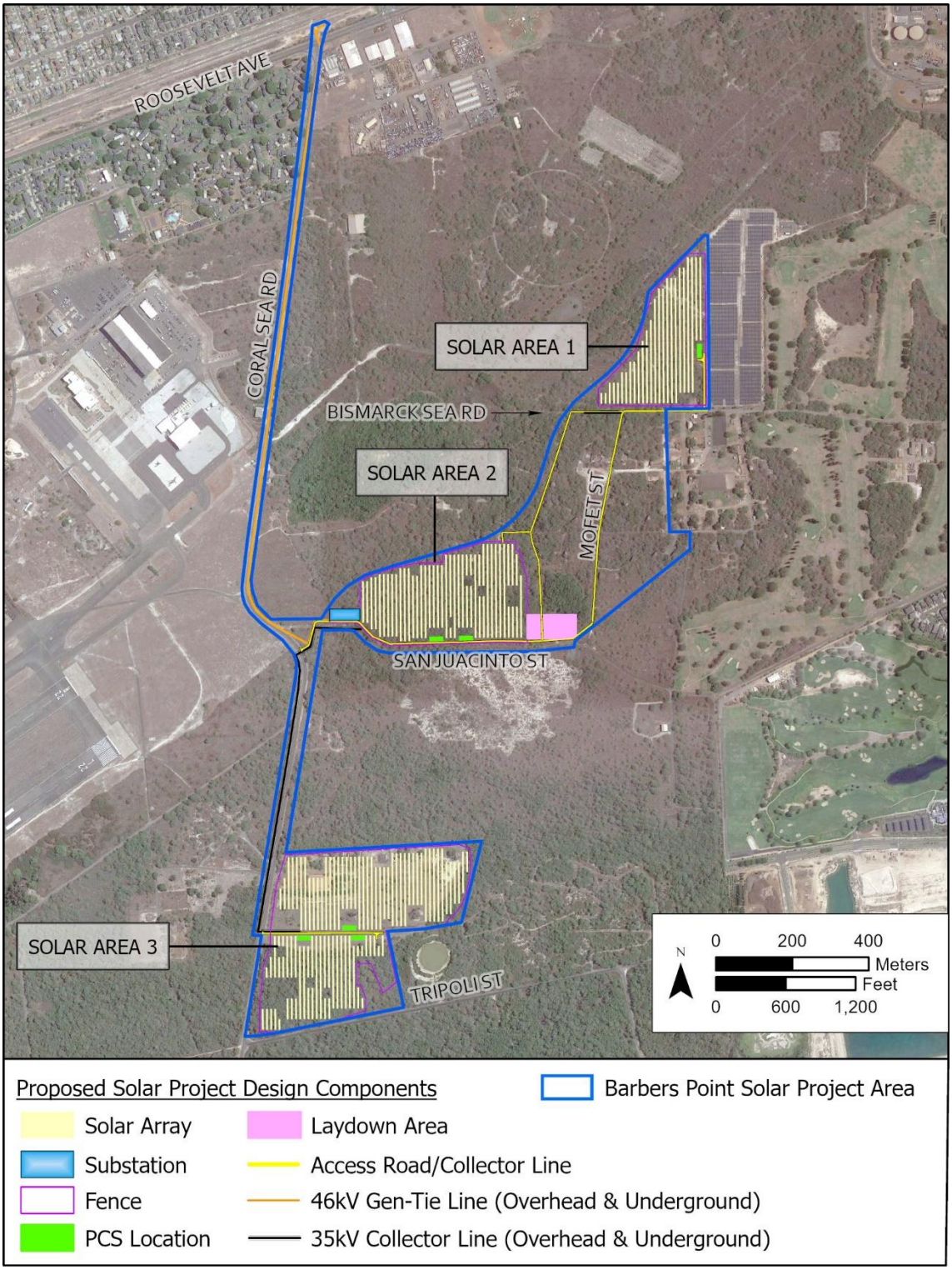

Figure 3. Proposed Barbers Point Solar Project Design (courtesy of Innergex; base map: Google Earth Imagery 2019).

1.3 ENVIRONMENTAL SETTING

The project area is located on the ʻEwa Plain in the southwestern portion of Oʻahu Island, ascending gradually to the northeast from approximately 3.0 m (10 ft) to 12.0 m (40 ft) above mean sea level. The project area lies between 0.6 km (0.2 miles) and 2.6 km (1.6 miles) north-northeast of the ʻEwa Plain's southern coastline.

The project area is composed of Pleistocene limestone outcrop formed from coral reefs when sea levels were upwards of 7.5 m (24.6 ft) above current sea levels (McDonald et al. 1983:420–421). Following a drop in sea level and uplifting of Oʻahu Island, the exposed coral reef was eroded into a karst topography characterized by limestone pits and subsurface caverns (Ziegler 2002:96). The pits are typically "bell-shaped" in cross-section because of rainwater erosion that was more corrosive in the pit interiors due to a slower evaporation rate and mixing with ground water (Ziegler 2002:97).

The project area contains three soil types (Figure 4): coral outcrop comprising the majority of the project area, mixed fill in the northeastern portion of the project area that comprises the MCAS Ewa airfield, and a small strip of Mamala stony silty clay loam on the northeastern-most extent adjacent to Roosevelt Avenue (Soil Survey Staff 2020).

Annual rainfall on the ʻEwa Plain averages 508 mm (20 in) with the greatest amount of rainfall occurring in January with an average of 104 mm (4.1 in; Tuggle and Tomonari-Tuggle 1997:5). The variable rainfall throughout the year indicates the ʻEwa Plain endured periods of drought and sometimes heavy rain. Although no intermittent or permanent streams exist in the project area, the water table was likely higher during the pre-Contact era and once provided an important underground water source captured in the multitude of limestone pits on the ʻEwa Plain, including a large water-filled pit (Ordy Pond) adjacent to the project area (Tuggle and Tomonari-Tuggle 1994:8).

TetraTech (2020) identified *kiawe* (*Prosopis pallida*) and buffelgrass as the primary vegetation type in the project area, with the latter plant species generally occurring as an understory to the roughly 5 to 9 m (15 to 30 feet) tall *kiawe*. Other non-native species present include *koa haole* (*Leucaena leucocephala*), *ʻopiuma* (*Pithecellobium dulce*), Chinese violet (*Asystasia gangetica*), Zulu giant (*Stapelia gigantea*), sisal (*Agave sisalana*), Guinea grass (*Urochloa maxima*), sourgrass (*Digitaria insularis*), and the highly invasive rubber vine (*Cryptostegia grandifolia*) specific to the southernmost portion of Parcel 40. Three native species were identified in the project area, including *ʻilima* (*Sida fallax*), hoary abutilon (*Abutilon incanum*), and *kaunaʻoa pehu* (*Cassytha filiformis*), a parasitic plant found in the canopy of *kiawe* trees.

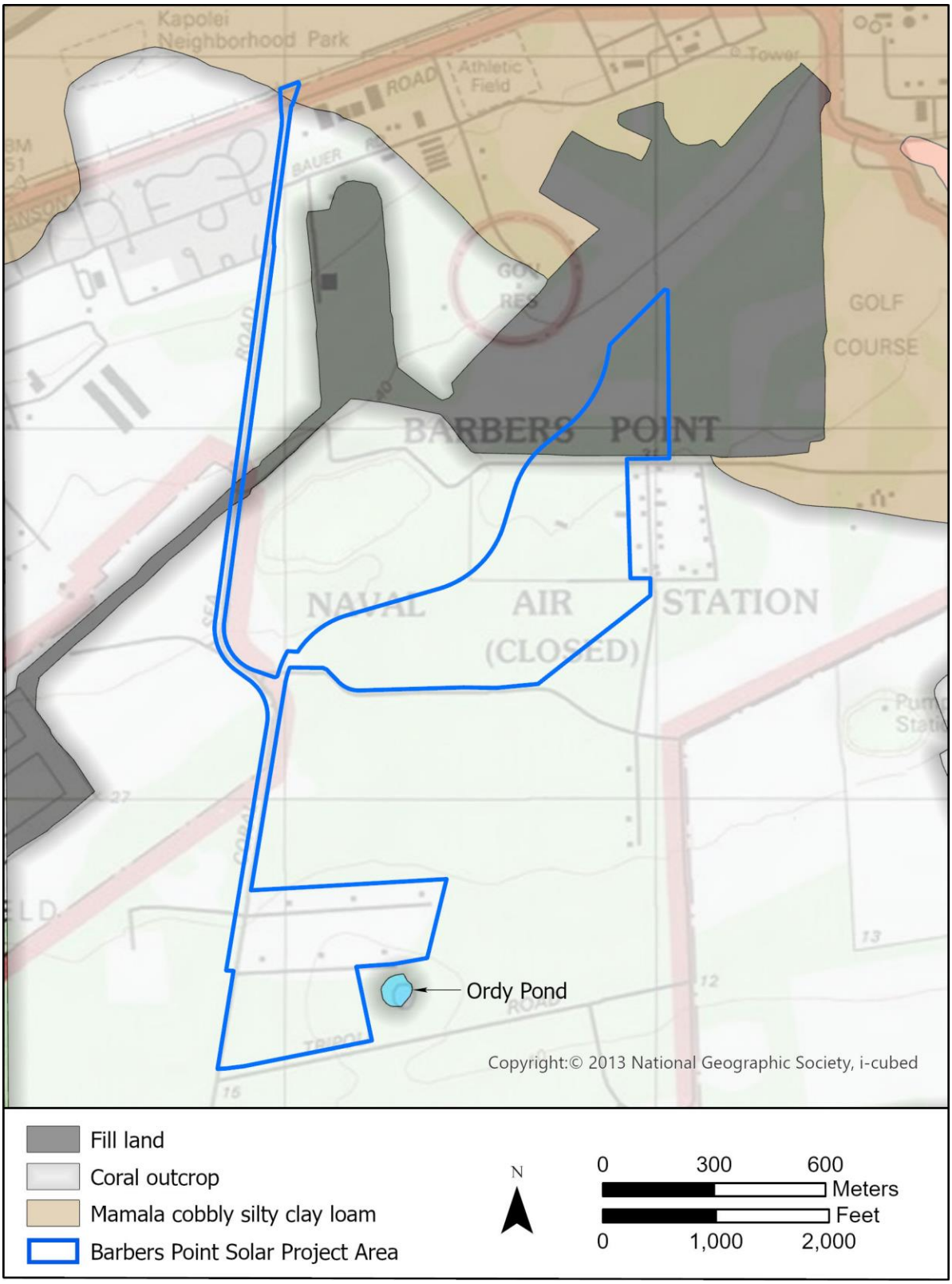

Figure 4. Soil classifications in project area (Soil Survey Staff 2020; USGS Ewa Quadrangle 1998).

2.0 METHODS

This section outlines the methods used during background research, fieldwork, laboratory analysis, and preparation of the archaeological inventory survey report.

2.1 BACKGROUND RESEARCH METHODS

During the literature and historic map research for this project, several repositories were visited. Relevant archaeological reports were obtained from the library of the Hawaiʻi State Historic Preservation Division (SHPD). Historic documents, maps, and reference volumes were found in the Hawaiʻi State Archives, the University of Hawaiʻi Library system, Bishop Museum Archives, and private collections. Online sources of information included the United States Department of Agriculture (USDA), the State of Hawaiʻi Department of Accounting and General Services (DAGS), the Office of Hawaiian Affairs Kīpuka and Papakilo Databases, the Hawaii Office of Planning Statewide GIS Program, Waihona ʻĀina, and AVA Konohiki.

2.2 FIELD METHODS

Fieldwork for this project included a pedestrian survey and detailed recording and classification of all identified historic properties within the project area. Fieldwork was undertaken over 32 non-consecutive days between 1 June and 16 July 2020 as well as 29 January, 25 May, and 17 June 2021. Geotechnical testing was monitored for 8 days between 18 November and 1 December 2020. The survey team was led by Jennifer Robins, B.A. with Caleb Fechner, B.A.; James McIntosh, B.A.; Amber Jolis Steinbruchel, B.A.; and Kylie Tuitavuki, B.A. assisting. Principal Investigators Mara Mulrooney, Ph.D. and Paul Cleghorn, Ph.D. provided direction throughout the field survey.

The project area, including the solar array and associated infrastructure area, access corridors, and gen-tie corridor, were subject to a pedestrian survey with 100% coverage.

2.2.1 Pedestrian Survey

Pedestrian survey of the project area was undertaken to identify and document historic properties in the project area, including the previously identified archaeological sites and component features (see Section 3.4 of this report). To our knowledge, no GPS locations were collected during previous investigations and archaeological feature distribution maps were generated only for smaller complexes (SIHP 50-80-12-01730, -01733, -05105, and the military features of 50-80-12-05106). To avoid confusion and to conduct fieldwork efficiently, all identified features were assigned consecutive temporary field numbers across the project area beginning with T-001. The few legible site tags from previous studies were recorded to assist with future correlation of the previously identified site inventory.

Survey transects were conducted by a 3-person archaeological field crew spaced 5.0 m (16.4 ft) apart. Site documentation included detailed recording with written descriptions, photography, GPS recording, and plan-view mapping of all culturally modified features. Unmodified limestone pits were documented with written descriptions, GPS recording, and photography.

Vegetation clearance was undertaken as needed to expose all archaeological features. The accurate location of each site was mapped using a handheld Trimble GeoExplorer XT global positioning system (GPS) and positions were differentially corrected to provide precision of less than 2.0 m (6.6 ft).

An individual point was taken for each archaeological feature and natural limestone pit, which was marked by a feature datum indicated on plan maps. Coordinates were recorded in Universal Transverse Mercator, North American Datum for 1983, Zone 4 North (UTM NAD 83 Z4N) projection.

Detailed feature descriptions, which included a narrative description, overall measurements, and other relevant information were recorded for all identified historic properties. Documentation also included digital photography of each site and individual features. A 0.5 m (1.6 ft) long, red and white photo scale (or scaled metal tape) and a north arrow were used for photography. Plan-view maps of all culturally modified features were drawn to scale using tape and compass and/or GPS-based mapping techniques. Apart from larger historic structures, such as Quonset huts, bunkers, and aircraft revetments, a metal site tag labeled with the temporary field number was left at all archaeological features and limestone pits for re-location purposes.

2.2.2 Subsurface Testing

Most of the previously identified sites were tested during the *Phase II — Intensive Survey and Testing Naval Air Station Barber's Point Project* (Beardsley 2001) and testing results are presented with the individual site descriptions in this report. Newly identified sites were dominated by U.S. Military structures and limestone pits, as well as features in areas that will not be impacted by the current project. An adequate sample of limestone pits, as well as a wide range of built limestone features, were tested previously (Beardsley 2001). For this reason, subsurface testing was not undertaken during the current study.

Archaeological monitoring of geotechnical testing for the proposed Barbers Point Solar Project was conducted during the AIS. Geotechnical testing included the excavation of 18 boring locations (B-1 through B-18), and five resistivity tests (R-1 through R-5), which required no excavation. An access trail leading to each of the boring, trench, and resistivity locations was cleared. Except for modern trash and debris, no cultural materials were identified in any of the geotechnical testing locations. Results of the archaeological monitoring are presented in Section 4.5 of this report.

2.3 GEOSPATIAL METHODS

Historic maps were georeferenced in ArcGIS Pro 2.6.3 using the Ewa 7.5-minute USGS topographic quadrangle (1998). Known points were used to correlate the location of historic maps relative to these base layers; however, the location of the project area on historic maps should be considered approximate.

Geospatial data recorded using the handheld Trimble GeoExplorer XT GPS units were downloaded and post-processed using Pathfinder Office version 4.0. Recorded positions were differentially corrected to ensure accuracy with precision of less than 2.0 m (6.6 ft). GPS positions were exported as Esri shapefiles with a Universal Transverse Mercator, North American Datum for 1983, Zone 4 North (UTM NAD 83 Z4N) projection.

3.0 BACKGROUND RESEARCH

3.1 TRADITIONAL HISTORY

The division of Oʻahu lands into political districts occurred in the 15th century under the rule of Māʻilikūkahi. This division resulted in the creation of six districts or *moku* during traditional times: ʻEwa, Kona, Koʻolaupoko, Koʻolauloa, Waialua, and Waiʻanae. The Barbers Point Solar Project is located in the traditional land division called Honouliuli Ahupuaʻa, in the ʻEwa District (Figure 5). Honouliuli is the largest *ahupuaʻa* on the island of Oʻahu and forms a portion of the ʻEwa Plain. In general, an *ahupuaʻa* is a land division that extends from mountain to sea, so that people residing there have access to the range of resources in those environments, from marine resources to upland agriculture and everything in between (Alexander 1882:4).

3.1.1 Land Divisions and Named Places

In traditional Native Hawaiian culture, names are given to places of significance, and those names carry meaning. Thus, place names can convey much about the mythology of a place, the physical characteristics of a place, the qualities of the people who resided there, etc. Pukui et al. (1974) published a glossary entitled *Place Names of Hawaii*. In the preface, Samuel Elbert writes

> Hawaiians named taro patches, rocks and trees that represented deities and ancestors, sites of houses and *heiau* (places of worship), canoe landings, fishing stations in the sea, resting places in the forests, and the tiniest spots where miraculous or interesting events are believed to have taken place. (Pukui et al. 1976:x)

The Barbers Point Solar Project Area is within the *ahupuaʻa* of Honouliuli, in the *moku* of ʻEwa. The traditional name for Barbers Point is Kalaeloa. See Table 1 for the definitions of these place names, as well as the places shown on the Figure 6 map.

Table 1. Place Names Associated with the Project Area

Place Name	Meaning, Description	Pg. No. in Pukui et al. 1974
ʻEwa	"crooked"	28
Honouliuli	"dark bay"	51
Kalaeloa	"the long point"; the southwest point of Oʻahu	72
Kanehili	Not listed in Pukui et al. 1974; however, *kane* is defined in Pukui and Elbert 1986 as Tinea, a fungus skin disease (ringworm). *Kāne* (note the diacritical) may be related and has the following potentially applicable definitions: 1. male; 2. the leading of the four great Hawaiian gods; 3. name given at ʻEwa for the Tahitian banana known as *polapola* and *hēʻī*. The following definitions for *hili* from Pukui and Elbert 1986 may be applicable: 1. to braid or plait; 2. to turn aside, deviate, wander, stray; 3. to whip, smite, thrash, batter.	n/a
Keahi	"the fire"; point west of Pearl Harbor noted for *ʻōʻio* fish and as a surfing site	100

Place Name	Meaning, Description	Pg. No. in Pukui et al. 1974
Kualakaʻi	*Tethys* (a sea creature); a spring here is called Hoaka-lei (lei reflection) because Hiʻiaka picked *lehua* flowers here to make a lei and saw her reflection in the water	119
Puʻukapolei	Variantly as Puʻu-o-kapolei. Kapolei means "beloved Kapo" (a sister of Pele). Puʻu means "hill." The pig-man demigod, Kamapuaʻa, established his grandmother here as queen after conquering most of Oʻahu.	203
Puʻuloa	"long hill"; land section, camp, salt works, station, street, playground, beach park, village, area east of Pearl Harbor, and old name for Pearl Harbor; it is said that breadfruit were brought here from Samoa	200–201
Puʻupālailai	"young *lai* fish hill"	205
Waimānalo	"potable water"; land division, road, and gulch in Barbers Pt. quad; site of the home of Chief Kākuhihewa	225

The name of the rains in Honouliuli is Nāulu. In the *moʻolelo* of the journey of Hiʻiaka, sister of the goddess Pele, Hiʻiaka travels to ʻEwa and describes it as dry, calling out to the Nāulu clouds to relieve the people.

ʻAʻole au e hele i ke kaha o Kaupeʻa	*I shall not tread Kaupeʻa's expanse*
Kēlā kaha kūpā koili a ka lā i ek kula	*That stretch where the sun beats down on the plain*
Ua kūpono aʻela ka lā i ka piko o Wākea	*The sun is right overhead, at the navel of Wākea*
Ola i ke ahe a ka makani Māunuunu	*I am spared by the Māunuunu wind*
I ka hapahapai mai a ka makani ʻAoʻaoa	*By the uplifting ʻAoʻaoa breeze*
*Ke koi lā i ke ao o ka **Nāulu** e hanini i ka wai*	*Urging the **Nāulu** storm clouds to pour down their waters*
Ola ihola nā kupa kamaʻāina i ka wai a ka ʻōpua	*The natives here survive on water from the clouds*
Ke halihali aʻela nā ʻōpua i ke awa lau	*Which billowing clouds carry along to the branching lochs*

(Akana and Gonzalez 2015:195)

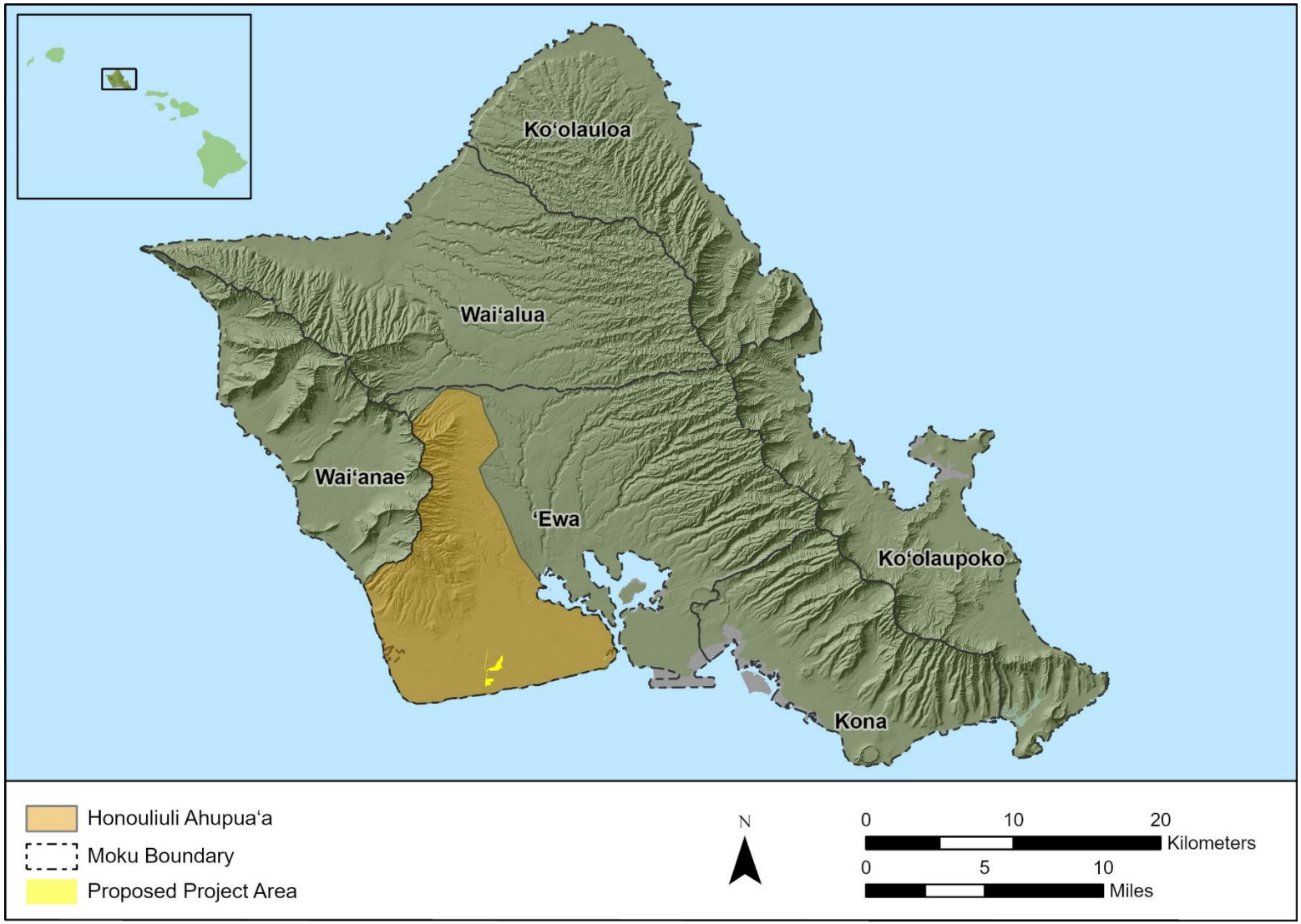

Figure 5. Hill shade imagery showing traditional *moku* boundaries of Oʻahu and *ahupuaʻa* of Honouliuli.

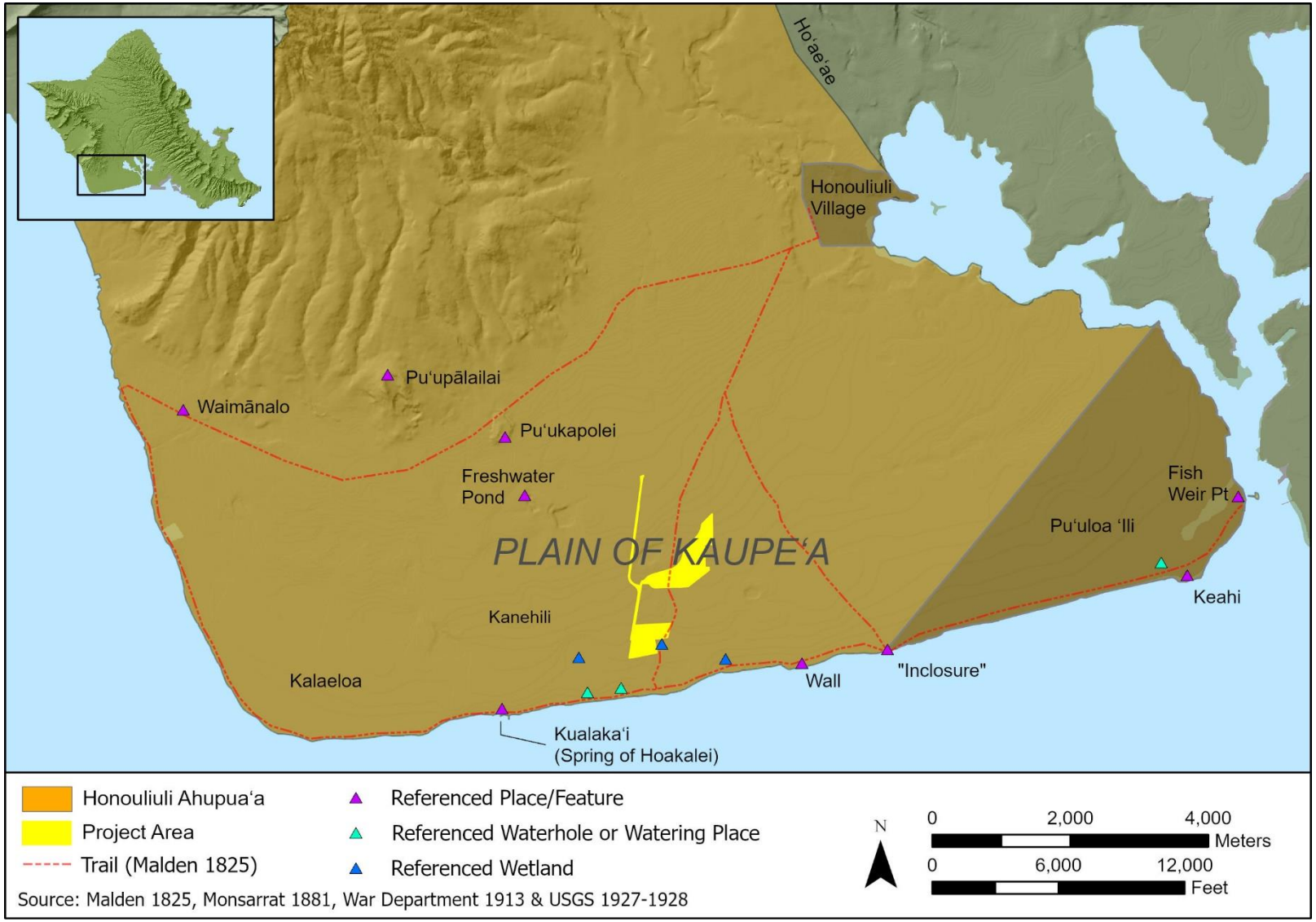

Figure 6. Traditional Hawaiian place names and resources of 'Ewa Moku.

3.1.2 ʻŌlelo Noʻeau

Hawaiian proverbs, or *ʻōlelo noʻeau*, have been passed down through oral traditions. Many *ʻōlelo noʻeau* have been collected and published in Hawaiian language newspapers and other primary and secondary sources. The *ʻōlelo noʻeau* presented below were compiled by Mary Kawena Pukui in the book entitled *ʻŌlelo Noʻeau Hawaiian Proverbs and Poetical Sayings* (Pukui 1983). These *ʻōlelo noʻeau* often have both a literal and metaphorical meaning (called *kaona*). *ʻŌlelo noʻeau* about geographical features and areas can help us to understand natural phenomenon, land use, and the history of a place. There is one *ʻōlelo noʻeau* that is specifically attributed to Honouliuli Ahupuaʻa because of the *ʻanaeholo* fish that would populate the area.

> Ka iʻa hali a ka makani. (1330)
>
> The fish fetched by the wind.
>
> The ʻanaeholo, a fish that travels from Honouliuli, where it breeds, to Kaiapāpaʻu on the windward side of Oʻahu. It then turns about and returns to its original home. It is driven closer to shore when the wind is strong.

According to Pukui, there are fifteen *ʻōlelo noʻeau* that describe the people and attributes of the ʻEwa Moku. Each *ʻōlelo noʻeau* is numbered, and the sayings can be referenced that way, rather than by page number (Pukui 1983).

> ʻĀina koi ʻula i ka lepo. (80)
>
> Land reddened by the rising dust.
>
> Said of ʻEwa, Oʻahu.

> Anu o ʻEwa i ka iʻa hāmau leo e. E hāmau! (123)
>
> ʻEwa is made cold by the fish that silences the voice. Hush!
>
> A warning to keep still. First uttered by Hiʻiaka to her friend Wahineʻomaʻo to warn her not to speak to Lohiʻau while they were in a canoe near ʻEwa.

> ʻEwa kai lumalumaʻi. (385)
>
> ʻEwa of the drowning sea.
>
> An epithet applied to ʻEwa, where kauwā were drowned prior to offering their bodies in sacrifice.

> ʻEwa nui a Laʻakona. (386)
>
> Great ʻEwa of Laʻakona.
>
> Laʻakona was a chief of ʻEwa, which was prosperous in his day.

Haunāele ʻEwa i ka Moaʻe. (493)

ʻEwa is disturbed by the Moaʻe wind.

Used about something disturbing, like a violent argument. When the people of ʻEwa went to gather the pipi (pearl oyster), they did so in silence, for if they spoke, a Moaʻe breeze would suddenly blow across the water, repilling it, and the oysters would disappear.

He kai puhi nehu, puhi lala ke kai o ʻEwa. (661)

A sea that blows up nehu fish, blows up a quantity of them, is the sea of ʻEwa.

He lōʻihi o ʻEwa; he pali o Nuʻuanu; he kula o Kulaokahuʻa; he hiki mai koe. (768)

ʻEwa is a long way off; Nuʻuanu is a cliff; Kulaokahuʻa is a dry plain; but all will be here before long.

Said of an unkept promise of food, fish, etc. Oʻahu was once peopled by evil beings who invited canoe travelers ashore with promises of food and other things. When the travelers asked when these things were coming, this was the reply. When the visitors were fast asleep at night, the evil ones would creep in and kill them.

I Waialua ka poʻina a ke kai, o ka leo ka ʻEwa e hoʻolono nei. (1263)

The dashing of the waves is at Waialua but the sound is being heard at ʻEwa.

Sounds of fighting in one locality are quickly heard in another.

Ka iʻa hāmau leo o ʻEwa. (1331)

The fish of ʻEwa that silences the voice.

The pearl oyster, which has to be gathered in silence.

Ka iʻa kuhi lima o ʻEwa. (1357)

The gesturing fish of ʻEwa.

The pipi, or pearl osyter. Fishermen did not speak when fishing for them but gestured to each other like deaf-mutes.

Ke kai heʻe nehu o ʻEwa. (1721)

The sea where the nehu come to schools to ʻEwa.

Nehu (anchovy) come by the millions into Pearl Harbor. They are used as bait for fishing, or eaten dried or fresh.

Ke one kuilima laula o ʻEwa. (1776)

The sand on which there was a linking of arms on the breadth of ʻEwa.

ʻEwa, Oʻahu. The chiefs of Waikīkī and Waikele were brothers. The former wished to destroy the latter and laid his plot. He went fishing and caught a large niuhi, whose skin he stretched over a framework. Then he sent a messenger to ask his brother if he would keep a fish for him. Having gained his consent, the chief left Waikīkī, hidden with his best warriors in the "fish." Other warriors joined them along the way until there was a large army. The surrounded the residence of the chief of Waikele and linked arms to form a wall, while the Waikīkī warriors poured out of the "fish" and destroyed those of Waikele.

Ku aʻe ʻEwa; Noho iho ʻEwa. (1855)

Stand-up ʻEwa; Sit-down ʻEwa.

The names of two stones, now destroyed, that once marked the boundary between the chiefs' land (Kuaʻe ʻEwa) and that of the commoners (Noho iho ʻEwa) in ʻEwa, Oʻahu.

O ʻEwa, ʻāina kai ʻula i ka lepo. (2357)

ʻEwa, land of the sea reddened by earth.

ʻEwa was once noted for being dusty, and its sea was reddened by mud in time of rain.

Ua ʻai i ke kāi-koi o ʻEwa. (2770)

He has eaten the kāi-koi taro of ʻEwa.

Kāi is Oʻahu's best eating taro; one who has easten it will always like it. Said of a youth or a maiden of ʻEwa, who, like the kāi taro, is not easily forgotten.

3.1.3 The Mythical Era

Preserved in *moʻolelo* (story) are tales about a period in Hawaiʻi before *kānaka* (humans), when gods and deities inhabited the islands, often bringing about the creation of lands and resources. Below are excerpts of *moʻolelo* that occur in Honouliuli Ahupuaʻa and the larger ʻEwa Moku.

The Name of Honouliuli

An explanation of the name Honouliuli is provided by Westervelt (1915) who attributes the name of this *ʻāina* (land) to an Oʻahu chief who had the same name. In the *moʻolelo Lepe-a-moa,* Chief Honouliuli lives with his wife Chiefess Kapālama. Together they raise their granddaughter Lepea-a-moa in the uplands of Kapālama. As a descendant of Ke-ao-lewa (the-moving-cloud), a bird-woman who lived in the sky, Lepe-a-moa could change into a bird and "her body shone with beauty like the red path of the sunlight on the sea, or the rainbow bending in the sky" (Westervelt 1915). As she grew, she cared for her grandparents and "her grandfather gave his name, Honouliuli, to a land district west of Honolulu, while Kapālama gave hers to the place where they lived" (Westervelt 1915).

The Name of ʻEwa

For *kānaka maoli* (Native Hawaiians), names were indicators of the history and geographical features of that *wahi* (place). Sterling and Summers note that the name may originate from a *moʻolelo* (story) about two gods, Kāne and Kanaloa.

> When Kane and Kanaloa were surveying the islands they came to Oahu and when they reached Red Hill saw below them the broad plains of what is now Ewa. To mark boundaries of the land they would throw a stone and where the stone fell would be the boundary line. When they saw the beautiful land lying below them, it was their thought to include as much of the flat level land as possible. They hurled the stone as far as the Waianae range and it landed somewhere, in the Waimanalo section. When they went to find it, they could not locate the spot where it fell. So Ewa (strayed) became known by the name. The stone that strayed. (Told to E. Sterling by Simeon Nawaa, March 22, 1954; Sterling and Summers 1978:1)

Hiʻiakaikapoliopele

In the Hawaiian epic story of Hiʻiakaikapoliopele, the youngest sister of Pele travels from Hawaiʻi Island to Kauaʻi and back. On her journey back to Kīlauea, Hawaiʻi Hiʻiaka travels across Keahumoa, the plain between the *ahupuaʻa* of Waipiʻo and Honouliuli. There she sees a group of women gathering *maʻo* blossoms and she offers them the following *ʻoli* (chant):

E lei ana ke kula o Keahumoa i ka maʻo	*The plain of Keahumoa wears the maʻo blossoms as its lei*
ʻOhuʻohu wale nā wahine kui lei o ke kanahele	*Adorning the women who string garlands in the wild*
Ua like no a like me ka lehua o Hōpoe	*It is like the lehua blossoms of Hōpoe*
Me he pua koili lehua ala i ka lā	*Lehua blossom upon which the sun beats down*
Ka oni pua koaiʻa i ka pali	*On the nodding koaiʻa flowers of the cliff*
I nā kaupoku hale o ʻĀpuku	*On the rooftops of the houses at ʻĀpuku*
Ke ku no I ke alo o ka pali o Puʻukuʻua	*Rising in the presence of the cliff of Puʻukuʻua*
He aliʻi no naʻe ka ʻāina	*The land is indeed the chief*
He kauwā no naʻe ke kanaka	*Man is indeed a slave*
I kauwā no naʻe wau i ke aloha	*I am indeed a slave to aloha–love*
Na ke aloha no naʻe i kono e haele no māua	*It is love which invites us to two–come*
E hele no wau a—	*I come*
	(Ka Hoku o Hawaii 1927)

Legend of Nāmakaokapaoʻo
Nāmakaokapaoʻo was the son of a great chief, but lived with his mother, Pokai, in Keahumoa, an area on the plains of Honouliuli. Although small in stature, Nāmakaokapaoʻo was a brave, strong child, but he did not get along with his step-father Pualiʻi. One day Nāmakaokapaoʻo pulled up the *ʻuala* (sweet potatoes) that Pualiʻi had planted near their home. Angry at what Nāmakaokapaoʻo had done, Pualiʻi came after him with an axe. Nāmakaokapoʻo used his *mana* (power) to say a death prayer against Pualiʻi before slaying him and hurling his head into Waipouli, a cave on the beach in Honouliuli (Fornander and Thrum 1916:274–276).

Story of Palila
The *moʻolelo, He Kaʻao no Palila*, recorded by (Fornander 1918) depicts the tale of a Palilia, a famous Kauaʻi *kupua* (demigod) who ventured from Kaʻena, Kauaʻi to Waikele, Oʻahu. Palila quickly traveled across the ʻEwa plains with the aid of his *lāʻau pālau* (war club).

> *Haʻalele keia ia Kaʻena, hele mai la a Kalena, a Pōhākea, Maunauna, Kānehoa, a ke kula o Keahumoa, nana ia ʻEwa. Kū kēia i laila nānā i ke kū a ka ea o ka lepo i nā kānaka, e pahu aku ana kēia i ka laʻau palau aia nei i kai o Honouliuli, kū ka ea o ka lepo, nu lalo o ka honua, me he olai la, makau nā kānaka holo a hiki i Waikele. A hiki o Palila, i laila, e paʻapu ana nā kānaka i ka nānā lealea a ke liʻi o Oʻahu nei, oai o Ahuapau.*
>
> After leaving Kaʻena, he came to Kalena, then to Pōhākea, then to Manuanua [a peak in Honouliuli], then to Kānehoa [a peak in Honouliuli], then to the plain of Keahumoa [upland plain from Honouliuli to Waipiʻo] and looked toward ʻEwa. At this place he stood and looked at the dust as it ascended into the sky caused by the people who had gathered there; he then pushed his war club toward Honouliuli. When the people heard something roar like an earthquake they were afraid and they all ran to Waikele. When Palila arrived at Waikele he saw the people gathered there to witness the athletic games that were being given by the king of Oʻahu, Ahupuaa by name. (Fornander 1918:136–153)

Kānekuaʻana
Kānekuaʻana is the *moʻo* (lizard) goddess who maintained the abundant resources at Ke-awa-lau o Puʻuloa (the many harbored seas of Pearl Harbor). This *ʻāina* stretched from Pāʻakule, near the harbor's inlet, to the many *loko iʻa* (fishpond) along the shore. Kānuekuaʻana was known as the guardian or the protector of the *pipi* (Hawaiian pearl oyster) that were found throughout Puʻuloa. She was loved by the people of ʻEwa who built *heiau* in her honor and headed her *kapu* (taboo), restrictions. It was believed that making any noise while harvesting from the waters would cause the wind to blow, and the rippling waters would scare the fish and shellfish away. This belief was captured in an *ʻōlelo noʻeau* for the area: "*ka iʻa hāmau leo o ʻEwa*" meaning "'Ewa's fish that silence voices."

According to a *moʻolelo* recorded by (Pukui and Curtis 1994), a *wahine* (woman) gathered *pipi* during a period of *kapu* when it was forbidden to do so. A *konohiki* (landlord) saw her and as punishment she returned the *pipi* and was sent home empty-handed. Later that day the *konohiki* appeared at her house and demanded money as a fine for breaking the *kapu*. The *wahine* was very poor and only had one coin, but the *konohiki* took her money anyway. Kānekuaʻana saw what the *konohiki* had done and became very upset, and as a result she took the *pipi* away and went back to Kahiki (Pukui and Curtis 1994).

Kaʻahupāhau and the Sharks at Puʻuloa
Kaʻahupāhau is the beloved shark goddess who guards the waters of ʻEwa. She lived in an underwater cave near Mokuʻumeʻume (Ford Island) at Keanapuaʻa Point near the entrance of East Loch. Her brother, Kahiʻukā was famous for his tail that he would use to attack enemies or warn fishermen if danger was nearby.

The people of Puʻuloa (Pearl Harbor) treated Kaʻahupāhau with kindness and respect. They would feed her and scrap the barnacles off of her back. In return, she protected the people from man-eating sharks. The *ʻōlelo noʻeau*, "*Alahula o Puʻuloa, he alahele na Kaʻahupāhau*" (Everywhere in Puʻuloa is the trail of Kaʻahupāhau) was "said of a person who goes everywhere, looking, peering, seeing all, or of a person familiar with every nook and corner of a place" (Pukui 1983:4). It was a reminder of her viligance and dedication to guard the people of Puʻuloa.

In one *moʻolelo,* Mikololou, a man-eating shark from the island of Maui, visited Kaʻahupāhau at Puʻuloa. He rested on the shores, enjoying the hospitality of his host and the people of Puʻuloa; however, after a while he became hungry and angry when Kaʻahupāhau and her brother denied his request to eat his favorite food—humans. Furious, he killed all the men, women, and children in the village so he could satisfy his hunger.

Kaʻahupāhau and Kahiʻukā quickly learned about what had happened and conspired with their friends to avenge Mikololou. The next night, they made a feast in his honor at the top of the Waipahu river. There they provided him with so much food and *ʻawa* that he became stupefied. At the same time, people gathered at the base of the river, ready to trap and attack Mikolou. When he swam downstream, the people attacked him from the rear, and as he tried to swim away he became tangled and trapped in the nets. His body was then dragged onto the shore and burned, while the people were happy to be safe.

The special relation of the people to Kaʻahupāhau is also recorded in the *mele* Pūpū A O ʻEwa (Shells of ʻEwa) that was written by Elbert & Mahoe:

Pūpū (aʻo ʻEwa) i ka nuʻa (nā kānaka)	Shells of ʻEwa throngs of people
E naue mai (a e ʻike)	Coming to learn
I ka mea hou (o ka ʻāina)	The news of the land
Ahe ʻāina (ua kaulana)	A land famous
Mai nā kūpuna mai	From the ancient times
Alahula Puʻuloa he ala hele nō	All of Puʻuloa, the path trod upon by
Kaʻahupāhau, (Kaʻahupāhau)	Kaʻahupāhau
Alahula Puʻuloa he ala hele nō	All of Puʻuloa, the path trod upon by
Kaʻahupāhau, Kaʻahupāhau	Kaʻahupāhau
Nani Kaʻala hemolele i ka mālie	Beautiful Kaʻala, sublime in the calm
Kuahiwi kaulana aʻo ʻEwa	Famous mountain of ʻEwa
E kiʻi ana i ka makani o ka ʻāina	That fetches the wind of the land
Hea ka Moaʻe eia au e ke aloha	The tradewind calls, "here I am, beloved"

Kilakila ʻo Polea noho i ka ʻolu	Majestic Polea in the coolness
Ia home hoʻohihi a ka malihini	Home delightful to visitors
E walea ana i ka ʻolu o ke kiawe	Relaxing in the coolness of the kiawe
I ka pā kolonahe a ke Kiu	And the soft blowing of the Kiu wind
	(Elbert and Mahoe 1970)

3.1.4 Aliʻi of ʻEwa

The *moʻolelo* of ʻEwa *aliʻi* (chiefs) document the famous battles, journeys, alliances, romances, and accomplishments that occurred throughout history and often reveal a little bit about the places where these events occurred. The excerpts below come from some of these *moʻolelo* and highlight events that are said to have occurred in Honouliuli Ahupuaʻa and the larger ʻEwa Moku.

Māweke
ʻEwa was once known as the political epicenter of Oʻahu. Fornander and Grant (Fornander and Grant 1996:47) write about Māweke, a great chief, who lived in ʻEwa in the mid-eleventh century. It is said that his son, Keaunui, navigated his way out of Puʻuloa (Pearl Harbor) by creating a path with his canoe. His descendants ruled Oʻahu until Chief Haka was defeated in around 1540 (Cordy 2002:24).

Kalaʻimanuia
Kalaʻimanuia, a powerful *wahine aliʻi* (female ruler), united Oʻahu around 1600–1620 (Cordy 2002). She divided the island amongst her four children, giving Haʻo responsibility of the ʻEwa and Waiʻanae districts. Her eldest son, Kū, was given the title of *mōʻī* (king) and the *kuleana* (responsibility) to ensure the safety and peace of all the districts. Kū however wanted full control and tried to take the land from his siblings. To stop him, Haʻo and his brother Kaʻihikapu fought together and defeated Kū. Kaʻihikapu became the new *mōʻī*; however, over time Kaʻihikapu grew jealous of the wealth and abundance of resources that Haʻo had in ʻEwa. In one *moʻolelo*, Kaʻihikapu sent a Trojan-horse-like surprise to Haʻo.

The chiefs of Waikīkī and Waikele were brothers. The former wished to destroy the latter and laid his plot. He went fishing and caught a large *niuhi* (man-eating shark), whose skin he stretched over a framework. He then sent a messenger to ask his brother if he would keep a fish for him. Having gained his consent, the chief left Waikīkī hidden with his best warriors in the "fish." Other warriors joined them along the way until there was a large army. They surrounded the residence of the chief of Waikele and linked arms to form a wall, while the Waikīkī warriors poured out of the fish, and destroyed those of Waikele (Pukui 1983:191).

In another version of the story, as told by Fornander, Kaʻihikapu sent the carcass of a man-eating shark to Haʻo and instructed him to sacrifice it at his *heiau* in Waikele (Fornander and Grant 1996:270–271). Seeing this as moment of vulnerability, Kaʻihikapu and his men attacked Haʻo and his priests during the ceremony, killing them all and taking control of ʻEwa.

A third version of the story seems to be a combination of the previous two (Kamakau 1991:67). Kaʻihikapu catches a shark in Waikīkī and offers it to Haʻo to sacrifice at his *heiau* in Waikele.

When the shark is on the altar, Kaʻihikapu and his men jump out of the shark and kill Haʻo and the priests. Kaʻihikapu's men then place their bodies into the shark and offer it as a sacrifice. According to McAllister, this *heiau* is called Hapupu and is in the area of Paumakua, which means "all fiery eyed" (Kamakau 1991:61–67; Thrum 1922:65). The once peaceful relationship between the brothers—Kū, Haʻo, and Kaʻihikapu—is reflected in the *ʻōlelo noʻeau* "*Ke one kuilima laula o ʻEwa*. The sand on which there was a linking of arms [*kuilima*] on the breadth of ʻEwa" (Pukui 1983:191).

Kahahana

Chief Kahahana was the last independent ruler of Oʻahu. Born into a high ranking family on Oʻahu, Kahahana was sent to Maui to grow up in the court of his relative Chief Kahekili—ruler of Maui, Molokaʻi, Lānaʻi and Kahoʻolawe (Cordy 2002:42).

According to one *moʻolelo*, Kahahana was sent by Chief Kahekili to Waikīkī to meet with a *kahuna* (priest) named Kaʻōpulupulu. At first, Kahahana was a benevolent leader and cared for the people of Waikīkī; however, over time he grew ruthless and violent towards the people. Angry at Kahahana's behavior, Kaʻōpulupulu left Oʻahu and returned to Maui.

When Chief Kahekili learned of what had happened, he was furious. He ordered Kaʻōpulupulu to take his son, Kahulupue, and return to Oʻahu where they were to reunite with Kahahana in Waiʻanae. When they arrived, they were violently abused by Kahanana's men, who were following his order to physically stab and stone Kahulupue. Eventually, Kahekili learned about what had transpired and in retaliation he sent his men out to kill Kahahana, who had escaped with his wife, Kekuapoʻi, and friend Alapaʻi into the depths of ʻEwa.

For two years and four months, the three of them traveled and hid in the depths of ʻEwa, moving from Moanalua down to the lochs of Puʻuloa, before heading *mauka* (upland) to Waipiʻo, Wahiawā, Helemano, and Līhue. Eventually tired of running, Kahahana sent his wife to negotiate with her brother Kekuamanoha in Waikele. After learning the true hiding-place of Kahahana and Alapaʻi, Kekuamanoha sent a message to Kahekili who, at the time, was residing in Waikīkī. Seizing hold of this opportuinty, Kahekili sent his men to kill Kahahana and Alapaʻi at the plains of Hōʻaeʻae in Honouliuli.

Waipiʻo Kīmopō

After Kahahana's death in 1785, his father, ʻElani, conspired with other Oʻahu chiefs to kill Kahekili and his men. The Oʻahu chiefs coordinated to all attack on the same night. ʻElani and his men were to kill the chiefs of ʻEwa; Chief Makaʻioulu and Pupuka would attack Kahekili in Waikīkī; and Konamanu and Kalikoʻonui would kill Huʻeu in Waialua.

Someone informed Kahekili about the plot, and he sent a messenger to ʻEwa and Waiʻalua to warn the other men. The chiefs in ʻEwa escaped to the *moku* of Kona, but the messenger who was sent to Waialua did not make it in time, and so Huʻeu and his men were killed. To avenge the death of Huʻeu, Kahekili gathered his men together to wage war with the districts of ʻEwa and Kona, ultimately killing all of the men, women, and children. It is said that the Kahoaʻaiʻai stream in ʻEwa was filled with dead bodies, and that the water flowed red and tasted bitter from the smashed brains of those who were massacred (Kamakau 1992:138). This incident was known as the Waipiʻo Kīmopō (Waipiʻo assassination) because the plot originated there, and from that day forward, ʻEwa was known as, "the land of deadly plots" (Sterling and Summers 1978).

3.1.5 Ka ʻOihana Mahi ʻAi no Honouliuli—Traditional Agriculture of Honouliuli

The backbone of Hawaiian society were the planters and fishermen, and *mahi ʻai* and *lawaiʻa* are the traditions of farming and fishing in Hawaiʻi. While the ruling *aliʻi* (chiefs) bloodlines fell in and out of power, the people who farmed and fished remained a constant and stable presence in Hawaiian society. In old Hawaiʻi, the upland farmers traded crops for fish with those who lived along the shore, exchanging the things they cultivated or collected to obtain what they could not easily get. This bond between *mauka* and *makai* has been preserved in the following *ʻōlelo noʻeau*: "*Ko koā uka, ko koā kai* (those of the upland, those of the shore)" (Pukui 1983:196).

Most of the people living in any *ahupuaʻa* were *makaʻāinana* (commoners). Literally, *makaʻāinana* means "people that attend the land." They prepared, planted, and harvested their own plots. They also cultivated the lands of whichever *aliʻi* happened to be in control at the time. The land was theirs to use; no one ever held title to it. Despite the absence of ownership, this system enjoyed a fairly high degree of stability. It was in the interest of the *aliʻi* to treat people fairly and maintain the occupancy of industrious *makaʻāinana*, who were free to relocate.

Taste the Kāī-koi of ʻEwa

From the abundance of *wai* grew a renowned variety of *kalo* named Kāī O ʻEwa. There were many sub-varieties of Kāī O ʻEwa: Kāīkeʻokeʻo, Kāīʻeleʻele, Kāīuliuli, Kāīʻulaʻula, Kāīkea, and Kāīkoi. Kāīkeʻokeʻo was said to be beloved by the chiefs for its unique aroma and flavor. Kāīkoi was known to spread out, quickly sending out *oha* (shoots) until it covered the entire *loʻi* (terrace). It was said that anyone who married someone from the area would never leave because the love of the *kāikoi* was so strong. This sentiment is captured in the following *ʻōlelo noʻeau* (Pukui 1983:305):

> Ua ʻai i ke kāi-koi o ʻEwa. (2770)
>
> *He has eaten the* kāi-koi *taro of ʻEwa.*
>
> Kāi *is Oʻahu's best eating taro; one who has easten it will always like it. Said of a youth or a maiden of ʻEwa, who, like the* kāi *taro, is not easily forgotten.*

At the base of Honouliuli Stream where the water deposits into the bay lies an area that was once known for its *loʻi kalo*. The abundance of water in this particular *ʻāina* nourished a bounty of crops that once sustained hundreds of Native Hawaiians.

3.1.6 Ka ʻOihana Lawaiʻa no Honouliuli—Traditional Fishing of Honouliuli

Honouliuli was known for the rich marine life that filled the surrounding waters. An oral history interview with Mark Kahalekulu (2014) revealed the many fish that filled the area, including *moi* (*Polydactylus sexfilis*), *awa* (*Chanos chanos*), *kala* (*Naso unicornis*), *palani* (*Acanthurus dussumieri*), *manini* (*Acanthurus triostegus sandvicensis*), *ʻōhua* (*Acanthurus triostegus sandvicensis*), *ʻamaʻama* (*Mugil cephalus*), *āholehole* (*Kuhlia sandvicensis*), *ʻōpae* (*Halocaridina rubra*), *heʻe* (*Octopus cyanea*), and the prized *ʻanae* (adult mullet, *Mugil cephalus*).

Traditionally *ʻanae* were associated with the waters of ʻEwa. These *ʻanae* traveled along the coast from Honouliuli in ʻEwa to Laʻiemaloʻo in the district of Koʻolauloa and were known *as Kaʻanae o Kaihuopalaʻai* (The *ʻanae* of Kaihuopalaʻai). A *moʻolelo* explains that Kaihuopalaʻai was the father of a supernatural eel named Laumeki, and the area where his family resided lacked fish. So Laumeki made a counter-clockwise circuit of the island, leading the fish from Honouliuli near Puʻuloa (Pearl Harbor) to his home in Laʻiemaloʻo. It's believed that the *ʻanae* of the area still travel this route today.

An alternate *moʻolelo* depicts the migration of the *ʻanae* as *ʻamaʻama,* young mullet. Although in a different life stage, these *iʻa* followed the same migratory pattern, moving from Honouliuli to Laʻie (Titcomb and Pukui 1977:64).

> Kaihuopalaʻai (a place) was famous from olden times down to the time when the foreigner ruled Honouliuli, after which time the famous old name was no longer used [...] It is said that in those days the *ʻamaʻama* heard and understood speech, for it was a fish born of a human being, a supernatural fish. These were the keepers of this fish [...] Kaulu, the husband, and Apokaʻa, the wife, who bore the children, Laniloa, the son, and Awawalei, the daughter. These two children were born with two other supernatural children, an eel and a young *ʻamaʻama*. From this *ʻamaʻama* child came all the *ʻamaʻama* of Kaihuopalaʻai, and thus did it gain renown for its *ʻamaʻama* [...] Laniloa went to Laʻie in Koʻolauloa, and there he married. His sister remained in Honouliuli and married Mokueo, and to them were born the poeple who owned the *ʻamaʻama*, including the late Mauliʻawa and others [...] These were fishermen who knew the art of making the fish multiply and make them come up to the sand [...] While Laniloa lived in Laʻie he heard of the great schools of *ʻamaʻama* at Honouliuli. There were no *ʻamaʻama,* large or small, where he lived. He thought of his younger sister, the *ʻamaʻama*, and guessed that [this] was the reason the place was growing so famous. He said to his wife, "I shall ask my sister to send us some fish for I have a longing for *ʻamaʻama*..." Laniloa left Laʻie to go to ʻEwa... He reached the house and found his parents and sister. His parents were quite old for he had been away a long time... He said, "I have come to my *ʻamaʻama* sister for a bit of fish as there is none where I live except for some *au moana* (sea-faring) crabs." [...] After three days and nights he left ʻEwa [...] The fish were divided into two groups, those that were going and those that were staying. As Laniloa's sister went along the shore, she went in her human form. The fish came from, that is, left Honouliuli without being seen on the surface. They went deep under water until they passed Kaʻaʻaliʻi, then they rose to the surface [...] They reached Waikīkī [...] They went on. The sister slept at Nuʻupia while the fish stopped outside of Na Moku Manu [...] Finally she reached Laʻie, and to this day this is the route taken by the *ʻamaʻama*.

The *ʻōlelo noʻeau* "*ka iʻa hali a ka makani* (the fish blown by the wind)" refers to this *moʻolelo* and the annual migration pattern of the *ʻanae* (Pukui 1983:145). When the *ʻanae* migrate they are known as *ʻanae-holo* (running or travelling mullet), but when they remain offshore or in the same area they are refered to as *ʻanae-pali* (cliff mullet).

Within the ʻEwa Moku, Puʻuloa Ahupuaʻa was known for the great variety of shellfish. The *pipi* (Hawaiian pearl oyster) was a highly valued delicacy that was eaten raw. The shells were prized for making attractive fish lures that would be used to catch *aku* (*Katsuwonus pelamis*).

ʻEwa was also known for the *limu* (algae) that covered the coastline. In his interview, Kahalekulu (2014) shared that beds of *limu* could reach a height of two to three feet. This also included various types such as *līpoa* (*Dictyopteris plagiogramma*)*, kala* (*Sargassum echinocarpum*), and *manauea* (*Gracilaria coronopifolia*). During certains seasons, Kahalekulu recalled that as a child he could smell the *limu* from Pōhākea Elementary School. Kahalekulu shared that his

parents stressed the importance of managing the natural resources and only taking what one needed; however, due to multiple changes within the region, the *limu* began to dissappear until it was no longer able to replenish itself (Kahalekulu 2014).

3.2 POST-CONTACT PERIOD

A significant turning point in Hawai‘i’s history is the arrival of Captain James Cook in 1778 which began an influx of visitors from the West who ultimately left a lasting effect on the landscape and people. The effects of Western influence on Honouliuli are described below.

3.2.1 Barbers Point

The post-Contact name Barbers Point comes from Captain Henry Barber, whose ship, the *Arthur*, ran aground there.

> In October 1796, a ship went aground at Kalaeloa, Oahu. This ship had visited the island on several occasions during the rule of Ka-lani-ku-pule. This was the first time a foreign ship had grounded on these shores. Kamehameha was on Hawaii, but Young had remained on Oahu. All the men on the ship came ashore at night in their boats. At daylight when the ship was seen ashore Ku-i-helani placed a ban on the property of the ship and took care of the foreigners. Hawaiian divers recovered the valuables, and they were given over to the care of Ku-i-helani, but part were given by Captain Barber to the men who had recovered them. (Kamakau 1991:174)

Prasad (2018) summarized the stories about Captain Barber, as related in Sterling and Summer’s Sites of Oahu, which paint him as an unsavory character.

> Sterling and Summers (1978) describe accounts related to Captain Barber, mostly re-telling the same event(s) with slight variations. One of the stories recalls an incident just prior to the ship running aground when Captain Barber tried to trick Kamehameha by giving the king a gift of a keg of diluted brandy because he felt that providing a keg of good brandy would be a waste. After the wreck of his ship, Barber appealed to the king for assistance in retrieving goods that had been stolen off the ship. During a feast, the ship’s captain found the ‘awa he was given had been similarly diluted by Kamehameha (Joseph Emerson, as told to Mrs. Beatrice Greenwell, in Sterling and Summers 1978:39). Some accounts describe Barber as an unscrupulous man whose primary interest was in trading sea otter pelts and transporting supplies to and from penal colonies in Australia (Sterling and Summers 1978:39–40). (Prasad 2018:10)

3.2.2 Population and Landscape

One of the earliest Western accounts of Kalaeloa (Barbers Point) is by Captain George Vancouver who led a voyage to Hawai‘i in 1792. Of Kalaeloa, he wrote “this tract of land was of some extent but did not seem to be populous, nor to possess any great degree of fertility; although we were told that at a little distance from the sea, the soil is rich, and all necessaries of life are abundantly produced” (Vancouver and Vancouver 1798:361–363).

Although it is the driest region of the island, Native Hawaiians did subsist on the ‘Ewa Plain. Its residents had access to the resources of the Wai‘anae Mountains, as well as the marine resources in Pearl Harbor; in addition to fishing, wetland agriculture was maintained in the irrigable lowlands of the harbor.

However, in Honouliuli, just as it was across the islands, introduced diseases drastically decreased the Native Hawaiian population. Missionaries first arrived in the islands in the 1820s and undertook census data collection. They recorded a Native Hawaiian population of 1,026 in 1832, but by 1836, it had decreased to 870 (Schmitt 1973:19–22). A Protestant missionary named Artemas Bishop worked in ʻEwa and observed that:

> The people of the district are rapidly diminishing, and whole neighborhoods where in former years were numerous families and cultivated lands, there are now no inhabitants, and the land is left to run to waste. The fathers have died off, and the children wander into other parts, and there are none to fill their places. (Bishop 1854)

3.2.3 Māhele, Private Land Ownership, and New Enterprises in Honouliuli

In 1848, King Kamehameha III and 245 *aliʻi* (royalty) and *konohiki* (landlord) came together to divide the lands of the kingdom into three classifications. The Crown and the *aliʻi* received their land titles and awards for both whole *ahupuaʻa* and individual parcels within an *ahupuaʻa* which were then subsequently formally granted in 1850 (Alexander 1890:114). The lands given to the *aliʻi* and *konohiki* were referred to as Konohiki Lands, and lands retained by the King as Crown Lands. The distinction of Crown Land is important and defined as

> private lands of His Majesty Kamehameha III., to have and to hold for himself, his heirs and successors forever; and said lands shall be regulated and disposed of according to his royal will and pleasure subject only to the rights of tenants. (Kingdom of Hawaii 1848)

At the death of Kamehameha IV and with lack of a clear heir, some confusion as to the inheritance of Crown Lands and whether or not it followed the family line or the throne. It was decided by the Supreme Court that under the confirmatory Act of June 7th, 1848, "the inheritance is limited to the *successors* to the *throne* [...] the wearers of the crown which the conqueror had won," and that at the same time, "each successive possessor may regulate and dispose of the same according to his will and pleasure as private property, in the manner as was done by Kamehameha III" (Alexander 1890:121).

The *ahupuaʻa* of Honouliuli was claimed by Kamehameha I following his conquest of Oʻahu. He gave the *ahupuaʻa* to Kalanimoku, who passed the land on to his sister, Wahinepiʻo. The entire *ahupuaʻa* was awarded to Kamehameha's granddaughter, Miriam Keʻahi-Kuni Kekauʻōnohi, except for *kuleana* awards, located primarily within and adjacent to the Honouliuli Gulch. Upon Kekauʻōnohi's death, the lands passed to her third husband, Levi Haʻalelea. Upon his death, the land passed to his surviving wife, who then leased the land to James Dowsett and John Meek for ranching. In 1877, most of the land in Honouliuli was sold to James Campbell. Campbell used much of the land for cattle grazing and agricultural production.

At the time, there was not much water in the dry plains of ʻEwa. In 1879, Campbell imported a well-driller from California and bore 250 feet into the earth where "a sheet of pure water flowing like a dome of glass from all sides of the well casing" gushed forth (Campbell 2003). With the discovery of water and the presence of a new fence, Campbell opened Honouliuli Ranch in 1881 and focused his efforts on cattle ranching (Campbell 2003).

In 1890, the Ewa Plantation Company was established, who controlled over 12,000 acres of land by the 1920s. A 1913 Military Surveys map (Battalion of Engineers 1913) indicates the plantation expanded into the northeast portion of the current project (Figure 7).

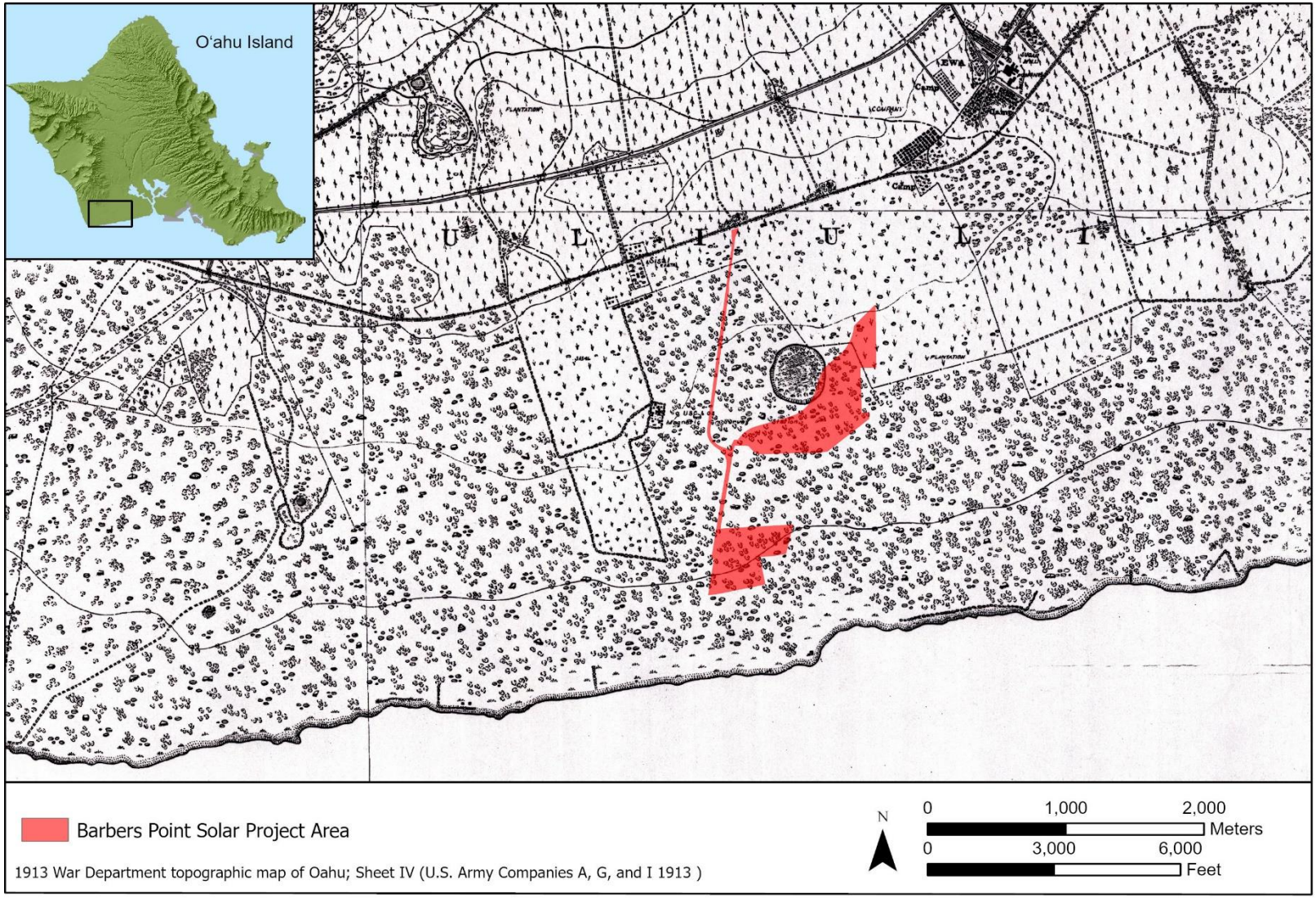

Figure 7. Military survey map showing Ewa Plantation fields in northeastern portion of the project area. Individual plant symbols indicate commercial agriculture.

In the 1920s, the Ewa Plantation Company had great success, being known as the richest sugar plantation in the world, and in the following decade, it expanded to become a community with homes, schools, and other infrastructure to support the laborers (Campbell 1994). At that time, the Honouliuli Ranch held the lease on 20,000 acres of land. The OR&L Railway (Oahu Rail & Land Company), which was established in 1889, crossed the ʻEwa Plain and was in operation until 1947 (Figure 8). Sugar industry activities continued in the area until the 1970s, and military training activities were conducted in some areas during the 1930s and 1940s. Both had detrimental impacts to the natural and cultural landscape of the ʻEwa Plain (see Tuggle 1997).

Figure 8. OR&L Co. train (Hawaiʻi Historic Foundation 2014).

In addition to the Crown Lands passed down by Kamehameha I, some *makaʻāinana* of Honouliuli made claims for their house lots and farm lands. In an act ratified on August 6th, 1850, the gathering rights of the common people for personal use, which included the gathering of both terrestrial and marine resources, in addition to the right to water and the right-of-way on the lands of the *konohiki*, were guaranteed and embodied in Section 10477 of the Civil Code (Alexander 1890:114–115). By this same act, resolutions passed by the Privy Council granted fee-simple titles, free of all commutation, with the exception of awards granted within the towns of Honolulu, Lāhainā, and Hilo, to all native tenants for their cultivated lands and house lots (hereafter referred to as *kuleana* lands) (Alexander 1890:115). Claims of the native tenants, or *kuleana* land claims, were presented to and heard by the Land Commission whose duty was to:

> ascertain the nature and extent to each claimant's rights in land, and to issue an Award for the same which is prima facie evidence of title "and shall furnish as good and sufficient a ground upon which to maintain an action for trespass, ejectment or other real action against any other person or persons whatsoever, as if the claimant, his heirs or assigns had received a Royal Patent for the same." (Alexander 1890:110)

Testimony for *kuleana* lands often included claims for multiple *ʻili*, or *ʻāpana*, located both *mauka* and *makai*. These claims were recorded under a single *helu*, or case number, and brought before the Land Commission for consideration. *Kuleana* land awards, or *kuleana* claims that were approved by the Land Commission, were granted to tenants of the land, Native Hawaiians, naturalized foreigners, non-Hawaiians born in the islands, or long-term resident foreigners, who could prove occupancy on the parcels prior to 1845 (hereafter referred to as

Land Commission Awards [LCA]). Despite the effort to allocate lands to the *makaʻāinana*, much of these lands would ultimately be obtained by foreigners in payment for services rendered to the Kingdom or sold as land grants for commercial agriculture enterprises. *Kuleana* land awards for Honouliuli are detailed in Table 2.

Table 2. Kuleana Land Awards Associated with Honouliuli

Place Name	LCA No. and Description
Aihonu (moʻo)	LCA 831 to Kaekuna: "Apana 2. Mau loi 2 me ke kula ma ka moo Aihonu, Poohilo, Honouliuli, E.O. [0.126 acre] Apana 3. He kahuahale ma kula o Aihonu, Honouliuli, E.O. [0.365 acres] Apana 4. He loi ma Aihonu, Poohilo, Honouliuli, E.O. [0.085 acre]." Also LCA 847:2 to Hinaa and LCA 1570:1 to Kekua 1. (AB 2:218, 241; 6:137)
Aimea (kōʻele)	Claim no. 1666B by Kuahilo for "an apana moo aina called Kaleipuawa in the ili of Poohilo, Honouliuli, Ewa, Oahu… bounded H[onolulu] by the koele of Aimea" (FT 9:132)
Ako (*loʻi*)	LCA 763 to Keliiaa: "Apana 2. He loi Ako ma Poohilo, Honouliuli, E.O." 0.119 acre. LCA 832 to Opiopio: "He moo kalo Ako, ili o Poohilo, Honouliuli, Ewa, Oahu." 0.669 acre. (AB 2:163, 219)
Alae (*kōʻele, loʻi*)	Claim no. 1580B by Kapioho: "Apana 1. Namooelua [q.v.] is bounded M[auka] by the loi Alae of deponant [Kikala, claim no. 681] & the koele of Alae" (FT 9:133)
Haalelenui (*loʻi*)	LCA 1570 to Kekua 1: "Ap. 2. He loi Haalelenui ma Aihonu, Poohilo, Honouliuli, Ewa. Oahu." 0.248 acre
Hakelo (*loʻi*)	Claim no. 1605B by Nakai is for "a moo aina in 3 pieces, & having 6 lois, one called Hakelo" (FT 9:131.)
Halawa (*moʻo*)	LCA 845 to Kaukahiko: "[Apana 1] Moo aina Halawa, ili o Niukee, Honouliuli, Ewa, Oahu." 1.234 acre (AB 7:258)
Haleokane (*loʻi*)	Claim no. 5654:2 by Kuhiana is for "a loi called Kalokoloa in the moo aina Waianu, ili Poohilo, Honouliuli, Ewa, Oahu… Bounded Makai by the loi Haleokane of Kekua [claim no. 1570 or 1598?]" (FT 9:134)
Halulu (*moʻo*)	LCA 898 to Kaneaola: "Apana 3. Moo aina Halulu, ili o Polapola, Honouliuli, E.O." (AB 2:297)
Haole (*moʻo*)	LCA 839 to Kaaiawaawa: "Ap. 5. He kula mahiai iloko o ka moo aina o Haole." 0.33 acre (IN 765; AB 2:233)
Hiwalalo (*moʻo*)	LCA 1580B to Kapioho: "Section 2 - Is in the moo land of Hinalalo. Mauka by Alae ditch / Honolulu by Kapalakai of Maio moo land / Makai by the konohiki's poalima / Waianae by Lopanui, Kalaoa's moo land." 2 ap., 1.505 acres (RP 2868)
Hiwaluna (*loʻi*)	Claim no. 5653C [LCA 751] by Kalauli for "3 lois called Hiwalalo in the moo aina Malua, ili of Polapola..." is bounded "Makai by the loi Hiwaluna no Keliiaa [claim 763:3]" (FT 9:143)
Hopeiki (*moʻo*)	LCA 1701 to Alauka: "Ap. 1. Ekolu loi, Hopeiki, ili o Poohilo, Honouliuli, Ewa, Oahu." 0.802 acre (AB 6:136)
Hopenui (*moʻo*)	LCA 1701 to Alauka: "Ap. 2. He loi iloko o Hopenui, Poohilo, Honouliuli, Ewa, Oahu." 0.087 acre (AB 6:136)
Iao (*loʻi*)	Claim no. 5653 by Kua: "1st a moo aina of 2 lois & a kula called Kahui in the ili of Maui, Honouliuli, Ewa, Oahu. It is bounded... W[aianae] by the loi called Iao of Leleaupa." (FT 9:142)
Kaaimano (*loko*)	Claim no. 5653B by Kanehekili in the *moʻo* [Ka]Mookahi is bounded "makai by the loko Kaaimano of konohiki." (FT 9:143)
Kaaiopelu (*loʻi*)	Claim no. 1570 by Kekua 1: "Apana 4. 2 lois called Kaaiopelu & Kalokoloa in the moo aina of Waianu, Poohilo, Honouliuli, Ewa, Oahu" (FT 9:139)

Place Name	LCA No. and Description
Kaakau (*ʻili ʻaina*)	LCA 755 to Kainohananui for Kaope: "Apana 2. Kahuahale i kula o Kaakau Honouliuli." 1.53 acres (IN 765; AB 2:149)
Kaamaikeaha (*loʻi*)	Claim no. 5653C [LCA 751] by Kalauli for "3 lois called Hiwalalo in the moo aina Malua, ili of Polapola" is bounded "Waianae by the loi Kaamaikeaha of Mili." (FT 9:143)
Kaaumakua (*ʻili ʻaina*)	LCA 1719 to Hiilea is for his "Moo aina Kanuwahine, ili o Kaaumakua, Honouliuli, E.O." 1.01 acres. Also mentioned in LCA 748 to Kalauhala, LCA 756 to Kauouo, LCA 762 to Kalama, LCA 768 to Pio for Wahinenui, LCA 905 to Kaimuena, LCA 910 to Nunu, LCA 917 to Kaulu for Kaoliko, LCA 1570B to Pekane, 1570C to Hanolowaa, LCA 1580 to Kanahuna and LCA 1670 to Moano. Claim no. 883 by Kumupopo was not awarded. (IN 766; AB 6:130; NR 2:502)
Kaauwaiwai (*moʻo*)	LCA 1570C to Naholowaa: "Ap. 2. He moo aina Kaauwaiwai, ili o Kaaumakua, Honouliuli, Ewa, Oahu." 1.674 acres. Written "Kaauwewai" in FT 9:140 (AB 6:138)
Kahakumaka (*loʻi*)	Claim no. 5653 by Kua: "1st a moo aina of 2 lois & a kula called Kahui in the ili of Maui, Honouliuli, Ewa, Oahu. It is bounded M[auka] by the loi called Kahakumaka of Koi" (FT 9:142)
Kahewamakawalu (*moʻo*)	LCA 755 to Kainohananui: "He moo aina Kahewamakawalu, Niukee, Honouliuli, E.O." (AB 2:149)
Kahiwapalaai (*ʻili ʻaina)*	Claim no. 1580B by Kapioho "consists first of 2 moos named Namooelua [q.v.] & 2d one loi in the moo aina Hiwalalo, both in the ili Kahiwapalaai, Honouliuli, Ewa, Oahu." In the Award Book Namooelua is in the *ʻili* of Polapola. This is probably a garble for Kaihuopalaai (q.v.). (FT 9:133)
Kahoopauli (*moʻo*)	LCA 754 to Kaunahi: "Apana 2. He 3 mau loi iloko o ka moo Kahoopauli, Niukee, Honouliuli, W. O." 0.523 acre. (AB 2:147)
Kahui (*moʻo*)	LCA 839 to Kaaiawaawa: "Apana 3, 4. He apana moo aina Kahui, ili o Kamilomilo, Honouliuli, E.O." LCA 5950 to Pihana no Puniawa: "He moo aina, Kahui, ili o Kamoku, Honouliuli, Ewa, Oahu." 1.156 acres. Also recorded in LCA 1580 to Kanahuna: "Ap. 3. Moo aina, Kahui, ili o Kamilomilo, Honouliuli, Ewa, Oahu." (AB 2:233, 6:133, 6:135) Claim no. 5653 by Kua: "1st a moo aina of 2 lois & a kula called Kahui in the ili of Maui, Honouliuli, Ewa, Oahu." (FT 9:142)
Kahuilalo (*moʻo*)	LCA 1713 to Kealani: "Ap. 1. He moo aina, Kahuilalo, ili o Niukee, Honouliuli, Ewa, Oahu." 1.07 acres (AB 6:130)
Kahuiluna (*moʻo*)	LCA 876 to Nohunohu: "Moo aina o Kahuiluna, ili o Niukee, Honouliuli, E.O." 1.047 acres (AB 2:277)
Kahuiopalaai (*ʻili ʻaina*)	Claim no. 5670B by Kaohai "is called Lopanui in the ili Kaihuopalaai, Honouliuli, Ewa, Oahu" but the LCA is placed in Polapola (q.v.) (FT 9:137)
Kailikahi (*ʻili ʻaina*)	LCA 752 to Haae: "He ili aina Kailikahi, Honouliuli, Ewa, Oahu." 5.448 acres. LCA 839 to Kaaiawaawa: "Apana 2. Kahuahale, kula o Kailikahi, Poohilo, Honouliuli." 0.426 acre (IN 766; AB 2:143, 233)
Kalahu (*loko*)	Claim no. 1570C by Naholowaa is for "a moo aina called Kaauwewai [sic, Kaauwaiwai] in the ili Kaaumakua, Honouliuli, E.O.... contains 3 lois & a kula mahiai and is bounded... Makai by the loko of konohiki called Kalahu." (FT 9:140)
Kalaipuawa (*moʻo*)	LCA 839 to Kaaiawaawa: "Apana 1. He moo kalo Kalaipuawa, ili o Poohilo, Honouliuli, Ewa, Oahu." 1.127 acres. Misspelt "Kaluipuawa" (q.v.) in LCA 1666B to Kuahilo but written "Kaleipuawa" in FT 9:132
Kalawaha (*loʻi*)	Claim no. 1580 by Kanahuna is for "3 lois and a kahuahale in 2 pieces. The lois are named Kalawaha, Poina & Palakai in the ili Kamilomilo, Honouliuli, Ewa, Oahu.... Apana 2 [kahuahale] is bounded... W[aianae] by the koele Kalawahaiki." (FT 9:133)
Kaleipuawa (*moʻo*)	Claim no. 1666B by Kuahilo for "an apana moo aina called Kaleipuawa in the ili of Poohilo, Honouliuli, Ewa, Oahu." (FT 9:132)

Place Name	LCA No. and Description
Kaloiiki (*loʻi*)	Claim no. 1570 by Kekua 1: "Ap. 2. A loi called Haalelenui in the moo Waianu, ili of Poohilo, bounded M[auka] by the lois Kamalua and Kaloiiki of Kauhailepa (claim no. 911)." (FT 9:139)
Kaloiliili (*loʻi*)	LCA 901 to Kuahine: "Apana 2. Kaloiliili, ili o Niukee, Honouliuli, E.O." (AB 2:301)
Kaloiloa (*moʻo*)	Claim no. 1713:1 by Kealani is "a moo aina called Kahui in the ili Niukee, Honouliuli, Ewa, Oahu, contains 3 lois & is bounded... Makai by the moo Kaloiloa of Aoao [claim no. 892], W[aianae] by the auwai & a loi called Kaloiiki." (FT 9:136)
Kalokoeli (*moʻo*)	LCA 1565 to Kaalauahi: "Ap. 1. He moo aina Kalokoeli, N[i]ukee, Honouliuli, Ewa, Oahu." 1.642 acres. (AB 6:131)
Kalokoloa (*loʻi*)	Claim no. 5654:2 by Kuhiana is for "a loi called Kalokoloa in the moo aina Waianu, ili Poohilo, Honouliuli, Ewa, Oahu." (FT 9:134) LCA 914 to Kamaala: "He moo aina Kalokoloa, ili o Niukee, Honouliuli, E.O." 0.791acre. (AB 2:331)
Kalole (*moʻo*)	LCA 768 to Pio: "Ap. 1. He moo aina Kalole, ili o Niukee, Honouliuli, E.O." 0.358 acre. "Apana 2. He kahuahale ma Kalole, ili o Niukee." 0.202 acre. In claim no. 1605B by Nakai, "Kalole is one of 6 lois in the ili Niukee." (AB 2:171; FT 9:131)
Kaluakanaka (*moʻo*)	LCA 832 to Opiopio: "Ap. 2. Elua loi, Kaluakanaka, Poohilo, Honouliuli, E.O." 0.538 acre (AB 2:219)
Kaluamanoiki (*moʻo*)	LCA 832 to Opiopio: "Ap. 2. Elua loi, Kaluakanaka, Poohilo, Honouliuli, E.O." 0.538 acre (AB 2:169)
Kaluamoo (*moʻo*)	LCA 1666 to Mauwele: "He moo kalo Kaluamoo, ili o Poohilo, Honouliuli, Ewa, Oahu." 0.506 acre. LCA 907 to Luana: "Apana 1. He moo aina Kaluamoo, ili Niukee, Honouliuli, Ewa, Oahu." 1.176 acres. (AB 6:135, 7:650)
Kaluamooiki (*ʻili ʻaina*)	LCA 766 to Paele: "Apana 2. He kahuahale ma kula o Kaluamooiki, Honouliuli." 0.316 acre (IN 766, AB 2:169)
Kaluanonomuku (*kūʻula*)	Claim no. 1570 by Kekua 1: "Apana 3, a kula mahiai called Kaluanonomuku in the moo aina of Aihonu, ili of Poohilo, Honouliuli, Ewa, Oahu." (FT 9:139)
Kamaieleele (*loʻi*)	Claim no. 5653 by Kua: "Apana 2, one loi in the moo aina of Kamalua in the ili Polapola, Honouliuli, Ewa, Oahu & is bounded... W[aianae] by the loi Kamaieleele of Laamaikahiki (no. 874)." (FT 9:142)
Kamaihiili (*moʻo*)	LCA 831 to Kaekuna: "He moo aina Kamaihiili, Poohilo, Honouliuli, E.O." 1.030 acres. (AB 2:217)
Kamaipipipi (*ʻili ʻaina*)	LCA 760 to Kuhemu: "Apana 2. He kahuahale ma kula o Kamaipipipi, Honouliuli." 0.198 acre. Also LCA 907 to Luana. (IN 766; AB 2:157, 7:260)
Kamalua (*loʻi, moʻo*)	Claim no. 5950 by Pihana: "Apana 2. 1 loi o Kamalua ka inoa iloko o ka moo o Kekee ma ka ili o Kamoku i Honouliuli, Ewa, Oahu." Written "Malua" in FT. (NT 9:287; FT 9:141) LCA 911 to Kauhailopa: "He moo aina Kamalua, Poohilo, Honouliuli, E.O." 1.245 acres. (AB 2:327) Claim no. 5653 by Kua: "Apana 2, one loi in the moo aina of Kamalua in the ili Polapola, Honouliuli, Ewa, Oahu & is bounded... Makai by the loi Kamalua of Kikala (no. 881)." Claim no. 5653C [LCA 751] by Kalauli is for "3 lois called Hiwalalo in the moo aina Malua, ili of Polapola." (FT 9:142, 143).
Kamilomilo (*ʻili ʻaina*)	LCA 839 to Kaaiawaawa: "Apana 3. He apana moo aina Kahui, ili o Kamilomilo, Honouliuli, E.O." Also Apana 4. LCA 917 to Kaulu: "Ap. 1. He moo aina Kumuniu, ili o Kamilomilo, Honouliuli, Ewa, Oahu." Also LCA 1703 to Aemaikai. Claim no. 757 by Kaniau was not awarded. (IN 766; AB 2:233, 333, 6:139; NR 2:414)

Place Name	LCA No. and Description
Kamoku (*ʻili ʻaina*)	LCA 886 to Kahalewai: "[Apana 1.] He moo aina Pi, ili Kamoku, Honouliuli, E.O." Claim no. 5950 by Pihana: "Apana 2. 1 loi o Kamalua ka inoa iloko o ka moo o Kekee ma ka ili o Kamoku i Honouliuli, Ewa, Oahu." Also LCA 751 to Kalauli, LCA 753 to Manuwa, LCA 906 to Kanoho for Abrahamson, LCA 1672 to Makue. (IN 766; AB 2:141, 145, 309, 6:133, 7:259)
Kamooiki (*loʻi*)	LCA 911 to Kauhailopa: "Ap. 2. He loi Kamooiki, Hopenui, Poohilo, Honouliuli, E.O." 0.389 acre. (AB 2:327)
Kamookahi (*moʻo*)	LCA 5653B to Kanehekili: "Ap. 1. He kula iloko o Kamookahi, Poohilo, Honouliuli, Ewa. Oahu. Ap. 2. He loi iloko o Kamookahi, Poohilo..." 0.833 acre in the two apana. Written "Mookahi" in FT 9:143. (AB 6:138)
Kamoomuku (*moʻo*)	LCA 933 to Uia: "Ap. 1. He moo aina, Kamoomuku, ili o Niukee, Honouliuli, Ewa. Oahu." 0.637 acre. (AB 6:132)
Kamuku (*moʻo*)	LCA 892 to Samuela Aoao: "Apana 1. He moo aina Kamuku ili o Niukee, Honouliuli, E.O." 1.387 acres. (IN 767; AB 2:291)
Kamumuku (*moʻo*)	LCA 1573 to Kawahamana: "Ap. 1. He moo aina Kamumuku, ili o Niukee, Honouliuli, Ewa, Oahu." 0.671 acre. (AB 6:131)
Kaneakiha (*moʻo*)	LCA 1672 to Makue: "He moo aina Kaneakiha, ili o Kamoku, Honouliuli, Ewa, Oahu." 1.699 acres. (AB 6:133)
Kanenelu (*moʻo*)	LCA 990 & 1688 to Poopuu: "He moo aina Kanenelu, ili Loloulu, Honouliuli, Ewa, Oahu." 0.712 acre (AB 6:133)
Kanuoopu (*moʻo*)	LCA 762 to Kalama: "He moo aina Kanuoopu, ili o Kaaumakua, Honouliuli, E.O." 5.0 acres. Written "Kanuoopa" in FT 9:140. (AB 2:161)
Kanuwahine (*moʻo*)	LCA 1719 to Hiilea: "Moo aina Kanuwahine, ili o Kaaumakua, Honouliuli, Ewa, Oahu." 1.01 acre. (AB 6:130)
Kapaiokiha (*moʻo*)	LCA 5654 to Kuhiena: "He moo kalo Kapaiokiha, ili o Maui, Honouliuli, Ewa, Oahu." 0.606 acre. (AB 6:135)
Kapalaha (*loʻi*)	Claim no. 5670C by Kumupopo: "Apana 2. A loi called Mooiki in the ili Loloulu, Honouliuli, Ewa, Oahu, is bounded M[auka] by the loi Kapalaha of Kekua (claim no. 1570 or 1598)." (FT 9:138)
Kapapapuhi (*ʻili ʻaina*)	LCA 887 to Kaihikapu: "Ap. 2. He kahuahalae ma Kapapapuhi, Honouliuli, E.O." 0.45 eka. Also LCA 767 to Hapauea, LCA 845 to Kukahiko, LCA 892 to Aoao, LCA 914 to Kamaala, LCA 1565 to Kaalauahi, LCA 1598 to Kekua 2, LCA 173 to Healani, 10933 to Uwia. Kapapapuhi is misfiled in Hoaeae in IN 765, and misspelt "Kapapahi" in IN 766–767. (IN 765; AB 2:285,291,331, 6:130,131,132, 7:258,265, 9:382; Sterling and Summers 1978:34)
Kapaua (*moʻo*)	LCA 874 to Laamaikahiki: "Apana 1. Elua loi ma Kapaua, ili o Polapola, Honouliuli. (AB 2:273)
Kapoepoe (*loʻi*)	Claim no. 5653 by Kua: "Apana 2, one loi in the moo aina of Kamalua in the ili Polapola, Honouliuli, Ewa, Oahu & is bounded... M[auka] by the loi Kapoepoe of Kikala (no. 881)." (FT 9:142)
Kauakahimalolo (*moʻo*)	LCA 933 to Uwia: "Ap. 2. Moo Kauakahimalolo, ili o Niukee, Honouliuli, Ewa, Oahu." 1.299 acres. (AB 6:132)
Kauhikuakua (*moʻo*)	LCA 1570 to Moano: "Ap. 1. He moo aina Kauhikuakua, ili o Loloulu, Honouliuli, Ewa, Oahu." 0.605 acre. (AB 6:134)
Kauilahanau (*moʻo*)	Claim no. 764 by Maeaea is "ma Kauilahanau ma Lihue i Honouliuli... [Apana 1]... ma ka Akau Pumaialau, ma ka Hikina Kalahiki, ma ka Hema Kawaipapa. [Apana 2]... ma ka Akau o Kawaipapa, ma ka Hikina o Kalahiki, ma ka Hema ke alapii o Pohakea, ma ke Komohana o Pohakea." (NR 2:420)

Place Name	LCA No. and Description
Kaulaula (*ʻili ʻaina*)	LCA 749 to Mahina is for "He ili aina o Kaulaula, Honouliuli, Ewa, Oahu. 1.358 acres" less 20 *loʻi* of Makaula containing 0.412 acre, net 0.946 acre. (IN 767; AB 9:435)
Kaumaka (*moʻo*)	LCA 1605B to Nakai: "Ap. 1. He kahuahale ma Kaumaka, ili o Niukee, Honouliuli, Ewa, Oahu." 0.255 acre. (AB 6:140)
Kauwahine (*moʻo*)	LCA 754 to Kaunahi: "Apana 1. He auwai me ka pahale ma Kauwahine, ili Niukee, Honouliuli, Ewa, Oahu." 0.456 acre. (AB 2:147)
Keaniani (*moʻo*)	LCA 768 to Pio for Wahinenui: "Apana 3. He moo aina Keanini, ili o Kaaumakua, Honouliuli, E.O." 1.687 acres. (AB 2:171)
Kekee (*moʻo*)	Claim no. 5950 by Pihana: "a loi called Malua in the moo of Kekee, ili of Kamuku [sic, Kamoku], Honouliuli, Ewa, Oahu... bounded M[auka] by the loi Kekee of Makue (no. 1672)... Makai by the moo aina Kekee..." Written "Kamalua" in NT. (FT 9:141)
Kepoe (*moʻo*, *ʻili ʻaina*)	LCA 5670C to Kumupopo: "Ap. 1. He moo aina Kepoe, ili o Kepoe, Honuliuli. E.O." 1.369 acres. (IN 767; AB 6:141)
Kepoi (*moʻo*)	Claim no. 5670C by Kumupopo: "Apana 1 is a moo aina called Kepoi in the ili Poohilo, Honouliuli, Ewa, Oahu. It contains 7 lois and a kula kahuahale." (FT 9:138)
Kihewamakawalu (*loko*)	Claim no. 1605B by Nakai for a moo aina in Niukee: "Apana 1 is bounded M[auka] by the kula of konohiki & the loko Kihewamakawalu... W[aianae] by the loi called Kapaiki of Kaunahi [claim 754] & a part of Kihewamakawalu... M[akai] by the pali of Kihewamakawalu." (FT 9:131)
Kohepalaoa (place)	Claim no. 5584 by Kauhi (not awarded) "is situated in the place called Kohepalaoa, Puuloa, Ewa, Oahu." (FT) "...kona pahale ma Kohepalaoa, he wahi pana aia ma ka ili o Puuloa, E.O." (NT) Claims no. 5977 by Mahoe, no. 5594 by Kauhane were not awarded (FT 9:144, 195; NT 9:290)
Kohumakahou (*kūʻula*)	Claim no. 1570B by Pekane: "Apana 2, the fishpond [Mokumeha] is bounded... W[aianae] by the kula alialia Kohumakahou." (FT 9:140)
Koula (*moʻo*)	LCA 917 to Kaulu: "Ap.2 [deleted] He moo aina o Koula, ili o Kamilomilo, Honouliuli, E.O." 1.958 acres. Also LCA 1703 to Aemaikai: "He moo aina Koula, ili o Kamilomilo." 1.296 acres. (AB 2:333, 6:139)
Kuaihee (*moʻo*)	LCA 1570B to Pekane: "Ap. 2. Elua moo aina i Mooiki me Kuaihee, ili o Kaaumakua, Honouliuli, Ewa, Oahu." 2.876 acres (AB 6:140)
Kuaihoe (*loʻi*)	Claim no. 5653C [751] by Kalauli for "Ap. 3, a kahuahale & a loi in Puaaluu ili of Honouliuli, E.O., bounded... W[aianae] by the loi Kuaihoe of konohiki." (FT 9:143)
Kuaiopelu (*loʻi*)	Claim no. 5653C [751] by Kalauli for "Ap. 3, a kahuahale & a loi in Puaaluu ili of Honouliuli, E.O., bounded... W[aianae] by the loi Kuaihoe of konohiki." (AB 6:137)
Kuaipuaa (*loʻi*)	Claim no. 5670B:2 by Kaohai is for "a loi called Kuamano in the moo Makawela & ili Kaihuopalaai, Honouliuli, Ewa, Oahu. It is bounded H[onolulu] by the loi Kuaipuaa." (FT 9:137)
Kuaka (*loʻi*)	LCA 901 to Kuahine: "He loi o Kuaka, ili o Niukee, Honouliuli, E.O." (AB 2:301)
Kuamano (*loʻi*)	Claim no. 5670B:2 by Kaohai is for "a loi called Kuamano in the moo Makawela & ili Kaihuopalaai, Honouliuli, Ewa, Oahu. It is bounded M[auka] by the loi Kuamanoiki." (FT 9:137)
Kumuhahane (*moʻo*)	LCA 827 to Kauakahilau: "He moo aina Kumuhahane, Poohilo, Honouliuli, E.O." 1.597 acres. Also claim no. 9351 by Kauakahilau (AB 2:213; NR 4:444)
Kumuhau (*moʻo*)	LCA 848 to Kapule: "Apana 1. He moo aina Kumuhau, ili Poohilo, Honouliuli, E.O." 0.984 acre. (AB 7:260)

Place Name	LCA No. and Description
Kumuniu (*moʻo*)	LCA 917 to Kaulu: "Ap. 1. He moo aina Kumuniu, ili o Kamilomilo, Honouliuli, Ewa, Oahu." 0.713 acre. LCA 898 to Kaneaola: "Ap. 1. He moo Kumuniu, ili o Polapola, Honouliuli, E.O." (AB 2:333, 2:297)
Kumupali (*loʻi, moʻo*)	Claim no. 8658 by Kapoli for "he loi a me kahi kula no, a me kahi kio, o Kumupali ka inoa o ua loi nei aia i Loloulu i Honouliuli" was not awarded. (NR 4:365) LCA 881 to Kikala: "He moo aina Kumupali, ili o Polapola, Honouliuli, E.O." 2.61 acres. (AB 2:281)
Kumuula (*moʻo*)	LCA 905 to Kaimuena: "Apana 2. He moo kalo, Kumuula, ili o Kaaumakua, Honouliuli, E.O." (AB 2:307)
Kumuulu (*kōʻele*)	Claim no. 1580 by Kanahuna is for "3 lois and a kahuahale in 2 pieces. The lois are named Kalawaha, Poina & Palakai in the ili Kamilomilo, Honouliuli, Ewa, Oahu. Apana 1 is bounded makai by the koele Kumuulu... Apana 2 [kahuahale] is bounded mauka by the koele Kumuulu." (FT 9:133)
Kunia (*ʻili ʻaina*)	Claim no. 764 by Maeaea (not awarded) for two parcels in Lihue, each "bounded Honolulu by vacant land called Kunia." (FT 2:285)
Kupaihi (*moʻo*)	LCA 1605B to Nakai: "Ap. 3. He loi ma Kupaihi, ili o Niukee, Honouliuli, Ewa. Oahu." 0.162 acre. (AB 6:141)
Lihue (*ʻili ʻaina*)	Claim no. 764 by Maeaea (not awarded) "is in Lihue, Honouli [sic], Ewa, in two pieces. [Part] 1 is bounded Honolulu by Kunia (land), *mauka* Kanehoa (land), *makai* by Opunahaa (land). Waianae by Pohakea (Pali). [Part] 2. Second lot: bounded *mauka* by Nakai [LCA 1605B], Honolulu by vacant land called Kunia, *makai* by Opunaha [sic] stream, Waianae by a ravine." See Kauilahanau for another description. Lihue is shown on the USGS 1928 Schofield and Waiʻanae quads at about N21-27-00, W158-06-00, in Honouliuli. It is named in a survey of Hoʻāeae as lying north and west of that land, south of Kunia Camp. Some sources extend the region northward to include Wahiawā and Waiʻanae Uka (see catalog no. 176.02.027) (FT 2:285; BCT 1:133; USGS 1928 (Schofield, Waianae); Coulter 1935:179.)
Loloulu (*ʻili ʻaina*)	LCA 872 to Kahakuliilii: "He moo aina Paakai ili Loloulu, Honouliuli, E.O." 1.66 acres. Also LCA 860 & 1688 to Poopuu, 916 to Kama, LCA1598 to Kekua 2, LCA1670 to Moana, LCA 5670C:4 to Kumupopo. Claims no. 759 by Liliu, LCA 883 by Kumupopo, LCA 1566 by Kaheananui, LCA 1688 by Poopuu, LCA 8658 by Kapoli were not awarded. (IN 767; AB 2:271, 6:141; NR 2:415,502, 3:165,210, 4:376.)
Lopanui (*loʻi*)	LCA 5670B to Kaohai: "Elua mau loi Lopanui, ili Polapola, Honouliuli, Ewa, Oahu." 0.678 acre. Placed in the ili Kaihuopalaai in FT 9:137 (AB 6:137)
Mahuna (*loʻi*)	LCA 1605B to Nakai: "Ap. 2. He moo aina ma ka ili o Mahuna, Honouliuli, E.O." 0.885 acre. But in FT 9:131, Mahuna is a loʻi in the ʻili Niukee (IN 767; AB 6:141; FT 9:131; NT 9:277)
Makaii (*ʻili ʻaina*)	LCA 1670 to Moano: "Ap. 2. He kahuahale, ma Makaii, ili o Kaaumakua [Honouliuli, Ewa, Oahu]." 0.091 acre. LCA 916 to Kama: "He kahuahale ma Makaii, Honouliuli, E.O." 0.135 acre. Claim no. 914 by Kamaala in Niukee is bounded on the south by "ka muliwai o Makaii". (NR) (IN 767; AB 6:134, 7:259; NR 2:526.)
Makawela (*moʻo*)	LCA 5204 to Kalama 2: "He moo aina Makawela ili o Polapola, Honouliuli, Ewa, Oahu." 0.925 acre. (AB 7:539)
Makawelaiki (*moʻo*)	LCA 881 to Kikala: "Apana 2. Moo Makawelaiki, ili Polapola, Honouliuli, E.O." 1.114 acres. (AB 2:281)
Makue (*moʻo*)	Claim no. 5950 by Pihana "i Kamoku i Honouliuli Ewa mokupuni o Oahu.... Eia ka lua o koʻu kuleana aina i ka moo aina o Makue." (NR 5:187)

Place Name	LCA No. and Description
Manaole (*kūʻula*)	Claim no. 1570 by Kekua 1: "Ap. 2. A loi called Haalelenui in the moo Waianu, ili of Poohilo, bounded M[akai] by the lois & kula called Manaole (claim no. 911). (FT 9:139)
Maukapuaa (*ʻili ʻaina*)	Claim no. 763 by Keliiaa: "Eia ke kolu o koʻu kuleana aina. Aia ma Mauakapuaa i Honouliuli." Not awarded (NR 2:419)
Maui (*moʻo, ʻili ʻaina*)	LCA 756 to Kauouo: "Moo aina Maui, ili Kaaumakua, Honouliuli, E.O." 1.922 acres. LCA 1580 to Kanahuna: "He pahale ma kula o Maui, ili o Kaaumakua, Honouliuli, Ewa, Oahu." (AB 2:151, 6:135) LCA 763 to Keliiaa: "Apana 1. He kahuahale me kula mahiai, kula o Maui, Hono. E.O." 3.66 acres. LCA 869 to Pue: "Apana 1. Moo aina Kumupali, ili o Maui, Honouliuli, E.O." Also LCA 910:2 to Nunu, 5653 to Kua, 1699 to Leleiupa (IN 767; AB 2:163,269,313, 6:130, 7:26)
Mauiau (*moʻo*)	Claim no. 1570B:1 by Pekane is for "3 moo ainas in one piece, called Mauiau, Mooiki & Kuaihee, being 10 lois & a kahuahale in the ili of Kaaumakua, Honouliuli, E.O." (FT 9:140)
Mokumehua (*puʻuone*)	LCA 1570B to Pekane: "Ap. 1. He puuone, Mokumeha, ili o Kaaumakua, Honouliuli, Ewa, Oahu." 1.739 acres. (AB 6:140)
Mooiki (*loʻi, moʻo*)	Claim no. 5670C by Kumupopo: "Apana 2. A loi called Mooiki in the ili Loloulu, Honouliuli, Ewa, Oahu." (FT 9:138) LCA 1570B to Pekane: "Ap. 2. Elua moo aina i Mooiki me Kuaihee, ili o Kaaumakua, Honouliuli, Ewa, Oahu." 2.876 acres. LCA 5670C to Kumupopo: "Ap. 2. Elua loi Mooiki, ili o Puaaluu, Honouliuli, Ewa, Oahu." 0.44 acre. (AB 6:140-141)
Mooloihi (*moʻo*)	LCA 753 to Manuwa: "Apana 2. He moo aina Mooloihi, Kamoku [Ewa, Oahu]." 0.5 acre. "Apana 3. Ma Mooloihi." 1.349 acres. (AB 2:145)
Namooelua (*moʻo*)	LCA 1580B to Kapioho: "Ap. 1. He moo aina, Namooelua, ili o Polapola, Honouliuli, Ewa, Oahu." 1.256 acres. "...in the ili Kahiwapalaai." in FT 9:133 (AB 6:139)
Naopala (*moʻo*)	LCA 760 to Kuhemu: "He moo aina Naopala, ili o Niukeee, Honouliuli, E.O." 1.548 acres. (IN 767; AB 2:157)
Nihola (*moʻo*)	LCA 767 to Hapauea: "Apana 1. He moo aina Nihola, ili o Niukee, Honouliuli, Ewa, Oahu." 0.984 acre. (AB 9:382)
Niukee (*moʻo*)	LCA 758 to Nihua: "He moo aina Niukee, ili Niukee, Honouliuli, E.O." 1.449 acres. Often written "Nukee" in NR (AB 2:155) LCA 892 to Samuela Aoao: "Apana 1. He moo aina Kamuku ili o Niukee, Honouliuli, E.O." 1.387 acres. Also 17 other LCA. Frequently written "Nukee" in NR. (IN 767; AB 2:291)
Paakai (*moʻo*)	LCA 872 to Kahakuliilii: "He moo aina Paakai ili Loloulu, Honouliuli, E.O." 1.66 acres. (AB 2:271)
Paeokiha (*moʻo*)	Claim no. 5654:1 by Kuhiana is for "a moo aina called Paeokiha in the ili of Maui, Honouliuli, Ewa, Oahu." (FT 9:134)
Palaau (*loʻi*)	LCA 848 to Kapule: "Apana 2. Ekolu mau loi Palaau, Poohilo." 0.673 acre
Palahemo (*moʻo*)	LCA 761 to Kinolua: "Apana 2. He kahuahale ma kula o Palahemo, Honouliuli." 0.256 acre. Also LCA 765 to Kamalae. Perhaps named for the famous "water hole inland from South Point Kaʻū, Hawaiʻi." (PEM 176) (IN 768; AB 2:159, 167)
Palakai (*loʻi*)	Claim no. 1580 by Kanahuna is for "3 lois and a kahuahale in 2 pieces. The lois are named Kalawaha, Poina & Palakai in the ili Kamilomilo, Honouliuli, Ewa, Oahu." (FT 9:133)
Panaenui (*ʻauwai*)	Claim no. 5670B:2 by Kaohai is for "a loi called Kuamano in the moo Makawela & ili Kaihuopalaai, Honouliuli, Ewa, Oahu. It is bounded W[aianae] by the auwai Panaenui." (FT 9:137)

Place Name	LCA No. and Description
Panahaha (*moʻo*)	LCA 748 to Kalauhala: "Apana 1. He moo aina Panahaha ili Kaaumakua, Honouliuli, E.O.... Apana 2. He kahua hale ma kula o Panahaha, ili o Kaaumakua." Total 1.294 acres. (AB 2:135)
Paneenui (*moʻo*)	LCA 898 to Kaneaola: "Ap. 2. He loko kalo, Paneenui, ili o Polapola, Honouliuli, E.O." (AB 2:297)
Pi (*moʻo*)	LCA 886 to Kahalewai: "[Apana 1.] He moo aina Pi, ili Kamoku, Honouliuli, E.O." 1.359 acres. "Apana 2. He loi i mokuaku i ke koele maloko o Pi." 0.137 acre. (AB 7:259)
Poaiwaikele (*ʻili ʻaina*)	LCA 1699 to Leleiupa: "Apana 1. He kahuahale ma ke kula o Poaiwaikele, Honouliuli." 0.193 acre. (IN 768; AB 7:261)
Poepoe (*loʻi*)	Claim no. 1570 by Kekua 1: "Apana 3, a kula mahiai called Kaluanonomuku in the moo aina of Aihonu, ili of Poohilo, Honouliuli, Ewa, Oahu. It is bounded... H[onolulu] by the loi called Poepoe of Manaole (q.v.)." (FT 9:139)
Poina (*moʻo*)	LCA 1580 to Kanahuna: "Ap. 2. Moo aina Poina, ili o Kamilomilo, Honouliuli, Ewa, Oahu." (AB 6:135)
Polapola (*ʻili ʻaina*)	LCA 1720 to Hilinae: "Apana 1. Moo aina iloko o ka ili o Polapola, Honouliuli, Ewa, Oahu. 0.781 eka. Apana 2. He pahale ma kula o Polapola. 0.146 eka." Also LCA 763:3 to Keliiaa: "He moo aina Hiwa, ili o Polapola, Honouliuli, E.O." 5.534 acres. Also LCA 751 to Kalauli, 874 to Laamaikahiki, 881 to Kikala, 898 to Kaneaola, 1580B to Kapioho, 5204 to Kalama 2, 5670B to Kaohai. Polapola is also known as Kaihuopalaai in Foreign Testimony. (IN 768; AB 9:383)
Poohilo (*ʻili ʻaina*)	LCA 1701 to Alauka: "Ap. 1. Ekolu loi, Hopeiki, ili o Poohilo, Honouliuli, Ewa, Oahu. Ap. 2. He loi iloko o Hopenui, Poohilo, Honouliuli, Ewa, Oahu." 0.802 acre and 0.087 acre. Also claims no. 763 by Keliiaa, 827 by Kauakahilau, 828 by Kawahaea, 831 by Kaekuna, 832 by Opiopio, 834 by Oni, 839 by Kaaiawaawa, 847 by Hinaa, 848 by Kapule, 911 by Kauahailepa, 1570 by Kekua 1, 1666 by Mauwele, 1666B by Kuahilo, 5653B by Kanehekili; claim no. 9351 by Kauakahilau was not awarded (see no. 827). Claims no. 844 by Kuailau, no. 883 by Kumupopo, no. 946 by Kauinui were not awarded. (IN 768–769; AB 6:136; NR 2:466,471,502,553, 4:444)
Poopoo (*moʻo*)	LCA 828 to Kawahaea: "He pahale ma ke kula o Poopoo, ili o Poohilo, Honouliuli, Ewa, Oahu." 0.255 acre. (AB 2:215)
Puaaluu (*ʻili ʻaina*)	LCA 5670C to Kumupopo: "Ap. 2. Elua loi Mooiki, ili o Puaaluu, Honouliuli, Ewa, Oahu." 0.44 acre. Also claim no. 5653C {751] by Kalauli: "Ap. 3, a kahuahale & a loi in Pualuu [sic] ili of Honouliuli, E.O." Claim no. 883 by Kumupopo was not awarded. (IN 769; AB 6:141; FT 9:143; NR 2:502)
Puehuehu (*moʻo*)	LCA 1670 to Moano: "Ap. 3. Moo aina Puehuehu, ili o Kaaumakua, Honolulu [sic; Honouliuli]." 0.824 acre. Claim no. 844 by Kuailau was not awarded. (AB 6:134; NR 2:471)
Pulehu (*loʻi*)	Claim no. 5670B:2 by Kaohai is for "a loi called Kuamano in the moo Makawela & ili Kaihuopalaai, Honouliuli, Ewa, Oahu. It is bounded M[akai] by the loi Pulehu." (FT 9:137)
Puowaikele (*loʻi*)	Claim no. 5653 by Kua: "1st a moo aina of 2 lois & a kula called Kahui in the ili of Maui, Honouliuli, Ewa, Oahu. It is bounded... Makai by the loi called Puowaikele of konohiki." (FT 9:142)
Waianu (*moʻo*)	Claim no. 5654:2 by Kuhiana is for "a loi called Kalokoloa in the moo aina Waianu, ili Poohilo, Honouliuli, Ewa, Oahu." (FT 9:134)
Waimanana (*ʻili ʻaina*)	Claim no. 902 by Haakue "ma Waimanana i Honouliuli, Ewa" was not awarded (NR 2:516)

Place Name	LCA No. and Description
Waioha (*moʻo*)	LCA 768 to Pio for Wahinenui: "Apana 4. He pahale ma kula o Waioha, ili o Kaaumakua, E.O." 0.387 acre. Also LCA 905 to Kaimuena, 1570C to Naholowaa. (AB 2:171, 307, 6:138) LCA 917 to Kaulu: "Ap. 3. He puuone ma Waioha, ili o Kamilomilo, Honouliuli, E.O." 0.693 acre. (AB 2:333)
Waioipu (*kōʻula*)	Claim no. 5584 by Kauhi (not awarded) "is situated in the place called Kohepalaoa, Puuloa, Ewa, Oahu... and is bounded... H[onolulu] by the kula Waioipu." (FT 9:144)

3.2.4 U.S. Military Occupation

There was a major shift in land use in Honouliuli from agricultural to military in the late nineteenth century as interest grew from the U.S. in Hawaiʻi as a geographically strategic base. Although the main interest lay in utilization of the lochs of Pearl Harbor, the adjacent plains of ʻEwa at Barbers Point were also a focal point for U.S. military development in Hawaiʻi. An in-depth account of the military history at Barbers Point can be found in Appendix B of the Cultural Resource Survey done by Tuggle and Tomonari-Tuggle in 1997 (Denfeld 1995). The interested reader should seek the full account there. The following is a summary of the details relevant to the project from that account, in addition to various other military archival resources.

The military presence in the area started with a reciprocity treaty in 1887 which granted the US exclusive rights to Ke-Awa-Lau-o-Puʻuloa, better known today as Pearl Harbor. Strategically, having use of the lochs of Puʻuloa was a great advantage to the U.S. military operations because of Hawaiʻi's central location within the Pacific.

In 1921, the Barbers Point Military Reservation was established. In July 1931, a battery of two 16-inch guns named Battery Hatch was started:

> Battery Hatch was comprised of two gun emplacements with 360 degree fields of fire. There was also a railroad connecting the dispersed emplacements, barracks, and pillboxes for machine guns to provide local defense. (Denfeld 1995:175)

Battery Hatch was named after Brigadier General Henry J. Hatch, who served in Hawaiʻi as a captain. The battery stood at the Fort Barrette military reservation (Denfeld 1995:175).

The Ewa Mooring Mast Field, which later became known as the Marine Corps Air Station Ewa (MCAS Ewa), was established in the northern portion of the project area by the U.S. Navy with the intent to develop a base for airships, also known as dirigibles (Figure 9):

> In 1932 the Navy leased 206 acres from the Campbell Estate to construct a dirigible landing field on the ʻEwa Plain. A mooring mast, a steel tower, was erected near ʻEwa to receive the Akron. The Akron, a test vessel, built in 1931, was to make a Pacific flight to Barbers Point. Before the mission to Barbers Point could be accomplished, the Akron crashed and was destroyed in a storm on April 3, 1933. The next landing scheduled for ʻEwa was the Macon. Disaster struck again; the Macon crashed in a storm on February 12, 1935. These disasters led the Navy to cut back its large dirigible program, and abandon the mooring mast at ʻEwa. It remained unused until the Marine Corps arrived in 1940 to construct an airfield. (Denfeld 1995:175)

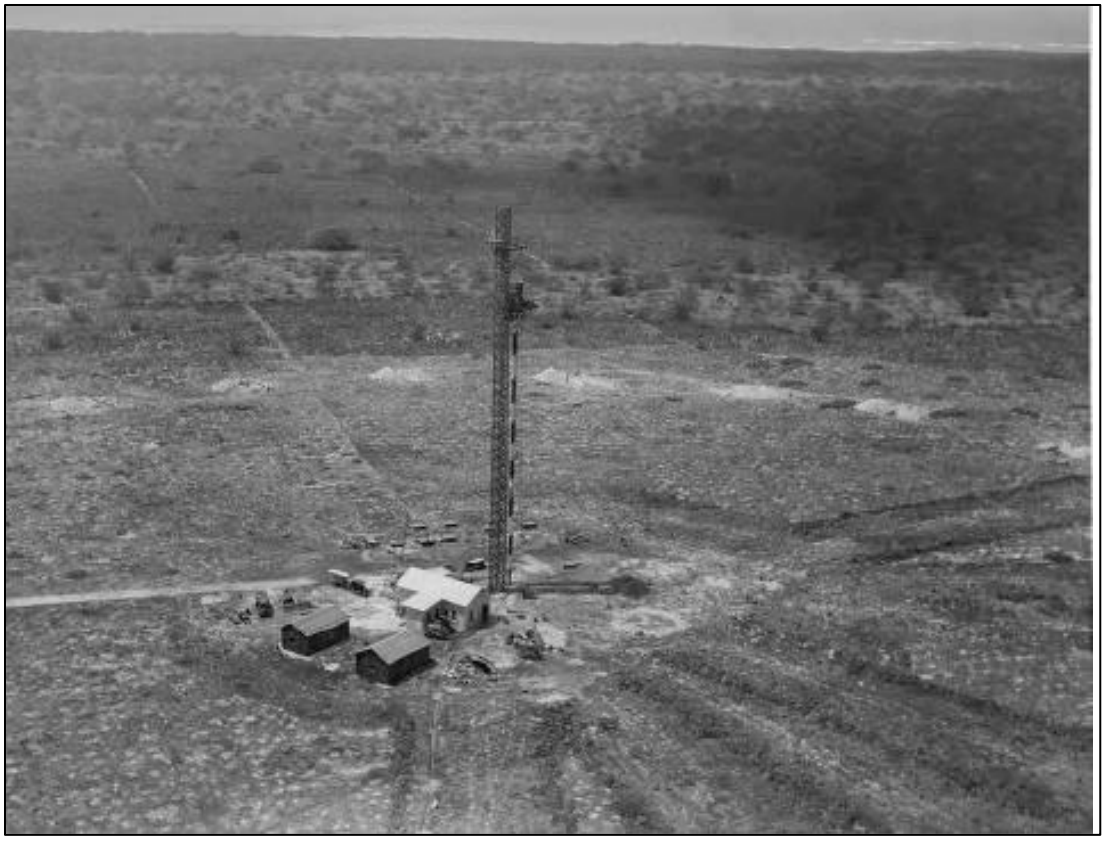

Figure 9. 1925 photograph of Ewa Field dirigible mooring mast and associated buildings (National Park Service USAR-2967, in Frye and Resnick 2013:Figure 8).

The U.S. military increased their leased area around Ewa Field to 3,500 acres and reinstated the mooring mast area to active military use as a Marine Corps airfield (Tuggle and Tomonari-Tuggle 1997:27). At the time of the December 7, 1941 Japanese attack, the Marine Corps had expanded the Ewa Mooring Mast Field into an active airfield with two intersecting runways as well as an aircraft warmup platform and mooring apron, and the original mooring mast was converted to a control tower (Truluck 2014:6; Figure 10). Squadrons were housed in a temporary camp on the north side of the airfield that consisted of "a mixture of quickly built wooden buildings and tents with wooden floors organized on a grid system" (Frye and Resnick 2013:7).

On December 7, 1941, beginning at 7:55 am, Ewa Field was attacked three times by the Imperial Japanese Navy aircrafts, resulting in the destruction or partial destruction of all 49 planes parked on the apron. Thirteen individuals were wounded, and four people were killed (Tuggle and Tomonari-Tuggle 1997:27).

The surprise attack on Ewa Field resulted in an immediate expansion of the Marine base, which became MCAS Ewa on September 1, 1942 when the Navy moved their Carrier Air Service Units to the newly completed airfield at NAS Barbers Point immediately to the southwest (Frye and Resnick 2013:11). NAS Barbers Point served as "a primary facility for carrier aircraft repair" while neighboring MCAS Ewa was a staging area for aircraft on route to the Pacific front (Tuggle and Tomonari-Tuggle 1997:40).

Figure 10. December 2, 1941 aerial photograph of Ewa Field (Naval History Heritage Command, in Frye and Resnick 2013).

Ewa Plain Battlefield District
The U.S. Navy determined that Ewa Field (SIHP 50-80-12-05127) was eligible for listing on the National Register of Historic Places (NRHP) as a site under Criterion A for its association with the Japanese aerial attack on Oʻahu on December 7, 1941 (NRHP nomination form, Truluck 2014). The Ewa Field was also determined eligible as a district (Ewa Plain Battlefield; SIHP 50-80-12-8025) and was officially listed on the NRHP in 2016 with the following contributing elements (NRHP nomination form, Frye and Resnick 2013):

- 1941 Runways
- Warm up platform
- Swimming pool
- OR&L Co. railroad spur
- Road network
- Open fields
- Woodlots
- Recreation and parking areas
- Hangar
- Control tower
- Barracks
- Latrines & boiler room
- Fuel tanks
- Compass rose (original in 1941 runway)
- Storage building
- Perimeter fence
- Karst features

The MCAS Ewa buildup in 1942–1943 involved the expansion of the airfield and construction of 75 "half-dome" aircraft revetments on the south side of the airfield. Administration and storage buildings were also erected among the revetments (NRHP nomination form, Frye and Resnick 2013:7) and a housing area was constructed by the U.S Naval Construction Battalions or "Seabees" southeast of the revetments. "Seabee" is a nickname for the abbreviation "CB" for Construction Battalion. The original Seabee camp was later used as housing for Navy patrol squadrons (J. Bond, personal communication, March 5, 2021).

A Historic American Buildings Survey (HABS) was completed for the aircraft revetments that were once part of MCAS Ewa:

> The revetments are built with a parabolic-shaped cast-in-place concrete beam over the one opening to each revetment. Each beam is 6 feet high and 12 inches thick. Although the title of the drawings says they are "44' Clear Span" they actually span about 53 feet. The 44-foot clear span measurement is based on the span between points at which there is a 7-foot vertical clearance. The maximum clear height of the front arch is 16'9". The beam is further reinforced with five concrete fins, each six inches thick, which act as buttresses for the beam and as a further interconnection between the beam and the revetment shell...

The perimeter footings of the shell are relatively small: only 2'-0" wide by 1'-6" deep. They are set on a solid coral bed and the footings were connected to that coral rock base by 5/8" steel dowels grouted into three-foot deep holes in the coral at four feet on center.

After completion, the revetments were covered with about ten feet of sand. Many of the revetments are still completely covered by the sand, with grass and trees growing from the mounds. The top surface[s] of some revetments are partially exposed due to erosion. The floors of the revetments are covered with asphalt paving. (Mason 1995, HABS No. HI-279-A)

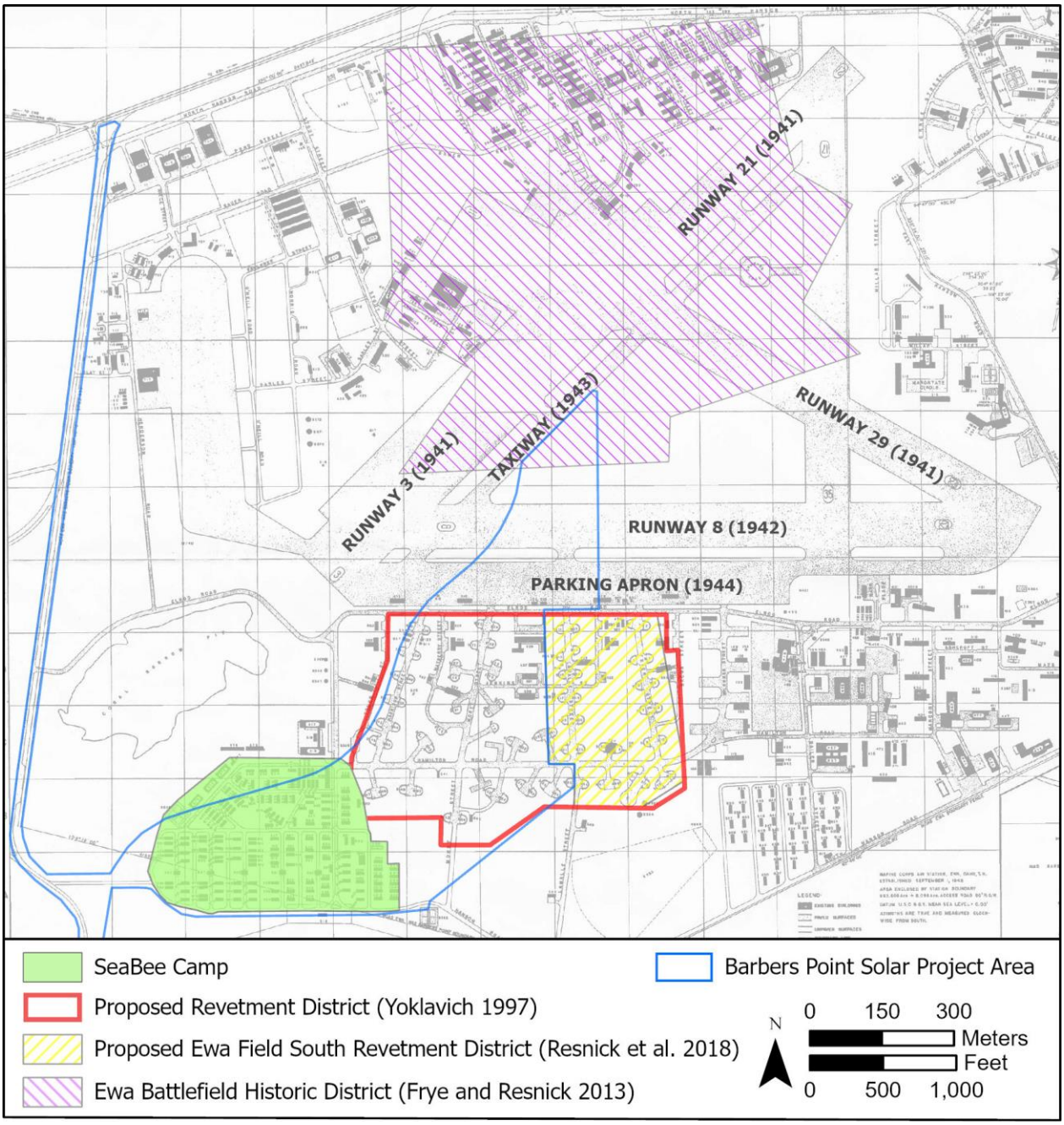

Figure 11. Map of MCAS Ewa (U.S. Navy 1948) showing historic districts, the Seabee Camp, and expanded airfield after December 7, 1941.

All 75 revetments were evaluated as eligible for the NRHP under Criterion A for their association with the change in airplane parking protocol after the December 7, 1941 attack, and under Criterion C for their unique architecture (Yoklavich 1997:219). Yoklavich (1997:228) proposed that all 75 revetments and five buildings be nominated for the NRHP as the Revetments Area Historic District. The five buildings consisted of three Quonset huts (Building 1506, 1520, and 1523), an ARMCO magazine for pyrotechnics (Building 1525), and a pre-cast concrete structure used as an air raid shelter (Building 87). All five of the buildings and 42 of the 75 revetments were identified within the current project area (Site T-02, see Appendix B).

Proposed Ewa Field South Revetment Historic District

Following Yoklavich's 1997 study, a portion of the revetment area outside of the current project area (within the current U.S. Navy stable parcel, immediately east of the central portion of Parcel 38) was nominated for the NRHP as the Ewa Field South Revetment Historic District because of its association with "the development and defense of Ewa Field following the December 7, 1941 attack" (Criterion A), because it contains "unique and distinctive examples of World War II-period, defensive structures" (Criterion C), and for "its ability to yield important information related to a study of archaeological remains associated with CASU [Carrier Aircraft Service Unit] squadron support facilities" (Criterion D; NRHP nomination form, Resnick et al. 2018). The contributing resources or defining features for the historic district include:

- 32 revetments
- 1942 roads and taxiways
- Parking area
- Underground utilities
- 1943 Quonset hut
- Building 528
- Building 530
- Building 531
- Building 552

MCAS Ewa was decommissioned in 1949 and absorbed into NAS Barbers Point (Denfeld 1995:182). The MCAS Ewa airfield and support buildings were abandoned; however, most of the administration and technical buildings continued to be used by the Navy (Tuggle and Tomonari-Tuggle 1997:41). The 1953 USGS Geological Survey map indicates the northern portion of the project area remained relatively unchanged since 1948 (see Figure 12) and new roads were built in the southern portion of the project area as NAS Barbers Point expanded east.

U.S. military training continued in the project area during the 1970s and 1980s, as evidenced by a barbed-wire-fenced enclosure located within the former MCAS Ewa airfield area. Consultation with MCAS 'Ewa historian John Bond indicated that the enclosure was likely used by the Navy and Army for training during the Panama Conflict, based on the presence of Cold War Razor wire (J. Bond, personal communication, December 21, 2020).

NAS Barbers Point was closed in 1999 and, except for a few leased parcels, much of the portion of NASBP that is within the current project area has been vacant and is presently overgrown with vegetation.

3.3 SUMMARY OF ARCHIVAL RESEARCH

The numerous named places, myths, and proverbs associated with Honouliuli intimate that in the pre-Contact period, the region was populated and traversed. This is further shown by the many *kuleana* claims that were submitted during the Māhele by the residents who were living on and cultivating the land. During the post-Contact period, as Western influence in the islands grew, the area was also under agricultural use from the late nineteenth to early twentieth centuries when it transitioned to use for sugarcane and ranching.

In the 1930s, in the northern portion of the Barbers Point Solar Project Area, the Ewa Mooring Mast Field was developed, which would eventually be expanded into the MCAS Ewa airfield, which was later subsumed under the Naval Air Station Barbers Point. This was a result of the air station being targeted in the 1941 Japanese attack, which led to the U.S.'s engagement in World War II. Plans morphed into an air station with greater capacity because of the involvement in the war. The U.S. Coast Guard remained in Honouliuli, but the U.S. Navy closed the air station in 1999, and the John Rodgers airfield became Kalaeloa Airport, as it remains today.

Many remnants of traditional use in the Barbers Point Solar Project Area that may have existed are most likely disturbed, if not destroyed. Because of the history of commercial agriculture followed by military development, extensive ground disturbance has occurred in the Barbers Point Solar Project Area. However, structures from the military era, such as revetments, and remnants from the 1941 attack are still preserved. Some of these are recognized in the National Register of Historic Places.

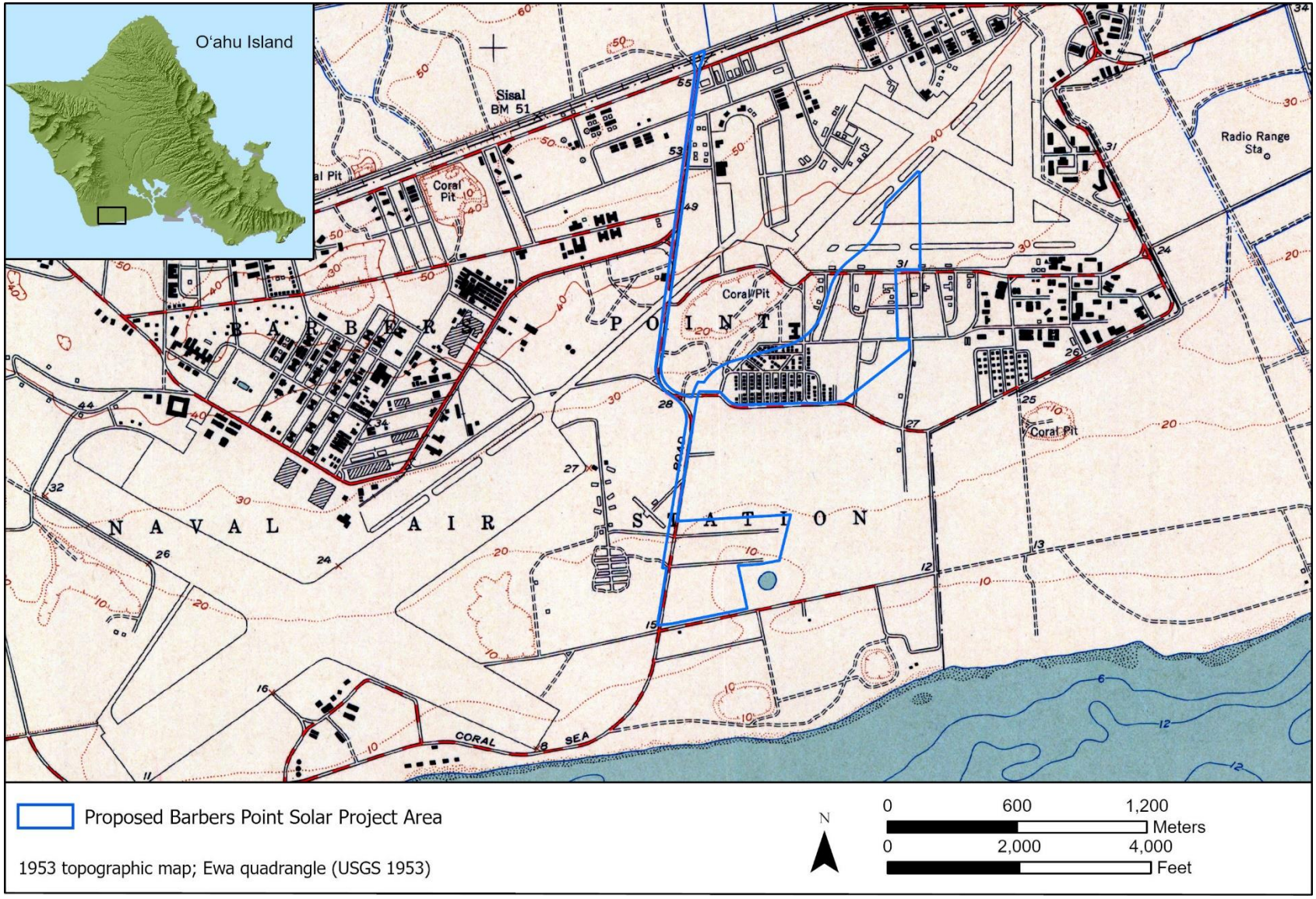

Figure 12. Portion of 1953 USGS topographic map (Ewa Quadrangle) showing project area location.

3.4 'EWA PLAIN PREVIOUS ARCHAEOLOGY

Numerous archaeological investigations have been conducted on the 'Ewa Plain beginning in 1933, when J.G. McAllister first documented archaeological sites in the region and made a valuable observation regarding the significance of many naturally formed depressions in the coral plains:

> It is probable that the holes and pits in the coral were formerly used by Hawaiians. Frequently the soil on the floor of larger pits was used for cultivation, and even today one comes upon bananas and Hawaiian sugar cane still growing in them. They afford shelter and protection, but I doubt if previous to the time of Cook there was ever a large population here (McAllister 1933:109).

A multitude of archaeological surveys and excavations conducted over the past four decades documented an archaeological landscape on the 'Ewa Plain indicative of traditional Hawaiian settlement during the pre-Contact and early post-Contact era, as well as post-Contact land use primarily associated with commercial agriculture, such as sugarcane and sisal, and U.S. military training (e.g., Sinoto 1976, Hammatt and Folk 1981, Welch 1987, Haun 1991, Dunn et al. 1991, Tuggle and Tomonari-Tuggle 1997, Wickler and Tuggle 1997, and Beardsley 2001). All identified traditional Hawaiian archaeological sites were built with locally derived limestone and characterized by various types of enclosures, platforms, walls, alignments (among other limestone features), and walled limestone depressions commonly referred to as pits. An unusual feature type called "vaulted" mounds were also identified on the 'Ewa Plain and named for their crypt-like spaces (Tuggle and Tomonari-Tuggle 1997; Beardsley 2001). Despite their vaulted character, testing of these features did not identify burials with this feature type, and the archaeological materials identified during testing suggested a storage or cooking function (see discussion below regarding SIHP 50-80-12-05100 in the current project area).

The documented traditional Hawaiian sites are often characterized by large concentrations of features revealing settlements of two to three families who subsisted off marine resources and dryland farming, the latter done in enclosed limestone pits and clusters of planting mounds (Tuggle 1997:15). Burials were also identified in stone structures but more commonly within soil floors or beneath overhangs of limestone pits (e.g., Wickler and Tuggle 1997; Beardsley 2001, discussed below). Using data from 200 radiocarbon dates from the 'Ewa Plain sites, Tuggle (1997:17) estimated three temporal periods of short-term settlement of the 'Ewa Plain: 1) AD 1300–1450; 2) AD 1450–1700; and 3) after AD 1700.

Significant fossil remains of extinct or extirpated birds have been identified in the limestone pit features and some in contexts with traditional Hawaiian cultural deposits (e.g., Wickler and Tuggle 1997, discussed below). According to Athens et al. (2002:57), some researchers have attributed bird extinction on the 'Ewa Plain to Polynesian colonization of the Hawaiian Islands, either through predation or landscape alteration. More recent paleoenvironmental data, however, suggest a "very rapid vegetation change" due to the introduction of the Polynesian rat (*Rattus exulans*) as the main cause of extinction or extirpation of some land birds, particularly flightless taxa and passerines (Athens et al. 2002:75). Archaeological evidence disputing the human predator theory includes the general absence of bird remains in most of the 'Ewa Plain occupation sites, the natural deposition of fossil bird remains generally found below cultural deposits or in questionable mixed interfaces with cultural deposits (Athens et al. 2002:57), and the lack of cultural use shown on the fossil bird remains, such as burning or breakage patterns (e.g., Wickler and Tuggle 1997:iv).

A more detailed discussion of the archaeological investigations within or near the project area is provided below.

3.4.1 Previous Archaeological Investigations in Vicinity of the Project Area

Seven archaeological investigations were conducted within the project area (Welch 1987; Haun 1991; Tuggle 1997; Tuggle and Tomonari-Tuggle 1997; Wickler and Tuggle 1997; Beardsley 2001; and Dye 2008). In addition, at least twelve studies were conducted within 0.8 km (0.5 miles) of the project area and are included in this summary (Davis 1979; Jourdane 1979; Dunn et al. 1991; Jones 1993; Franklin et al. 1995; Maly 1999; O'Hare et al. 2007; Hammatt and Shideler 2012b, Medrano et al. 2014; Yucha et al. 2015; Kingsbury et al. 2017; and Morrison and Chambers 2018). Each of the previous studies are summarized in Table 3 and their locations are shown in Figure 13.

3.4.1.1 Ewa Marina Community Project

Several archaeological investigations were conducted in the Ewa Marina Community Area located east of the current project area (see Figure 13). The project is currently being developed into two areas: Ocean Pointe Residences in the *mauka* or northern parcel and Hoakalei Resort on the coastal parcel. Archaeological investigations have been ongoing since the late 1970s (e.g., Davis 1979; Jourdane 1979; Dunn et al. 1991; Franklin et al. 1995; Maly 1999; and Dye 2015, among others).

A total of 53 sites, including 334 features, were documented by Dunn et al. 1991 during an intensive archaeological survey that included previously and newly recorded sites. The traditional Hawaiian sites consisted of surface structures and modified pits associated with habitation, agriculture, possible burials, and ceremonial use. Historic sites included military bunkers, building foundations, a well and incinerator (Dunn et al. 1991:45). Franklin et al. 1995 completed the data recovery and Maly et al. 1999 prepared the archaeological site protection plan for three historic preserves designated the Ahu Preserve, Kauhale Preserve, and Kuapapa Preserve. At least six burials have been identified in the project area since the Dunn et al. (1991) survey.

Archaeological and cultural monitoring is ongoing during construction and is currently conducted by Pacific Legacy, Inc. archaeologist and cultural specialist Kimberly Kalama.

3.4.1.2 Naval Air Station Barbers Point

Several surveys have been conducted within the Naval Air Station Barbers Point (NAS Barbers Point) and current project area, most in preparation for an Environmental Impact Statement on the cleanup, disposal, and reuse of NAS Barbers Point (Welch 1987; Haun 1991; Jones 1993; Tuggle 1997; Tuggle and Tomonari-Tuggle 1997; Wickler and Tuggle 1997; and Beardsley 2001).

Four of the NAS Barbers Point investigations (Haun 1991; Tuggle and Tomonari-Tuggle 1997; Wickler and Tuggle 1997; and Beardsley 2001) documented and evaluated 11 sites in the current project area (Table 4). Two WWII sites (SIHP 50-80-12-05127 and -8025) were evaluated as eligible for the National Register for Historic Places (see Table 4).

Each of the NAS Barbers Point archaeological investigations and previously documented sites in the project area are summarized below.

Table 3. Summary of Previous Archaeological Investigations in Vicinity of Project Area

Reference	Investigation	Location	SIHP No. (50-80-12-)	Findings
Welch 1987	Archaeological Reconnaissance	Ewa Marine Corps Air Station at Navy Air Station Barbers Point	SIHP -03721 and -03722	Documented a traditional Hawaiian habitation complex and historic wall
Davis 1979; Jourdane 1979; Dunn et al. 1991; Franklin et al. 1995; and Maly 1999	Archaeological survey, data recovery and preservation	Ewa Marina Community subsequently developed into Ocean Pointe residences and Hoakalei Resort	SIHP -03201 through -03206, -03208 through -03218, -04265, -04267 through -04272; -04274 through -04282; -04284, -04286, -04289 through -04293, -04295 through -04307	Documented 53 sites associated with traditional Hawaiian habitation, agriculture, ceremony, burials, and historic features. Paleontological remains identified in limestone pits.
Haun 1991	Reconnaissance Survey	Naval Air Station Barbers Point	SIHP -01717 through -01757, and -02220	Documented 43 sites associated with traditional Hawaiian habitation, agriculture, burial, ceremony, and water sources in limestone pits. Historic structures and features associated with ranching, agriculture, and U.S. military training.
Jones 1993	Phase I archaeological survey	Naval Air Station Barbers Point	SIHP -01718 through -01720, -01723, and -01726	Documented five previously identified sites associated with traditional Hawaiian habitation and agriculture; historic and U.S. military sites.
Tuggle and Tomonari-Tuggle 1997	Phase I archaeological survey	Naval Air Station Barbers Point	SIHP -05093 through -05307	Documented new and previously identified traditional Hawaiian habitation, agriculture, burial, trails, historic ranch sites, and U.S. military sites. Paleontological data recovered from limestone pits.
Wickler and Tuggle 1997	Phase II archaeological survey	Naval Air Station Barbers Point	SIHP -01752 through -01756	Documented and excavated sites previously identified by Haun (1991) and Tuggle and Tomonari-Tuggle (1997). Paleontological data recovered from limestone pits.

Reference	Investigation	Location	SIHP No. (50-80-12-)	Findings
Beardsley 2001	Phase II archaeological survey	Naval Air Station Barbers Point	SIHP -01717 through -01722, -01727, -01725, -01729 through -01746, -01748 through -01751, -01757, -05094, -05097, -05100, -05102, -05105, -05106, -05107, -05108, -05119, -05121, -05126, -05129	Documented and excavated sites previously identified by Haun (1991) and Tuggle and Tomonari-Tuggle (1997). Paleontological data recovered from limestone pits.
O'Hare 2007	Archaeological Assessment	Honouliuli Sewage Treatment Plant and adjacent 'Ewa Industrial Park	-	No findings
Dye 2008	Preservation Plan for Save O'ahu's Race Track	Parcel 40 of current project area	50-80-12-01747 and -05107	
Hammatt and Shideler 2012	Archaeological field inspection	Kalaeloa Airport	-	No findings
Medrano et al. 2014	Archaeological Survey	Coastal parcel bounded by Coral Sea Rd on the east	SIHP -05119, -05120, -07483, -07994, -07946 through -07504	Documented traditional Hawaiian habitation, agriculture, possible burials, trails, and U.S. military sites.
Kingsbury et al. 2017	Archaeological Inventory Survey	Corridor along Coral Sea Road	-	No findings
Morrison and Chambers 2018	Archaeological Inventory Survey	Corridor along Coral Sea Road	Temporary Sites 1 through 3	Documented three archaeological sites associated with traditional Hawaiian and U.S. military use and 30 dissolution pits, including those previously identified as SIHP 50-80-12-01745.

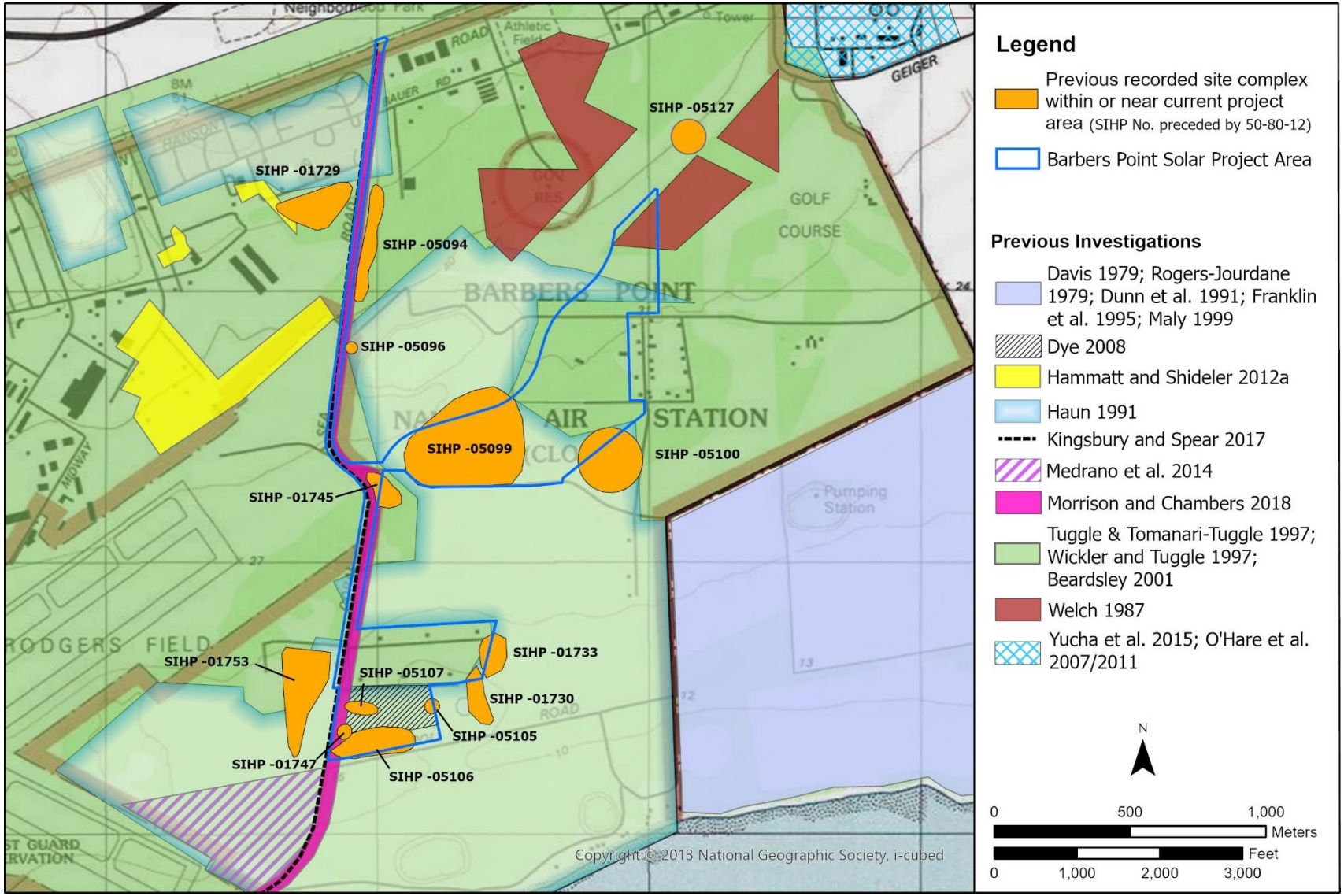

Figure 13. Previous archaeological investigations and documented sites in project area (USGS Ewa Quadrangle 1998).

Table 4. Summary of Previously Documented Sites within and Adjacent to Barbers Point Solar Project Area

SIHP No.	Fea. Count	Type	Function	Temporal Period	NRHP Significance	Reference
50-80-12-01729	14	Unmodified pits	Agriculture, habitation, refuse	Post-Contact	D	Haun 1991; Tuggle and Tomonari-Tuggle 1997; Beardsley 2001
50-80-12-01730	14+	Walls, enclosures, platform, mounds, modified pits	Hawaiian habitation-agriculture complex	Pre-Contact to early post-Contact	D	Haun 1991; Tuggle and Tomonari-Tuggle 1997; Beardsley 2001
50-80-12-01733	10+	Walls, enclosures, platform, trail, modified pits	Hawaiian habitation-agriculture complex	Pre-Contact to early post-Contact	D	Haun 1991; Tuggle and Tomonari-Tuggle 1997; Beardsley 2001
50-80-12-01745	4	Modified pits	Hawaiian agriculture	Pre-Contact to early post-Contact	D	Haun 1991; Tuggle and Tomonari-Tuggle 1997; Beardsley 2001
50-80-12-05094	6+	Unmodified pits	Agriculture, refuse		C, D	Tuggle and Tomonari-Tuggle 1997; Wickler and Tuggle 1997; Athens et al. 1997
50-80-12-05099	multiple	Building foundations, roads, remnant utilities	Former military housing	WWII era	Not significant, lacks integrity	Tuggle and Tomonari-Tuggle 1997
50-80-12-05100	17	Mounds, enclosures, walls, mounds	Hawaiian habitation and agriculture	Pre-Contact to early post-Contact	C, D	Tuggle and Tomonari-Tuggle 1997; Beardsley 2001
50-80-12-05105	3	Remnant structure, farm machinery	20th century homestead	Early 20th Century	D	Tuggle and Tomonari-Tuggle 1997; Beardsley 2001
50-80-12-05106 (includes -01747)	19+	Walls, enclosures, platform, mounds, Limestone Pit,	U.S. military training/Hawaiian habitation & agriculture	Post-Contact (WWII era); pre-Contact	D	Haun 1991; Tuggle and Tomonari-Tuggle 1997; Beardsley 2001
50-80-12-05107	28+	Limestone Pit complex	Agriculture/undetermined	Pre-Contact to early post-Contact	D	Tuggle and Tomonari-Tuggle 1997; Beardsley 2001
50-80-12-05127	multiple	Ewa airfield	December 4, 1941 attack locale	1941	A, D	Tuggle and Tomonari-Tuggle 1997
50-80-12-08025	multiple	Ewa Battlefield Historic District	December 4, 1941 attack locale and surrounding area	WWII era	A, C, and D	Tuggle and Tomonari-Tuggle 1997

Haun (1991)
The Bishop Museum conducted a reconnaissance survey of variable intensities of NAS Barbers Point and documented 43 sites across the entire project area (Haun 1991). The sites include traditional Hawaiian habitation, agricultural, burial, ceremonial, storage features, and water sources in limestone pits. Confirmed burials were identified in limestone pits (Haun 1991:34). Historic sites associated with ranching/agriculture and U.S. military training were also documented in the Haun (1991) NAS Barbers Point project area. Five of the sites that were recorded by Haun (SIHP 50-80-12-01729, -01730, -01733, -01745, and -01747) are within the current project area and summarized in Table 4. Three of these five sites (SIHP 50-80-12-01730, -01733, -01745) were interpreted as traditional Hawaiian habitation or agricultural sites composed of stone-constructed and limestone pit features. SIHP 50-80-12-01729 was a complex of unmodified limestone pits, the largest of which contained bird bone and midden (Haun 1991:54). SIHP 50-80-12-01747 was listed as a possible U.S. military C-shaped wall (Feature A) with two nearby limestone pits, one of which contained visible bird bone (Feature C) and the other (Feature B) appeared bulldozed and emitted noxious fumes (Haun 1991:95–96). No burials were identified within the current project area.

Although a sparse amount of cultural material from the sites suggested short-term habitation, Haun (1991:142) theorized that the dense concentrations of features and the architectural complexity of some of the features might indicate a semi-permanent or seasonal occupation.

Welch (1987)
International Archaeological Research Institute, Inc. (IARII) (Welch 1987) conducted an archaeological reconnaissance of a 100-acre parcel at the former Ewa Marine Corps Air Station portion of NAS Barbers Point. The survey area included portions of the current project area that bordered the MCAS Ewa airfield. The survey documented two archaeological sites, SIHP 50-80-12-03721 and -03722. SIHP 50-80-12-03721 is a traditional Hawaiian habitation complex of walls and C-shaped enclosures. SIHP 50-80-12-30722 is a limestone wall associated with historic ranching and farming. Both sites were evaluated as eligible for inclusion in the National Register of Historic Places and intensive survey and data recovery were recommended.

Tuggle and Tomonari-Tuggle (1997)
International Archaeological Research Institute, Inc. (IARII) conducted a Phase I cultural research survey of NAS Barbers Point, which included re-survey of portions of the Haun (1991) survey area and further documentation of the previously identified sites. A historic building inventory of NAS Barbers Point was also conducted, and the results were included in Appendix C of Tuggle and Tomonari-Tuggle's (1997) report (Yoklavich 1997).

As a result of Tuggle and Tomonari-Tuggle's (1997) survey, additional features were added to four of the previously recorded sites in the current project area (SIHP 50-80-12-01729, -01745, -01730, and -01733) and seven new sites were identified within the current project area (SIHP 50-80-12-05094, -05099, -05100, -05105 through -05107, and -05127; see Table 3).

The newly identified sites consisted of a complex of limestone pits (SIHP 50-80-12-05094), a demolished WWII-era military housing area (SIHP 50-80-12-05099), a traditional Hawaiian habitation and agricultural complex (SIHP 50-80-12-05100), a complex of limestone pits with no known cultural material (SIHP 50-80-12-05107), an early 1920s homestead near Ordy Pond (SIHP 50-80-12-05105), the MCAS Ewa Field runways targeted during the Japanese attack (SIHP 50-80-12-05127), and a military training complex consisting of a grenade range, barbed wired and a dry-laid masonry structure (SIHP 50-80-12-05106; Tuggle and Tomonari-Tuggle 1997:106–107).

The Phase I survey report listed SIHP 50-80-12-01747 as a complex of five or more limestone pits but made no mention of Haun's (1991) C-shaped wall feature (Feature A), which he interpreted as a possible U.S. military feature (Tuggle and Tomonari-Tuggle 1997:104, 122).

SIHP 50-80-12-05100 contained the "vaulted" mounds discussed above that also included an unspecified number of limestone pits. Tuggle and Tomonari-Tuggle (1997:106) interpreted SIHP 50-80-12-05100 as a habitation-agricultural complex with the "vaulted" structures functioning as cooking or storage features. This was based on preliminary data obtained from the subsequent investigation by Beardsley (2001).

Beardsley (2001)

Paul H. Rosendahl Inc. (PHRI) conducted a Phase II intensive survey to fully document a portion of the previously identified sites at NAS Barbers Point and to collect data for significance evaluations (Beardsley 2001). A prefinal report of the Phase II survey was prepared by O'Hare et al. (1996). Beardsley's (2001) report is the result of a lengthy review process of the O'Hare et al. (1996) prefinal that was required to resolve reviewer comments and interpret the sites in the context of Hawaiian archaeology.

During the Phase II survey, additional features and some features could not be relocated. Ten of the current project sites, SIHP 50-80-12-01729, -01730, -01733, -01745, -01747, -05094, -05100, -05105, -05106, and -05107, were included in Beardsley's (2001) investigation. These ten sites are summarized below using the archaeological data that was presented in the Beardsley (2001) Phase II report.

It is important to acknowledge that Beardsley's Phase II survey revised the feature inventories of SIHP 50-80-12-01747, -05106, and -05107. All three site complexes partly overlap in the southernmost portion (Parcel 40) of the current project area. SIHP 50-80-12-05106, originally classified as a U.S. military site by Tuggle and Tomonari-Tuggle (1997), was revised to include all surface features (limestone-built structures) newly and previously identified in this area. Most of the features previously classified as military in function appear to have been dropped from the site inventory. Likewise, all modified and unmodified limestone pits in this lower parcel were grouped under SIHP 50-80-12-05107, originally assigned to 18 limestone pits in the northwest corner of the parcel by Tuggle and Tomonari-Tuggle (1997). Because of the new feature groupings, it appears that SIHP 50-80-12-01747 was subsumed under SIHP 50-80-12-05106 (Feature A, C-shape) and under SIHP 50-80-12-05107 (Features B and C, limestone pit features). Although general feature distribution maps are provided for SIHP 50-80-12-01729, -01733, -01745, and -05094, none exist in Beardsley's (2001) report for SIHP 50-80-12-05100, -05106, and -05107. These changes are discussed in their individual site descriptions below.

<u>SIHP 50-80-12-01729</u>

Beardsley's (2001) survey relocated the unmodified pit complex recorded by Haun (1991) as SIHP 50-80-12-01729. The largest and deepest pit (Feature A) was mapped and tested; no further work occurred at the other previously identified features. Recent trash was recorded on the surface and in the upper portion of Feature A. Sparse faunal material and a lens of brown soil and charcoal were documented in the lower layer of the feature (Beardsley 2001:IV.64).

<u>SIHP 50-80-12-01730</u>

Beardsley (2001:IV.83) relocated and documented 12 of the original 18 features originally recorded by Haun (1991) at SIHP 50-80-12-01730. The documented features consisted mostly of traditional Hawaiian habitation and agricultural features (e.g., walls, enclosures, a platform, and modified limestone pits) and a few were ranching or U.S. military features. Excavations

within eight of the features yielded basalt and volcanic glass flakes, rodent and bird bone, marine shell, and traditional Hawaiian and historic artifacts (Beardsley 2001:IV.83–89).

The bird bone inventory from SIHP -01730 (Feature M, modified limestone pit) was diverse and included extinct avian species, such as *Chaetoptilia* sp., *Puffinus Iherminiieri, Thambetochen Xanion,* and *Branta* sp. (Beardsley 2001:V.4).

SIHP 50-80-12-01733
Beardsley's (2001) survey relocated 10 of the original 14 features recorded by Haun (1991) at SIHP 50-80-12-01733. The documented features consisted of traditional Hawaiian habitation and agricultural features in the form of cairns (mounds), walls, a C-shaped wall, and modified limestone pits. Excavations at seven of the features yielded only sparse faunal material (Beardsley 2001:V.104–107).

SIHP 50-80-12-01745
The intensive survey (Beardsley 2001) documented all four previously identified modified limestone pits at SIHP 50-80-12-01745, two of which were originally identified by Haun (1991) (Features A and B) and two additional features (Features C and D) that were identified by Tuggle and Tomonari-Tuggle (1997). Excavations at three of the site features yielded rodent and bird bone, including extinct avian species (e.g., *Puffinus Iherminiieri*, *Thambetochen Xanion*, and *Branta* sp.) from Features C and D (Beardsley 2001:IV.77–79, V.40).

SIHP 50-80-12-01747
The intensive survey (Beardsley 2001) documented the three features originally identified by Haun (1991) as a U.S. military training structure (Feature A) with two adjacent limestone pits (Features B and C) at SIHP 50-80-12-01747. Excavation at Feature A yielded sparse faunal material of fish, bird, and rodent bones and was re-interpreted as a traditional Hawaiian feature. As discussed above, Feature A was subsumed under SIHP 50-80-12-05106 and Features B and C were likely subsumed under SIHP 50-80-12-05107, though correlation of the two limestone pits with their new feature designations is challenging because of the absence of feature plans and location maps.

SIHP 50-80-12-05094
Beardsley's (2001) survey documented the additional unmodified pit complex along the eastern side of Coral Sea Road that had been documented by Tuggle and Tomonari-Tuggle (1997), near SIHP 50-80-12-01729, which was recorded by Haun (1991). Five pits were recorded. Feature A had been previously tested by Tuggle and Tomonari-Tuggle (1997) and had yielded limited quantities of bird bone, but no cultural materials. Beardsley completed test excavations at Features B and C, which were mapped in detail. Features B and C both contained invertebrates, bird bone, and rodent bone, but no cultural materials. Feature C also contained a deciduous human tooth, but there was no indication of a burial within the sink (Beardsley 2001:IV.65–67).

SIHP 50-80-12-05100
The intensive survey (Beardsley 2001) documented 17 stone features (e.g., cairns, walls, mounds, and enclosures) at SIHP 50-80-12-05100, but no mention is made of unspecified pits previously identified at the site by Tuggle and Tomonari-Tuggle (1997). Excavations were conducted at seven of the features (Features A, B, H, I, M, O, and Q), which yielded bird, fish, and rodent bone; marine shell; and a coral abrader). An ash and charcoal deposit (with sparse midden) at Feature B was submitted for radiocarbon dating analysis and returned calibrated date ranges of AD 1325–1340 and AD 1390–1460 (Beardsley 2001:IV.71). The site was

interpreted as a habitation-agricultural complex, with the dated charcoal-ash feature at Feature B considered a cooking event inside the vaulted feature.

SIHP 50-80-12-05105
The intensive survey (Beardsley 2001) documented three features as SIHP 50-80-12-05105, including structural remains of an early 20th-century homestead that was previously identified by Tuggle and Tomonari-Tuggle (1997:107) and two parallel dry-laid walls (Feature A) originally identified as a military training feature (Feature C) of SIHP 50-80-12-05106 (Tuggle and Wickler 1997:339). Excavations and surface collection at the site yielded abundant historic artifacts, basalt and volcanic glass flakes, modified bone fragments, and sparse faunal remains (Beardsley 2001:IV.186–187).

SIHP 50-80-12-05106
The intensive survey (Beardsley 2001) documented 17 features at SIHP 50-80-12-05106, including a C-shaped wall (Feature A) that was previously identified by Haun (1991) as SIHP 50-80-12-01747 and a square enclosure (Feature L) that was previously identified by Tuggle and Tomonari-Tuggle as Feature D of SIHP 50-80-12-05106 (see Wickler and Tuggle 1997:49). Both previously identified enclosures were re-interpreted as traditional Hawaiian habitation and agricultural features. Two long walls (Feature Q) were newly identified at SIHP 50-80-12-05106 by Beardsley (2000:V-193) and may correspond to a large rectangular walled enclosure that was previously identified by Tuggle and Tomonari-Tuggle (1997) as a military grenade range (see Wickler and Tuggle 1997:49).

The remaining 15 documented features appear to have been newly identified during Beardsley's (2001) survey and include stone mounds, C-shaped, L-shaped, and straight walls, and two platforms. Two of the mounds (Features J and K) were interpreted as military or ranching features and the remaining features were interpreted as traditional Hawaiian habitation or agricultural features (Beardsley 2001:IV-188–193). An excavation at Feature A, a C-shaped enclosure, yielded sparse bird, fish, and rodent bone. Excavation of three additional features (Features F, L, and P) yielded no cultural material.

SIHP 50-80-12-05107
The intensive survey (Beardsley 2001) documented 28 limestone pits at SIHP 50-80-12-05107, including one unmodified limestone pit (Feature W) that appears to be Feature B of SIHP 50-80-12-01747 (Haun 1991). Excavations were conducted at six of the limestone pits (Features D, I, L, S, Y, and Z), three of which were culturally modified. Bird and rodent bone were recovered from three of the limestone pits (Feature D, S, and Y) including extinct avian species from Features S and L, such as *Chaetoptilia* sp., *Thambetochen Xanion*, and *Branta* sp. (Beardsley 2001:V.44).

Wickler and Tuggle (1997)
Also associated with Archaeological Research Services for the Proposed Cleanup, Disposal, and Reuse of NAS Barbers Point, IARII conducted Part II of the Phase II intensive survey to fully document previously identified sites not included in Beardsley (2001) Phase II intensive survey and to collect data for significance evaluations (Wickler and Tuggle 1997). This study also included a paleoenvironmental study conducted by David Tuggle (Wickler and Tuggle 1997:6).

Twenty-four previously identified sites were investigated during the Phase II survey that included traditional Hawaiian settlement complexes and post-Contact ranching, sisal cultivation, and U.S military training sites. Three of their Phase II sies, including a pit complex

(SIHP 50-80-12-05094) and two ranching and U.S. military sites (SIHP 50-80-12-05105 and -05106, respectively) are within the current project area and are discussed below.

SIHP 50-80-12-05094
Wickler and Tuggle (1997:37-40) described SIHP 50-80-12-05094 as a sinkhole complex located along a strip of land measuring approximately 330 m long by 80 m wide on the eastern side of Coral Sea Road. They observed that roughly 50 of the pits had excavation potential, primarily for palaeoenvironmental information, and recommended a program of intensive data recovery if preservation of the features were not possible.

SIHP 50-80-12-05105
Wickler and Tuggle (1997:48) described SIHP 50-80-12-05105 as a single-feature site consisting of a "bulldozed and burned wood and tar-paper structure" that was likely once a shed or shack. Based on the artifacts and archival data, the site was interpreted as an early 20th-century homestead for a fisherman or as a temporary camp for ranchers. Data recovery was recommended for the site's trash pile (Wickler and Tuggle 1997:48).

SIHP 50-80-12-05106
Wickler and Tuggle (1997:49–50) describe SIHP 50-80-12-05106 as a WWII military complex consisting of seven features (Features A through G). The site includes a C-shaped enclosure (Feature A) originally identified as SIHP 50-80-12-01747 (Haun 1991), a large rectangular enclosure that they interpreted as a grenade range (Feature B), a military obstacle course composed of two parallel, dry-laid stone walls (Feature C), a small rectangular enclosure (Feature D), two barbed-wire fence alignments (Feature E and F) and a modified limestone pit (Feature G). SIHP 50-80-12-05106 was recommended as eligible for the NRHP but they determined that no further work was necessary (Wickler and Tuggle 1997:50).

As discussed previously, SIHP 50-80-12-05106 was recorded differently by Beardsley (2001:IV. 188–193) and all features with U.S. military functions appear to have been removed from the SIHP -05106 inventory. The two smaller enclosures (originally Feature A and D) were reclassified as traditional Hawaiian features and the latter (Feature D) was re-designated as Feature L. In addition, Beardsley (2001:IV.185) re-designated SIHP -05106, Feature C (dry-laid limestone military obstacle course) as Feature A of SIHP -05105, a historic homestead or ranch camp.

Five traditional Hawaiian sites immediately west of the current project area are representative site types for Hawaiian settlement and land use in the immediate area. During the Phase II survey, Wickler and Tuggle (1997) reorganized the five sites into two complexes (SIHP 50-80-12-01752 and -01753), recognizing distinct residential clusters with associated agricultural and religious features—the latter possibly forming a religious center for both sites (Wickler and Tuggle 1997:171). The ceremonial structures include possible agricultural *heiau* and fishing shrines and emphasized the economic importance of both marine resources and agricultural goods to Native Hawaiians occupying the sites. Modified and unmodified limestone pits contained cultural deposits associated with habitation. Three limestone pits and a stone platform contained human remains. Radiocarbon dating suggests the sites were occupied after AD 1400 with intensive settlement after AD 1600 (Wickler and Tuggle 1997:iv).

Bird bone, including extinct and extirpated species, was recovered from non-cultural limestone pits and one limestone pit contained a cultural deposit. None of the fossil bird remains contained evidence for cultural use, such as burning or specific breakage patterns (Wickler and Tuggle 1997:iv).

3.4.1.3 Miscellaneous Archaeological Investigations Within and Near the Project Area

O'Hare et al. (2007) /Yucha et al. (2015)
Cultural Surveys Hawai'i conducted two archaeological assessments and field inspections at the Honouliuli Wastewater Treatment Plant, located immediately northeast of the current project area (O'Hare et al. 2007; Yucha et al. 2015). No historic properties were identified during either investigation.

Dye (2008)
T.S. Dye and Colleagues, Archaeologists prepared a preservation plan for Save Oahu's Race Track (SORT) project in Parcel 40 of the current project area for preservation of SIHP 50-80-12-01747 and -05107 through avoidance and protection. Dye (2008:2) reported that SIHP 50-80-12-05106 was within the SORT project area but it was evaluated as no longer significant because of its military function and thus did not warrant preservation efforts. Prior to implementation of the preservation plan, SORT had reportedly begun unapproved ground-disturbing activities within the lower wooded portion of Parcel 40 and "damaged a significant historical feature" in the vicinity of SIHP 50-80-12-01747, -05106, and -05107 (Dye 2008:attachment of KH&L memo).

Hammatt and Shideler (2012)
Cultural Surveys Hawai'i conducted an archaeological field inspection of the northeast corner of Kalaeloa Airport northwest of the current project area (Hammatt and Shideler 2012). The field inspection included the area where the point of interconnection is proposed for the Barbers Point Solar Project. No cultural resources were identified during the field inspection.

Medrano et al. (2014)
Scientific Consultant Services conducted an archaeological inventory survey for the Aloha Solar Energy Fund II (ASEF) facility located immediately southwest of the current project area. The project site was bounded on the east and southeast side by Coral Sea Road (Medrano et al. 2014). The survey identified 21 sites interpreted as traditional Hawaiian, post-Contact ranching and 20th-century U.S. military training (Medrano 2014:240). The traditional Hawaiian features (e.g., enclosures, walls, platforms, mounds, and limestone pits termed karst pits) were interpreted as habitation, agricultural, storage, trails, and possible burials (Medrano et al. 2014: 240–246). The possible burial mounds were included in a Burial Treatment Plan (Kingsbury et al. 2017) and, along with most of the traditional Hawaiian sites, were avoided and placed under protective preservation (Hazlett 2020). Two sites (SIHP 50-80-12-07487 and -07502) were recommended for data recovery and archaeological monitoring was required during all construction activities. Of interest, a northeast–southwest trending trail (SIHP 50-80-12-07457, Feature 1) was recorded in the project area that may have extended near or across Parcel 40 of the current study area.

Kingsbury et al. (2017)
Scientific Consultant Services conducted an archaeological assessment as an addendum to the Medrano et al. 2014 report discussed above (Kingsbury et al. 2017). The assessment was done for an electrical distribution line associated with the proposed solar project and included a field survey and backhoe trenching. The project corridor extended along Coral Sea Road between the proposed Aloha Solar Project parcel and Roosevelt Avenue. No cultural resources or archaeological materials were identified during the investigation.

Morrison and Chambers (2018)
IARII conducted an archaeological inventory survey of proposed utilities renovations for the United States Coast Guard along Coral Sea Road between the Coast Guard facility and Roosevelt Avenue (Morrison and Chambers 2018). Three sites were identified in the project corridor (Temporary Sites 1 through 3) that lay adjacent to Coral Sea Road south of the current project area (Morrison and Chambers 2018:25–26). Thirty limestone pits were identified in the current project area in the vicinity of SIHP 50-80-12-01745, a complex of modified pits documented during the NAS Barbers Point surveys (see above). None of the SIHP 50-80-12-01745 features were identified as culturally modified limestone pits.

3.5 BACKGROUND SUMMARY AND PREDICTIVE MODEL

The Barbers Point Solar Project Area is situated on weathered limestone from an ancient coral reef that characterizes much of the ʻEwa Plain. The karst landform generally lacks topographic features but is dominated by subsurface pits and channels (previously referred to as sinks) dispersed along the limestone surface.

The background and previous archaeological investigations presented above predicts three general themes of land use and settlement in the area: 1) pre-Contact and early post-Contact settlement across the ʻEwa Plain; 2) ranching, sisal cultivation, and sugar plantations during the late 19th century and into the early 20th century; and 3) U.S. military occupation and training from 1932 into the 1990s.

Pre-Contact and early post-Contact Hawaiian habitation and agricultural sites were anticipated in all areas not previously disturbed by 20th-century development of the project area and among the previously documented sites that were located inside the current project area. A multitude of natural limestone pits, with potential to contain significant archaeological and paleontological deposits, were expected throughout the project, with some possibly containing Native Hawaiian human remains.

Historic ranching features were expected throughout the undisturbed portions of the project area and remnant limestone walls once bordering sugar or sisal plantations were anticipated in the northern portion of the project area. Because most of the project area was occupied by the U.S. military, a wide variety of U.S. military features were anticipated throughout the project area, including intact buildings, aircraft features, roads and utilities, and other training structures that had been identified previously.

4.0 RESULTS OF FIELDWORK

Section 4.0 presents an overview of the archaeological survey results and monitoring during the geotechnical program. Methods utilized during both project tasks are presented in Section 2.0 of this report. Individual site descriptions with illustrations and photographs are presented in separate volumes of this report (see Appendices A and B). Previous testing results are included in the site descriptions where relevant. Subsurface testing results from the current project are presented in Appendix C and are summarized below.

4.1 SURVEY COVERAGE

The archaeological survey involved 100% coverage of the project area and re-documentation of all historic properties that were previously documented by Haun (1991), Tuggle and Tomonari-Tuggle (1997), Wickler and Tuggle (1997), and Beardsley (2001).

Visibility during both fieldwork tasks ranged from fair to good depending on the density of vegetation, which consisted of high grasses throughout much of the project area and variable densities of *kiawe* (*Prosopis pallida*) and *koa haole* (*Leucaena leucocephala*). Large portions of the project area were disturbed from development of MCAS Ewa and NAS Barbers Point, resulting in partial destruction of limestone structures (e.g., SIHP 50-80-12-05106, Feature 34 enclosure, among others) and the creation of bulldozer push piles and larger berms of land clearing debris in both Parcels 38 and 40.

4.2 ARCHAEOLOGICAL SURVEY FINDINGS

The AIS resulted in the identification and documentation of 17 historic properties containing a total of 438 archaeological features. Features were subsequently grouped into eight of the previously identified sites (SIHP 50-80-12-01729, -01733, -01745, -05094, -05099, -05100, -05106, -05107) and nine newly identified sites (T-01, T-02, T-03, T-07, T-08, T-09, T-10, T-11, and T-12; Table 5 and Figure 14). Temporary Site T-08 contains MCAS Ewa airfield features that postdate the December 7, 1941 Japanese attack and are not included in the NRHP listed Ewa Plain Battlefield District (SIHP 50-80-12-8025).

4.2.1 Major Types of Archaeological Sites

Two major types of archaeological sites were identified during the present survey. These include sites related to Pre-Contact and early Post-Contact habitation, agricultural, recreation, and ceremony, and sites related to U.S. military occupation and training. One of the sites (SIHP 50-80-12-05106) includes features associated with both functional site types.

4.2.2 Distribution of Historic Properties

Given the substantial land modifications undertaken during construction of the U.S. military facilities in the project area, the current distribution of archaeological features shows only a fragmented picture of the Pre-Contact and early Post-Contact archaeological record. Despite the potential destruction of archaeological sites in the project area, two concentrations of traditional Hawaiian historic properties are preserved in the project area: one in the lower portion of Parcel 40 (SIHP 50-80-12-01733, -05106, and -05107) and another located in the southeastern portion of Parcel 38 (SIHP 50-80-12-05100).

Table 5. Summary of Historic Properties Documented in Barbers Point Solar Project Area

SIHP No. (50-80-12-)	Temp Site No.	No of Features	Site Type	Possible Function	Possible Temporal Period
01729	–	2	Unmodified limestone pits	Undetermined	Undetermined
01733	–	18	Walls, mounds, C-shapes, and limestone pits	Habitation-agriculture complex	Pre-Contact to early Post-Contact
01745	–	18	Modified and unmodified limestone pits	Agriculture	Pre-Contact to early Post-Contact
05094	–	5	Unmodified limestone pits	Undetermined	Undetermined
05099	–	27	Structural remains of Navy Sea Bee Camp	U.S. military	WWII era
05100	–	24	Mounds, platforms, C-shapes, enclosures, walls, mounds, and limestone pit	Pre-Contact/early post-Contact habitation and agriculture	Pre-Contact to early Post-Contact
05106	–	99	Walls, enclosures, platform, mounds, modified/ unmodified limestone sinks, berm, channel	Pre-Contact/early post-Contact habitation, ceremony, agriculture, recreation /U.S. military training	Pre-Contact to early Post-Contact/WWII and after
05107	–	7	Modified and unmodified limestone pits	Pre-Contact/early post-Contact agriculture	Pre-Contact to early Post-Contact
–	T-01	7	Bunkers and building foundation	U.S. military	WWII era
–	T-02	57	Aircraft revetments and related infrastructure	U.S. military	WWII era
–	T-03	160	Unmodified and modified limestone pits	Undetermined	Undetermined
–	T-07	1	L-shaped wall	Habitation	Pre-Contact to early post-Contact
–	T-08	4	MCAS Ewa Airfield features	Runways, aprons, taxiways, tie-down rings, utility box, irrigation ditch	1942-1944 WWII era
–	T-09	6	Concrete structures for utilities, foundation	U.S. Military	1942, WWII and after
–	T-10	1	Unmodified limestone pit	Undetermined	Undetermined
–	T-11	1	Unmodified limestone pit	Undetermined	Undetermined
–	T-12	1	Cultural Deposit	Habitation	Pre-Contact to early post-Contact era

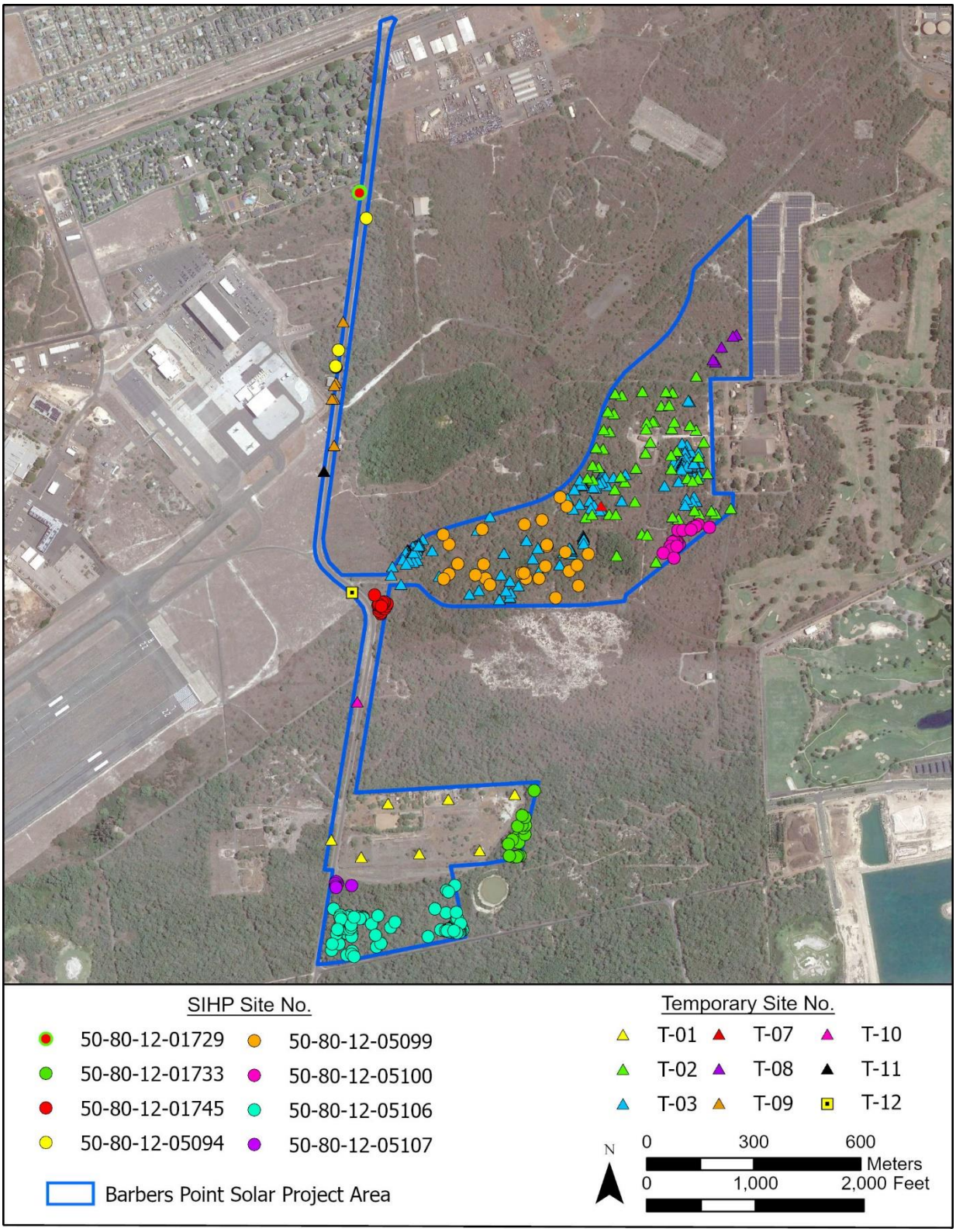

Figure 14. Archaeological site locations in the Barbers Point Solar Project Area (Google Earth Imagery 2019).

Both site clusters are on exposed reef (limestone) with the main features of SIHP 50-80-12-05100 situated on a slight rise in the otherwise level landform. The remaining historic properties include concentrations of unmodified limestone pits (SIHP 50-80-12-01729, -05094, T-10, and T-11), concentrations of limestone pits with a few modified pits (Sites -01745 and T-03), an isolated traditional Hawaiian habitation feature (Site T-07) and five U.S. military sites (SIHP 50-80-12-05099 and T-01, T-02, T-08, and T-09). An additional site (T-12), a subsurface pre-Contact or early post-Contact habitation deposit, was documented during subsurface testing in the vicinity of the proposed 46kV Gen-Tie line (see Appendix C).

Feature Types and Site Definition

The 438 documented features represent a variety of feature types (Table 6). Except for four single-feature sites (Site T-07, T-10, T-11, and T-12), most of the features were combined into multiple-feature complexes because of their proximity to one another, correlation with eight previously documented sites in the project area (SIHP 50-80-12-01729, -01733, -01745, -05094, -05099, -05100, -05106, and -05107), probable cultural affiliation (Pre-Contact/early Post-Contact Hawaiian or U.S. military occupation) (Temporary sites T-01, T-02, T-08, and T-09), or similarity in feature classification (for example, the concentration of predominantly non-modified limestone pits with undetermined functions or cultural affiliations designated as T-03, T-10, and T-11).

The traditional Hawaiian architectural features include mounds, enclosures, platforms, modified limestone pits, a boulder placed on-end, and C-shaped, L-shaped, and linear walls. A portion of the more poorly constructed linear walls might represent bulldozer push related to development of the U.S. military bases and two of the limestone structures in the MCAS Ewa revetments area are likely related to military training (see Section 4.4 below).

Table 6. Feature Types Identified in the Barbers Point Solar Project Area

Feature Type	No. of Features		Feature Type	No. of Features
Aircraft revetment	42		Limestone pit	207
Asphalt surface	2		Limestone pit (modified)	17
Barbed wire fencing	1		L-shaped Wall	3
Berm	3		Metal barrier	9
Berms	1		Metal plates with rings	1
Boulder on-end	1		Metal post	1
Bunker	7		Mound	67
Concrete curbing	1		Platform	4
Concrete footings	1		Quarry	1
Concrete structure	4		Quonset hut	2
Concrete utility	22		Sign post foundation	1
C-shaped wall	7		Stone-constructed channel	1
Cultural deposit	1		Stone-masoned building	1
Enclosure	11		Wall	19

The U.S. military features consist of 42 aircraft revetments, seven bunkers, two Quonset huts, one feature with stone-masoned walls, one stone-constructed channel, four land clearing berms, asphalt and concrete structures or surfaces, and a variety of metal and concrete structures, such as in-ground utility boxes, drainage features, plane tie-downs, and building foundations, among other remnant structural remains.

4.3 PRE-CONTACT AND EARLY POST-CONTACT SETTLEMENT AND LAND USE

Eight of the sites identified in the project area contain pre-Contact or early post-Contact habitation, agricultural, and possibly ceremonial features (SIHP 50-80-12-01733, -01745, -05100, -05106, -05107, T-03, T-07, and T-12).

The density of traditional Hawaiian features indicates the lower half of the project area was intensively used during the pre-Contact and early post-Contact era, with settlement clusters established around concentrations of agricultural mounds and limestone pits that provided natural planting venues with good soil retention and irrigation through groundwater. The largest settlement cluster (SIHP 50-80-12-05106) is located on the most *makai* (southern) portion of the project area with nearby access to the freshwater source at Ordy Pond and Honouliuli's coastal resources.

SIHP 50-80-12-01733 is a complex of 18 features documented in the northeastern portion of Parcel 40. The site was previously recorded by Haun (1991) and intensively documented and tested by Beardsley (2001). The site consists predominantly of unmodified limestone pits (n=12) and stone structures (mounds, walls, and C-shaped walls) interpreted as agricultural and temporary habitation features. The site was extensively disturbed by former land modification and some of the walls might represent remnants of this disturbance.

SIHP 50-80-12-01745 is a complex of two modified and 16 unmodified limestone pits clustered in the southwestern portion of Parcel 38. The site was previously recorded and tested by Tuggle and Tomonari-Tuggle (1997) and Beardsley (2001), who identified two modified and 12 unmodified limestone pits. One of the previously tested modified pits (Feature 13) yielded bird and rodent bone and charcoal that produced a radiocarbon calibrated date of AD 1400–1655 (Beardsley 2001:IV.17). The modified pits are interpreted as agricultural features.

SIHP 50-80-12-05100 consists of a complex of 24 habitation, ceremonial, and agricultural features located in the southeast portion of Parcel 38. SIHP -05100 was previously identified during Tuggle and Tomonari-Tuggle's (1997) survey and intensively documented and tested during Beardsley's subsequent (2001) investigation. The current project analysis and consultation efforts suggest the habitation features are permanent residences and the multiple habitation features likely formed a traditional *kauhale* or multiple-feature residential complex.

SIHP 50-80-12-05106 consists of 84 traditional Hawaiian agricultural, habitation, and ceremonial features distributed in the southernmost portion of Parcel 40. The site was previously identified and recorded by Tuggle and Tomonari-Tuggle (1997) and Wickler and Tuggle (1997), and intensively documented and tested by Beardsley (2001). Consultation with cultural practitioner Shad Kane identified a large enclosure at the site (Feature 34) as a *kahua* (an open place for sports) used during the *makahiki*. The *makahiki* began around the middle of October and lasted about four months with sports and religious festivities and a *kapu* (taboo/prohibition) on war.

SIHP 50-80-12-05107 is a complex of two modified and five unmodified limestone pits clustered in the northwest corner of the lower portion of Parcel 40. The site was previously documented by Tuggle and Tomonari-Tuggle (1997) and Beardsley (2001); however, no correlations with the previous site data could be made with the current site inventory. The two modified limestone pits are interpreted as agricultural features and the unmodified pit functions are undetermined.

Temporary Site T-03 consists of an extensive concentration of modified limestone pits (n=3) and unmodified pits (n=157) distributed over roughly 27 hectares (66 acres) of Parcel 38. The three modified pits are interpreted as agricultural features while the unmodified pit functions are undetermined.

Temporary Site T-07 is an L-shaped wall located in the center of Parcel 38 in between military revetments and military roads. The site is interpreted as a permanent habitation feature.

Temporary Site T-12 is a subsurface traditional Hawaiian cultural deposit partially preserved beneath construction fill along the west side of Coral Sea Road. The site might represent a remnant floor of an architectural feature or open-air venue that was later disturbed by historic and modern development of the surrounding NAS Barbers Point facility.

4.3.1 Habitation

Four of the sites (SIHP 50-80-12-01733, -05100, -05106, and T-07) contain probable residential features in the form of limestone enclosures, platforms, "vaulted" mounds, and C-shaped and L-shaped enclosures (Table 7 and Figure 15). All the habitation features in the project area were clustered with agricultural mounds, walled windbreaks, and modified and unmodified limestone pits.

Based on formality of architecture, nature of cultural deposits from the previous studies, and spatial associations with other habitation features, the habitation features at SIHP 50-80-12-05106 and -01733 appear to be predominantly temporary in use and the features at SIHP 50-80-12-05106 and Site T-07 appear more permanent.

Permanent Habitation
The permanent habitation features at SIHP 50-80-12-05100 and Site T-07 are concentrated between 1.5 and 1.6 km from the coast at around 9 m (30 ft) asl (above sea level; Figure 15). An interesting perspective from ʻEwa cultural descendant Kimberly Kalama was that the features at SIHP 50-80-12-05100 and -05106 have specific architectural characteristics that suggest two different "builders" were associated with the two sites.

SIHP 50-80-12-05100 is a unique complex of enclosures and well-constructed mounds situated around a prominent and formally constructed platform (Feature 10). The platform and many of the mounds were intentionally constructed with an interior rectangular void that was originally thought to have suggested the presence of a burial. All the suspect features were tested by Beardsley (2001) and a relatively diverse cultural deposit was identified at many of the features. Burials were not confirmed in any of the tested features. The variety of feature types and archaeological materials at SIHP 50-80-12-05100 suggest the complex is a traditional *kauhale* where different structures served specific functions in the residential complex, such as a space for preparing food, for eating (*hale ʻāina* or *hale mua*) and sleeping (*hale noa*; Handy and Pukui 1972:9).

Table 7. Summary of Traditional Hawaiian Habitation Features

Site No.	Feature	Type*	Possible Duration of Use
50-80-12-01733	2	C-shaped wall	Temporary
50-80-12-01733	3	Contiguous enclosures	Temporary
50-80-12-05100	1	Enclosure	Permanent with ceremonial component
50-80-12-05100	2	Mound (vaulted)	Permanent
50-80-12-05100	3	Platform	Permanent
50-80-12-05100	4	Mound (vaulted)	Permanent
50-80-12-05100	5	Platform (vaulted)	Permanent
50-80-12-05100	6	Mound (vaulted)	Permanent
50-80-12-05100	7	Mound (vaulted)	Permanent
50-80-12-05100	8	Mound (vaulted)	Permanent
50-80-12-05100	9	Mound (vaulted)	Permanent
50-80-12-05100	10	Platform (vaulted)	Permanent
50-80-12-05100	12	Enclosure	Permanent
50-80-12-05100	17	Enclosure	Permanent
50-80-12-05100	18	C-shaped wall	Permanent
50-80-12-05100	22	Mound (vaulted)	Permanent
50-80-12-05106	10	Enclosure	Temporary
50-80-12-05106	26	Enclosure	Temporary
50-80-12-05106	38	Enclosure	Temporary
50-80-12-05106	42	C-shaped wall	Temporary
50-80-12-05106	49	Enclosure	Temporary
50-80-12-05106	61	C-shaped wall	Temporary
50-80-12-05106	70	Enclosure (remnant)	Temporary
50-80-12-05106	90	L-shaped wall	Temporary
T-07	–	L-shaped wall	Permanent
T-12	Layer IV	Cultural layer	Undetermined

* The term "vaulted" refers to constructed voids in the architecture, not burial vaults.

The largest enclosure (Feature 1) on the west side of the complex contains a possible ceremonial component that might suggest it once functioned as a *hale mua* (men's house) based on its size and morphology. The previously tested features at SIHP 50-80-12-05100 had a relatively scant archaeological deposit predominantly consisting of bird and fish bone. However, the archaeological remains also contained artifacts, including a fishhook, coral abrader, and volcanic glass flake.

Site T-07 is a substantially built L-shaped wall roughly 220 m northwest of the SIHP 50-80-12-05100 complex. The site is adjacent to a large unmodified limestone pit (Site T-03, Feature 77) that was likely utilized as part of the permanent residence for storage or a semi-sheltered living space. The surrounding terrain has been substantially disturbed by construction of the MCAS Ewa revetments and roads, thus likely destroying any other residential features potentially associated with Site T-07.

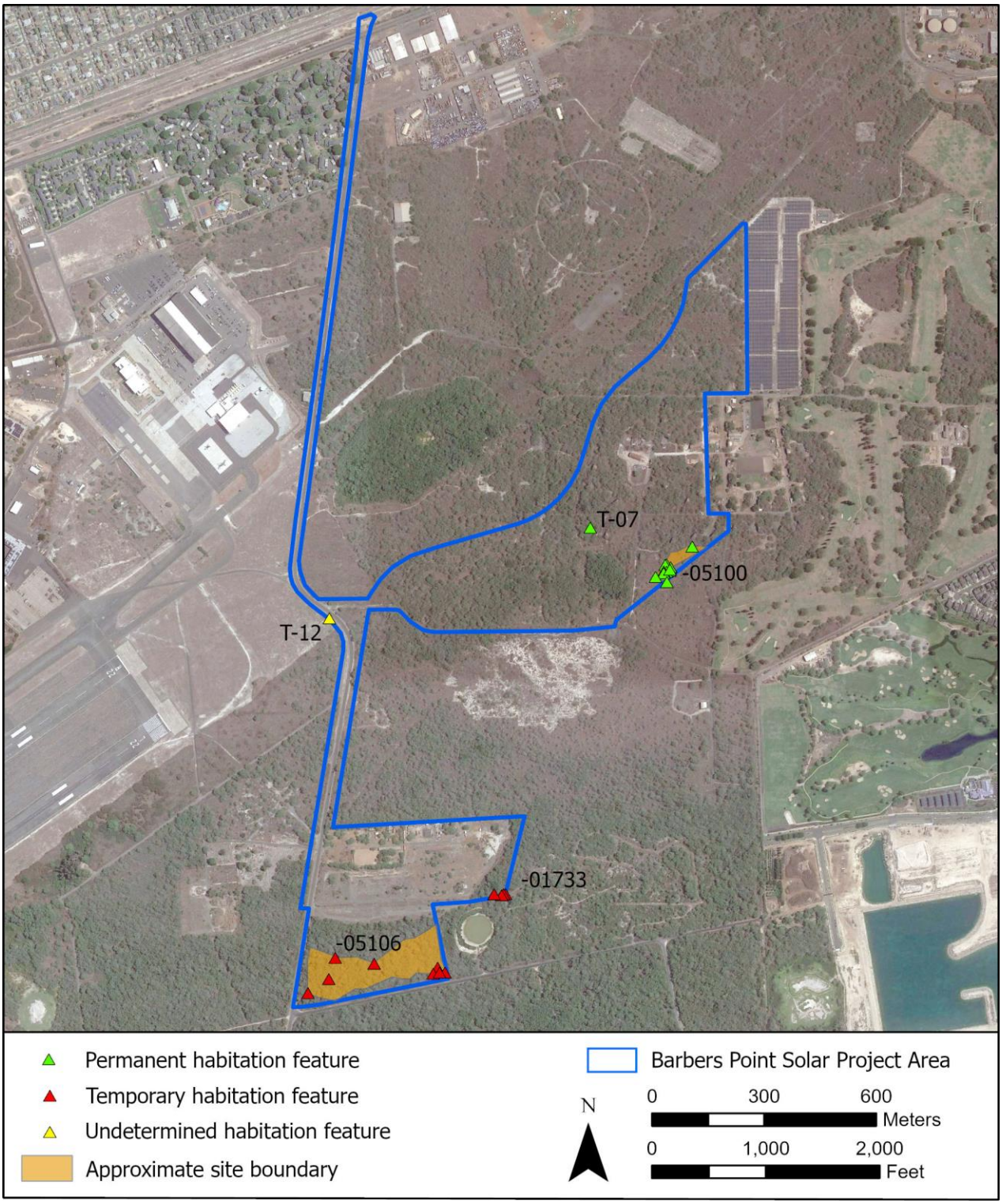

Figure 15. Distribution of traditional Hawaiian temporary and permanent habitation features (Google Earth Imagery 2019).

Temporary Habitation
The smaller and less formally constructed temporary habitation structures identified at SIHP 50-80-12-01733 and -05106 are clustered roughly 0.6 kilometers (3 miles) from the coast at around 3 m (12 ft) asl (see Figure 15).

The features include C-shaped and L-shaped walls and enclosures. The previously tested Feature 61 at SIHP 50-80-12-05106 contained a scant archaeological deposit of bird and fish bone that is consistent with a short-term use (Beardsley 2001). The portion of SIHP 50-80-12-01733 overlapping the project area contains two temporary habitation features (Features 2 and 3) that likely represent recurrent use given the contiguous C-shaped walls of Feature 3 and the adjacent Feature 2 that likely functioned as a stone hearth.

The multiple temporary habitation features and scant archaeological deposits at SIHP 50-80-12-05106 and -01733 suggest these settlement clusters were occupied intensively on a recurrent basis while tending to seasonal crops when rainfall was high. This type of settlement pattern is consistent with those previously proposed for the ʻEwa Plain (Tuggle and Tomonari-Tuggle 1997) and confirmed at the more permanent settlement clusters immediately west of SIHP 50-80-12-05106 (Wickler and Tuggle 1997:177).

4.3.2 Ceremonial Use

Three archaeological features in the project area are interpreted as traditional Hawaiian ceremonial features and include SIHP 50-80-12-05100, Feature 1 and the partly contiguous configuration of SIHP 50-80-12-05106, Features 33, 34, and 93 (Figure 16).

SIHP 50-80-12-05100
Feature 1 is a permanent habitation enclosure with a raised surface that might represent an altar for ceremonial activities. The enclosure is also interpreted as being part of traditional *kauhale*. The presence of the possible altar in combination with its large size might indicate it functioned as a *hale mua* or men's house.

SIHP 50-80-12-05106
Features 33, 34, and 93 are in the southeastern corner of Parcel 40, just north of a dense concentration of agricultural features and west of Ordy Pond.

Feature 34 is a large walled enclosure originally interpreted as a military training feature (Tuggle and Tomonari-Tuggle 1997) and later as a ranching structure (Beardsley 2001). Consultation with the Native Hawaiian community during the current study more strongly suggests the enclosure was associated with the *makahiki* and functioned as a *kāhua* (enclosed grounds) for practicing games and sports during the *Ikuwa*, a Hawaiian time of the year that refers to October and November (Malo 1997:215). The wall is broken in several places, possibly due to previous road building and land clearing and the interior floor is covered with sand brought in from the coast specifically for its use during the *makahiki*. This feature was interpreted by cultural practitioner Shad Kane during an interview for the Cultural Impact Assessment for the Barbers Point Solar Project (see Mulrooney and Pacubas 2021).

Feature 93 is a substantially built platform that likely included Feature 33 as a separate ceremonial space or possible living area. The irregular-shaped Feature 93 platform appears to have been truncated by previous land clearing and road building. The platform surface contains a few depressions, possibly marking posts or a foundation for sacred objects. It is attached to the Feature 93 enclosure by a wide wall or low platform that extends west of the platform.

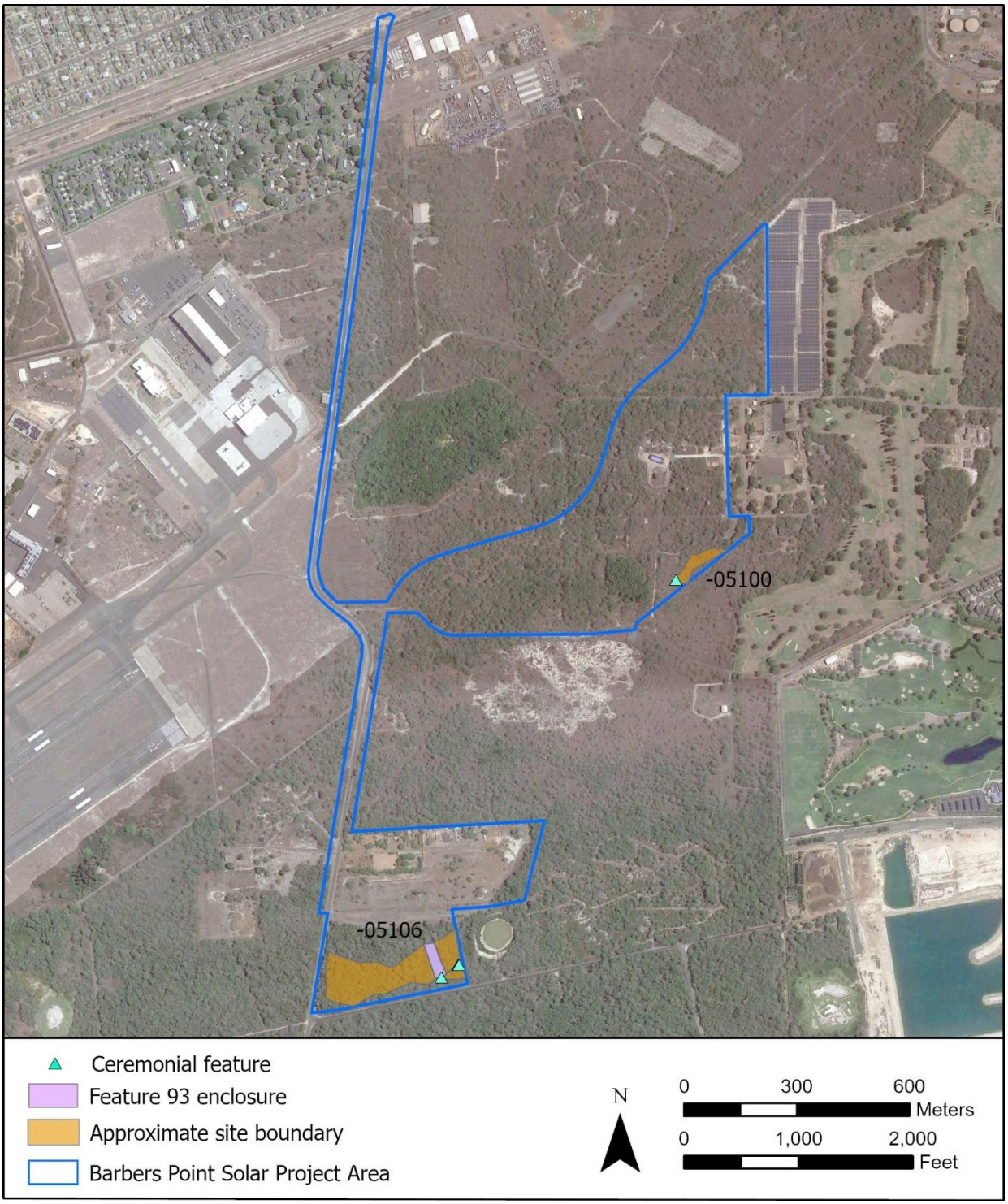

Figure 16. Distribution of traditional Hawaiian ceremonial features (Google Earth Imagery 2019).

4.3.3 Agriculture

A total of 80 possible agricultural features were identified among the six multiple-feature complexes (SIHP 50-80-12-01733, -01745, -05100, -05106, -05107, and Site T-02; Figure 17 and Table 8). The intensively cultivated landscape is dominated by limestone mounds of variable sizes and shapes (70%), modified limestone pits (20%), walled windbreaks consisting of wall sections and L-shaped walls (10%), and an enclosure probably representing a larger cultivated area in SIHP 50-80-12-05106.

The small limestone mounds were likely used for cultivating sweet potato or gourds and some of the larger mounds might be associated land clearing, processing of harvested crops, or both functions. The densest concentration of mounds is in the southeast corner of SIHP 50-80-12-05106, where many mounds are spaced as close as one to two meters apart.

Modification of the limestone pits are typified by an alignment or layer of limestone cobbles or boulders placed along the perimeter of the pits. Feature 13 at SIHP 50-80-12-01745 is the best example of a fully walled limestone pit, a feature type that was probably more common in the project area prior to U.S. military development of large portions of the area.

Table 8. Frequencies of Agricultural Feature Types

Site/Feature Type	Count
Enclosure	**1**
50-80-12-05106	1
L-shaped Wall	**1**
50-80-12-05106	1
Modified limestone pit	**16**
50-80-12-01745	2
50-80-12-05106	9
50-80-12-05107	2
T-03	3
Mound	**56**
50-80-12-01733	2
50-80-12-05100	7
50-80-12-05106	47
Wall	**6**
50-80-12-05106	6
Total	**80**

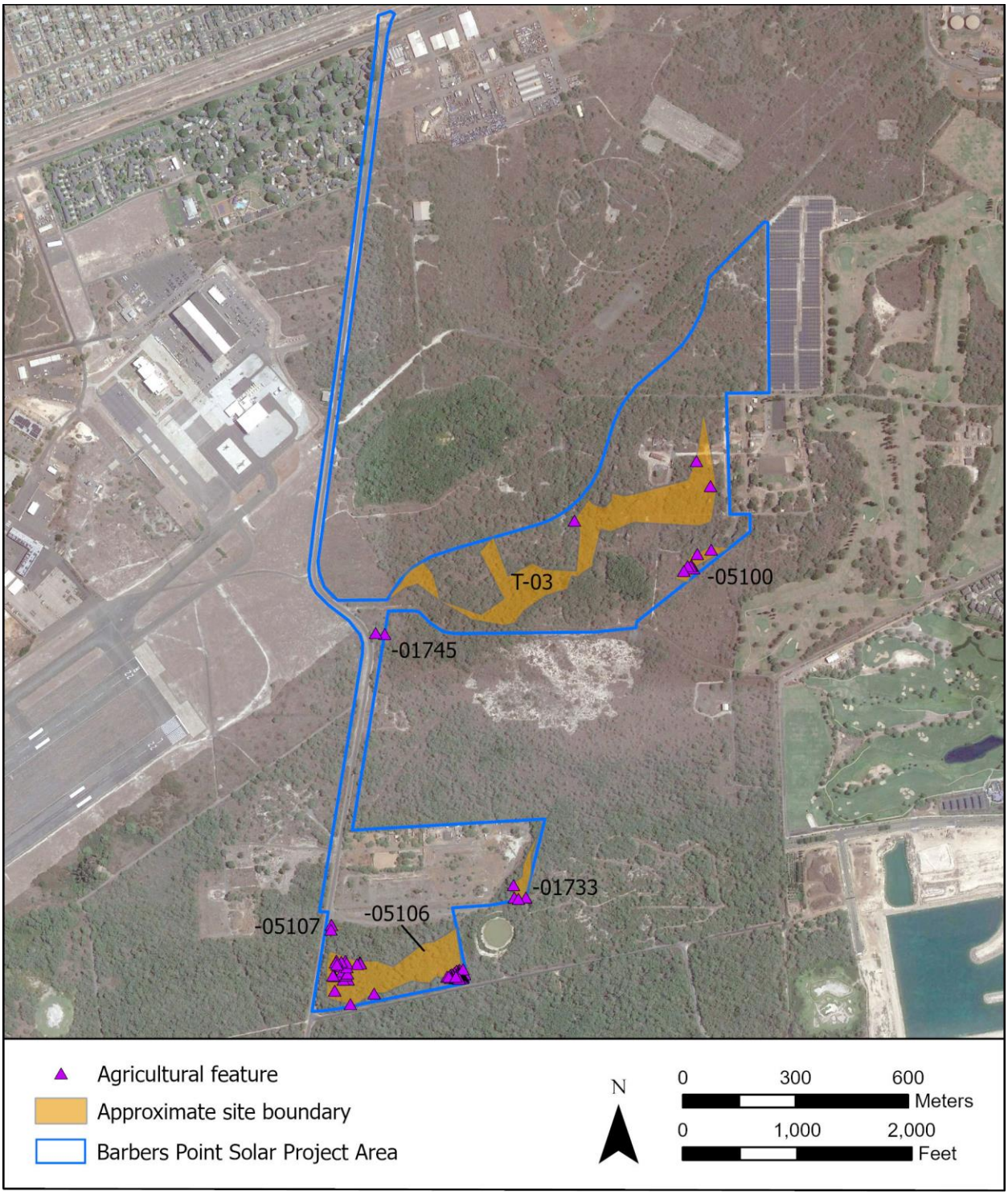

Figure 17. Distribution of traditional Hawaiian agricultural features that include all modified limestone pits (Google Earth Imagery 2019).

4.3.4 Unmodified Limestone Pits

All naturally formed limestone pits larger than 0.5 m in diameter were documented during the AIS fieldwork, resulting in a total of 207 unmodified pits documented in the project area (Table 9 and Figure 18).

Wahi pana, or traditional storied places, are often represented by natural features that may not be discernable as an archaeological resource, such as significant water holes that no longer contain water, or burials that are concealed within natural limestone pits. Unmodified limestone pits are a ubiquitous natural feature found throughout the project area and represent 46% of the feature inventory. The unmodified limestone pits currently have an undetermined function. The limestone pits are also paleoenvironmental resources for interpreting the natural history of the ‘Ewa Plain and they potentially contain fossil remains of extinct or extirpated birds.

Table 9. Frequencies of Unmodified Limestone Pits at Historic Properties

Site No.	Count
50-80-12-01729	2
50-80-12-01733	12
50-80-12-01745	16
50-80-12-05094	5
50-80-12-05100	1
50-80-12-05106	7
50-80-12-05107	5
T-03	157
T-10	1
T-11	1
Total	**207**

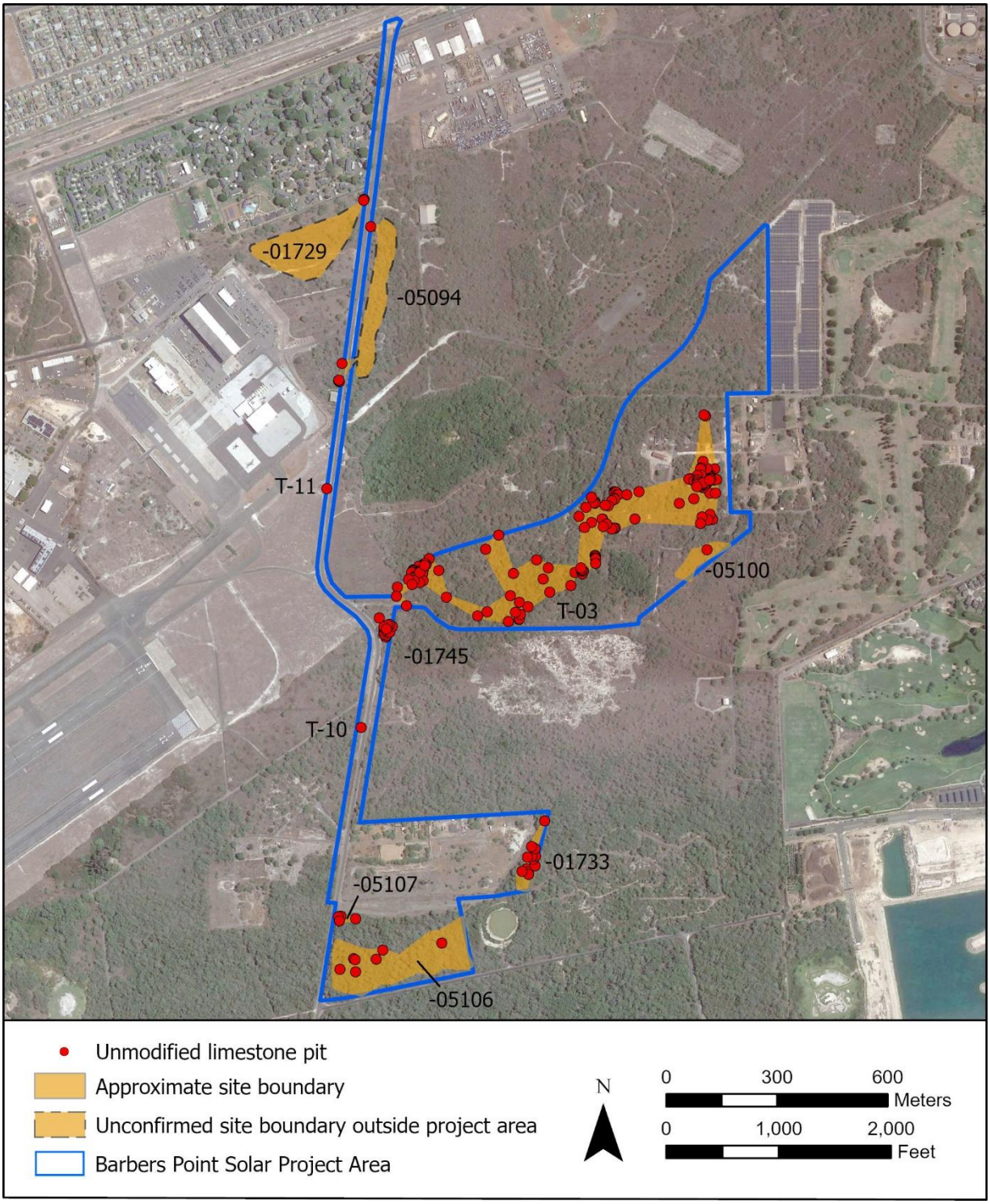

Figure 18. Distribution of unmodified limestone pits (Google Earth Imagery 2019).

4.4 TWENTIETH-CENTURY U.S. MILITARY OCCUPATION

Six historic properties (SIHP 50-80-12-05099, -05106, T-01, T-02, T-08, and T-09) were documented in the project area that reflect U.S military occupation and training activities during the WWII era and into more recent times (Figure 19).

SIHP 50-80-12-05099, known as the Seabee Camp, was constructed by the U.S Naval Construction Battalions and consisted of temporary Quonset huts supported by underground and above-ground utilities and a network of roads. The camp also had recreational facilities, including a tennis court documented during the survey (Feature 26) and an amphitheater (J. Bond, personal communication, March 5, 2021). By 1952, MCAS Ewa was decommissioned, and the camp was absorbed into U.S. Naval Air Station Barbers Point (Tuggle and Tomonari-Tuggle 1997:41). After decommissioning, the temporary Quonset huts were dismantled and used elsewhere (J. Bond, personal communication, March 5, 2021).

SIHP 80-80-12-5106 contains 15 U.S. military features that consist of stone features, including a limestone serpentine-like channel (Feature 28), associated with training and land modification that were once part of an active training area at NAS Barbers Point. Some of the land modifications might also be associated with pre-military ranching or recent unauthorized road building (see Previous Archaeology section of this report).

Site T-01 consists of six high explosive magazines and the foundation of Building 183, located in the norther portion of Parcel 40. The storage bunkers were built in 1943 and were documented in detail by Yoklavich (1997:241).

Site T-02 contains 42 aircraft revetments and associated structures, such as Quonset huts for administrative use, a bunker for pyrotechnics (Feature 5), a temporary air raid shelter (Feature 35), and other contemporaneous structural remnants and land clearing features. The revetments and supporting infrastructure were constructed in 1942–1943 in response to the December 7, 1941 Japanese attack and destruction of aircraft left unprotected on the adjacent MCAS Ewa airfield. A portion of T-02 is included in the proposed Revetment District (Yoklavich 1997).

Site T-08 consists of four aviation-related features that were part of the former MCAS Ewa airfield that postdate the December 7, 1941 attack. These four features consist of two parking aprons built between 1942 and 1944 (Feature 1), two plane tie-downs on the parking apron (Feature 2), a concrete utility box (Feature 3), and an irrigation ditch between the parking aprons (Feature 4).

Site T-09 consists of concrete utility covers and foundations along Coral Sea Road. Two of these (Features 2 and 4) are covers of sub-grade octagonal chambers that were built in 1942 and were recorded by Mason Architects during a 2018 Historical Structure Documentation project within the Coral Sea Road Right of Way. Feature 1 is a concrete foundation, Features 3 and 5 are covers of underground utilities, and Feature 6 appears to be a building foundation.

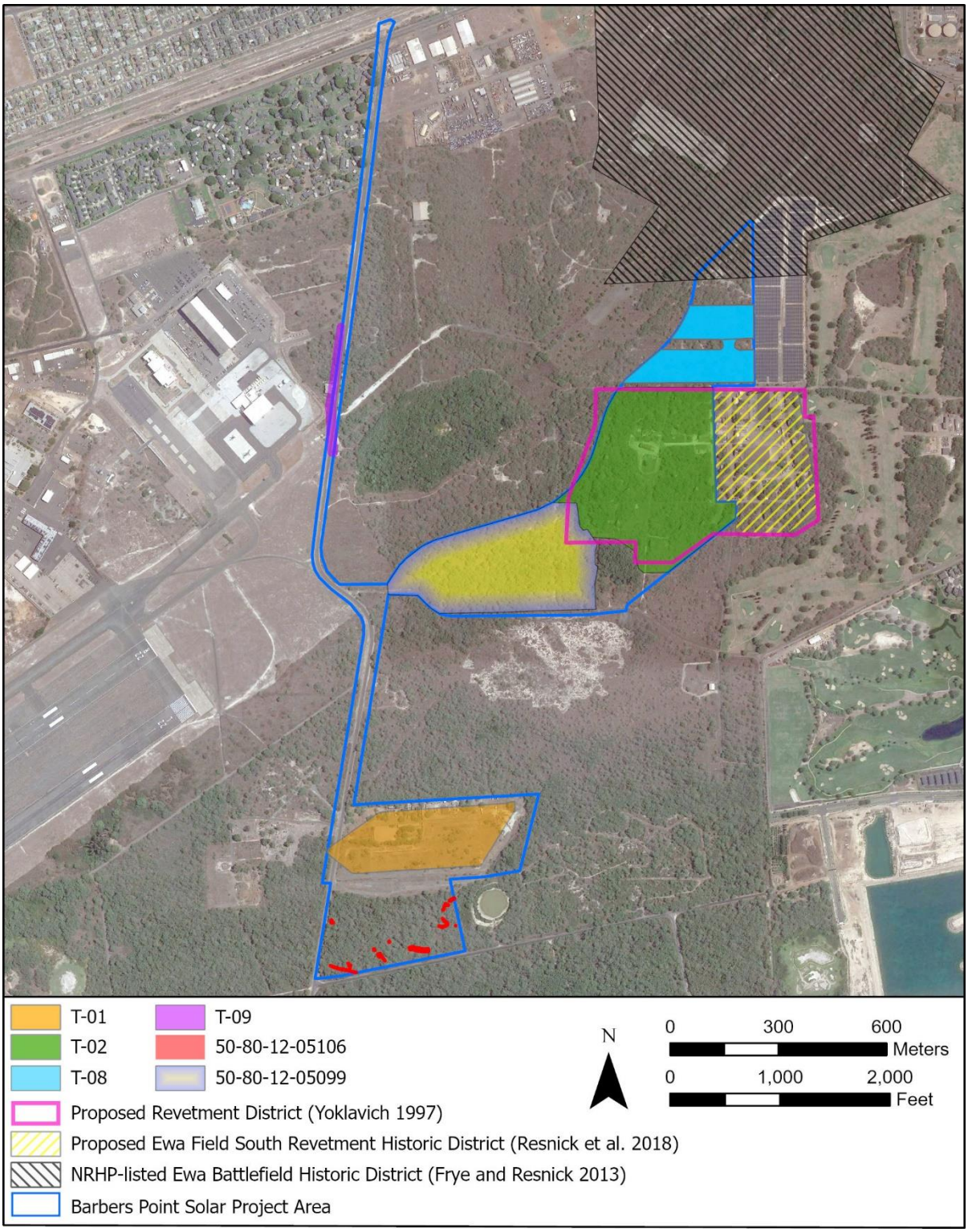

Figure 19. Distribution of U.S. military sites and SIHP 50-80-12-05106 military features within the Barbers Point Solar Project Area in relation to proposed and established historic districts (Google Earth Imagery 2019).

4.5 RESULTS OF TESTING

Nine test trenches (Trench 1 through 9) were excavated to identify potential subsurface archaeological deposits and features in locations proposed for underground utilities in the Barbers Point Solar Project Area (Figure 20). Four of the test trenches (Trench 1 through 4) were excavated within the proposed overhead and underground 46kV Gen-Tie line on the west side of Coral Sea Road. The remaining five trenches were excavated within the proposed overhead and underground 35kV collector line located along the west side of Coral Sea Road (Trench 6 through 9) and in Parcel 38 on the south side of San Juacinto Road (Trench 5).

All trench descriptions, profiles, and soil descriptions are included in Appendix C. The soils and sediments of the trenches include topsoil and crushed coral fills, and natural silt loams on the coral bench. All trenches measured 5.0 m long × 0.7 m wide and were excavated to depths averaging 0.8 m below surface (bs). Trench 4 contained a cultural layer (Site T-12) and Trench 5 contained an unmodified limestone pit (Site T-03, Feature 160).

Temporary Site T-12 (Trench 4)
A traditional Hawaiian cultural layer was identified in Trench 4 as Layer IV and designated Temporary Site T-12. The cultural layer yielded a volcanic glass scraper (Artifact No. 1), 182.5 grams of marine and faunal bone midden, and 6.6 grams of wood charcoal. Most of the site midden consisted of marine shell (95%) and included bivalves (Isognomonidae, Lucinidae, Mytilidae, Pteriidae), sea urchin (Echinoidea), gastropod (Cypraeidae, *Nerita picea*, Patellidae, Thaididae, Trochidae, and Turbinidae), and crustacean. The faunal bone consisted of unidentified fish and small mammal. Results of laboratory analyses and artifact identification are provided in Section 4.6, below.

The cultural layer of T-12 likely represents a remnant floor of an archaeological surface feature or an open-air venue, both of which were likely disturbed by historic and modern development of the surrounding NAS Barbers Point facility.

Temporary Site T-03 (Trench 5)
An unmodified sink was identified in Trench 5 and added to the Temporary Site T-03 feature inventory as Feature 160. No archaeological deposits were identified in this feature, which contained a homogenous silt loam.

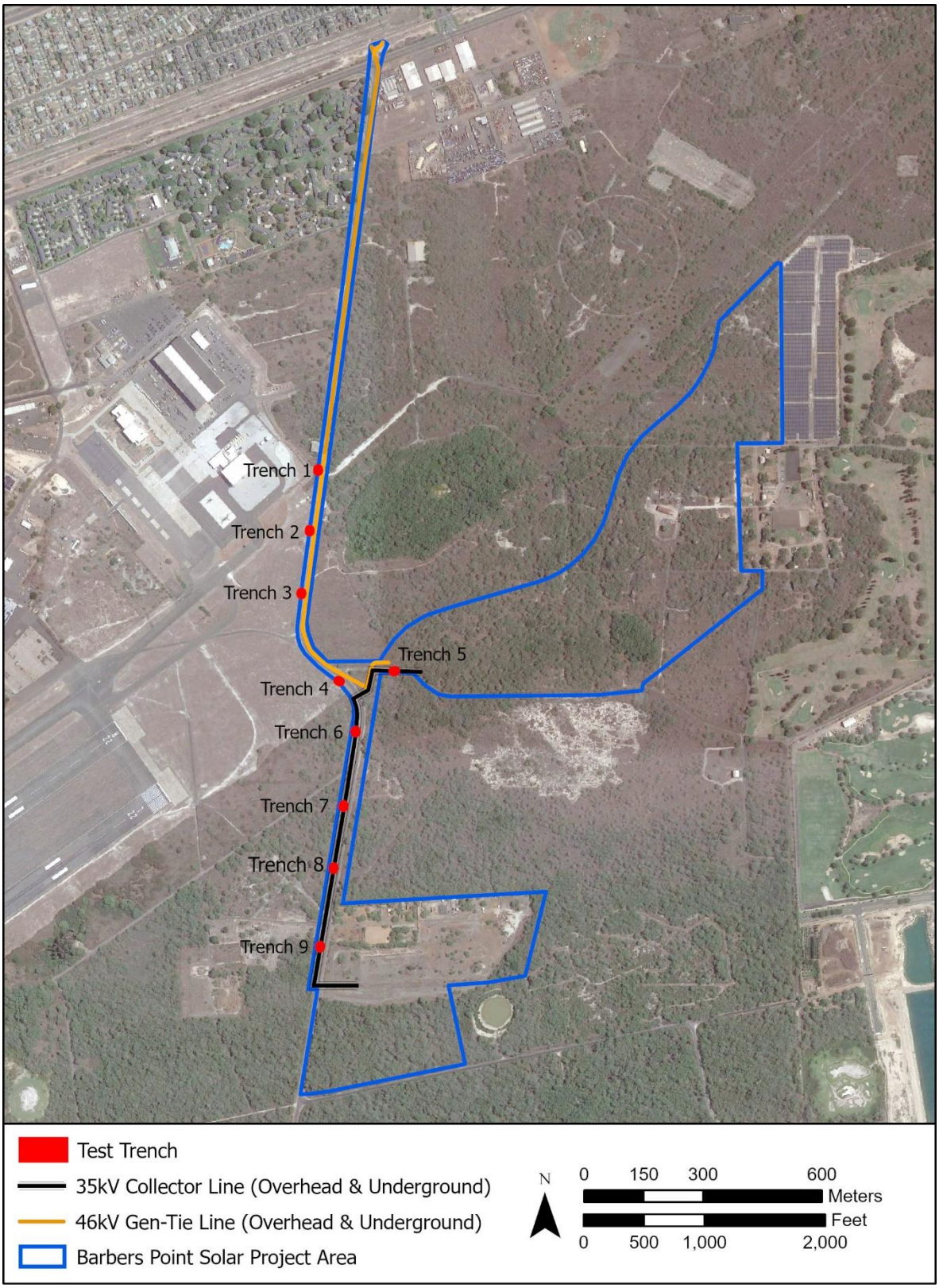

Figure 20. Locations of test trenches for Barbers Point Solar Project (Google Earth Imagery 2019).

4.6 LABORATORY ANALYSIS

Analysis of archaeological material recovered during the project's subsurface testing is provided below. Recovered faunal remains were sorted in the Pacific Legacy, Inc. laboratory and identified to the lowest taxonomic level possible, using Severns' 2001 *Hawaiian Seashells*. The historic bottle identification was made using the SHA/BLM Historic Glass Bottle Identification & Information Website (sha.org).

4.6.1 Faunal Remains

Faunal remains were recovered from the Site T-12 cultural layer (Layer IV) that was documented in Trench 4. A total of 182.5 grams of faunal remains were recovered from a 60.5-liter sample of the cultural layer (Layer IV). Marine shell comprised 95% of the total midden by weight and included four species of bivalves (55%), six species of gastropods (38%), unidentified echinoid (1.2 %), and crustacean (0.05 %) (Table 10). A total of 6.7 grams of unidentified fish bone and small mammal was also identified in the Layer IV midden inventory.

One single shell fragment identified as Turbinidae was recovered from a natural soil layer (Layer III) in Trench 9. The cultural association of this shell fragment is unclear.

4.6.2 Floral Remains

Floral remains were recovered from the cultural layer (Layer IV) in Trench 4, including a scant amount of *kukui* nut (*Aleurites moluccana*) and 6.6 grams of wood charcoal. The wood charcoal was not submitted for radiocarbon analysis because it lacked a clear datable context, such as an archaeological feature.

4.6.3 Artifact Analysis

Two artifacts were collected during the subsurface testing: a volcanic glass scraper (Artifact 1) from the Site T-12 cultural layer in Trench 4 and an historic bottle (Artifact 2) collected from crushed coral fill associated with a buried utility in Trench 3.

Artifact 1 (Figure 21) is a volcanic glass scraper composed of a vitreous black-olive material, with cortex present on two surfaces and multiple multidirectional flake scars. Possible use-wear or retouch is visible along the lateral edge. The Artifact 1 scraper measures 1.1 cm long by 0.7 cm wide by 0.5 cm thick.

Artifact 2 (Figure 22) is a clear glass Bireley's soda bottle with a wide-mouth finish, and bead on the neck and ribbed body. The name "Bireley's" is embossed on the bottle adjacent to "TRADE MARK REC.", and "CONTENTS 6 ¾ FLD. OZ." The heel of the bottle is embossed with "REG PAT. D-112.191" and other illegible text. The maker's mark on the base of the bottle is associated with the Owens-Illinois Glass Co. (1929-present) and is shown as a diamond O-I maker's mark with a "23" plant code and "2" date code. The plant code is from Los Angeles, California (1932-present) and the date code represents 1932. An additional maker's mark that appears to be "Dacro" is embossed on the base.

The Frank W. Bireley Company opened in 1923 and was acquired by General Foods in 1943. The bottle likely contained a non-carbonated fruit-flavored soft drink. The bottle measures 17.0 cm tall by 5.6 cm wide. The mouth measures 4.5 cm wide.

Table 10. Identification and Weights of Site T-12 Midden

Barbers Point Solar AIS	Trench 4	
Depth	80-103 cmbs	
Faunal Bone	Wt. (g)	%
Mammalia (Mammal)	4.0	2.19%
Unid. Small Mammal spp.	4.0	2.19%
Osteichthyes (Bony Fish)	2.7	1.48%
Unid. Osteichthyes spp.	2.7	1.48%
Bone Totals	**6.7**	**3.67%**
Marine Shell	Wt. (g)	%
Bivalvia (Bivalve)	101.8	55.78%
Isognomonidae spp.	5.8	3.18%
Lucinidae spp.	0.7	0.38%
Mytilidae spp.	93.2	51.07%
Pteriidae spp.	2.1	1.15%
Echinoidea (Sea Urchin)	2.2	1.21%
Unid. Echinoidea spp.	2.2	1.21%
Gastropoda (Gastropod)	69.6	38.14%
Cypraeidae spp.	14.1	7.73%
Nerita picea	49.4	27.07%
Patellidae spp.	1.0	0.55%
Thaididae spp.	2.1	1.15%
Trochidae spp.	1.2	0.66%
Turbinidae spp.	1.8	0.99%
Malacostraca (Crustacean)	0.1	0.05%
Carpiliidae spp.	0.1	0.05%
Shell Totals	**173.7**	**95.18%**
Flora	Wt. (g)	%
Euphorbiaceae	2.1	1.15%
Aleurites moluccana	2.1	1.15%
Flora Totals	**2.1**	**1.15%**
Totals	**182.5**	**100.00%**

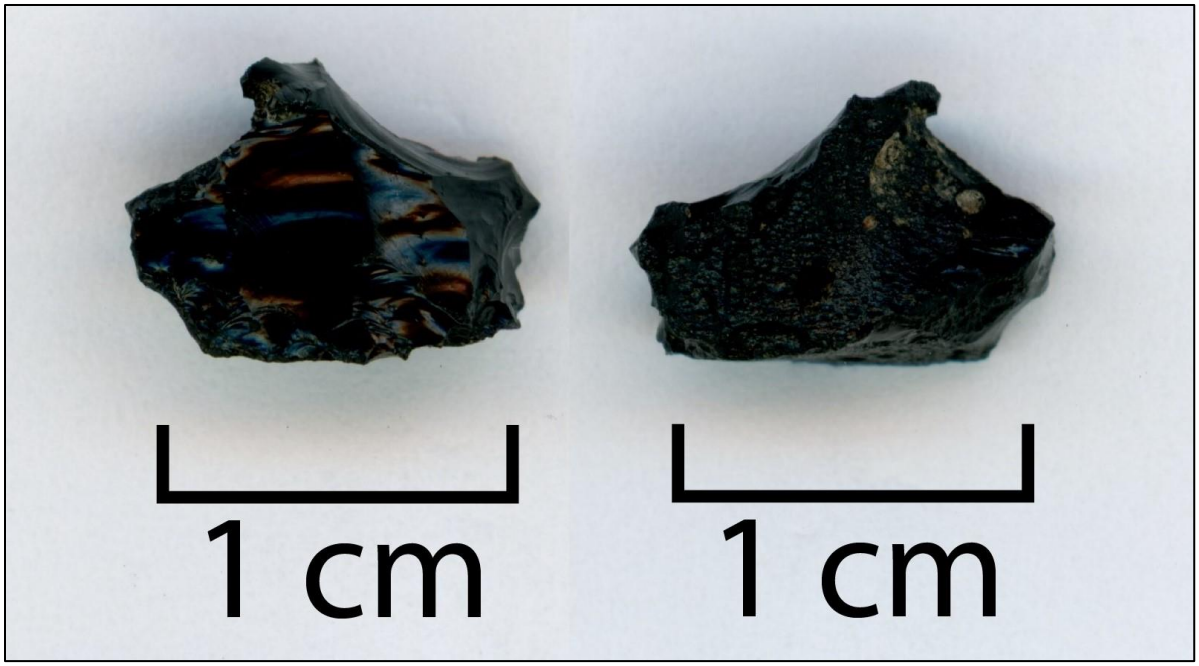

Figure 21. Artifact No. 1, volcanic glass scraper.

Figure 22. Artifact No. 2, "Bireley's" soda bottle.

4.7 MONITORING OF GEOTECHNICAL PROGRAM

Archaeological monitoring was conducted during geotechnical sampling by GEOLABS, Inc., from 18 November to 1 December 2020. All ground-disturbing activities were monitored by Pacific Legacy archaeologist Jennifer Robins, B.A., and Caleb Fechner, B.A assisted on one day when geotechnical work was being conducted at separate locations.

The geotechnical program was implemented throughout the project area and included 18 subsurface borings and five resistivity tests (Figure 23). The resistivity tests did not require excavation and were not monitored. An access trail leading to each of the boring and resistivity locations was cleared of vegetation to allow access to the testing locales for the GEOLABS, Inc. machinery and vehicles. Except for modern rubbish on the surface, no cultural materials or archaeological resources were identified in any of the geotechnical testing locations. All sites documented during the AIS were avoided during the geotechnical work and access routes and testing locales were adjusted when required.

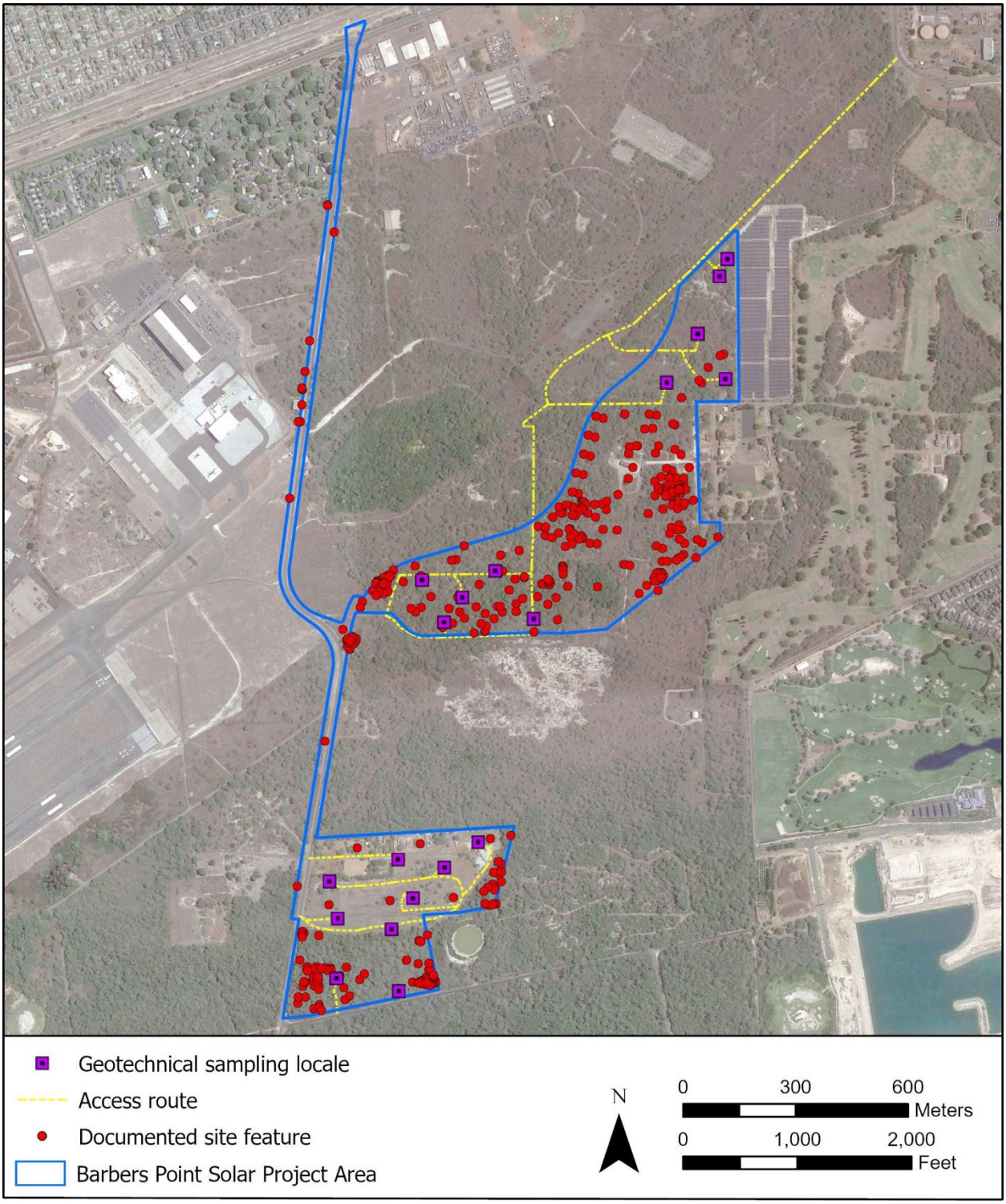

Figure 23. Geotechnical testing locations in the Barbers Point Solar Project Area (Google Earth Imagery 2019).

4.8 CONSULTATIONS

Hawai'i Administrative Rule §13-276-5(g) states that an Archaeological Inventory Survey report, "shall contain information on the consultation process with individuals knowledgeable about the project area's history, if discussions with the SHPD, background research or public input indicate a need to consult with knowledgeable individuals." In addition, Pacific Legacy completed a Cultural Impact Assessment for the project area, which included a substantial consultation effort (Mulrooney and Pacubas 2021). This CIA is being undertaken to assess the potential impacts of the proposed use of the project area and involved extensive consultation with community members. Knowledgeable individuals were identified and contacted via mailed letters and/or email and the results of this consultation process will be detailed in a forthcoming report. Consultation was undertaken under Chapter 6E throughout the duration of AIS investigations and included presentations to the O'ahu Island Burial Council (OIBC), SHPD, and OHA, as well as numerous email communications and site visits with various stakeholders.

Consultation with local individuals and families knowledgeable about the Barbers Point Solar Project Area (as specified in HAR §13-276-5[g]) was undertaken through various community meetings (open houses, small group meetings, one-on-one meetings) throughout 2019, 2020 and 2021 that were facilitated by Barbers Point Solar LLC and their consultant in addition to the CIA consultation process. A full community outreach and engagement report is available on the project's website: https://www.innergex.com/hawaii/barbers-point/.

Consultation was undertaken in relation to archaeological, cultural, and Native Hawaiian concerns. The consultation process involved cultural practitioners, SHPD, and the O'ahu Island Burial Council (OIBC). Meetings and site visits that specifically related to the AIS included:

- May 26, 2020: Virtual Pre-Consultation Meeting with SHPD and DHHL.
- July 1, 2020: Site visit with DHHL, SHPD
- July 8, 2020: Virtual Public Open House presenting an overview of the project, via WebEx.
- September 9, 2020: Virtual presentation to OIBC to present the preliminary AIS results and recommendations.
- October 6, 2020: Site visit with Kimberly Kalama, Hoakalei Cultural Foundation
- October 28, 2020: Site visit with SHPD
- November 10, 2020: Virtual Public Open House presenting the preliminary archaeological and environmental study results, via WebEx.
- December 21, 2020: Site visit with John Bond, Kanehili Cultural Hui; Daniel Martinez, Pearl Harbor National Memorial, and staff
- January 22, 2021: Site visit with John Bond, Kanehili Cultural Hui and Ross Stephenson, Hawaiian Railway Society
- February 18, 2021: Virtual meeting with SHPD and DHHL to present the preliminary AIS results and recommendations.
- March 5, 2021: Site visit with John Bond, Kanehili Cultural Hui
- April 19, 2021: Meeting with SHPD via Zoom
- June 10, 2021: Virtual meeting with SHPD and DHHL to present the updated AIS results and recommendations

- June 16, 2021: Virtual meeting with OHA (Lauren Morawski and Kamakana Ferreira) to present the draft AIS results and discuss treatment recommendations.
- June 17, 2021: A site visit was organized with the three CIA participants, Shad Kane, Mana Caceres, and Keala Norman to visit significant archaeological sites in portions of the project area. The site visit was facilitated by Mara Mulrooney and Krickette Pacubas (Pacific Legacy) and Myriam Bernede-Martin (Barbers Point Solar LLC).

During the site visits and consultation meetings, concerns were raised about the proposed project's impacts on identified historic properties. In particular, consulting parties were concerned about the impacts to limestone pits, as pits in nearby areas are known to contain burials as well as paleontological remains. Consulting parties advocated for the avoidance of these features, but recognized that it may not be feasible to avoid all of the documented pit features throughout the project area. They recommended that data recovery investigations be conducted at those features that will be impacted by the project.

A concern of some consulting parties was the project's effect on the Ewa Battlefield Historic District (SIHP 50-80-12-08025). The project design was initially proposed in the Hawaiian Electric RFP with a Point of Interconnection/generation transmission line (POI/gen-tie) that was to interconnect into the existing Hawaiian Electric transmission line for the Kalaeloa Renewable Energy Park (directly adjacent to the northeastern side of Parcel 38). Some stakeholders expressed concerns about potential impacts to historical features along this proposed route. Barbers Point Solar listened to this feedback. After discussions with Hawaiian Electric, government agencies, and additional field surveys, Barbers Point Solar was able to identify a new POI/gen-tie route that would avoid the noted historical features.

Consulting parties raised concerns about the project's effect on the contributing features of the Ewa Battlefield Historic District that are directly north of the project area, as well as the proposed Ewa Field South Revetment Historic District situated in the central portion of Parcel 38. Feedback centered on the project's potential effect on viewsheds to and from the historic district and proposed historic district, as well as short-term (during construction) and long-term (post-construction) direct and indirect effects on these areas, both during the life of the project and following removal of the project infrastructure and restoration of the project site to pre-installation conditions.

Additional concerns were raised about the project's impact on the Seabee Camp (SIHP 50-80-12-05099) and the MCAS Ewa parking aprons (T-008, Feature 1) in particular, on the ability to restore these areas to pre-installation conditions following the removal of project infrastructure.

Additional consultation with key stakeholders, including cultural descendants, the Office of Hawaiian Affairs, and the Oʻahu Island Burial Council is ongoing throughout the project development phase.

5.0 SIGNIFICANCE ASSESSMENTS

The State of Hawai'i has developed a system for evaluating significance of historic properties under Hawai'i Administrative Rules Title 13 Chapter 284 (HAR §13-284-6, Rules Governing Procedures for Historic Preservation Review to Comment on projects subject to review pursuant to Hawai'i Revised Statutes [HRS] Section 6E-42). This system is patterned after Federal Regulations 36 CFR §60.4 and is meant to provide a framework for the evaluation of significance.

> To be significant, a historic property shall possess integrity of location, design, setting, materials, workmanship, feeling, and association and shall meet one or more of the following criteria as defined in HAR §13-284-6:
>
> Criterion "a" Be associated with events that have made an important contribution to the broad patterns of our history;
>
> Criterion "b" Be associated with the lives of persons important in our past;
>
> Criterion "c" Embody the distinctive characteristics of a type, period, or method of construction; represent the work of a master; or possess high artistic value;
>
> Criterion "d" Have yielded, or is likely to yield, information important for research on prehistory or history; or
>
> Criterion "e" 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 17 historic properties that were identified during the current AIS has been assessed pursuant to HAR §13-275-6. All of the recorded sites are assessed as significant under Criterion "d" and some were assessed as significant under additional criteria. One of the identified historic properties, SIHP 50-80-12-05099 (the Seabee Camp) has diminished integrity due to previous disturbance; however, it exhibits integrity in the aspects of location, setting, feeling, and association. The seven historic properties that consist solely of limestone pits (SIHP 50-80-12-01729, -01745, -05094, -05107, T-03, T-10, and T-11) possess integrity of location, setting, materials, feeling, and association. The other eight historic properties exhibit a high degree of integrity in all aspects: location, design, setting, materials, workmanship, feeling, and association. **Location** is the place where historic properties were constructed and **association** speaks to their relationship to one another and the physical environment or **setting**. The project area is situated on the 'Ewa Plain and contains historic properties that evidence traditional Hawaiian use of the area in pre-Contact and/or early post-Contact times, as well as more recent use of the area for military activities. The location, association, and setting of the historic properties in the project area provide information about how this area was used by Native Hawaiians and later inhabitants of the region through time, especially the U.S. military. **Design**, **materials**, and **workmanship** refer to the built structures that comprise these sites, which demonstrate a high level of ingenuity in this setting, as many incorporate natural features such as pit caves and topographic features, as well as locally available limestone in their construction. **Feeling** is the historic properties' historic sense of a particular period of time. The historic properties convey a feeling and appreciation of

traditional use of the karst plain within which they are situated. These historic properties are significant for their association, especially with Native Hawaiian inhabitants of this unique landscape, as well as significant events during the 20th century, including WWII and the Cold War Era.

The eight traditional Hawaiian historic properties (SIHP 50-80-12-01733, -01745, -05100, -05106, -05107, T-03, T-07, and T-12) are assessed as significant under Criterion "d", for providing information regarding patterns of pre-Contact and early post-Contact settlement and subsistence strategies related to seasonal farming on the lower and mid-elevations of the ʻEwa Plain. All unmodified limestone pits are also evaluated as significant under Criterion "d" for their potential to yield paleoenvironmental information important to the Hawaiian pre-Contact era. Specific features at SIHP 50-80-12-05100 are also assessed as significant under Criterion "c" because of the "vaulted" mounds and platform that embody a method of construction unique to this area. This historic property is also assessed as significant under Criterion "e" due to the ceremonial component to the site. Three possible ceremonial features at SIHP 50-80-12-05106 are also assessed as significant under Criterion "e" because the core of these features (Feature 34), also assessed as significant under Criterion "c," is believed to be associated with the *makahiki*, and cultural practices once conducted at the site features are of great significance to Native Hawaiians.

All five of the U.S. military historic properties (Sites -05099, T-01, T-02, T-08, and T-09) and U.S. military features included in SIHP 50-80-12-05106 are assessed as significant under Criterion "d" because the historic properties have the potential for yielding important information associated with the Navy's Carrier Aircraft Service Unit support facilities represented at Sites T-01 and T-02, T-08, T-09, and Cold War occupation and training on the ʻEwa Plain represented by archaeological features at SIHP 50-80-12-05106. Tuggle and Tomonari-Tuggle (1997, Appendix A:168) evaluated SIHP 50-80-12-05099 as lacking integrity. The site's diminished integrity was confirmed during the AIS fieldwork by the presence of only remnant utility features and a large berm on the eastern edge of the historic property that suggests the former Seabee Camp was nearly completely dismantled and a portion of the construction debris was consolidated into the berm or pushed into limestone pits. However, the location of this former camp near the revetments (Site T-02), its association with the development and dismantling of MCAS Ewa, and the setting and feeling of this location remain.

A selection of revetments and buildings included in Site T-02 are also assessed as significant under Criterion "a," for their associations with "a landmark historic event as the revetments were built specifically for the protection of aircraft following the December 7, 1941 attack," and under Criterion "c," because it "contains revetments and other structures that are important to the history of military engineering during World War II" (NRHP nomination form, Resnick et al. 2018). The sub-grade chambers at Site T-09 are also assessed as significant under Criterion "a," for their associations with post-December 7, 1941 activities and communications, and under Criterion "c" because they also reflect the history of military engineering relating to communications during the WWII era.

Below, Table 11 lists the significance assessments and recommended mitigation for the 17 historic properties that were identified during the current AIS investigation. Table 12 provides detailed mitigation recommendations for each of the 438 features that comprise the 17 historic properties.

Table 11. Significance and Integrity Assessments for Historic Properties in the Barbers Point Solar Project Area

SIHP No. (50-80-12-)	Significance	Integrity	Recommendation
01729	d	location, setting, materials, feeling, and association	Preservation
01733	d	location, design, setting, materials, workmanship, feeling, and association	Preservation / Data Recovery
01745	d	location, setting, materials, feeling, and association	Preservation / Data Recovery
05094	d	location, setting, materials, feeling, and association	Preservation / Data Recovery
05099	d	location, setting, feeling, association	No Further Work
05100	c, d, e	location, design, setting, materials, workmanship, feeling, and association	Preservation
05106	d, e	location, design, setting, materials, workmanship, feeling, and association	Preservation / Data Recovery/ No Further Work
05107	d	location, setting, materials, feeling, and association	Preservation
XXXXX (T-01)	d	location, design, setting, materials, workmanship, feeling, and association	Preservation / No Further Work
XXXXX (T-02)	a, c, d	location, design, setting, materials, workmanship, feeling, and association	Preservation / No Further Work
XXXXX (T-03)	d	location, setting, materials, feeling, and association	Preservation / Data Recovery
XXXXX (T-07)	d	location, design, setting, materials, workmanship, feeling, and association	Preservation
XXXXX (T-08)	a, d	location, design, setting, materials, workmanship, feeling, and association	No Further Work
XXXXX T-09	a, c, d	location, design, setting, materials, workmanship, feeling, and association	Preservation / No Further Work
XXXXX (T-10)	d	location, setting, materials, feeling, and association	Data Recovery
XXXXX (T-11)	d	location, setting, materials, feeling, and association	Data Recovery
XXXXX (T-12)	d	location, setting, materials, feeling, and association	Data Recovery

Table 12. Significance Assessments and Recommended Treatment for Historic Properties Documented during the AIS (Listed by Feature)

Site	Feature	Formal Type	Interpreted Function	Probable Age	Significance	Impacted by current project	Recommended Mitigation
01729	1	Limestone pit	Undetermined	Undetermined	d	No	Preservation
01729	2	Limestone pit	Undetermined	Undetermined	d	No	Preservation
01733	1	Wall	Habitation-agriculture /military land modification?	Pre-Contact/ Post-Contact	d	No	Preservation
01733	2	C-shaped wall	Habitation (T)	Pre-Contact	d	No	Preservation
01733	3	C-shaped wall	Habitation (T)	Pre-Contact	d	No	Preservation
01733	4	Wall	Habitation-agriculture /military land modification?	Pre-Contact/post-Contact	d	No	Preservation
01733	5	Mound	Agriculture	Pre-Contact	d	No	Preservation
01733	6	Mound	Agriculture	Pre-Contact	d	Yes	Data Recovery
01733	7	Limestone pit	Undetermined	Undetermined	d	Yes	Data Recovery
01733	8	Limestone pit	Undetermined	Undetermined	d	Yes	Data Recovery
01733	9	Limestone pit	Undetermined	Undetermined	d	Yes	Data Recovery
01733	10	Limestone pit	Undetermined	Undetermined	d	Yes	Data Recovery
01733	11	Limestone pit	Undetermined	Undetermined	d	Yes	Data Recovery
01733	12	Limestone pit	Undetermined	Undetermined	d	Yes	Data Recovery
01733	13	Limestone pit	Undetermined	Undetermined	d	Yes	Data Recovery
01733	14	Limestone pit	Undetermined	Undetermined	d	Yes	Data Recovery
01733	15	Limestone pit	Undetermined	Undetermined	d	Yes	Data Recovery
01733	16	Limestone pit	Undetermined	Undetermined	d	Yes	Data Recovery
01733	17	Limestone pit	Undetermined	Undetermined	d	Yes	Data Recovery
01733	18	Limestone pit	Undetermined	Undetermined	d	Yes	Data Recovery

Site	Feature	Formal Type	Interpreted Function	Probable Age	Significance	Impacted by current project	Recommended Mitigation
01745	1	Limestone pit	Undetermined	Undetermined	d	No	Preservation
01745	2	Limestone pit	Undetermined	Undetermined	d	No	Preservation
01745	3	Limestone pit	Undetermined	Undetermined	d	No	Preservation
01745	4	Limestone pit	Undetermined	Undetermined	d	No	Preservation
01745	5	Limestone pit	Undetermined	Undetermined	d	No	Preservation
01745	6	Limestone pit (modified)	Agriculture	Pre-Contact	d	No	Preservation
01745	7	Limestone pit	Undetermined	Undetermined	d	No	Preservation
01745	8	Limestone pit	Undetermined	Undetermined	d	No	Preservation
01745	9	Limestone pit	Undetermined	Undetermined	d	No	Preservation
01745	10	Limestone pit	Undetermined	Undetermined	d	No	Preservation
01745	11	Limestone pit	Undetermined	Undetermined	d	No	Preservation
01745	12	Limestone pit	Undetermined	Undetermined	d	No	Preservation
01745	13	Limestone pit (modified)	Agriculture	Pre-Contact	d	No	Preservation
01745	14	Limestone pit	Undetermined	Undetermined	d	No	Preservation
01745	15	Limestone pit	Undetermined	Undetermined	d	No	Preservation
01745	16	Limestone pit	Undetermined	Undetermined	d	Yes	Data Recovery
01745	17	Limestone pit	Undetermined	Undetermined	d	No	Preservation
01745	18	Limestone pit	Undetermined	Undetermined	d	No	Preservation
05094	2	Limestone pit	Undetermined	Undetermined	d	No	Preservation
05094	3	Limestone pit	Undetermined	Undetermined	d	No	Preservation
05094	4	Limestone pit	Undetermined	Undetermined	d	No	Preservation
05094	5	Limestone pit	Undetermined	Undetermined	d	No	Preservation
05094	6	Limestone pit	Undetermined	Undetermined	d	Yes	Data Recovery
05099	1	Metal barrier	Military Tie down anchor	Mid-20th century	d	Yes	No Further Work
05099	2	Metal barrier	Military fire hydrant	Mid-20th century	d	Yes	No Further Work

Site	Feature	Formal Type	Interpreted Function	Probable Age	Significance	Impacted by current project	Recommended Mitigation
05099	3	Metal barrier	Military fire hydrant	Mid-20th century	d	Yes	No Further Work
05099	4	Concrete drain hole/metal grate	Military drainage	Mid-20th century	d	Yes	No Further Work
05099	5	Concrete drain hole	Military drainage/sewer	Mid-20th century	d	Yes	No Further Work
05099	6	Concrete box/metal cover	Military utility	Mid-20th century	d	Yes	No Further Work
05099	7	Metal barrier	Military fire hydrant	Mid-20th century	d	Yes	No Further Work
05099	8	Concrete surface	Military road	Mid-20th century	d	Yes	No Further Work
05099	9	Concrete in-ground basin	Military cistern	Mid-20th century	d	Yes	No Further Work
05099	10	Concrete in-ground boxes	Military sewer	Mid-20th century	d	Yes	No Further Work
05099	11	Concrete box/Metal Cover	Military electric box	Mid-20th century	d	Yes	No Further Work
05099	12	Concrete drain hole	Military water/sewer	Mid-20th century	d	Yes	No Further Work
05099	13	Metal barrier	Military tie down anchor	Mid-20th century	d	Yes	No Further Work
05099	14	Metal barrier	Military fire hydrant	Mid-20th century	d	Yes	No Further Work
05099	15	Metal barrier	Military tie down anchor	Mid-20th century	d	Yes	No Further Work

Site	Feature	Formal Type	Interpreted Function	Probable Age	Significance	Impacted by current project	Recommended Mitigation
05099	16	Concrete drain hole/metal grate	Military drainage/sewer	Mid-20th century	d	Yes	No Further Work
05099	17	Concrete manhole	Military drainage	Mid-20th century	d	Yes	No Further Work
05099	18	Metal barrier	Military water	Mid-20th century	d	Yes	No Further Work
05099	19	Concrete boxes/valve	Military utility	Mid-20th century	d	Yes	No Further Work
05099	20	Concrete slab/drain hole	Military drainage	Mid-20th century	d	Yes	No Further Work
05099	21	Metal post	Military sign post	Mid-20th century	d	Yes	No Further Work
05099	22	Concrete drain hole/metal grate	Military drainage/sewer	Mid-20th century	d	Yes	No Further Work
05099	23	Berm	Military land modification	Mid-20th century	d	Yes	No Further Work
05099	24	Concrete slab	Military water	Mid-20th century	d	Yes	No Further Work
05099	25	Concrete drain hole	Military utility	Mid-20th century	d	Yes	No Further Work
05099	26	Asphalt surface	Military tennis court surface	Mid-20th century	d	Yes	No Further Work
05099	27	Concrete drain hole/metal grate	Military drainage	Mid-20th century	d	Yes	No Further Work
05100	1	Enclosure	Habitation (P)/ceremonial	Pre-Contact	c, d, e	No	Preservation
05100	2	Mound	Habitation (P)	Pre-Contact	c, d	No	Preservation
05100	3	Platform	Habitation (P)	Pre-Contact	c, d	No	Preservation

Site	Feature	Formal Type	Interpreted Function	Probable Age	Significance	Impacted by current project	Recommended Mitigation
05100	4	Mound	Habitation (P)	Pre-Contact	c, d	No	Preservation
05100	5	Platform	Habitation (P)/eating house	Pre-Contact	c, d	No	Preservation
05100	6	Mound	Habitation (P)	Pre-Contact	c, d	No	Preservation
05100	7	Mound	Habitation (P)	Pre-Contact	c, d	No	Preservation
05100	8	Mound	Habitation (P)	Pre-Contact	c, d	No	Preservation
05100	9	Mound	Habitation (P)	Pre-Contact	c, d	No	Preservation
05100	10	Platform	Habitation (P)	Pre-Contact	c, d	No	Preservation
05100	11	Mound	Agriculture	Pre-Contact	c, d	No	Preservation
05100	12	Enclosure	Habitation (P)	Pre-Contact	c, d	No	Preservation
05100	13	Mound	Agriculture	Pre-Contact	c, d	No	Preservation
05100	14	Mound	Agriculture	Pre-Contact	c, d	No	Preservation
05100	15	Mound	Agriculture	Pre-Contact	c, d	No	Preservation
05100	16	Mound	Agriculture	Pre-Contact	c, d	No	Preservation
05100	17	Enclosure	Habitation (P)	Pre-Contact	c, d	No	Preservation
05100	18	C-shaped wall	Enclosure; ammo box	Pre-Contact	d	No	Preservation
05100	19	Mound	Agriculture	Pre-Contact	d	No	Preservation
05100	20	Wall	Undetermined	Pre-Contact	d	No	Preservation
05100	21	Mound	Agriculture	Pre-Contact	d	No	Preservation
05100	22	Mound	Habitation (P)	Pre-Contact	c, d	No	Preservation
05100	23	Limestone pit	Undetermined	Undetermined	d	No	Preservation
05100	24	Wall	Undetermined	Post-Contact	d	No	Preservation
05106	1	Barbed wire fencing	Military	20th century	d	Yes	No Further Work
05106	2	Limestone pit (modified)	Agriculture	Pre-Contact	d	Yes	Data Recovery

Site	Feature	Formal Type	Interpreted Function	Probable Age	Significance	Impacted by current project	Recommended Mitigation
05106	3	Wall	Military land modification	20th century	d	Yes	No Further Work
05106	4	Wall	Military land modification	20th century	d	Yes	No Further Work
05106	5	Mound	Agriculture	Pre-Contact?	d	Yes	Data Recovery
05106	6	Wall	Military land modification	20th century	d	Yes	No Further Work
05106	7	Wall	Military land modification	20th century	d	Yes	No Further Work
05106	8	Berm	Military training	Mid-20th century	d	Yes	No Further Work
05106	9	Mound	Agriculture	Pre-Contact	d	No	Preservation
05106	10	Enclosure	Habitation (T)	Pre-Contact	d	No	Preservation
05106	11	Mound	Agriculture	Pre-Contact	d	No	Preservation
05106	12	Mound	Agriculture	Pre-Contact	d	No	Preservation
05106	13	Mound	Agriculture	Pre-Contact	d	No	Preservation
05106	14	Mound	Agriculture	Pre-Contact	d	No	Preservation
05106	15	Wall	Agriculture	Pre-Contact	d	No	Preservation
05106	16	Mound	Agriculture	Pre-Contact	d	No	Preservation
05106	17	Mound	Agriculture	Pre-Contact	d	No	Preservation
05106	18	Wall	Agriculture	Pre-Contact	d	No	Preservation
05106	19	Mound	Agriculture	Pre-Contact	d	No	Preservation
05106	20	Mound	Agriculture	Pre-Contact	d	No	Preservation
05106	21	Mound	Agriculture	Pre-Contact	d	No	Preservation
05106	22	L-shaped Wall	Agriculture	Pre-Contact	d	No	Preservation
05106	23	Mound	Agriculture	Pre-Contact	d	No	Preservation
05106	24	Mound	Agriculture	Pre-Contact	d	No	Preservation
05106	25	Mound	Agriculture	Pre-Contact	d	No	Preservation
05106	26	Enclosure	Habitation (T)	Pre-Contact	d	No	Preservation

Site	Feature	Formal Type	Interpreted Function	Probable Age	Significance	Impacted by current project	Recommended Mitigation
05106	27	Mound	Agriculture	Pre-Contact	d	No	Preservation
05106	28	Stone-constructed channel	Military obstacle course	20th century	d	Yes	No Further Work
05106	29	Wall	Military land modification	20th century	d	Yes	No Further Work
05106	30	Mound	Military land modification	20th century	d	Yes	No Further Work
05106	31	Wall	Military training	20th century	d	Yes	No Further Work
05106	32	Enclosure	Military training	20th century	d	Yes	No Further Work
05106	33	C-shaped wall	Ceremonial	Pre-Contact	d,e	No	Preservation
05106	34	Enclosure	Ceremonial-Makahiki	Pre-Contact	d,e	No	Preservation
05106	35	Mound	Agriculture	Pre-Contact	d	No	Preservation
05106	36	Mound	Agriculture	Pre-Contact	d	No	Preservation
05106	37	Mound	Agriculture	Pre-Contact	d	No	Preservation
05106	38	Enclosure	Habitation (T)	Pre-Contact	d	No	Preservation
05106	39	Mound	Agriculture	Pre-Contact	d	No	Preservation
05106	40	Mound	Agriculture	Pre-Contact	d	No	Preservation
05106	41	Limestone pit	Undetermined	Pre-Contact	d	No	Preservation
05106	42	C-shaped wall	Habitation (T)	Pre-Contact	d	No	Preservation
05106	43	Wall	Military training?	Post-Contact	d	Yes	Data Recovery
05106	44	Limestone pit	Undetermined	Undetermined	d	No	Preservation
05106	45	Mound	Military land modification	20th century	d	Yes	No Further Work
05106	46	Wall	Agriculture	Pre-Contact	d	No	Preservation

Site	Feature	Formal Type	Interpreted Function	Probable Age	Significance	Impacted by current project	Recommended Mitigation
05106	47	Mound	Agriculture	Pre-Contact	d	No	Preservation
05106	48	Mound	Agriculture	Pre-Contact	d	No	Preservation
05106	49	Enclosure	Habitation (T)	Pre-Contact	d	No	Preservation
05106	50	Mound	Agriculture	Pre-Contact	d	No	Preservation
05106	51	Limestone pit (modified)	Agriculture	Pre-Contact	d	No	Preservation
05106	52	Limestone pit (modified)	Agriculture	Pre-Contact	d	No	Preservation
05106	53	Mound	Boundary	Pre-Contact	d	No	Preservation
05106	54	Enclosure	Agriculture	Pre-Contact	d	No	Preservation
05106	55	Limestone pit (modified)	Agriculture	Pre-Contact	d	No	Preservation
05106	56	Limestone pit	Undetermined	Undetermined	d	No	Preservation
05106	57	Wall	Agriculture	Pre-Contact	d	No	Preservation
05106	58	Limestone pit (modified)	Agriculture	Pre-Contact	d	No	Preservation
05106	59	Limestone pit	Undetermined	Undetermined	d	No	Preservation
05106	60	Limestone pit (modified)	Agriculture	Pre-Contact	d	No	Preservation
05106	61	C-shaped wall	Habitation (T)	Pre-Contact	d	No	Preservation
05106	62	Limestone pit	Undetermined	Undetermined	d	No	Preservation
05106	63	Limestone pit (modified)	Agriculture	Pre-Contact	d	No	Preservation
05106	64	Mound	Agriculture	Pre-Contact	d	No	Preservation
05106	65	Limestone pit (modified)	Agriculture	Pre-Contact	d	No	Preservation
05106	66	Mound	Agriculture	Pre-Contact	d	No	Preservation
05106	67	Mound	Agriculture	Pre-Contact	d	No	Preservation
05106	68	Limestone pit	Undetermined	Undetermined	d	No	Preservation

Site	Feature	Formal Type	Interpreted Function	Probable Age	Significance	Impacted by current project	Recommended Mitigation
05106	69	Limestone pit (modified)	Agriculture	Pre-Contact	d	Yes	No Further Work
05106	70	Enclosure	Habitation (T)	Pre-Contact	d	Yes	Data Recovery
05106	71	Wall	Military land modification	20th century	d	Yes	Data Recovery
05106	72	Wall	Agriculture	Pre-Contact?	d	No	Preservation
05106	73	Boulder on-end	Undetermined	Pre-Contact	d	No	Preservation
05106	74	Wall	Agriculture	Pre-Contact	d	No	Preservation
05106	75	Mound	Agriculture	Pre-Contact	d	No	Preservation
05106	76	Mound	Agriculture	Pre-Contact	d	No	Preservation
05106	77	Mound	Agriculture	Pre-Contact	d	No	Preservation
05106	78	Mound	Agriculture	Pre-Contact	d	No	Preservation
05106	79	Mound	Agriculture	Pre-Contact	d	No	Preservation
05106	80	Mound	Agriculture	Pre-Contact	d	No	Preservation
05106	81	Mound	Agriculture	Pre-Contact	d	No	Preservation
05106	82	Mound	Agriculture	Pre-Contact	d	No	Preservation
05106	83	Mound	Agriculture	Pre-Contact	d	No	Preservation
05106	84	Mound	Agriculture	Pre-Contact	d	No	Preservation
05106	85	Mound	Agriculture	Pre-Contact	d	No	Preservation
05106	86	Mound	Agriculture	Pre-Contact	d	No	Preservation
05106	87	Mound	Agriculture	Pre-Contact	d	No	Preservation
05106	88	Mound	Agriculture	Pre-Contact	d	No	Preservation
05106	89	Mound	Agriculture	Pre-Contact	d	No	Preservation
05106	90	L-shaped Wall	Habitation (T)	Pre-Contact	d	No	Preservation
05106	91	Mound	Agriculture	Pre-Contact	d	No	Preservation
05106	92	Mound	Agriculture	Pre-Contact	d	No	Preservation
05106	93	Platform	Ceremonial	Pre-Contact	d,e	No	Preservation
05106	94	Mound	Agriculture	Pre-Contact	d	No	Preservation

Site	Feature	Formal Type	Interpreted Function	Probable Age	Significance	Impacted by current project	Recommended Mitigation
05106	95	Mound	Agriculture	Pre-Contact	d	No	Preservation
05106	96	Mound	Agriculture	Pre-Contact	d	No	Preservation
05106	97	Limestone pit	Undetermined	Undetermined	d	Yes	Data Recovery
05106	98	Mound	Agriculture	Pre-Contact	d	No	Preservation
05106	99	Wall	Military land modification	20th century	d	Yes	Data Recovery
05107	1	Limestone pit	Undetermined	Undetermined	d	No	Preservation
05107	2	Limestone pit	Undetermined	Undetermined	d	No	Preservation
05107	3	Limestone pit	Undetermined	Undetermined	d	No	Preservation
05107	4	Limestone pit	Undetermined	Undetermined	d	No	Preservation
05107	5	Limestone pit	Undetermined	Undetermined	d	No	Preservation
05107	6	Limestone pit (modified)	Agriculture	Pre-Contact	d	No	Preservation
05107	7	Limestone pit (modified)	Agriculture	Pre-Contact	d	No	Preservation
T-01	1	Bunker	Military ammunition storage	Mid-20th century	d	No	Preservation
T-01	2	Bunker	Military ammunition storage	Mid-20th century	d	No	Preservation
T-01	3	Bunker	Military ammunition storage	Mid-20th century	d	No	Preservation
T-01	4	Bunker	Military ammunition storage	Mid-20th century	d	No	Preservation
T-01	5	Bunker	Military ammunition storage	Mid-20th century	d	No	Preservation

Site	Feature	Formal Type	Interpreted Function	Probable Age	Significance	Impacted by current project	Recommended Mitigation
T-01	6	Bunker	Military ammunition storage	Mid-20th century	d	No	Preservation
T-01	7	Concrete curbing	Military building foundation	Mid-20th century	d	Yes	No Further Work
T-02	1	Aircraft revetment	Reinforced hangar	1942–1943	a, c	No	Preservation
T-02	2	Aircraft revetment	Reinforced hangar	1942–1943	a, c	No	Preservation
T-02	3	Aircraft revetment	Reinforced hangar	1942–1943	a, c	No	Preservation
T-02	4	Aircraft revetment	Reinforced hangar	1942–1943	a, c	No	Preservation
T-02	5	Bunker	Military ammunition storage	Mid-20th century	c	No	Preservation
T-02	6	Aircraft revetment	Reinforced hangar	1942–1943	a, c	No	Preservation
T-02	7	Aircraft revetment	Reinforced hangar	1942–1943	a, c	No	Preservation
T-02	8	Berm	Military land modification	Mid-20th century	d	No	Preservation
T-02	9	Aircraft revetment	Reinforced hangar	1942–1943	a, c	No	Preservation
T-02	10	Aircraft revetment	Reinforced hangar	1942–1943	a, c	No	Preservation
T-02	11	Aircraft revetment	Reinforced hangar	1942–1943	a, c	No	Preservation
T-02	12	Aircraft revetment	Reinforced hangar	1942–1943	a, c	No	Preservation

Site	Feature	Formal Type	Interpreted Function	Probable Age	Significance	Impacted by current project	Recommended Mitigation
T-02	13	Aircraft revetment	Reinforced hangar	1942–1943	a, c	No	Preservation
T-02	14	Aircraft revetment	Reinforced hangar	1942–1943	a, c	No	Preservation
T-02	15	Aircraft revetment	Reinforced hangar	1942–1943	a, c	No	Preservation
T-02	16	Aircraft revetment	Reinforced hangar	1942–1943	a, c	No	Preservation
T-02	17	C-shaped Wall	Military training	20th century	d	No	Preservation
T-02	18	Mound	Military development	20th century	d	No	Preservation
T-02	19	Concrete slab	Military Quonset hut foundation	Mid-20th century	d	No	Preservation
T-02	20	Quonset hut	Military	Mid-20th century	c	No	Preservation
T-02	21	Metal barrier	Military fire hydrant	Mid-20th century	d	No	Preservation
T-02	22	Aircraft revetment	Reinforced hangar	1942–1943	a, c	No	Preservation
T-02	23	Aircraft revetment	Reinforced hangar	1942–1943	a, c	No	Preservation
T-02	24	Aircraft revetment	Reinforced hangar	1942–1943	a, c	No	Preservation
T-02	25	Aircraft revetment	Reinforced hangar	1942–1943	a, c	No	Preservation
T-02	26	Aircraft revetment	Reinforced hangar	1942–1943	a, c	No	Preservation
T-02	27	Aircraft revetment	Reinforced hangar	1942–1943	a, c	No	Preservation

Site	Feature	Formal Type	Interpreted Function	Probable Age	Significance	Impacted by current project	Recommended Mitigation
T-02	28	Aircraft revetment	Reinforced hangar	1942–1943	a, c	No	Preservation
T-02	29	Aircraft revetment	Reinforced hangar	1942–1943	a, c	No	Preservation
T-02	30	Aircraft revetment	Reinforced hangar	1942–1943	a, c	No	Preservation
T-02	31	Aircraft revetment	Reinforced hangar	1942–1943	a, c	No	Preservation
T-02	32	Aircraft revetment	Reinforced hangar	1942–1943	a, c	No	Preservation
T-02	33	Aircraft revetment	Reinforced hangar	1942–1943	a, c	No	Preservation
T-02	34	Quonset hut	Military storage/admin	1944	c	No	Preservation
T-02	35	Concrete building	Air raid shelter	1944	d	No	Preservation
T-02	36	Stone-masoned building	Military structure	Mid-20th century	d	No	Preservation
T-02	37	Concrete footings	Military building foundation	Mid-20th century	d	No	Preservation
T-02	38	Aircraft revetment	Reinforced hangar	1942–1943	a, c	No	Preservation
T-02	39	Aircraft revetment	Reinforced hangar	1942–1943	a, c	No	Preservation
T-02	40	Aircraft revetment	Reinforced hangar	1942–1943	a, c	No	Preservation
T-02	41	Aircraft revetment	Reinforced hangar	1942–1943	a, c	No	Preservation

Site	Feature	Formal Type	Interpreted Function	Probable Age	Significance	Impacted by current project	Recommended Mitigation
T-02	42	Aircraft revetment	Reinforced hangar	1942–1943	a, c	No	Preservation
T-02	43	Aircraft revetment	Reinforced hangar	1942–1943	a, c	No	Preservation
T-02	44	Aircraft revetment	Reinforced hangar	1942–1943	a, c	No	Preservation
T-02	45	Aircraft revetment	Reinforced hangar	1942–1943	a, c	No	Preservation
T-02	46	Aircraft revetment	Reinforced hangar	1942–1943	a, c	No	Preservation
T-02	47	Sign post foundation	Military sign post	Mid-20th century	d	No	Preservation
T-02	48	Aircraft revetment	Reinforced hangar	1942–1943	a, c	No	Preservation
T-02	49	Aircraft revetment	Reinforced hangar	1942–1943	a, c	No	Preservation
T-02	50	Aircraft revetment	Reinforced hangar	1942–1943	a, c	No	Preservation
T-02	51	Aircraft revetment	Reinforced hangar	1942–1943	a, c	No	Preservation
T-02	52	Aircraft revetment	Reinforced hangar	1942–1943	a, c	No	Preservation
T-02	53	Aircraft revetment	Reinforced hangar	1942–1943	a, c	No	Preservation
T-02	56	Concrete box	Undetermined	Post-1943	d	Yes	No Further Work
T-02	57	Aircraft revetment	Reinforced hangar	1942–1943	a, c	No	Preservation
T-02	58	Aircraft revetment	Reinforced hangar	1942–1943	a, c	No	Preservation

Site	Feature	Formal Type	Interpreted Function	Probable Age	Significance	Impacted by current project	Recommended Mitigation
T-02	59	Quarry	Material for revetments	Mid-20th century	d	Yes	No Further Work
T-03	1	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	2	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	3	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	4	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	5	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	6	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	7	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	8	Limestone pit	Undetermined	Undetermined	d	Yes	Data Recovery
T-03	9	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	10	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	11	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	12	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	13	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	14	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	15	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	16	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	17	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	18	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	19	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	20	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	21	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	22	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	23	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	24	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	25	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	26	Limestone pit	Undetermined	Undetermined	d	No	Preservation

Site	Feature	Formal Type	Interpreted Function	Probable Age	Significance	Impacted by current project	Recommended Mitigation
T-03	27	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	28	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	29	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	30	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	31	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	32	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	33	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	34	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	35	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	36	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	37	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	38	Limestone pit	Undetermined	Undetermined	d	Yes	Data Recovery
T-03	39	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	40	Limestone pit	Undetermined	Undetermined	d	Yes	Data Recovery
T-03	41	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	42	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	43	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	44	Limestone pit	Undetermined	Undetermined	d	Yes	Data Recovery
T-03	45	Limestone pit	Undetermined	Undetermined	d	Yes	Data Recovery
T-03	46	Limestone pit	Undetermined	Undetermined	d	Yes	Data Recovery
T-03	47	Limestone pit	Undetermined	Undetermined	d	Yes	Data Recovery
T-03	48	Limestone pit	Undetermined	Undetermined	d	Yes	Data Recovery
T-03	49	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	50	Limestone pit	Undetermined	Undetermined	d	Yes	Data Recovery
T-03	51	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	52	Limestone pit	Undetermined	Undetermined	d	Yes	Data Recovery
T-03	53	Limestone pit	Undetermined	Undetermined	d	Yes	Data Recovery
T-03	54	Limestone pit	Undetermined	Undetermined	d	No	Preservation

Site	Feature	Formal Type	Interpreted Function	Probable Age	Significance	Impacted by current project	Recommended Mitigation
T-03	55	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	56	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	57	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	58	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	59	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	60	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	61	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	62	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	63	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	64	Limestone pit	Undetermined	Undetermined	d	Yes	Data Recovery
T-03	65	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	66	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	67	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	68	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	69	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	70	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	71	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	72	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	73	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	74	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	75	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	76	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	77	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	78	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	79	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	80	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	81	Limestone pit	Undetermined	Undetermined	d	No	Preservation

Site	Feature	Formal Type	Interpreted Function	Probable Age	Significance	Impacted by current project	Recommended Mitigation
T-03	82	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	83	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	84	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	85	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	86	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	87	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	88	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	89	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	90	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	91	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	92	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	93	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	94	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	95	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	96	Limestone pit (modified)	Undetermined	Pre-Contact/mid-20th century	d	No	Preservation
T-03	97	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	98	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	99	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	100	Limestone pit	Undetermined	Undetermined	d	Yes	Data Recovery
T-03	101	Limestone pit	Undetermined	Undetermined	d	Yes	Data Recovery
T-03	102	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	103	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	104	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	105	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	106	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	107	Limestone pit	Undetermined	Undetermined	d	No	Preservation

Site	Feature	Formal Type	Interpreted Function	Probable Age	Significance	Impacted by current project	Recommended Mitigation
T-03	108	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	109	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	110	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	111	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	112	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	113	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	114	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	115	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	116	Limestone pit (modified)	Agriculture	Pre-Contact	d	No	Preservation
T-03	117	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	118	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	119	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	120	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	121	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	122	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	123	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	124	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	125	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	126	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	127	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	128	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	129	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	130	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	131	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	132	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	133	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	134	Limestone pit	Undetermined	Undetermined	d	No	Preservation

Site	Feature	Formal Type	Interpreted Function	Probable Age	Significance	Impacted by current project	Recommended Mitigation
T-03	135	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	136	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	137	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	138	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	139	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	140	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	141	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	142	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	143	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	144	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	145	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	146	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	147	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	148	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	149	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	150	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	151	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	152	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	153	Limestone pit (modified)	Agriculture	Pre-Contact	d	No	Preservation
T-03	154	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	155	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	156	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	157	Limestone pit	Undetermined	Undetermined	d	No	Preservation
T-03	158	Limestone pit	Undetermined	Undetermined	d	Yes	Data Recovery
T-03	159	Limestone pit	Undetermined	Undetermined	d	Yes	Data Recovery
T-03	160	Limestone pit	Undetermined	Undetermined	d	Yes	Data Recovery
T-07	-	L-shaped wall	Habitation (P)	Pre-Contact	d	No	Preservation

Site	Feature	Formal Type	Interpreted Function	Probable Age	Significance	Impacted by current project	Recommended Mitigation
T-08	1	Asphalt surface	Runway apron	1942–1944	a, d	Yes	No Further Work
T-08	2	Metal plates with rings	Plane tie downs	Mid-20th century	a, d	Yes	No Further Work
T-08	3	Concrete box	Military electric box-airfield	Mid-20th century	d	Yes	No Further Work
T-08	4	Berms	Military ditch-airfield	Mid-20th century	d	Yes	No Further Work
T-09	1	Concrete slab	Building foundation	Mid-20th century	d	No	No Further Work
T-09	2	Concrete structure	Underground utility	1942	a, c, d	No	Preservation
T-09	3	Concrete structure	Underground utility	Mid-20th century	d	No	Preservation
T-09	4	Concrete structure	Underground utility	1942	a, c, d	No	Preservation
T-09	5	Concrete structure	Underground utility	Mid-20th century	d	No	Preservation
T-09	6	Concrete structure	Building foundation	Mid-20th century	d	No	Preservation
T-10	-	Limestone pit	Undetermined	Undetermined	d	Yes	Data Recovery
T-11	-	Limestone pit	Undetermined	Undetermined	d	Yes	Data Recovery
T-12	-	Subsurface Cultural Layer	Habitation	Pre-Contact to Early Post-Contact Era	d	Yes	Data Recovery

6.0 PROJECT EFFECT AND MITIGATION RECOMMENDATIONS

6.1 REGULATORY FRAMEWORK

The purpose of the State of Hawai'i Historic Preservation Program, as defined in Hawai'i Revised Statues (HRS) §6E-1, is to conserve, restore, and maintain "the historic and cultural heritage of the State [...] for the education, inspiration, pleasure, and enrichment of its citizens." In order to meet this goal, the historic preservation review program codified by HAR Title 13 specifies a six-step process:

1. Identification and inventory of historic properties within a project area;
2. Evaluation of significance of each identified historic property;
3. Determination of the effect of the project on significant historic properties;
4. Mitigation commitments to minimize the impacts of the project on historic properties;
5. Preparation of detailed mitigation plans, if applicable; and
6. Verification of completion of the five above steps.

Per HAR §13-284-3, regarding private (non-governmental) projects, this archaeological inventory survey report addresses the first four steps of this process: identification and inventory, evaluation of significance, effect determination, and proposed mitigation commitments.

6.2 PROJECT EFFECT

HAR §13-284-7 identifies two possible effect determinations, "no historic properties affected" and "effect, with proposed mitigation commitments." The purpose of this archaeological inventory survey is to identify and document all historic properties and assess their integrity and significance. Further, it identifies potential for the project to impact significant historic properties and provides agreed-upon mitigation commitments to address the identified adverse impacts. Additionally, this report may assist the Department of Hawaiian Home Lands in managing the archaeological resources present within its landholdings. It provides detailed information on the location, character, and relative significance of the archaeological remains present within the survey area.

The Barbers Point Solar Project will involve extensive ground disturbance, and as such, the project effect is determined to be "effect, with proposed mitigation commitments."

6.3 MITIGATION RECOMMENDATIONS

The present program of site recording was undertaken to gather information about the sites, not to mitigate any adverse impacts to these archaeological remains. Significance assessments and mitigation commitments have been made to meet AIS requirements and are based on the integrity and significance of each property. Each of the 438 features included in the 17 historic properties identified during the archaeological inventory survey of the Barbers Point Solar Project Area has been recommended for treatment. Treatment recommendations include the following:

Preservation (HAR §13-284-8 [a][1][A])
This category involves the preservation of a site and its features in their entirety. It is most often applied to sites which have been determined to be significant for more than simply their informational content (that have been assessed as significant under Criteria a, b, c, or e). A detailed Preservation Plan outlining how these sites are to be protected will be prepared and submitted to the State Historic Preservation Division for review and approval prior to initiation of any ground-disturbing activities related to the development of the survey area.

Data Recovery (HAR §13-278-2)
Archaeological data recovery is a form of mitigation that archaeologically records or recovers a reasonable and adequate amount of information from a historic property.

No Further Work
No further work is recommended for historic properties where sufficient archaeological data have been collected during previous investigations and the current AIS.

The 17 historic properties contain a total of 438 identified features within the Barbers Point Solar Project Area. Recommendations for the treatment of each of these features are summarized in Table 12 and their locations are shown within the proposed project design (Figure 24). Of the 17 historic properties that were identified, four (SIHP 50-80-12-01729, -05100, -05107, and T-07) will be completely avoided and preserved. Features included in eight additional historic properties (SIHP 50-80-12-01733, -01745, -05094, -05106, T-01, T-02, T-03, and T-09) will also be avoided and preserved. This includes 5 of 18 features at SIHP -01733, 16 of 17 features at SIHP -01745, 4 of 5 features at SIHP -05094, 79 of the 99 features included in SIHP -05106, 6 of the 7 features at T-01, 55 of the 57 features at T-02, 143 of the 160 features that make up T-03, and 5 of 6 features at T-09. In total, 348 of the features documented during this study are recommended for preservation (Table 13).

The proposed project design will potentially impact 90 of the 438 documented features. The impacts to 42 of these 90 features will be mitigated through data recovery at SIHP 50-80-12-01733 (13 features), -01745 (1 feature), -05094 (1 feature) -05106 (7 features), and T-03 (17 features, T-10 (1 feature), T-11 (1 feature), and T-12 (1 feature).

No further work is recommended for the remaining 48 historic property features potentially impacted by the project. These historic property features are included in SIHP -05099 (27 features), SIHP -05106 (13 features), T-01 (1 feature), T-02 (2 features), T-08 (4 features), and T-09 (1 feature).

Table 13. Mitigation Recommendations for Identified Features in the Barbers Point Solar Project Area

Recommended Mitigation	No. of Features
No Further Work	48
Data Recovery	42
Preservation	348
TOTAL	438

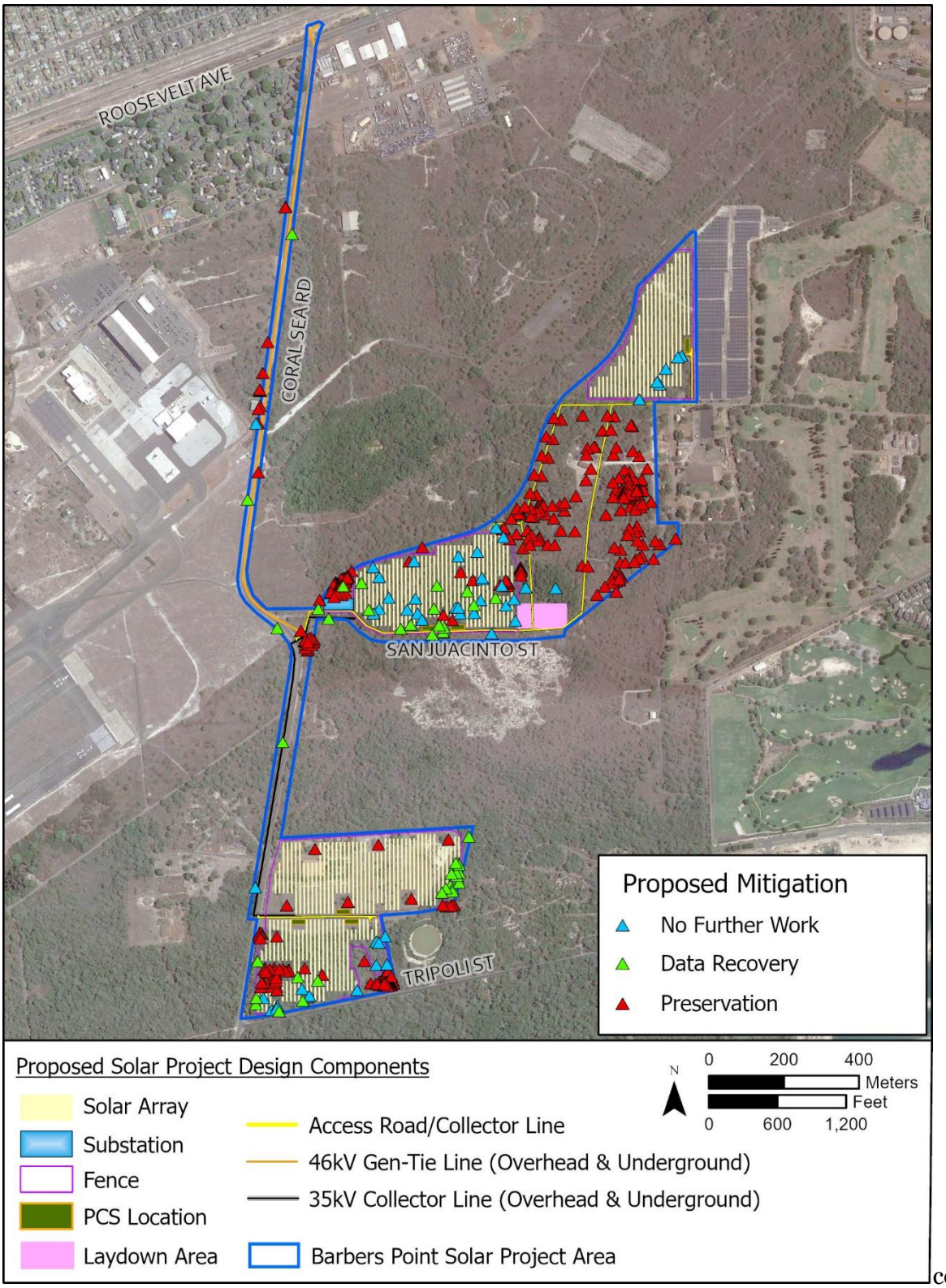

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Figure 24. Proposed mitigation measures for individual features of the historic properties in the Barbers Point Solar Project Area (Google Earth Imagery 2019).

6.3.1 Historic Properties Recommended for Preservation

A total of 348 features from 12 historic properties are recommended for preservation. These include features at previously identified Sites SIHP 50-80-12-01729, -01733, -01745, -05094, -05100, -05106, -05107, and newly identified sites T-01, T-02, T-03, T-07, and T-09 (see Table 12). These include most of the traditional Hawaiian features (n=110) and limestone pits (n=191) in the project area, six U.S. military bunkers in Parcel 40 (T-01), the majority of buildings and contributing elements included in the proposed Revetments Area Historic District (Site T-02), and the underground chambers and associated features that make up Site T-09. Full-time archaeological monitoring is recommended during all ground-disturbing activities to ensure that all sites slated for preservation will be protected in accordance with an accepted Preservation Plan.

6.3.2 Historic Properties Recommended for Data Recovery

Data recovery is recommended for 42 features from seven of the historic properties. These include 34 unmodified limestone pits (SIHP 50-80-12-01733, -01745, -05094, -05106, T-03, T-10, and T-11), one modified limestone pit (SIHP 50-80-12-05106, Feature 2), two limestone mounds (SIHP 50-80-01733, Feature 6 and SIHP 50-80-12-05106, Feature 8), a limestone enclosure (SIHP 50-80-12-80-05106, Feature 70), three limestone wall sections (SIHP 50-80-12-05106, Feature 43, 71, and 99), and a subsurface cultural layer (T-12).

These 39 features are recommended for data recovery because they will be impacted by the project; data recovery investigations will be carried out to recover any significant archaeological or paleontological deposits from the features. The limestone pits are also culturally sensitive for the Native Hawaiian community, as previous investigations have identified limestone pits that contain human remains near the project area. Data recovery in these instances will ensure that no human remains are adversely impacted by the proposed project. Data recovery will include hand-excavating a limestone pit (Feature 160) that was partially excavated during the testing phase of the project (Trench 5). Data recovery at Site T-12 will consist of hand excavations in the vicinity of Test Trench 4 to determine the horizontal and vertical extent of the documented cultural layer (Layer IV).

6.3.3 Historic Properties Recommended for No Further Work

The remaining 48 potentially impacted features from six historic properties are recommended for no further work because sufficient archaeological data have been collected from the features during previous investigations and the current AIS. The documented features recommended for no further work consist of:

- All 27 structural remnants associated with the former U.S. Navy Seabee camp (SIHP 50-80-12-05099). These structures include mainly concrete features and metal elements representing underground utilities (sewer, water, and drainage) and asphalt surfaces once serving as roads and a tennis court (Feature 26). One of the features is a large soil and debris berm (Feature 23) formed during dismantlement and demolition of the former camp.
- 13 military training features included in SIHP 50-80-12-05106. These features consist of stone features, including one stone-masoned feature (Feature 28), associated with training and land modification that were once part of an active training area at NASBP. All military features in SIHP 50-80-12-05106 have been fully documented during the

current AIS and the more obvious features (Features 1, 8, and 28) were recorded during previous investigations (Tuggle and Tomonari-Tuggle 1997; Wickler and Tuggle 1997; Beardsley 2001) and included subsurface testing and surface artifact collection at Feature 28. Feature 69, also recommended for no further work, is a pre-Contact or early post-Contact modified sink that was previously excavated and all contents from within the sink were removed and analyzed (Beardsley 2001). Thus, all site data have been collected from the sink feature.

- One concrete curb associated with a military building foundation at Site T-01.
- The two military features at Site T-02 including a training C-shaped wall built into a revetment (Feature 56), and a quarry pit from which limestone was extracted to build the surrounding revetments.
- The four aviation-related features that comprise Site T-08 and were part of the former MCAS ʻEwa airfield that postdate the December 7, 1941, attack. These four features consist of two parking aprons built between 1942 and 1944 (Feature 1), two plane tie-downs on the parking apron (Feature 2), a concrete utility box (Feature 3), and an irrigation ditch between the parking aprons (Feature 4).
- One concrete foundation at Site T-11.

Archaeological monitoring is recommended for the Project. Before initiation of any ground-disturbing activities related to Project construction, approval will be obtained from SHPD, including approval of a Project-specific Archaeological Monitoring Plan. The features recommended for No Further Work shall be called out in the Archaeological Monitoring Plan.

6.4 DISPOSITION OF MATERIALS

All field records (descriptions, notes, and photographs) resulting from the archaeological inventory survey have been temporarily housed in the Pacific Legacy Kailua, Oʻahu office. These will be provided to the landowner (Department of Hawaiian Home Lands) once all analysis and write-up has been completed. Long-term curation specifics will be determined by the Department of Hawaiian Home Lands as the landowner, per HAR 13-276-6(a).

7.0 SUMMARY AND INTERPRETATION

During the AIS fieldwork, 17 historic properties, comprising 438 component features, were documented in the Barbers Point Solar Project Area. The historic properties consist of eight previously identified sites (SIHP 50-80-12-01729, -01733, -01745, -05094, -05099, -05100, -05106, -05107) and nine newly identified sites (Temporary Sites T-01 through T-03, T-07 through T-12). The Barbers Point Solar Project Area was previously surveyed in preparation for the closure of the NAS Barbers Point in 1999 (Haun 1991, Tuggle and Tomonari-Tuggle 1997, Wickler and Tuggle 1997, and Beardsley 2001). The entire project area was re-surveyed with 100% coverage during the current AIS. Subsurface testing conducted along proposed project utilities on Coral Sea Road and San Juacinto Street in Parcel 38 identified a remnant pre-Contact to early post-Contact habitation layer (Site T-12) and a buried limestone pit feature that was added to a nearby complex of modified and unmodified limestone pits (Site T-03).

The 17 historic properties consist of limestone structures or modified limestone pits used for Hawaiian habitation, agriculture, and ceremonial activities; a subsurface Hawaiian habitation layer, unmodified limestone pits of an undetermined function; and intact historical buildings and remnant infrastructure associated with MCAS Ewa and NAS Barbers Point military bases that date from the 1940s to the late 1950s.

The large amount of archaeological data uncovered during the current project and previous surveys provide a better understanding of pre-Contact and early post-Contact Hawaiian settlement and land-use strategies on the ‘Ewa Plain of Honouliuli Ahupua‘a. The data also provide further information on U.S. military occupation of the project area and the ingenious construction of aircraft revetments and supporting facilities following the December 7, 1941 Japanese attack at MCAS Ewa airfield.

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ARCHAEOLOGICAL INVENTORY SURVEY OF THE PROPOSED BARBERS POINT SOLAR PROJECT IN THE AHUPUA‘A OF HONOULIULI, DISTRICT OF ‘EWA, ISLAND OF O‘AHU

[TMK: (1) 9-1-013:038; (1) 9-1-013:040; AND 9-1-016:027 (POR.)]

APPENDIX A:

SITE DESCRIPTIONS OF PREVIOUSLY IDENTIFIED HISTORIC PROPERTIES

CULTURAL RESOURCES CONSULTANTS

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APPENDIX A:

SITE DESCRIPTIONS OF PREVIOUSLY IDENTIFIED HISTORIC PROPERTIES

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PREFACE

This report volume contains archaeological site descriptions, feature plan maps, and photographs for previously identified sites (SIHP 50-80-12-01729, -01733, -01745, -05094, -05099, -05100, -05106, and -05107) documented in the Barbers Point Solar Project Area.

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1.0 ARCHAEOLOGICAL SITE DESCRIPTIONS

SIHP No.: 50-80-12-01729
Site Type: Complex of limestone structures
No. of Features: 2 within project area
Dimensions: 1.0 m (E/W) × 3.0 (N/S) (inside project area)
Condition: Fair
Possible Age: Undetermined
Possible Function: Undetermined
Significance: d
Recommended Treatment: Preservation
Previous Investigations: Archaeological survey (Haun 1991) and intensive survey and testing (Beardsley 2001)

SIHP 50-80-12-01729 is a complex of 14 limestone pits located in a currently undeveloped parcel on the west side of Coral Sea Road, south of Independence Road (Figure 1). The site was previously documented by Haun (1991), Tuggle and Tomonari-Tuggle (1997:122), and Beardsley (2001). Beardsley (2002:IV.64) excavated and drew a plan map of the largest of the pit features (Feature A). Feature A yielded historic artifacts, sparse faunal material, and a brown soil-charcoal feature (Feature HF-13). Beardsley interpreted Feature A as a trash pit associated with post-Contact use of the area.

The current survey identified two limestone pits (Features 1 and 2) of an undetermined function on the west side of Coral Sea Road in the vicinity of SIHP -01729. The current site boundary was expanded to include Feature 1 and 2.

Feature 1 is an unmodified pit that measures 0.7 (E/W) × 0.6 m (N/S) × 1.0 m deep. The pit contains a soil floor with scattered limestone boulders and cobbles. The pit is in fair condition with fair excavation potential.

Feature 2 is an unmodified pit that measures 0.7 (N/S) × 0.7 m (E/W) × 0.3 m deep. The pit is filled with soil and scattered limestone cobbles. The pit is in poor condition with poor excavation potential.

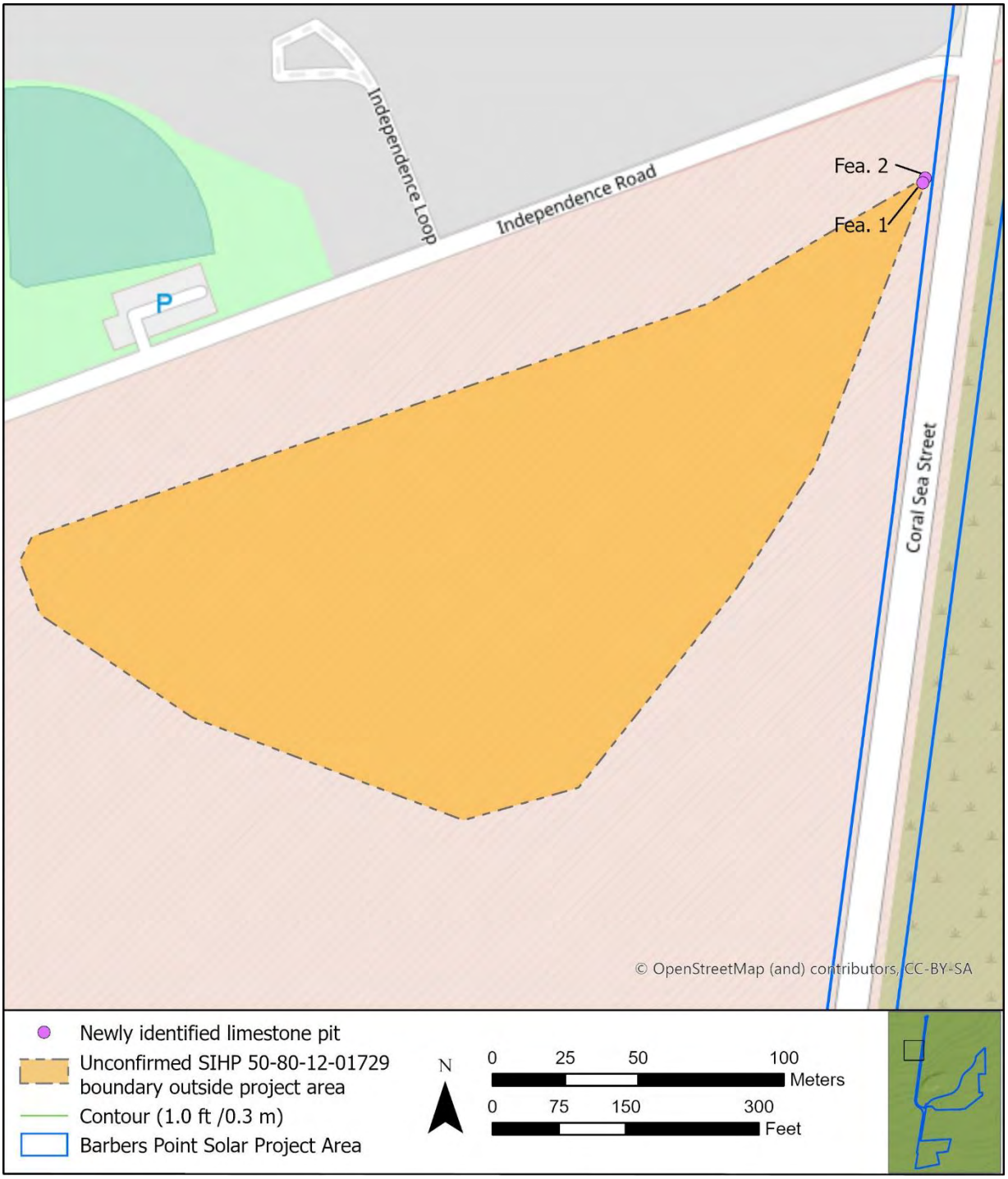

Figure 1. SIHP 50-80-12-01729 with newly identified features and expanded site boundary.

Figure 2. SIHP 50-80-12-01729, Feature 1 limestone pit (view to east).

Figure 3. SIHP 50-80-12-01729, Feature 2 limestone pit in foreground and Feature 1 in background (view to southeast).

SIHP No.: 50-80-12-01733
Site Type: Complex of limestone structures
No. of Features: 18
Dimensions: 200 m L × 45 m W
Condition: Fair
Possible Age: Pre-Contact/Post-Contact
Possible Function: Temporary habitation, agriculture, military
Significance: d
Recommended Treatment: Preservation/Data Recovery
Previous Investigations: Archaeological survey (Haun 1991) and intensive survey and testing (Beardsley 2001)

Eighteen features were documented in the northeastern portion of Parcel 40, within or near the previously identified SIHP 50-80-12-01733 complex (Table 1 and Figure 4). SIHP 50-80-12-01733 comprises 14 features originally identified by Haun (1991), of which 10 features were fully documented. Seven of the features were tested by Beardsley (2001) (Table 2). The site boundary is defined by the maximum extent of surface architectural features and the surface of pit openings.

The features identified during the current survey are interpreted as agricultural and temporary habitation features and include a small C-shaped wall (Feature 2), contiguous C-shaped walls (Feature 3), mounds (Features 5 and 6), and 12 limestone pits (Features 7 through 18). Two of the features (Features 1 and 4) might represent bulldozer push associated with land clearing for the military facility. The site area is heavily disturbed by development of the surrounding military facility and overgrowth of the dense *kiawe* (*Prosopis juliflora*) forest.

None of the currently documented site features matched with the previously identified features; some features are in proximity but differ in feature types or have different shapes and sizes (Figure 4). The mounds designated as Feature 6 and Feature N are similar in size but are located approximately 30 m apart. This spatial irregularity might suggest that Beardsley's map (2001:Figure IV-118) is inaccurate.

Table 1. Summary of SIHP 50-80-12-01733, Features 1 through 18, Currently Recorded in Project Area

Feature	Field No.	Type	Possible Function
1	T-115	Wall	Military land modification?
2	T-116	C-shaped wall	Temporary Habitation
3	T-117	Contiguous enclosures (3)	Temporary Habitation
4	T-118	Wall	Military land modification?
5	T-119	Mounds (2)	Agriculture?
6	T-120	Mound	Agriculture?
7	T-122	Unmodified pit	Undetermined
8	T-124	Unmodified pit	Undetermined
9	T-125	Unmodified pit	Undetermined
10	T-126	Unmodified pit	Undetermined
11	T-127	Unmodified pit	Undetermined
12	T-129	Unmodified pit	Undetermined
13	T-131	Unmodified pit	Undetermined
14	T-132	Unmodified pit	Undetermined
15	T-133	Unmodified pit	Undetermined
16	T-136	Unmodified pit	Undetermined
17	T-519	Unmodified pit	Undetermined
18	T-520	Unmodified pit	Undetermined

Table 2. SIHP 50-80-12-01733 Features Documented and Tested by Beardsley (2001:IV.104–107)

Feature	Type	Function	Tested	Archaeological Materials
B	Modified sinkhole (limestone pit)	Agricultural		-
C	Modified sinkhole (limestone pit)	Agricultural	X	-
D	L-shaped wall	Agricultural		-
F	Cairn (mound)	Agricultural	X	-
H	Cairn (mound)	Agricultural	X	-
I	Cairn (mound)	Agricultural	X	-
K	Wall	Agricultural		-
L	C-shaped wall	Agricultural	X	Sparse faunal
M	Cairn (mound)	Agricultural	X	-
N	Cairn (mound)	Agricultural	X	-

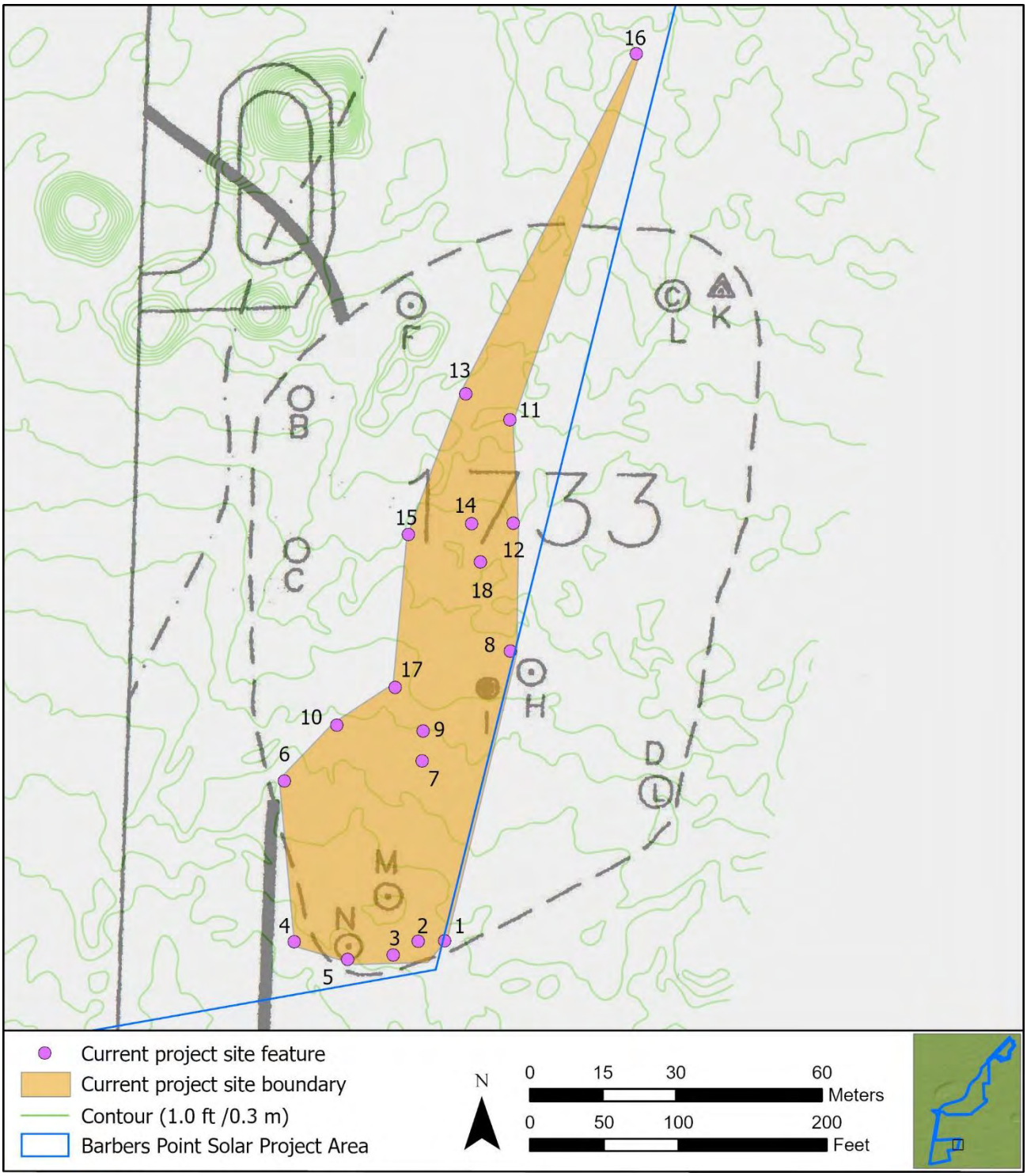

Figure 4. SIHP 50-80-12-01733 with current project feature locations and site boundary overlaid on PHRI feature location map (Beardsley 2001:Figure IV-118); underlying contours created from aerial LiDAR, 2019.

Feature 1 is a reversed "L-shaped" wall located on the eastern boundary of Parcel 40 (Figure 5 and Figure 6). The wall is constructed of loosely piled limestone cobbles and small boulders curved along a north-south and northeast-southwest axis. The wall is approximately 10 m long, 0.8 to 1.0 m wide and 0.2 to 0.4 m high. The land immediately east was previously graded and relatively clear of debris. A fenced parcel is southeast of the feature. Feature 1 was likely formed by land modifications for the development of the surrounding U.S. military facility, or it represents a former pre-Contact or post-Contact wall that was modified during military development. The feature is in fair condition.

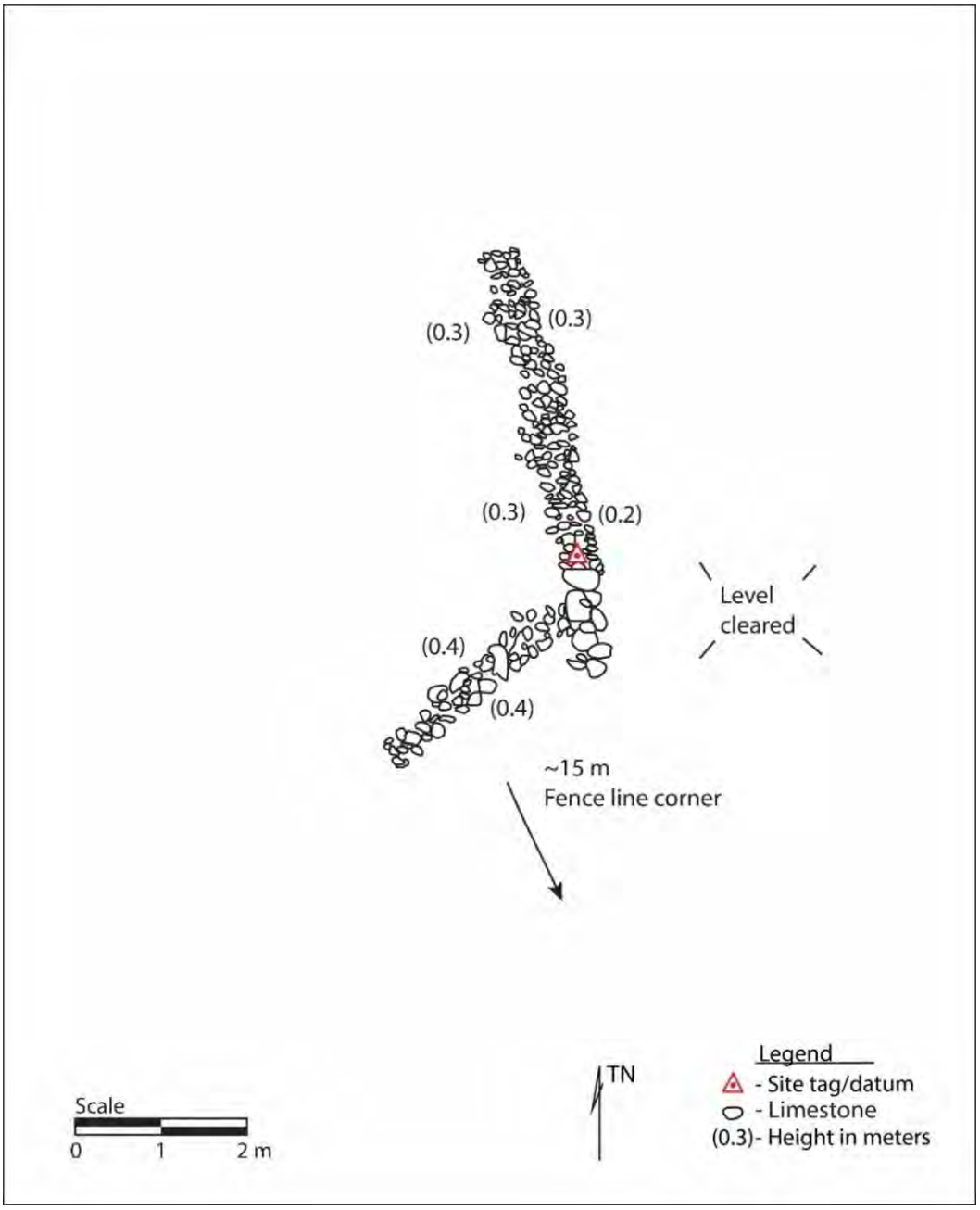

Figure 5. **Plan-view map of SIHP 50-80-12-01733, Feature 1 wall.**

Figure 6. SIHP 50-80-12-01733, Feature 1 wall (view to north).

Feature 2 is a small C-shaped wall located 2.8 m west-northwest of Feature 1 (Figure 7 and Figure 8). The C-shape is open to the southwest and composed of roughly stacked limestone cobbles and small boulders. It measures 2.0 m (NW/SE) by 1.5 m (NE/SW) on the outside and encloses a level soil surface roughly 1 m in dimeter. The wall is 0.5 to 0.7 m wide and a maximum of 0.45 m high. A limestone pebble on the southwest side of the C-shape is wrapped in old pink flagging, suggesting it was documented or tested by Beardsley (2001). Based on the small size of the feature, it likely functioned as a cooking hearth. The feature is in good condition.

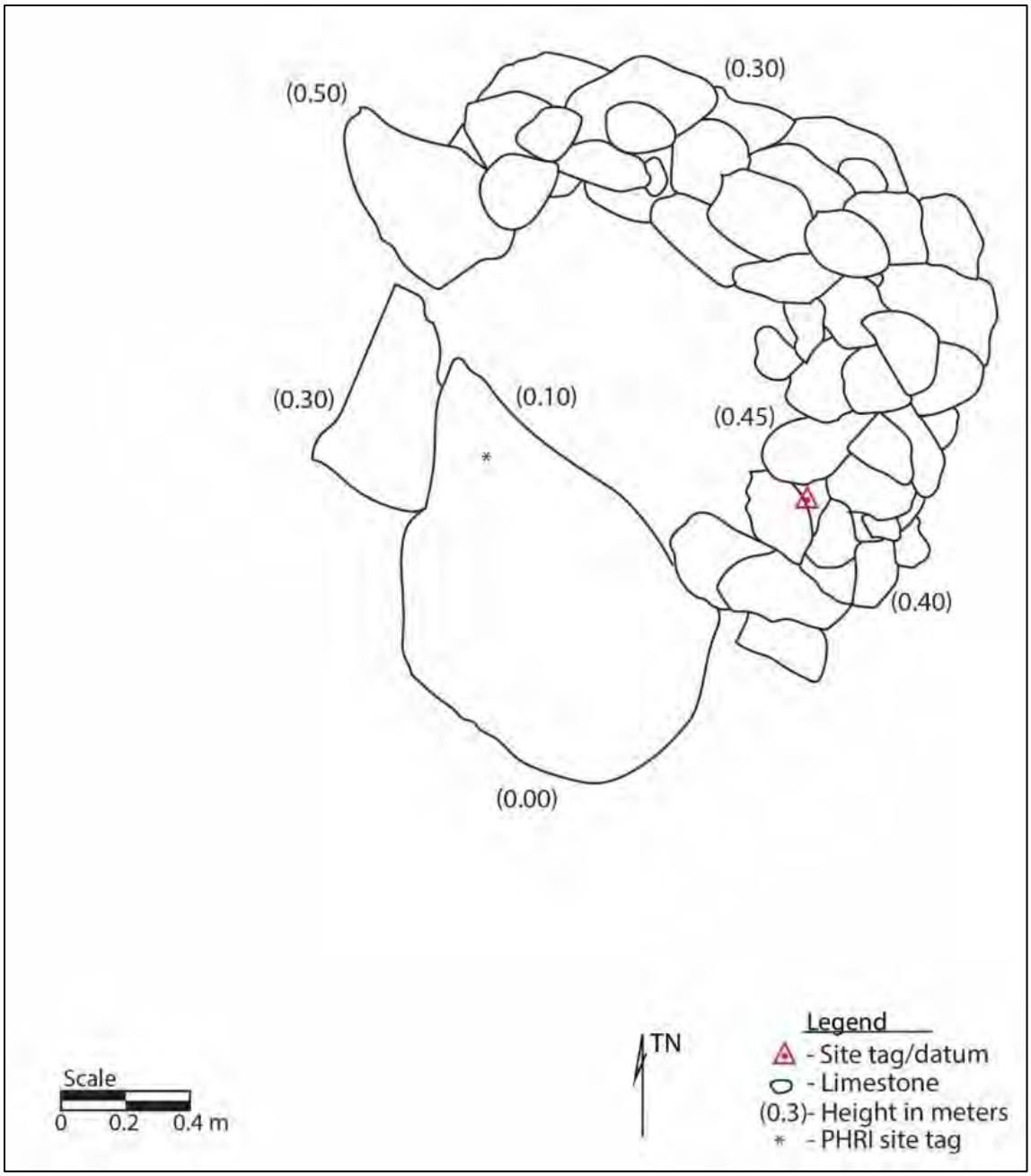

Figure 7. Plan-view map of SIHP 50-80-12-01733, Feature 2 C-shaped wall.

Figure 8. SIHP 50-80-12-01733, Feature 2 C-shaped wall (view to northeast).

Feature 3 consists of three contiguous C-shaped walls 2 m west of Feature 2 (Figure 9 through Figure 12). The C-shapes are open to the southwest and contain level soil floors. The walls range between 0.5 and 1.4 m wide and have a maximum height of 0.6 m. They are constructed of piled limestone cobbles and small boulders, with a few larger boulders incorporated. Rough stacking is apparent on the interior walls of the central and southeast C-shapes. The northwest C-shape is 3 × 2 m and partially encloses a level soil floor of 1.5 × 1 m. The central C-shape is 3 m in diameter and partially encloses a level soil area of 2 × 2 m. The southern C-shape is 3.5 m in diameter partially encloses a level soil area of 2 × 2 m. A large *kiawe* (*Prosopis juliflora*) tree is on the southeast edge of the feature and its roots and uplifting has disturbed the feature. It is in fair condition.

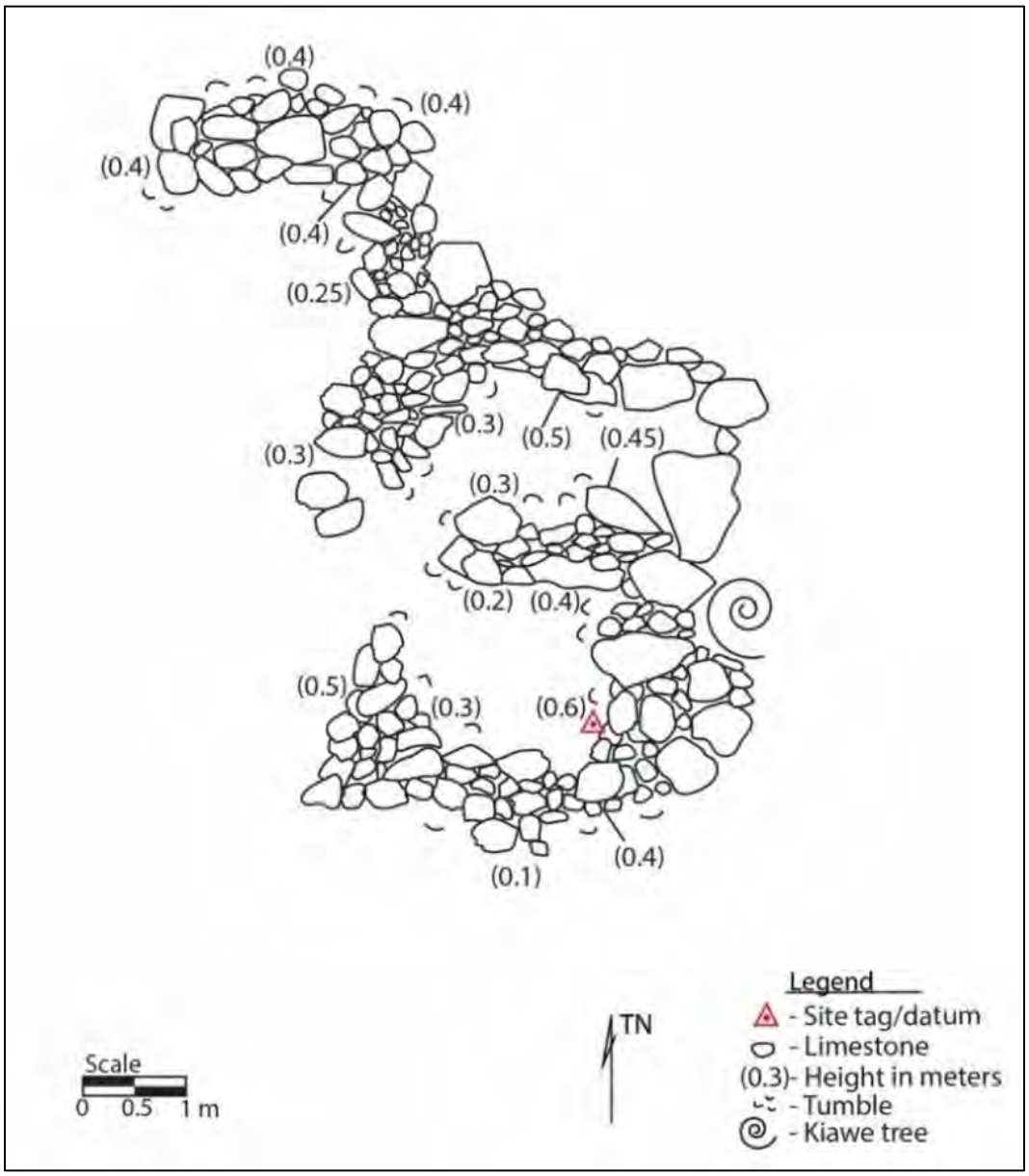

Figure 9. Plan-view map of SIHP 50-80-12-01733, Feature 3 contiguous enclosures.

Figure 10. SIHP 50-80-12-01733, Feature 3 northernmost C-shaped wall (view to north).

Figure 11. SIHP 50-80-12-01733, Feature 3 central C-shaped wall (view to north).

Figure 12. SIHP 50-80-12-01733, Feature 3 southernmost C-shaped wall (view to east).

Feature 4 is a remnant wall or bulldozer push located 6.0 m west of Feature 3 (Figure 13 and Figure 14). The wall is constructed of roughly piled limestone cobbles and small boulders. It measures 9.0 m (E/W) × 0.5 to 1.0 m wide (N/S) and has a maximum height of 0.3 m. Its poor condition suggests the wall was formed during land modifications conducted during construction of the military facility.

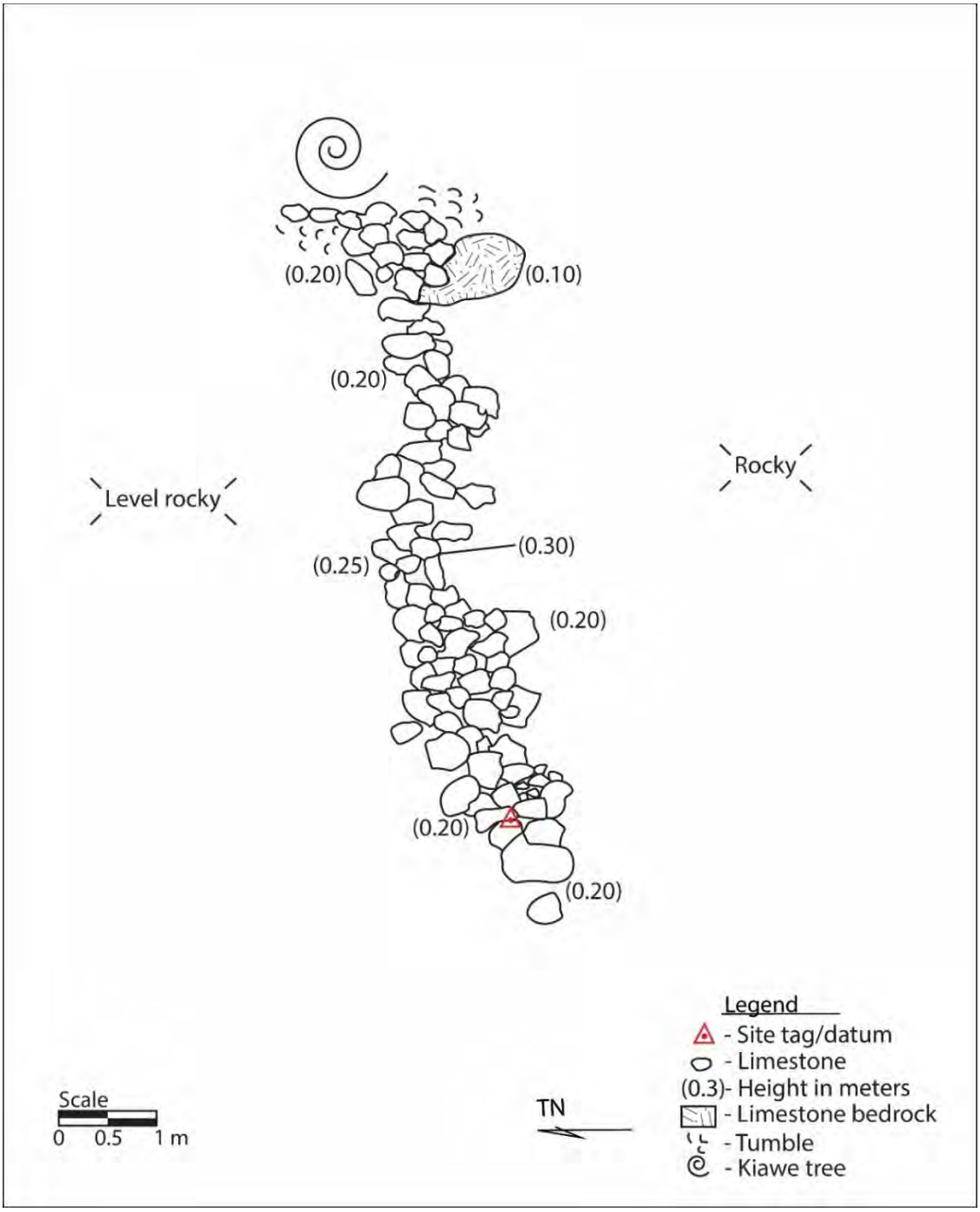

Figure 13. Plan-view map of SIHP 50-80-12-01733, Feature 4 wall.

Figure 14. SIHP 50-80-12-01733, Feature 4 wall (view to northeast).

Feature 5 consists of two linear stone mounds aligned in an L-shaped configuration between Feature 3 on the east and Feature 4 on the west (Figure 15, Figure 16, Figure 17). Both mounds are constructed of piled limestone cobbles and boulders. The Feature 5.1 northern mound is 3 m (N/S) × 2 m (E/W) × 0.4 m high. The Feature 5.2 southern mound is 2.2 m (E/W) × 1.1 m (N/S) × 0.4 m high. Feature 5 may have functioned as agricultural mounds. Both are in fair to good condition.

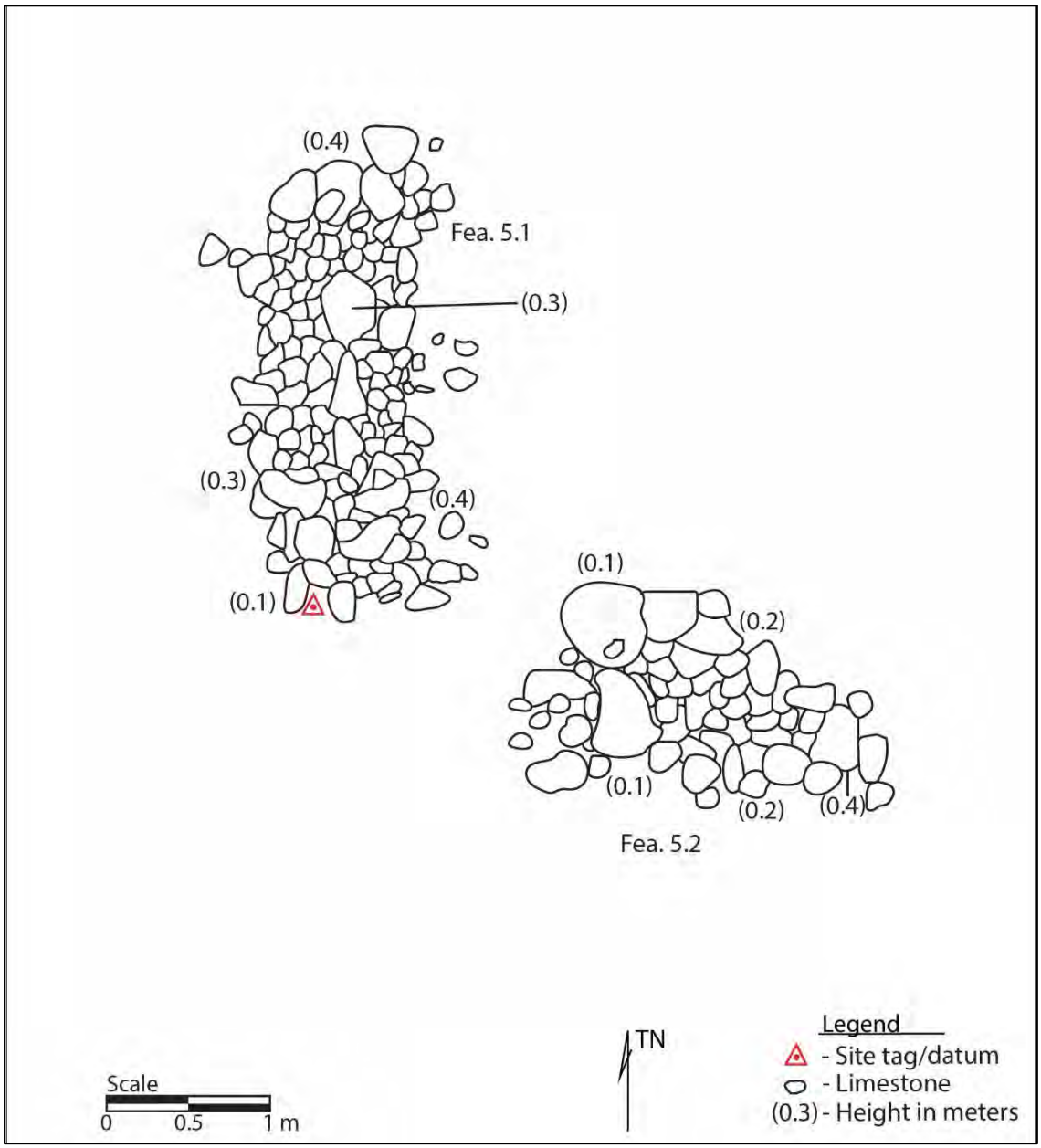

Figure 15. Plan-view map of SIHP 50-80-12-01733, Feature 5.1 and 5.2 mounds.

Figure 16. SIHP 50-80-12-01733, Feature 5.1 mound (view to north).

Figure 17. SIHP 50-80-12-01733, Feature 5.2 mound (view to north).

Feature 6 is a circular stone mound located 32 m north of Feature 4 (Figure 18 and Figure 19). The mound is constructed of piled limestone cobbles and small boulders and measures 2.3 m (E/W) × 1.7 m (N/S) × 0.7 m high. Feature 6 possibly functioned as an agricultural mound. It is in good condition.

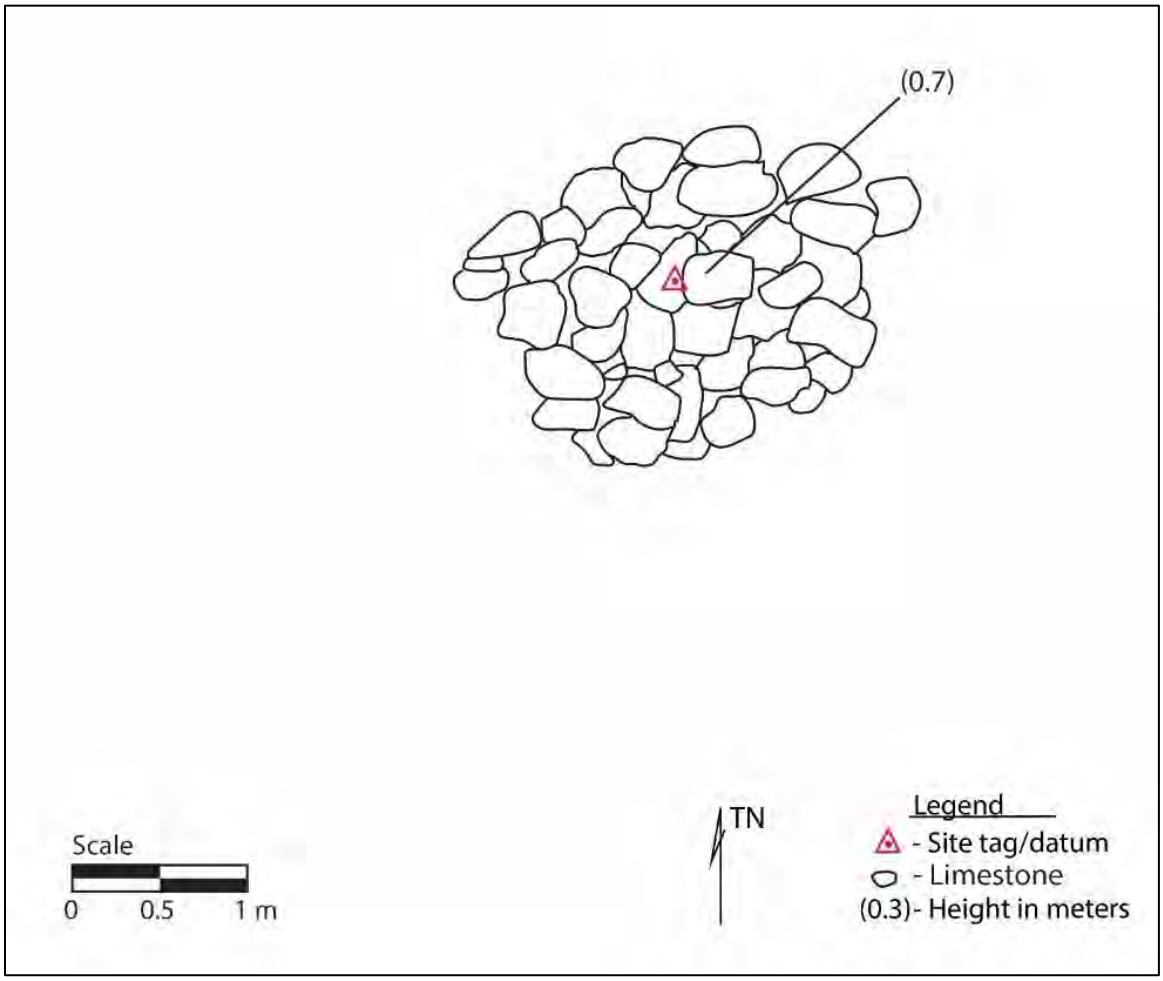

Figure 18. Plan-view map of SIHP 50-80-12-01733, Feature 6 mound.

Figure 19. SIHP 50-80-12-01733, Feature 6 mound (view to east).

Features 7 through 18 are limestone pits distributed over an area 160 m (N/S) × 40 m (E/W). Although none appeared to be modified with exterior walls or stone piles as seen elsewhere in the project area, the large amount of limestone rubble among the disturbed landform could have obscured any such modifications. The pits range from 0.4 to 1.7 m wide × 0.6 to 1.9 m long and has depths from 0.4 to 2.0 m (Table 3, Figure 20 through Figure 31).

Table 3. SIHP 50-80-12-01733 Pit Descriptions

Feature No.	Field No.	Width	Length	Depth	Stone-filled	Soil floor	Additional Contents
7	T-122	1.4	1.4	0.5	-	X	0.3 m soil deposit in pit
8	T-124	1.7	1.2	0.4	X	-	-
9	T-125	0.7	1.1	2.0	-	X	-
10	T-126	0.9	1.0	0.6	-	X	-
11	T-127	1.3	1.3	1.7	-	-	-
12	T-129	1.6	1.9	1.1	X	-	-
13	T-131	1.1	1.4	1.3	X	-	-
14	T-132	0.9	1.0	0.5	X	-	-
15	T-133	0.4	0.6	0.5	X	-	-
16	T-136	0.9	1.0	0.9	X	-	-
17	T-519	0.6	0.9	1.3	-	X	-
18	T-520	1.6	1.1	1.0	X	X	0.1 m soil deposit in pit

Figure 20. SIHP 50-80-12-01733, Feature 7 pit (view to southeast).

Figure 21. SIHP 50-80-12-01733, Feature 8 pit (view to north).

Figure 22. SIHP 50-80-12-01733, Feature 9 pit (view to northwest).

Figure 23. SIHP 50-80-12-01733, Feature 10 pit (view to north).

Figure 24. SIHP 50-80-12-01733, Feature 11 pit (view to southwest).

Figure 25. SIHP 50-80-12-01733, Feature 12 pit (view to southwest).

Figure 26. SIHP 50-80-12-01733, Feature 13 pit (view to north).

Figure 27. SIHP 50-80-12-01733, Feature 14 pit (view to southeast).

Figure 28. SIHP 50-80-12-01733, Feature 15 pit (view to west).

Figure 29. SIHP 50-80-12-01733, Feature 16 pit (view to northwest).

Figure 30. SIHP 50-80-12-01733, Feature 17 pit (view to northwest).

Figure 31. SIHP 50-80-12-01733, Feature 18 pit (view to west).

SIHP No.: 50-80-12-01745
Site Type: Limestone pit complex
No. of Features: 18
Dimensions: 60 m L × 40 m W
Condition: Fair to Good
Possible Function: Agriculture
Possible Age: Pre-Contact (AD 1400–1600)
Significance: d
Recommended Treatment: Preservation/Data Recovery
Previous Investigations: Archaeological survey (Haun 1991; Tuggle and Tomonari-Tuggle 1997) and intensive survey and testing (Beardlsey 2001)

SIHP 50-80-12-01745 is a complex of 18 limestone pits clustered in the southwestern portion of Parcel 38, immediately east of a prominent curve in Coral Sea Road (Table 4 and Figure 32). The site boundary is defined by the maximum extent of pit openings on the surface.

The surrounding landform has been disturbed by military development to the east and northeast of the site. Additional land disturbance is visible on the west side of the site adjacent to Coral Sea Road. The area is covered by a canopy of *kiawe* (*Prosopis juliflora*) and *koa haole* (*Leucaena pallida*).

Beardsley's (2001) investigation previously documented four modified limestone pits at SIHP 50-80-12-01745, two of which were originally identified by Haun (1991) (Features A and B) and two additional features (Features C and D) that were documented by Tuggle and Tomonari-Tuggle (1997). Excavations at three of the features (Features A, C, and D) yielded rodent and bird bone, including extinct avian species (e.g., *Puffinus Iherminieri, Thambetochen xanion,* and *Branta* sp.) from Features C and D (Beardsley 2001:IV.77–79, V.40). Feature A yielded a radiocarbon calibrated date of AD 1400-1655 (Beardsley 2001:IV.17).

During the current project survey, 18 limestone pit features were documented in the SIHP 50-80-12-01745 vicinity that included two modified pits (Features 6 and 13), both of which contain the largest openings at the site. Feature 13 was previously documented by Beardsley (2001:IV.77, 78) as Feature A. No other limestone pit features could be correlated with the previous site data, which lacked a feature distribution map.

The 16 unmodified limestone pits (Features 1 through 5, 7 through 12, and Features 14 through 18) measure from 0.9 to 1.5 m wide, 1.0 to 2.7 m long, and 0.5 to 1.9 m deep. A tabulated description (
Table 5) and photographs are provided for the 16 unmodified limestone pits documented at the site (Figure 38 through Figure 53).

Detailed descriptions are provided below for the two modified limestone pits (Features 6 and 13).

Table 4. Summary of SIHP 50-80-12-01745 Features

Feature	Field No.	Type	Possible Function
1	T-469	Unmodified pit	Undetermined
2	T-470	Unmodified pit	Undetermined
3	T-471	Unmodified pit	Undetermined
4	T-472	Unmodified pit	Undetermined
5	T-473	Unmodified pit	Undetermined
6	T-474	Modified pit	Agriculture
7	T-475	Unmodified pit	Undetermined
8	T-476	Unmodified pit	Undetermined
9	T-477	Unmodified pit	Undetermined
10	T-478	Unmodified pit	Undetermined
11	T-479	Unmodified pit	Undetermined
12	T-480	Unmodified pit	Undetermined
13	T-481	Modified pit	Agriculture
14	T-482	Unmodified pit	Undetermined
15	T-483	Unmodified pit	Undetermined
16	T-484	Unmodified pit	Undetermined
17	T-530	Unmodified pit	Undetermined
18	T-468	Unmodified pit	Undetermined

Table 5. SIHP 50-80-12-01745 Pit Descriptions

Feature No.	Field No.	Width	Length	Depth	Stone-filled	Soil floor	Additional Contents
1	T-469	1.1	1.2	1.2	X	X	-
2	T-470	1.0	1.3	0.9	X	X	-
3	T-471	1.0	1.2	0.8	X	X	-
4	T-472	0.6	1.0	1.2	X	X	-
5	T-473	0.9	3.4	0.8	X	X	-
6	T-474	2.5	5.0	0.8	X	X	Piled wall along edge
7	T-475	0.8	1.1	1.0	-	X	-
8	T-476	0.6	0.8	0.5	X	X	-
9	T-477	1.6	1.7	2.1	X	-	-
10	T-478	1.2	1.1	1.2	X	X	-
11	T-479	1.0	1.2	1.0	X	-	Two openings
12	T-480	1.6	4.0	1.2	X	-	Overhang on west side
13	T-481	3.5	5.4	0.6	X	-	Walled along opening
14	T-482	1.1	1.8	1.2	X	-	-
15	T-483	1.0	1.5	0.9	-	X	-
16	T-484	0.8	2.0	1.2	X	-	Two openings
17	T-530	0.8	1.1	1.0	X	X	-
18	T-468	1.0	1.3	1.1	X	-	-

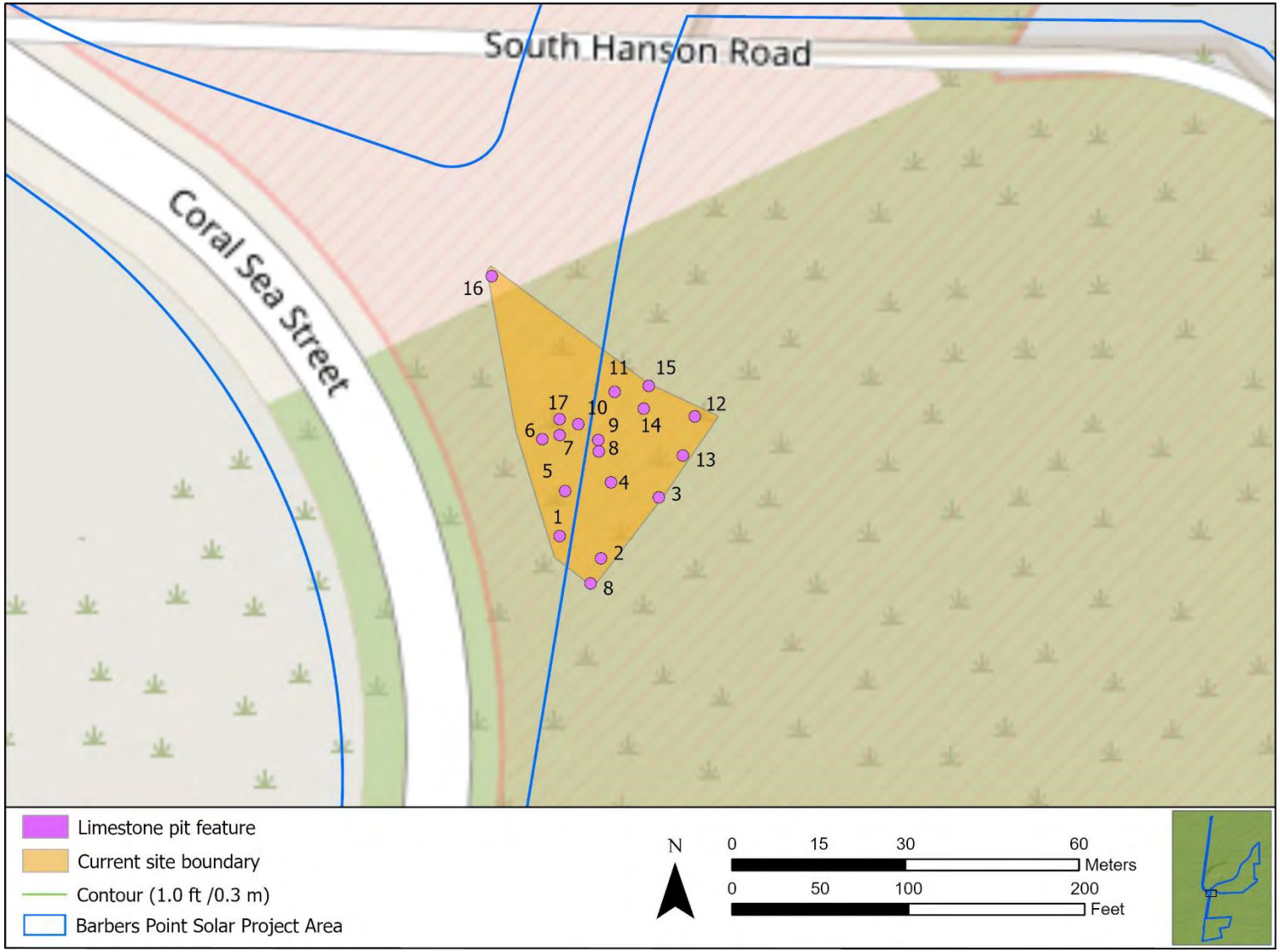

Figure 32. SIHP 50-80-12-01745, locations of current limestone pit features and expanded site boundary (site features outside of project area documented within original project area boundary).

Feature 6 is an oval-shaped modified limestone pit and located on the west edge of the site, an area greatly disturbed by the adjacent Coral Sea Road and uplifted *kiawe* trees (Figure 33 and Figure 34). The pit is 5.0 m (NW/SE) × 2.5 m (NE/SW) and 0.8 m deep. Limestone cobbles and small boulders are piled in a linear and mound formation along the southeast edge of the pit opening. The west side of the pit is encompassed with large limestone boulder slabs on-end that appear to have been pushed inside.

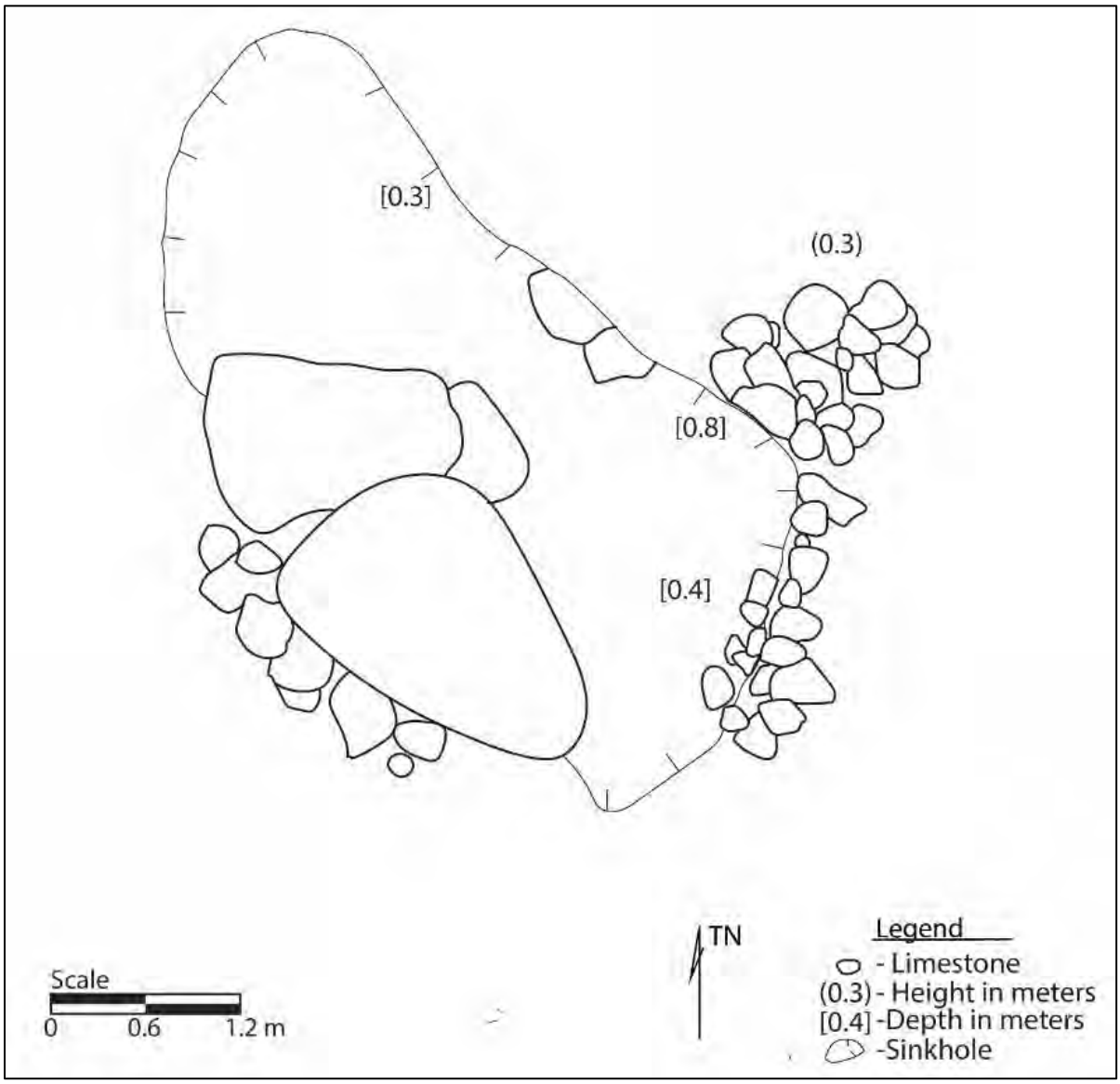

Figure 33. Plan-view map of SIHP 50-80-12-01745, Feature 6 modified pit.

Figure 34. SIHP 50-80-12-01745, Feature 6, showing stone piling on southwest side of the pit (view to west).

Feature 13 is an oval-shaped limestone pit overlapping the eastern boundary of the project area (Figure 35 and Figure 36). Beardsley (2001:IV.77, 78) described the feature as follows:

> A nearly continuous wall three courses high encircles this sinkhole opening. The wall is constructed with limestone cobbles, boulders and slabs; it is on the edge of the opening and contains a break in continuity in the southwestern portion. Some collapse is visible, and it is likely elements of the wall have fallen into the sinkhole. The interior of the sink is 4.6-×-2.3-×-0.7 m, with a base that is covered with soil and appears flat; during initial documentation, the sink appeared to be a depression, but Haun (1991), on the Bishop Museum survey, described the sink depth as 1.2 m. He also states that an unmodified sinkhole nearby contains the crab remains and bird bones.

A 1 × 1 m unit was excavated in the soil floor of the feature against the north edge of the limestone pit (Figure 37). The excavation yielded charcoal that returned a two-sigma range calibrated to AD 1400 to 1655 (Beardsley 2001:IV.77).

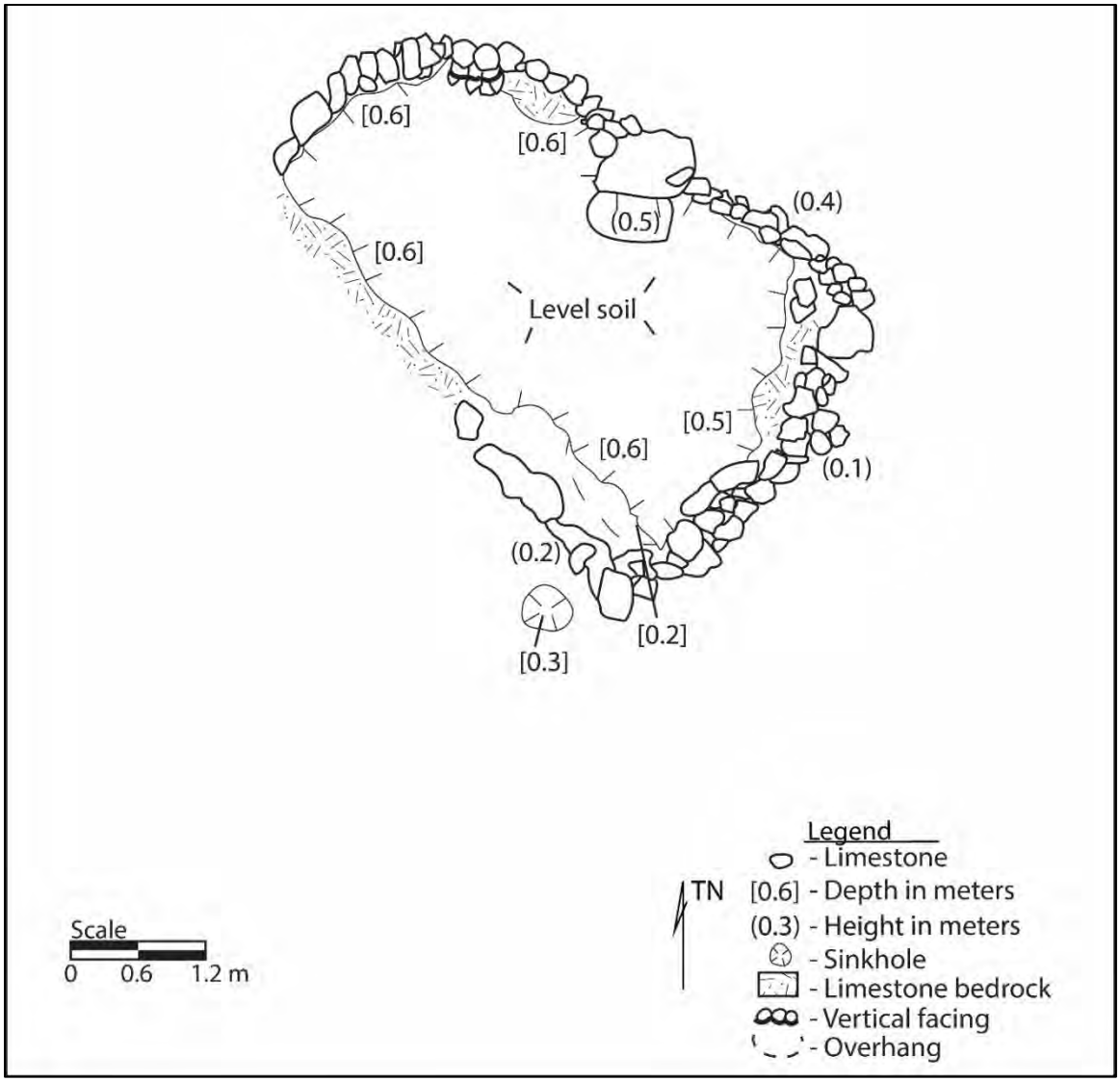

Figure 35. Plan-view map of SIHP 50-80-12-01745, Feature 13 modified pit.

Figure 36. SIHP 50-80-12-01745, Feature 13 modified pit (view to north).

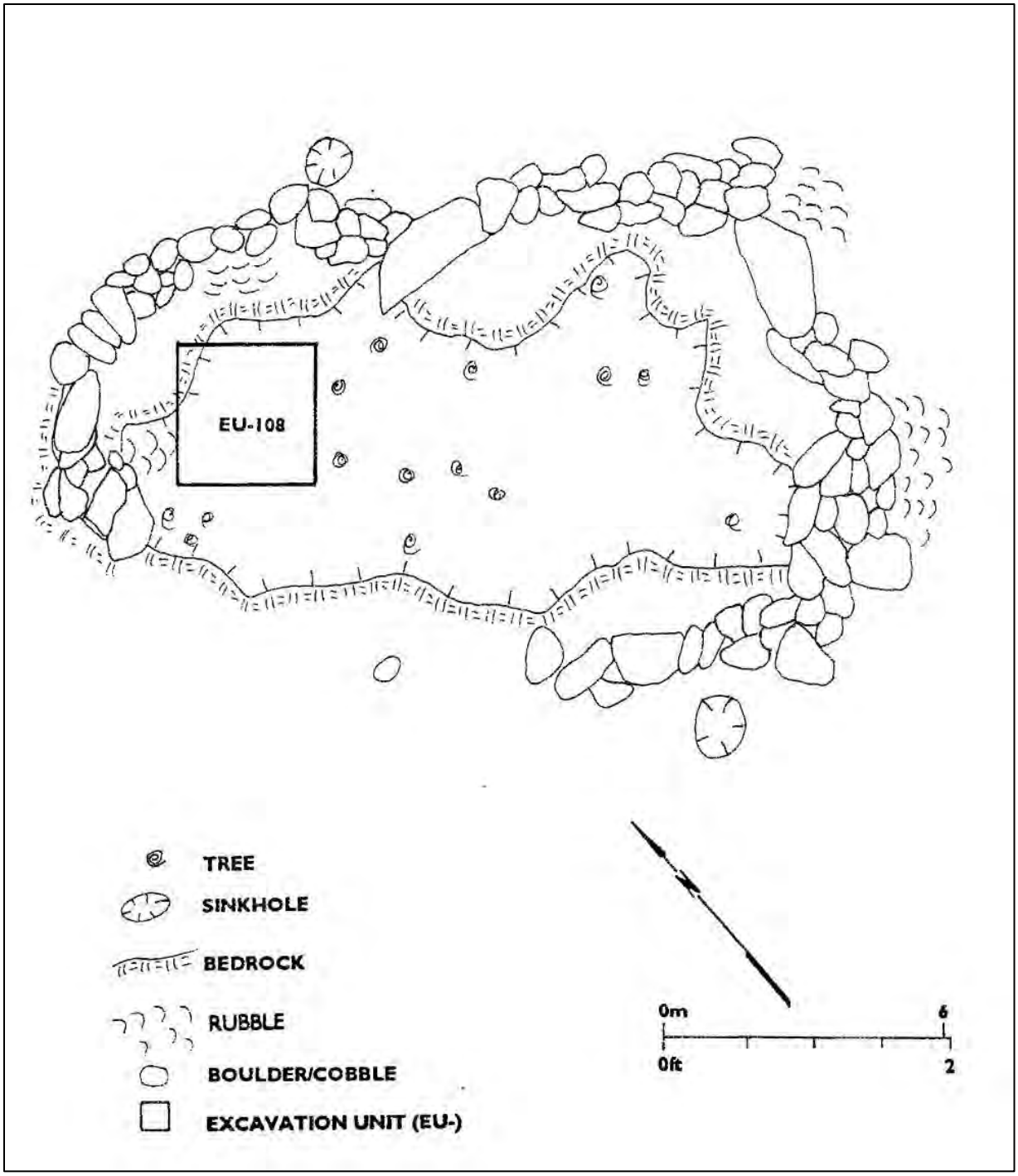

Figure 37. Plan-view map of SIHP 50-80-12-01745, Feature 13 showing location of Beardsley's excavation unit (from Beardsley 2001: Appendix I, Figure IV-74).

Figure 38. SIHP 50-80-12-01745, Feature 1 pit (view to north).

Figure 39. SIHP 50-80-12-01745, Feature 2 pit (view to southeast).

Figure 40. SIHP 50-80-12-01745, Feature 3 pit (view to southeast).

Figure 41. SIHP 50-80-12-01745, Feature 4 pit (view to west).

Figure 42. SIHP 50-80-12-01745, Feature 5 pit (view to north).

Figure 43. SIHP 50-80-12-01745, Feature 7 pit (view to north).

Figure 44. SIHP 50-80-12-01745, Feature 8 pit (view to southwest).

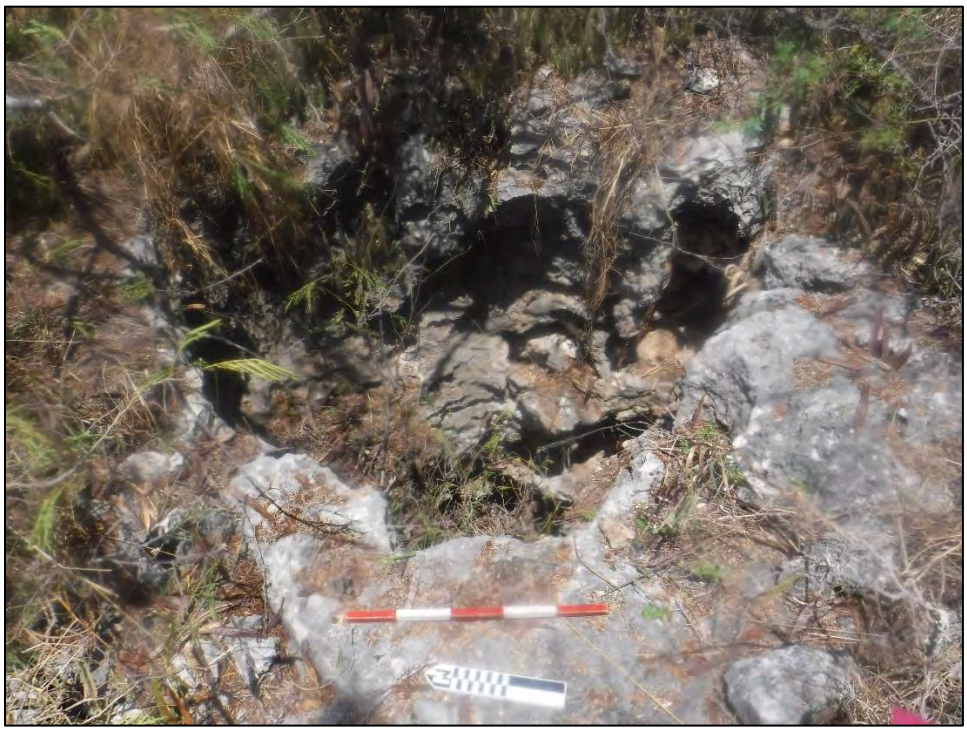

Figure 45. SIHP 50-80-12-01745, Feature 9 pit (view to southeast).

Figure 46. SIHP 50-80-12-01745, Feature 10 pit (view to northeast).

Figure 47. SIHP 50-80-12-01745, Feature 11 pit (view to southwest).

Figure 48. SIHP 50-80-12-01745, Feature 12 pit (view to southeast).

Figure 49. SIHP 50-80-12-01745, Feature 14 pit (view to northeast).

Figure 50. SIHP 50-80-12-01745, Feature 15 pit (view to southeast).

Figure 51. SIHP 50-80-12-01745, Feature 16 pit (view to southeast).

Figure 52. SIHP 50-80-12-01745, Feature 17 pit (view to southeast).

Figure 53. SIHP 50-80-12-01745, Feature 18 pit (view to northwest).

SIHP No.: 50-80-12-05094
Site Type: Complex of limestone pits
No. of Features: 5 within project area
Dimensions: 30 m (E/W) × 424 m (N/S) (within project area)
Condition: Fair
Possible Age: Undetermined
Possible Function: Undetermined
Significance: d
Recommended Treatment: Preservation/Data Recovery
Previous Investigations: Archaeological survey (Tuggle and Tomonari-Tuggle 1997)

SIHP 50-80-12-05094 is a complex of limestone pits located on the east and west sides of Coral Sea Road, roughly 5 to 9 km south of Roosevelt Blvd. (Figure 54). The site boundary is defined by the previously documented boundary (Tuggle and Tomonari-Tuggle 1997 and Wickler and Tuggle 1997) and expanded during the current survey to include five newly identified limestone pits (designated Features 2 through 6) documented within the project corridor.

The surrounding landform has been disturbed by military development and is covered by a canopy of *kiawe* (*Prosopis juliflora*) and *koa haole* (*Leucaena pallida*). *Noni* (*Morinda citrifolia*) and *wiliwili* (*Erythrina sandwicensis*) trees were observed in the site area east of the project corridor.

Wickler and Tuggle's 1997 report provides the following site description and site map (see Figure 54):

> There are numerous sinkholes in the site area, roughly 50 of which have potential for excavation, particularly for paleoenvironmental information. Many have small openings, but are deep and have expanded chambers. Small fragments of bone, probably bird, were noted on the surface in several sinkholes.

Only one of the previously identified pits was assigned a feature number (Feature 1) and was tested for paleoenvironmental data by Athens et al. (1997). The newly identified Features 2 through 5 are located on the west side of Coral Sea Road and Feature 6 is on the east side of Coral Sea Road.

Feature 2 (Figure 55) is 1.6 m (E/W) × 1.2 m (N/S) by 1.5 m deep. The pit is partly filled with limestone cobbles and small boulders. The pit is in fair condition with fair excavation potential.

Feature 3 (Figure 56) is 1.8 m (E/W) × 2.0 m (N/S) × 0.6 m deep. The pit floor contains a few cobbles on soil. The pit is in fair condition with good excavation potential.

Feature 4 (Figure 57) is 0.5 m (E/W) × 1.3 m (N/S) × 0.5 m deep. The pit is partly filled with small and medium boulders. Black military communication cord was observed in the pit. The pit is in fair condition with fair excavation potential.

Feature 5 (Figure 58) is a large limestone pit with mounded boulder push on its north side. The pit is 2.0 m (E/W) × 2.0 m (N/S) × 3.1 m deep. Most of the pit is filled to the ground surface with small to large boulders. The deepest portion of the pit is in the east side of the pit opening. The pit is in poor condition and has fair to poor excavation potential.

Feature 6 (Figure 59) is 1.2 m (E/W) × 1.2 m (N/S) × 0.35 m deep. The pit is filled with limestone cobbles and small boulders almost to ground surface.

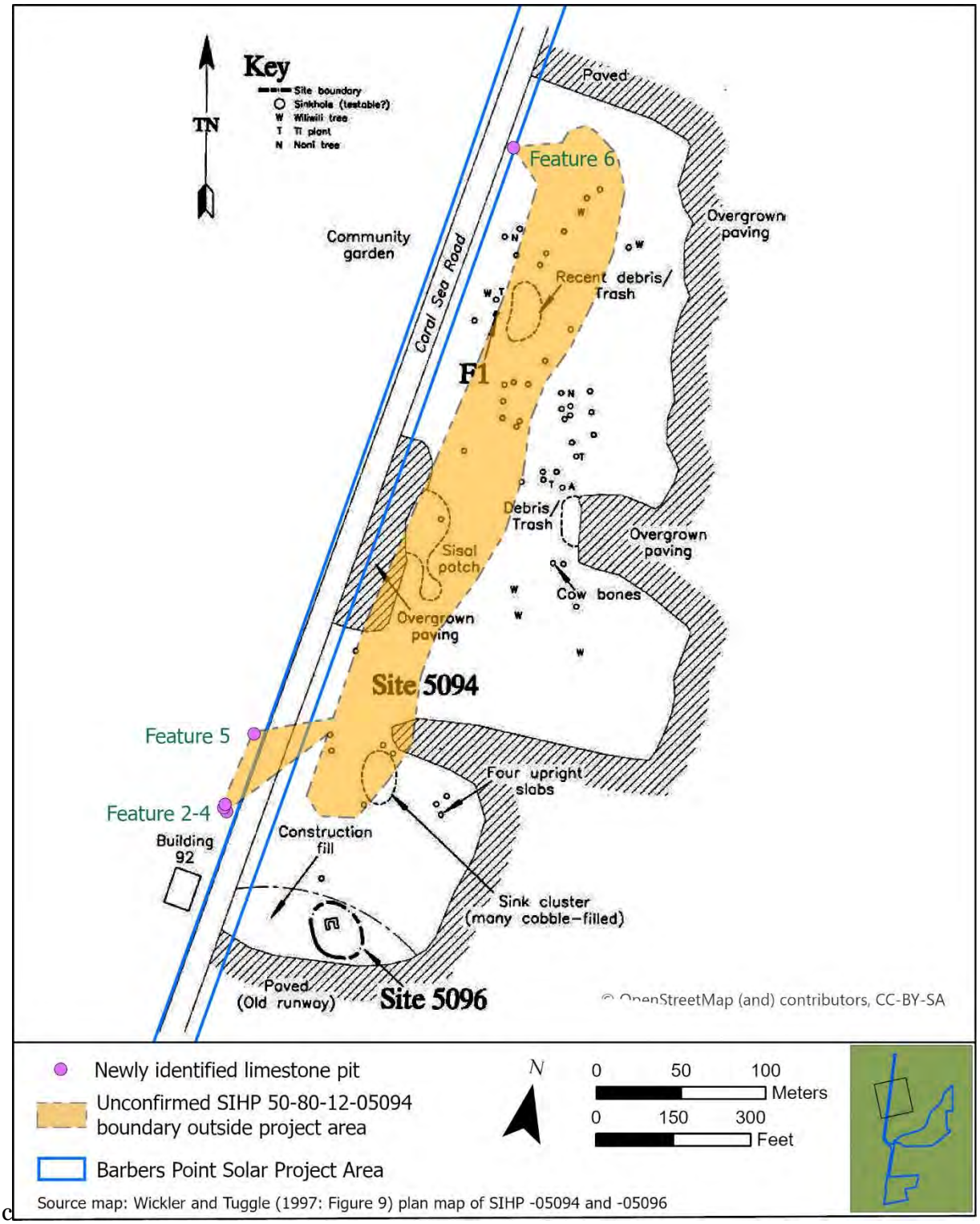

Figure 54. Locations of newly identified limestone pits on plan view map of SIHP 50-80-12-05094. The current site boundary is approximate outside of the project corridor and is based on a previous site boundary not reflecting features shown on Wickler and Tuggles' (1997) Figure 9 map.

Figure 55. SIHP 50-80-12-05094, Feature 2 limestone pit (view west).

Figure 56. SIHP 50-80-12-05094, Feature 3 limestone pit (view to northwest).

Figure 57. SIHP 50-80-12-05094, Feature 4 limestone pit (view to south).

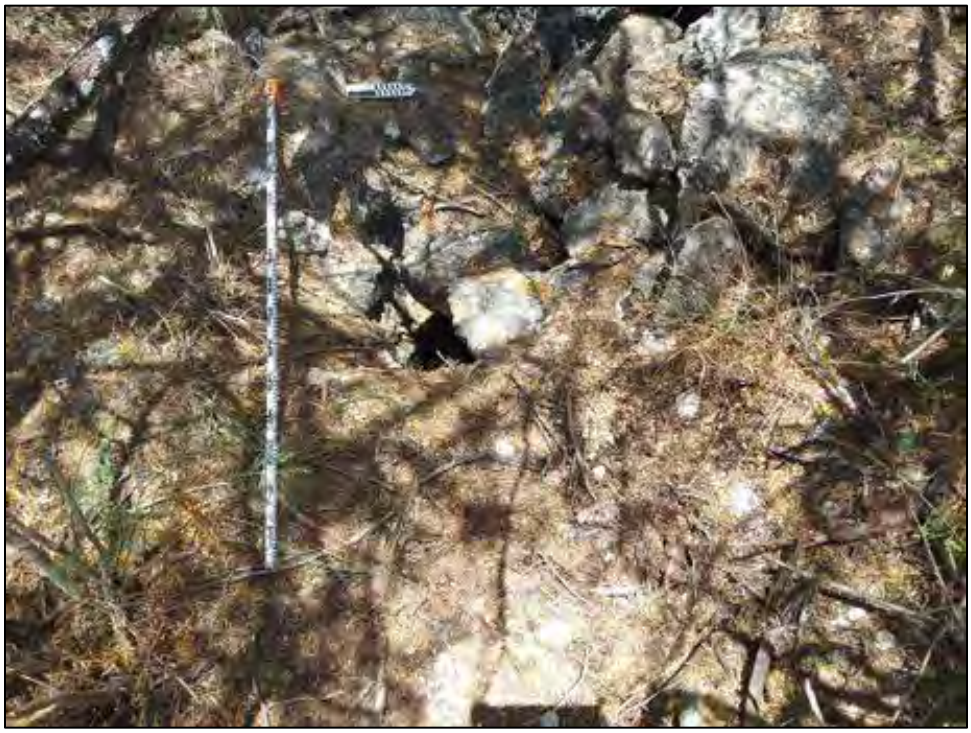

Figure 58. SIHP 50-80-12-05094, Feature 5 limestone pit (view to west).

Figure 59. SIHP 50-80-12-05094, Feature 6 limestone pit (view to north).

SIHP No.: 50-80-12-05099
Site Type: Complex of U.S. military structures
No. of Features: 27
Dimensions: 580 m L × 300 m W (within project area)
Condition: Fair to Poor
Possible Age: Post-1941 to 1952
Possible Function: U.S. Military Training and Residence
Significance: d
Recommended Treatment: No Further Work
Previous Investigations: Archaeological survey (Tuggle and Tomonari-Tuggle 1997)

SIHP 50-80-12-05099 is a complex of remnant structures and utilities associated with MCAS Ewa following the Japanese December 4, 1941 attack on Oʻahu. U.S Naval Construction Battalions, including the 130th Construction Battalion, built the original Seabee Camp, which was later used as housing for Navy patrol squadrons (J. Bond, personal communication, March 5, 2021). The Construction Battalion was affectionately referred to as the "Seabees," a nickname for the abbreviation "CB" for Construction Battalion.

By 1952, MCAS Ewa was decommissioned and the camp was absorbed into U.S. Naval Air Station Barber's Point (Tuggle and Tomonari-Tuggle 1997:41). After decommissioning, the temporary Quonset huts were dismantled and used elsewhere (J. Bond, personal communication, March 5, 2021). Other structures and utililties were demolished and some of the demolition debris apparently was consolidated into a large berm on the eastern edge of the former Seabee Camp (Feature 23). Other demolition material, such as metal sheeting, utility pipes, and rock debris, was observed in natural limestone pits in the site area. The pit features were grouped under a separate site number designated Temporary Site T-03 (see Appendix B).

The Seabee Camp was first identified by Tuggle and Tomonari-Tuggle (1997) as SIHP 50-80-12-05099, but no site documentation was completed. During the current study, 27 features (Features 1 through 27) were documented that represent former utilities (sewer, water, and drainage), recreation (tennis), land-clearing (berm), and roads associated with the original MCAS Ewa base facility and subsequent U.S. Navy housing (Figure 60 and Figure 61). These are described below by structure type; plan maps and photographs of features are also provided (Figure 62 through Figure 96). An active U.S. Navy sewer line with multiple drain hole covers was noted in the area but not documented because it appears to be more recent in origin and is still being used.

Several artifacts associated with the camp were identified and locations are shown by type on Figure 60. Mid-20th century bottles were observed throughout the site area but not recorded because none of the bottles provided information (e.g., date of occupation and functional association) that were not already known for the site.

Table 6. Summary of SIHP 50-80-12-05099 Features

Feature	Temporary Field No.	Type	Possible Function
1	T-183	Metal Barrier	Tie Down Anchor
2	T-186	Metal Barrier	Fire Hydrant
3	T-188	Metal Barrier Posts	Fire Hydrant
4	T-190	Concrete Drain hole/Metal grate	Drainage
5	T-191	Concrete Drain Hole	Sewer
6	T-194	Concrete Box/Metal Cover	Unknown utility
7	T-196	Metal Barrier	Fire Hydrant
8	T-608	Concrete Surface	Road
9	T-208	Concrete In-Ground Basin	Cistern
10	T-209	Concrete In-Ground Boxes/Metal Cover	Sewer
11	T-210	Concrete Box/Metal Cover	Unknown utility
12	T-212	Concrete Drainhole with Metal Cover/Post	Water/Sewer
13	T-213	Metal Barrier	Utility Barrier
14	T-217	Metal Barrier	Fire Hydrant
15	T-219	Metal Barrier	Tie Down Anchor
16	T-220	Concrete Drain Hole/Metal Grate	Drainage/Sewer
17	T-223	Concrete Drain Hole	Drainage
18	T-224	Metal Barrier	Utility
19	T-227	Concrete Boxes/Valve	Unknown utility
20	T-235	Concrete Slab/Drain Hole	Drainage
21	T-236	Metal Pipe	Signpost
22	T-237	Concrete Drain Hole/Metal Grate	Drainage/Sewer
23	T-238	Soil/Debris Berm	Demolition refuse
24	T-247	Concrete Slab	Water
25	T-258	Concrete Drain Hole	Utility
26	T-606	Asphalt Pavement	Tennis Court
27	T-607	Concrete Drain Hole-Metal Grate	Drainage

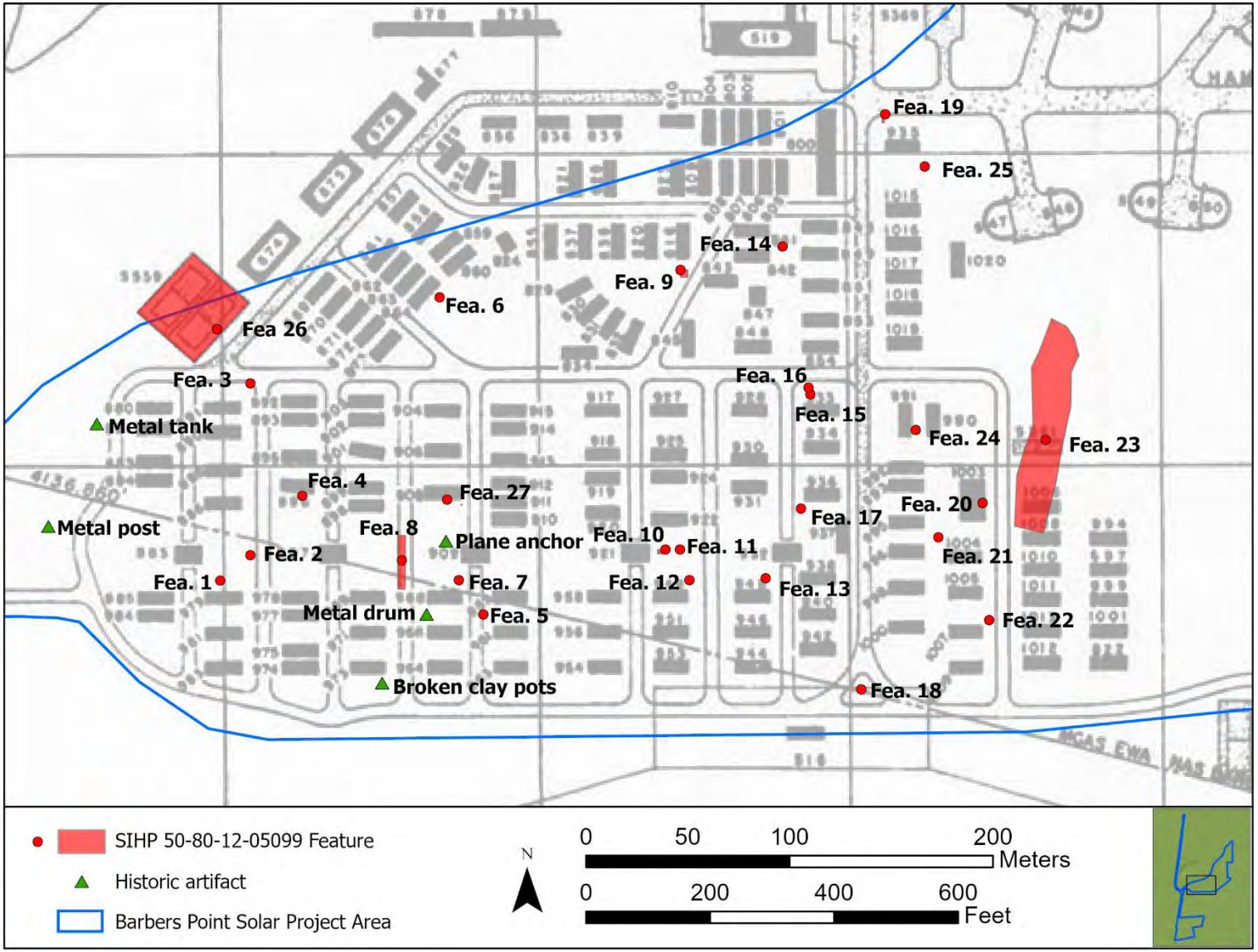

Figure 60. SIHP 50-80-12-05099 feature locations ovelaid on map of MCAS Ewa (U.S. Navy 1948).

Figure 61. Undated photograph of "130th CB base facility," showing approximate locations of SIHP 50-80-12-05099, Features 6, 9, 14, 15, and 16 (Source: U.S. Navy Seabee Museum).

Metal Pipe Barriers
Eight of the site features represent protective barriers placed around former utilities and possibly anchors for above-ground cables (Features 1–3, 7, 13–15, and 18).

Features 1, 13, and 15 are rectangular metal frames composed of metal piping 13 cm in diameter (see Figure 62, Figure 77, Figure 79, and Figure 80). Feature 15 is the most complete of this structure type and measures 1.8 × 1.2 m and 0.9 m high. An upright metal pipe is on the west side of Feature 15's metal frame and it ascends at an approximately 45-degree angle to the west. An unattached metal cable lies on the north side of the metal barrier. Based on the characteristics of Feature 15, these type of metal structures likely functioned as protective barriers for a subsurface anchor attached to an above-ground metal cable.

Features 2, 3, 7, and 14 are triangular-shaped metal frames that likely once housed fire hydrants (see Figure 63, Figure 64, Figure 69, Figure 70, and Figure 78). The barriers measure 1.8 m along the horizontal axes of the horizontal frame and are 0.9 m high. The frame pipe is 10 cm in diameter. Feature 7 contains a fire hydrant metal cap set into the ground at its center. Feature 3 consists of the three upright pipes that formed the legs of the triangular frame.

Feature 18 is a rectangular metal frame (see Figure 84 and Figure 85) located at the junction of Forarty Street and South Hanson Road. It is composed of metal piping 16 cm in diameter. A rectangular concrete curbing is at the base of the metal frame. The piped frame is 2.6 m (E/W) × 2 m (N/S) × 0.9 m high. The concrete curbing is 2 m (E/W) × 1.45 m (N/S) with an exterior height of 0.9 m and internal depth of 12 cm. The metal frame was painted with alternating yellow and black stripes probably for its visibility at the road intersection.

Concrete Structures
Nine of the site features consist of concrete structures often covered by metal grates that denote drainage holes (Features 4, 5, 12, 16, 17, 22, 25, and 27), two are above-ground concrete slabs (Features 20 and 24), four are below-surface concrete containers (Feature 6, 9, 10, 11, and 19), and one feature is a possible road section (Feature 28).

Features 4, 5, 12, 16, 17, 22, 25, and 27 comprise concrete drain holes and four of the drain holes have metal grate covers. The drainage features are square or circular in plan and contain holes measuring 0.5 m in dimeter or square. They were likely used to collect and divert rain runoff and were located on or near roads; alternatively, the drainage holes may have been part of a larger sewer system (see Figure 65, Figure 66, Figure 73Figure 76, Figure 81, Figure 83, Figure 92, and Figure 96). No photograph was taken of Feature 27 drain hole; however, the feature is identical to Feature 22 (see Figure 92).

Features 20 and 24 consist of two concrete slabs that measure 0.2 m thick, placed over concrete drains or open pits in the underlying limestone bedrock (see Figure 89, Figure 90, and Figure 95). One of the slabs (Feature 24) contained a valve and a horizontal metal pipe visible beneath the slab, and both contained a circular hole in the slab measuring 0.5 m in diameter.

Features 6, 9, 10, 11, and 19 are concrete basins or metal-covered boxes set below the ground surface (see Figure 67, Figure 68, Figure 74, Figure 73, Figure 75, Figure 86, and Figure 88). Features 6 and 11 are rectangular boxes covered with a metal sheet. What lies beneath the metal sheets was not determined due to safety concerns. Feature 9 appears to be a cistern, 3.6 m square and 0.7 m deep, with horizontal pipes in each wall and a remnant metal cover on the southwest corner. Feature 19 consists of two identical concrete boxes spaced 2.5 m apart near

the intersection of Forarty Street and Hamilton. The southernmost box contains a wheel valve marked “open” and “close.” Feature 19 is likely related to the dispersal of water.

Feature 21 is an upright pipe set in concrete measuring 0.5 m high and 8 cm in diameter (see Figure 140, p. 118). The function of Feature 21 is undetermined.

Feature 23 is a large berm (see Figure 60) aligned north–south on the eastern edge of the site area and western edge of a limestone quarry (Site T-002, Feature 59; see Appendix B). The berm is composed of soil and remnant metal and other structural debris likely collected during demolition of the Seabee Camp in the late 1950s. The berm measures 100 m (N/S) by a maximum width of 20 m (E/W) and average height of 4 m.

Asphalt Surfaces

Several named asphalt roads were constructed for the Seabee Camp, bounded by Hamilton on the north and northwest and South Hanson Road on the south. **Feature 26** is a large asphalt surface located in the northwest corner of the camp at the intersection of Hamilton and William Road (see Figure 60). The asphalt surface measures 40 m square and functioned as a tennis court surface. No photograph was taken of Feature 26.

Feature 27 is a rectangular section of concrete that appears to align with a north–south road at the center of the Seabee Camp (see Figure 60). It measures 26 m (N/S) × 3.5 m (E/W) and is flush to the surrounding ground surface. No photograph was taken of Feature 26.

Figure 62. SIHP 50-80-12-05099, Feature 1 rectangular metal frame (view to northwest).

Figure 63. SIHP 50-80-12-05099, Feature 2 triangular metal frame (view to north).

Figure 64. SIHP 50-80-12-05099, Feature 3 triangular metal frame (view to south).

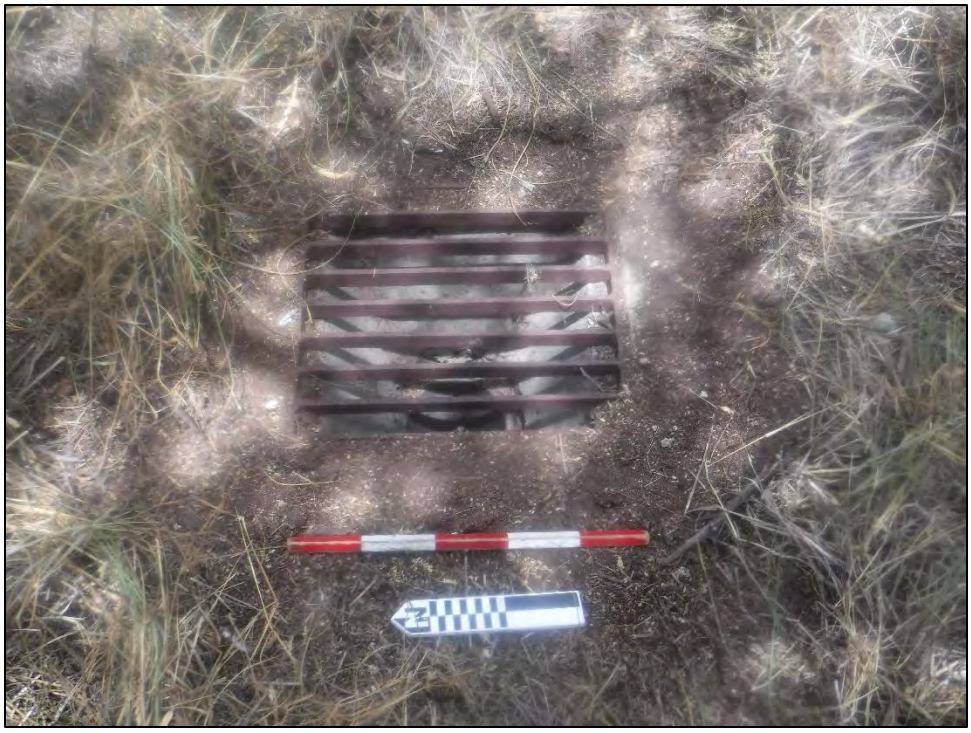

Figure 65. SIHP 50-80-12-05099, Feature 4 drain hole (view to east).

Figure 66.SIHP 50-80-12-05099, Feature 5 drain hole (view to northeast).

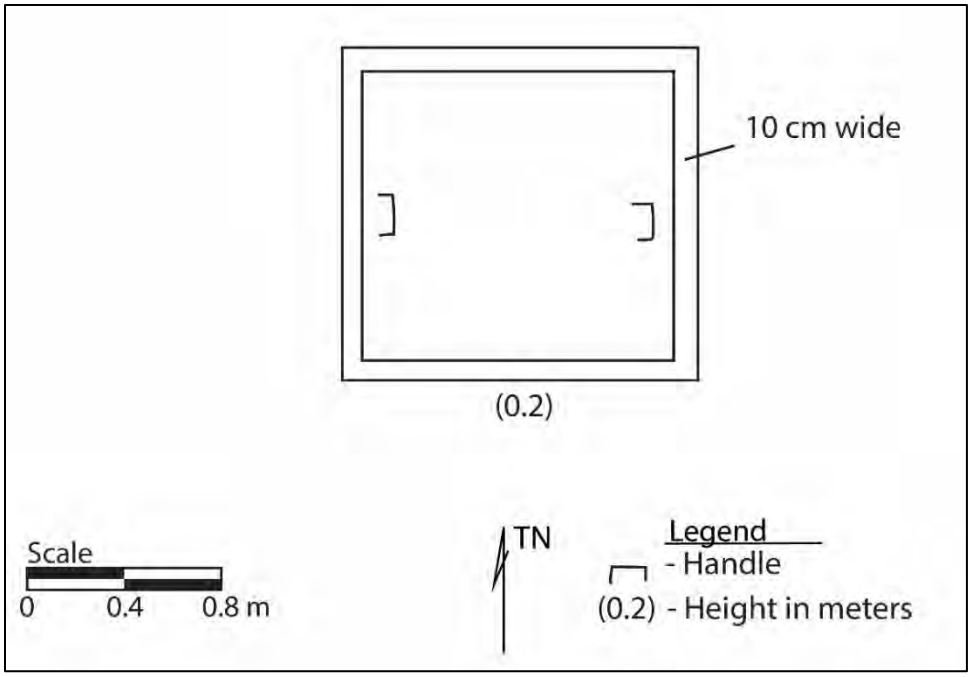

Figure 67. Plan-view map of SIHP 50-80-12-05099, Feature 6 concrete box with metal cover.

Figure 68. SIHP 50-80-12-05099, Feature 6 concrete box with metal cover (view to northwest).

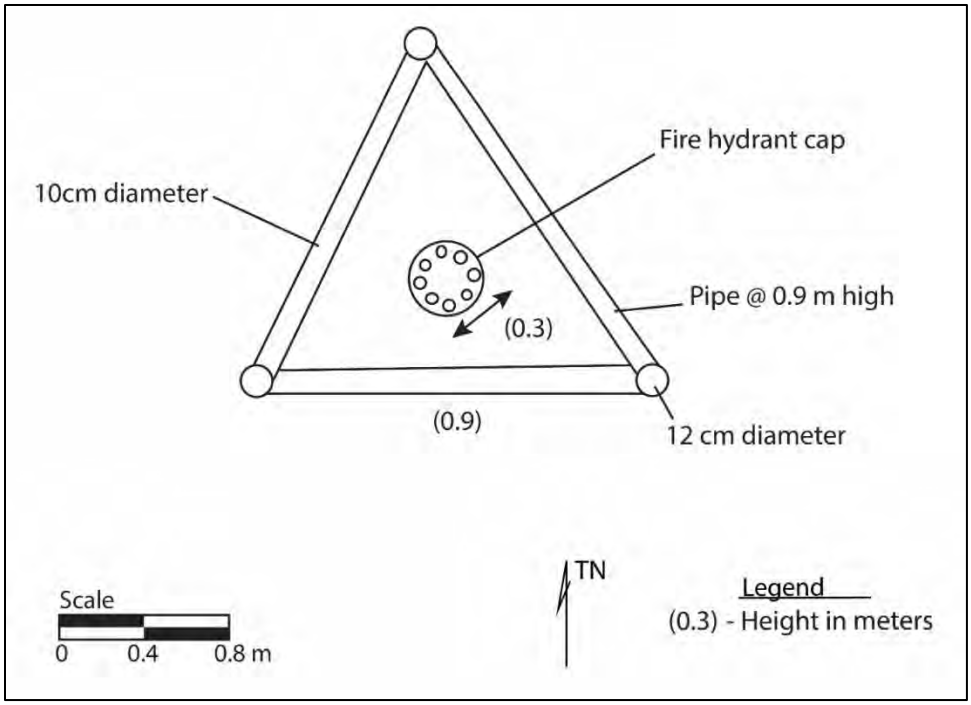

Figure 69. Plan-view map of SIHP 50-80-12-05099, Feature 7 triangular metal pipe frame.

Figure 70. SIHP 50-80-12-05099, Feature 7 metal frame (view to west).

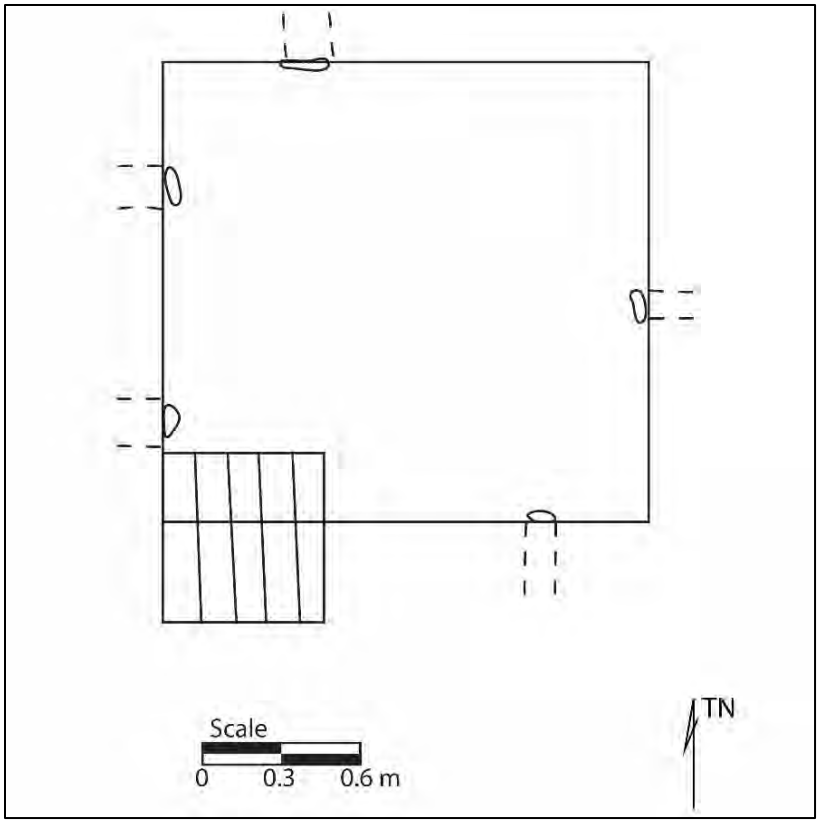

Figure 71. Plan-view map of SIHP 50-80-12-05099, Feature 9 concrete basin.

Figure 72. SIHP 50-80-12-05099, Feature 9 concrete basin (view to east).

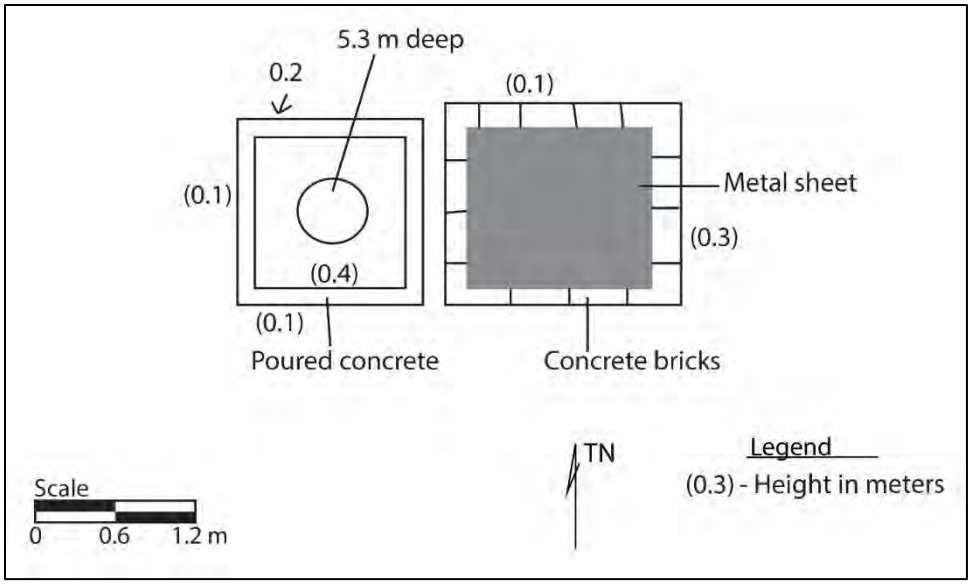

Figure 73. Plan-view map of SIHP 50-80-12-05099, Feature 10 concrete boxes.

Figure 74. SIHP 50-80-12-05099, Feature 10 concrete boxes (view to east).

Figure 75. SIHP 50-80-12-05099, Feature 11 concrete box with metal cover (view to west).

Figure 76. SIHP 50-80-12-05099, Feature 12 post and drain hole (covered; view to southwest).

Figure 77. SIHP 50-80-12-05099, Feature 13 metal frame (view to southwest).

Figure 78. SIHP 50-80-12-05099, Feature 14 metal frame (view to southwest).

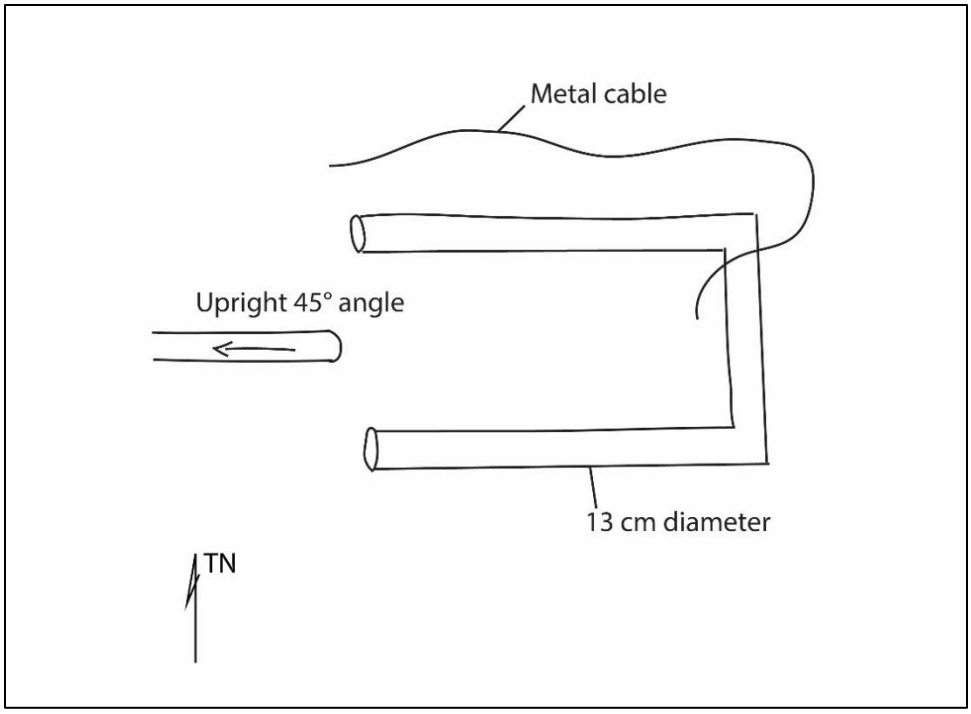

Figure 79. SIHP 50-80-12-05099, Feature 15 metal pipe frame sketch (no scale).

Figure 80. SIHP 50-80-12-05099, Feature 15 metal pipe frame (view to southwest).

Figure 81. SIHP 50-80-12-05099, Feature 16 drain hole (view to west).

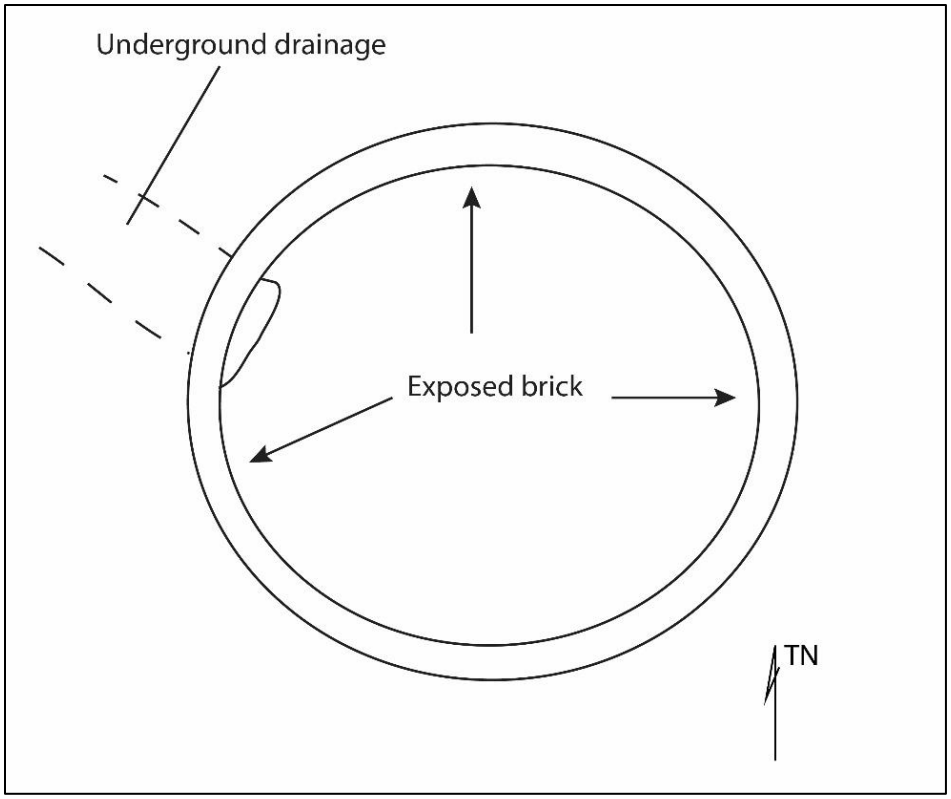

Figure 82. SIHP 50-80-12-05099, Feature 17 drain hole sketch (no scale).

Figure 83. SIHP 50-80-12-05099, Feature 17 drain hole (view to west).

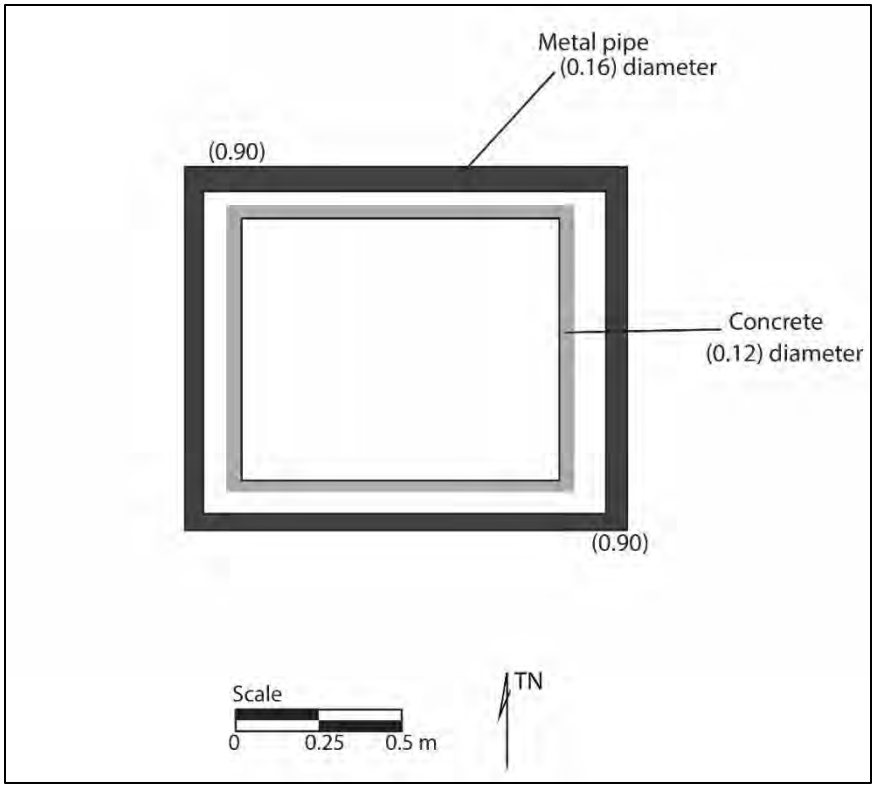

Figure 84. Plan-view map of SIHP 50-80-12-05099, Feature 18 rectangular metal frame.

Figure 85. SIHP 50-80-12-05099, Feature 18 metal frame (view to east).

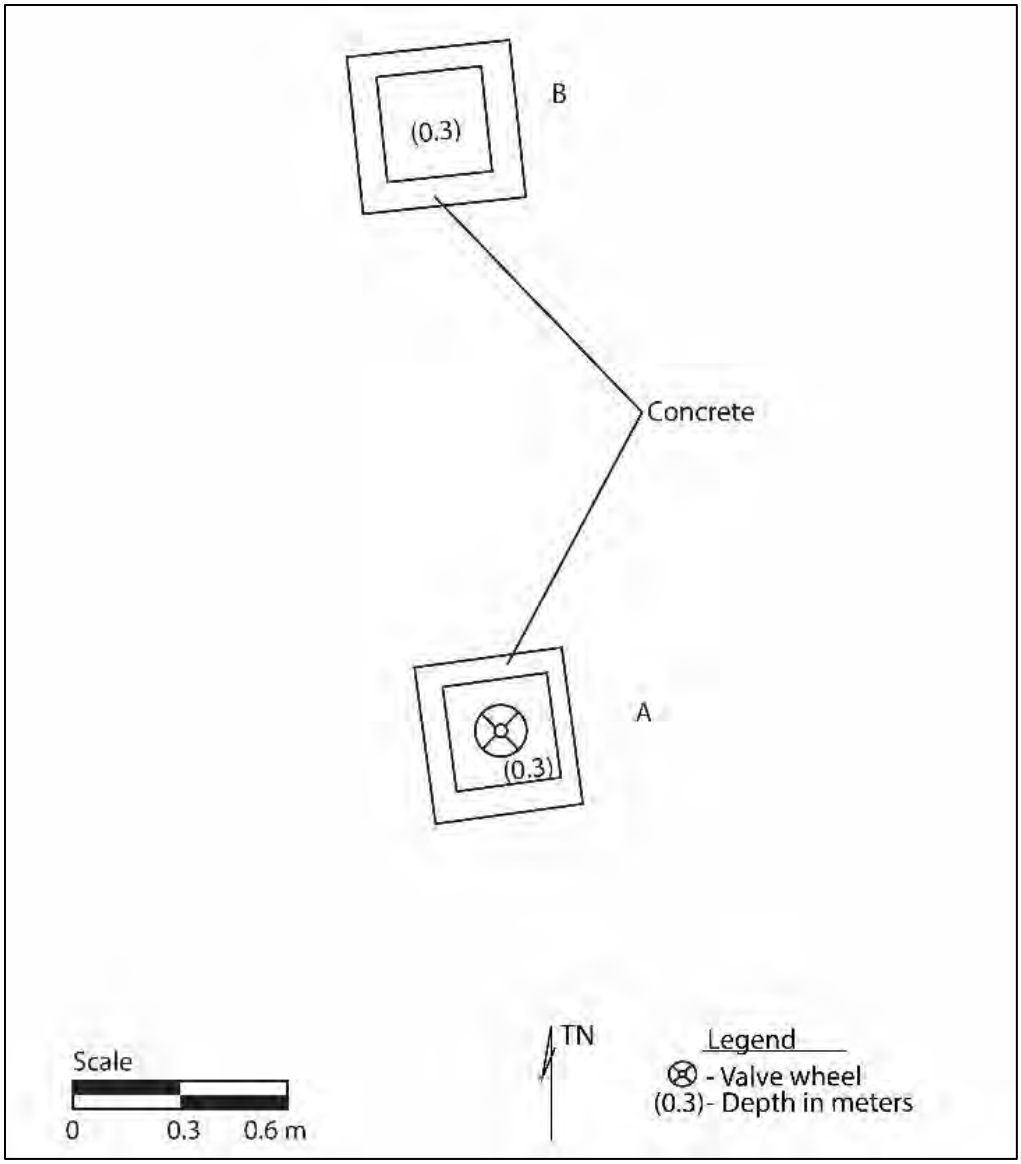

Figure 86. Plan-view map of SIHP 50-80-12-05099, Feature 19 concrete boxes with valve.

Figure 87. SIHP 50-80-12-05099, Feature 19 concrete box with valve (Box A; view to south).

Figure 88. SIHP 50-80-12-05099, Feature 19 concrete box with valve (Box B; view to northwest).

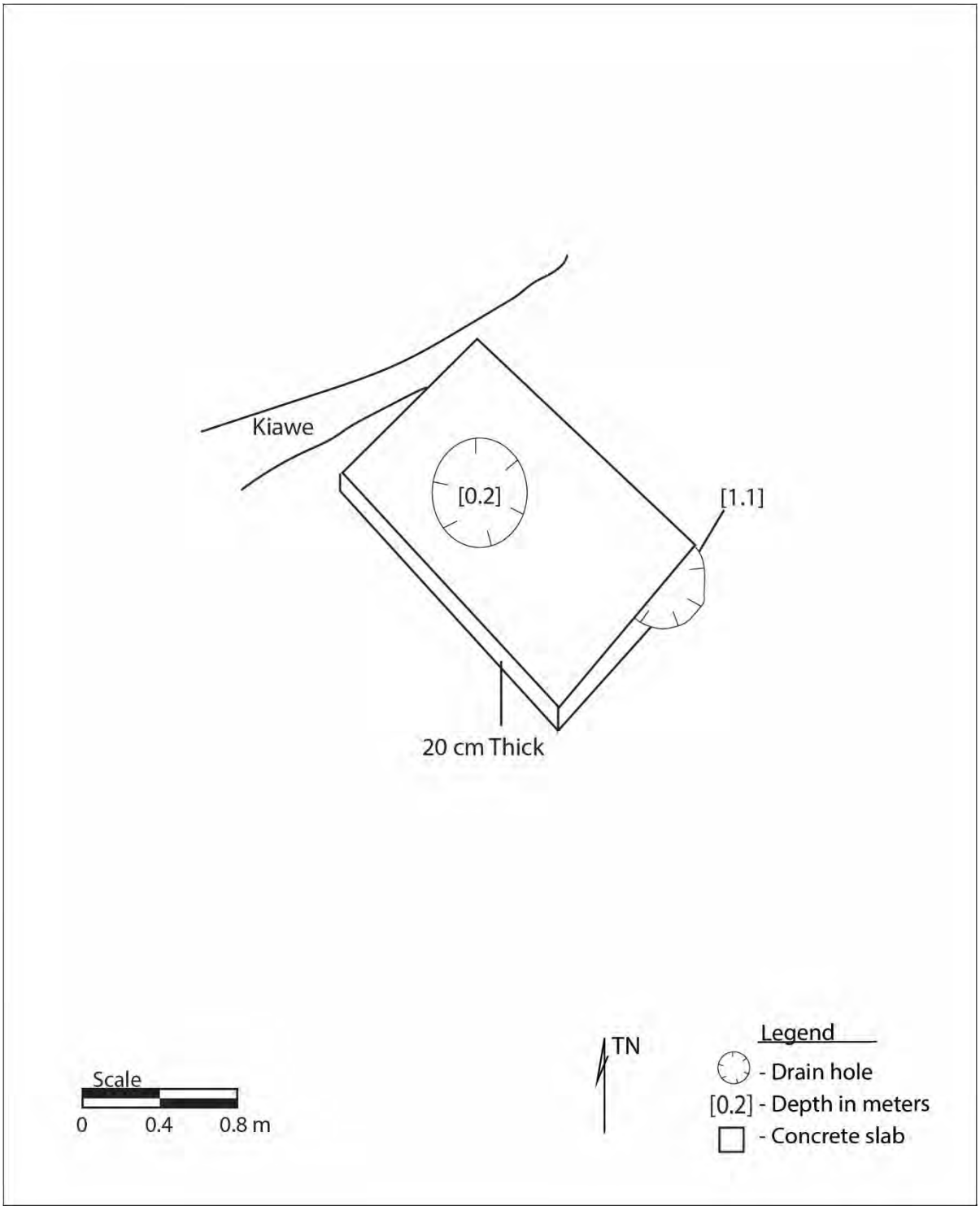

Figure 89. Plan-view map of SIHP 50-80-12-05099, Feature 20 concrete slab.

Figure 90. SIHP 50-80-12-05099, Feature 20 concrete slab (view to east).

Figure 91. SIHP 50-80-12-05099, Feature 21 upright pipe (view to northeast).

Figure 92. SIHP 50-80-12-05099, Feature 22 drainage (view to west).

Figure 93. SIHP 50-80-12-05099, Feature 23 berm (view to northeast).

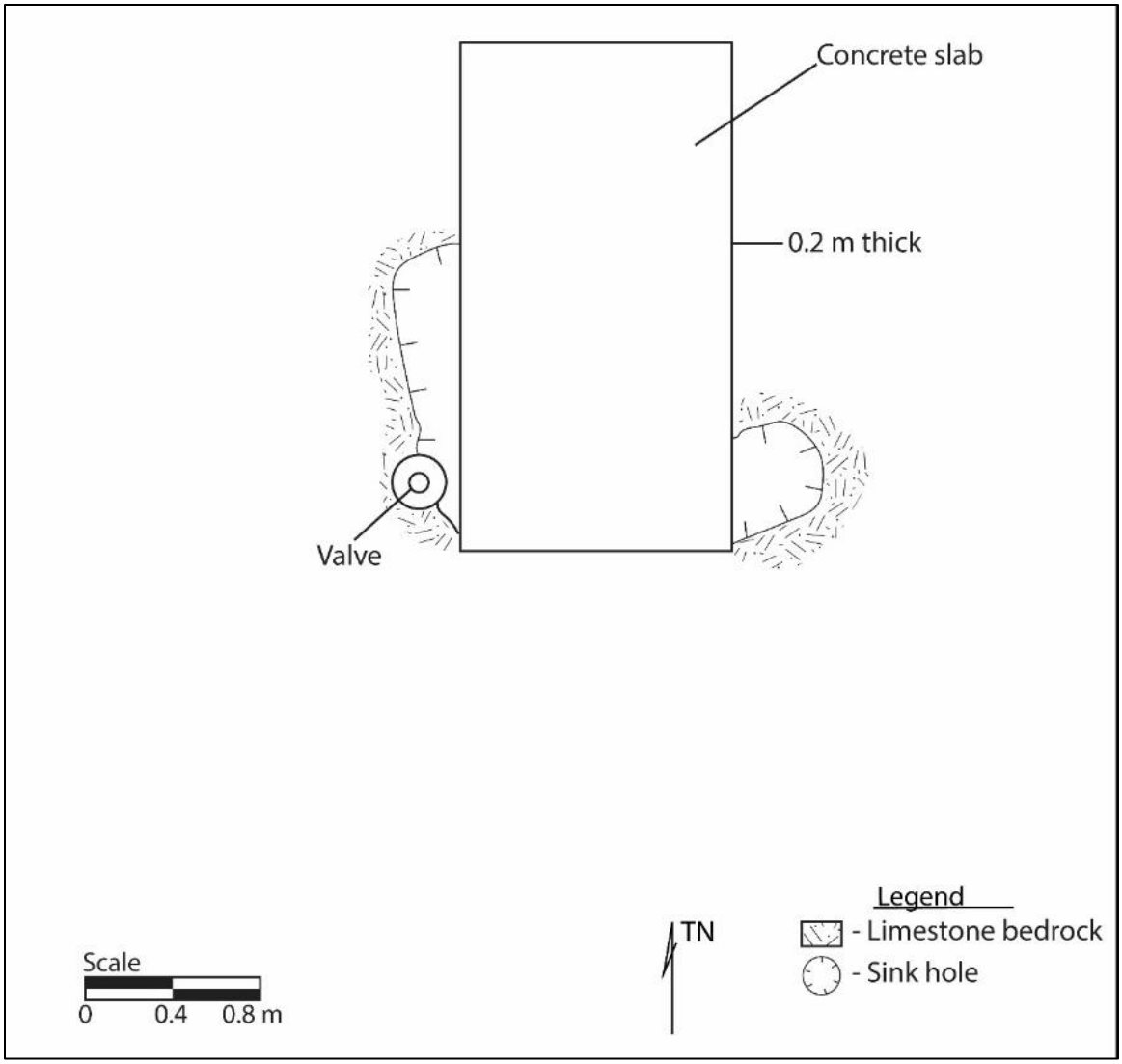

Figure 94. Plan-view map of SIHP 50-80-12-05099, Feature 24 concrete slab.

Figure 95. SIHP 50-80-12-05099, Feature 24 concrete slab (view to east).

Figure 96. SIHP 50-80-12-05099, Feature 25 concrete drain hole (view to southeast).

SIHP No.: 50-80-12-05100
Site Type: Complex of limestone structures
No. of Features: 24
Dimensions: 150 m L × 60 m W (within project area)
Condition: Fair to Good
Possible Age: Pre-Contact to Early Post-Contact
Possible Function: Habitation, agriculture
Significance: c, d, e
Recommended Treatment: Preservation
Previous Investigations: Archaeological survey (Tuggle and Tomonari-Tuggle 1997) and intensive survey and testing (Beardsley 2001)

SIHP 50-80-12-05100 consists of a complex of 24 features (designated Features 1 through 24), located in the southeast portion of Parcel 38 (Figure 97 and Table 7). SIHP -5100 was previously identified during Tuggle and Tomonari-Tuggle's (1997) survey and intensively documented and tested during Beardsley's subsequent (2001) investigation. Neither of the previous investigations provided an overall site map of SIHP -5100 with individual feature locations. Therefore, feature correlations could only be made using feature plan maps and descriptions provided in Beardsley's (2001) report. Of the 24 features documented during the current survey, seven features (Features 1, 2, 4, 5, 7, 9, and 22) were correlated with the previous site inventory (see Table 7).

Five of the features documented during the current survey (Features 1, 2, 5, 7, and 9) appear to have been tested during Beardsley's (2001) investigation. Testing results are provided below following their respective feature description. Taxa identification of fish, mammal, reptile, and amphibian bone collected during Beardsley's (2001) investigation is tabulated by site and included Cirrhitidae (hawkfish), Acanthuridae (surgeonfish), Balistidae (triggerfish), *Rattus exulans* (Polynesian rat), *Rattus norvegicus* (Norwegian rat), *Mus musculus* (house mouse), *H. auropunctatus* (mongoose), *Sus scrofa* (pig), and *Bufo marinus* (cane toad) (Beardsley 2001:V.27).

Based on testing results and feature characteristics, SIHP -5100 was previously interpreted as a traditional Hawaiian habitation and agricultural complex (Beardsley 2001). The current project analysis and consultation efforts suggest the habitation features are permanent residences and the multiple habitation features likely formed a traditional *kauhale* or multiple-feature residential complex. The features included in this site are in fair to good condition. The site boundary is determined based on the maximal extent of surface architecture.

The site area is characterized by a limestone plain covered in high unidentified grass and intermittent *kiawe* trees (*Prosopis pallida*). Most of the site features (Features 1–17) are clustered on a more elevated area of the plain and, for the most part, appear in good condition, suggesting this portion of the site was avoided during historic and recent land modifications. Features 18 through 24 comprise a more northerly feature cluster distributed south of a concentration of WWII revetments (Site T-002, Features 6–14; see Appendix B). This portion of the site area appears to have been more disturbed because of the nearby military development. However, land clearing and grading is visible throughout the general site area and is particularly evident along the project boundary by the construction of a WWII-era stone and soil berm (Site T-002, Feature 8; see Appendix B) immediately south of the site.

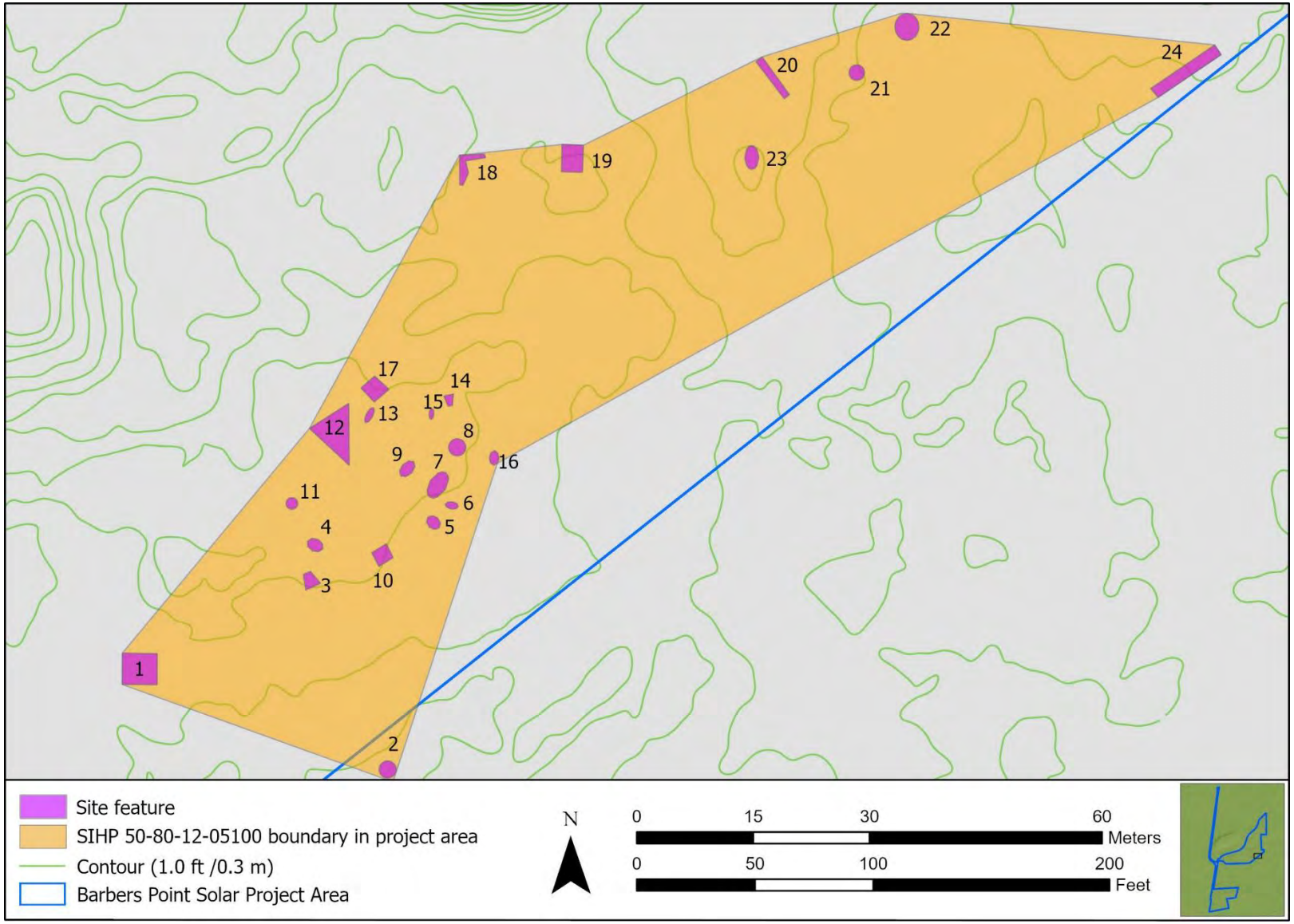

Figure 97. SIHP 50-80-12-05100, location of features overlaid on contours created from aerial LiDAR data, 2019.

Table 7. Summary of SIHP 50-80-12-05100 Features

Feature	Temporary Field No.	PHRI Feature	Type	Possible Function	Archaeological Material
1	T-268	O	Enclosure	Permanent habitation /ritual	Marine shell
2	T-270	Q	Mound	Permanent habitation	Marine shell, rodent, bird, and fish bone
3	T-271		Platform	Permanent habitation	
4	T-272	G	Mound	Permanent habitation	
5	T-273	B	Platform	Permanent habitation	Coral abrader, kukui nuts, marine shell, fish, mongoose, and rodent bone, fire-altered limestone, ash, and charcoal
6	T-274		Mound	Permanent habitation	
7	T-275	H	Mound	Permanent habitation	Marine shell, fish, bird, and rodent bone
8	T-276		Mound	Permanent habitation	-
9	T-277	A	Mound	Permanent habitation	-
10	T-278		Mound	Permanent habitation	-
11	T-279		Mound	Agriculture	-
12	T-280		Enclosure	Permanent habitation	-
13	T-281		Mound	Agriculture	-
14	T-282		Mound	Agriculture	-
15	T-283		Mound	Agriculture	-
16	T-284		Mound	Agriculture	-
17	T-287		Enclosure	Permanent habitation	-
18	T-288		C-shaped wall	Permanent habitation	-
19	T-289		Mound	Agriculture	-
20	T-301		Wall remnant	Undetermined	-
21	T-302		Mound	Agriculture	-
22	T-303	M	Mound	Permanent habitation	Fishhook, volcanic glass flake, modified bone, marine shell, fish, bird, and rodent bone, and undated charcoal cultural feature
23	T-304		Sink	Undetermined	-
24	T-319		Wall remnant	Undetermined	-

Feature 1 is a roughly square enclosure on the southeast edge of the site complex (Figure 98 and Figure 99). The feature was previously recorded by Beardsley (2001:IV.75) as Feature O. The enclosure exterior measures 2 m (N/S) × 2 m (E/W) and contains a wall 0.5–0.9 m wide by a maximum height of 0.7 m. The enclosure is relatively intact on the northeast corner with a bi-faced wall, roughly 2 m long × 0.9 m wide, constructed of 2 to 5 course facing of small limestone boulders and an interior fill of limestone cobbles and boulders. The remaining enclosure wall consists of piled limestone cobbles and boulders (0.2–0.3 m in height) and appears collapsed. The enclosure interior contains a *kiawe* tree (*Prosopis pallida*) and a level soil floor, accessed through a roughly 1 m wide entryway in the northwest corner of the enclosure.

A 1 × 1 m unit (designated EU-226) was excavated in the soil floor adjacent to the enclosure's south wall (Beardsley 2001:IV.75). The testing yielded sparse faunal material from the first two soil layers that included marine shell from gastropods and bivalves (Beardsley 2001:H-13).

Beardsley (2001) interpreted Feature 1 as a traditional Hawaiian habitation enclosure. During a site visit in October 2020, Kimberly Kalama (ʻEwa cultural descendant, Hoakalei Cultural Foundation and archaeological monitor working in the nearby Haseko Ocean Pointe development) suggests the feature also contains a ritual component represented by the raised bi-faced wall section on the enclosure's northeast corner. Except for the better preserved bi-faced wall section, the feature is currently in fair condition.

Figure 98. SIHP 50-80-12-05100, Feature 1 enclosure (view to southeast).

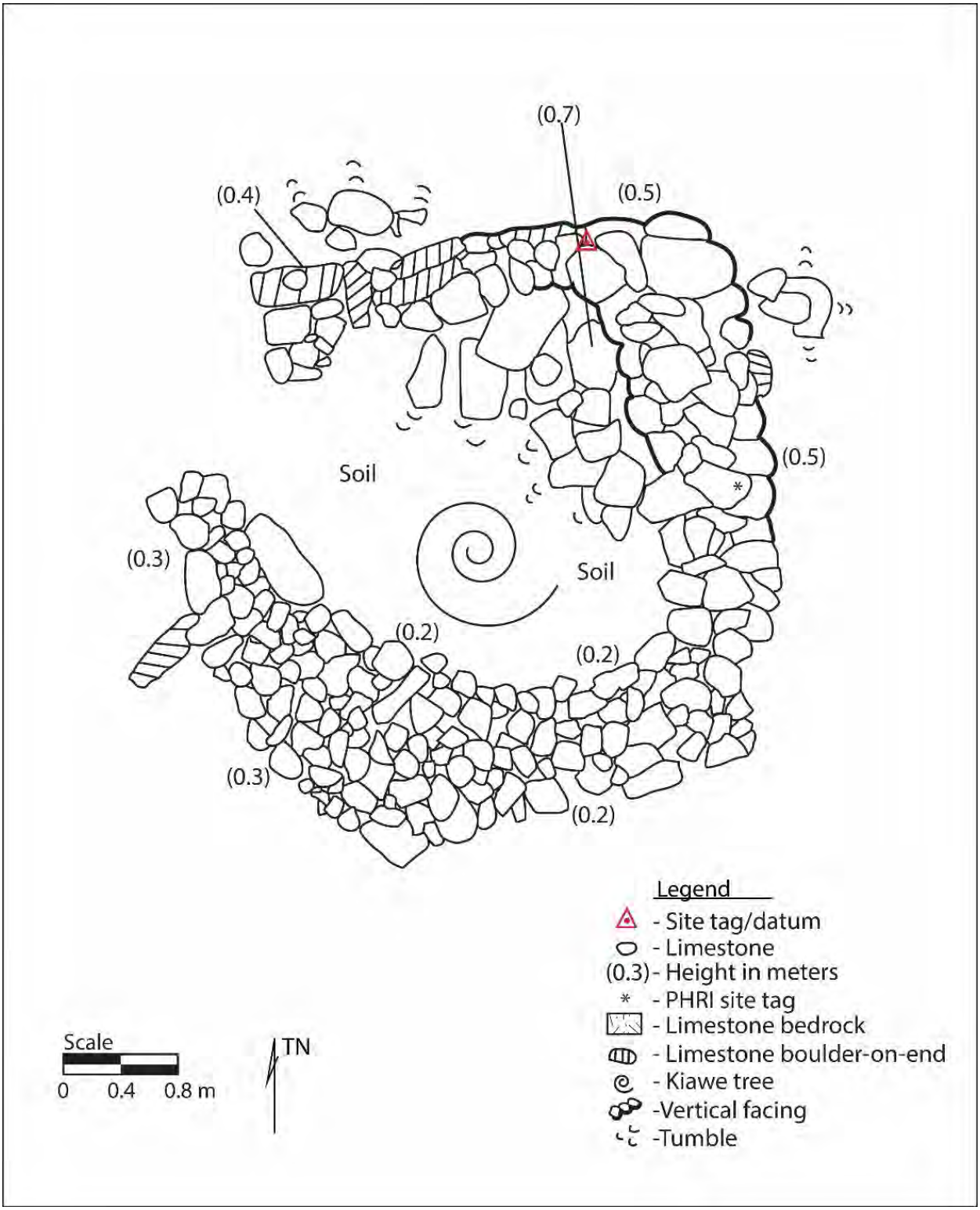

Figure 99. Plan-view map of SIHP 50-80-12-05100, Feature 1 enclosure.

Feature 2 (Figure 100 and Figure 101) is a rectangular-shaped mound located on the southeastern boundary of the project area, immediately north of the Site T-002, Feature 8 berm. The feature was previously recorded by Beardsley (2001:IV.75) as Feature Q and interpreted as a traditional Hawaiian habitation feature. The mound is 2 m (NW/SE) × 1.4 m (NE/SW) and is 0.5 m high (maximum). An interior cavity was constructed inside the mound and measures 1.2 m (NE/SW) × 0.6 m (NW/SE). As described by Beardsley (2001:IV.76) prior to excavation, five limestone slabs placed on-end lined the cavity walls and the surface stones of the mound had collapsed into the cavity.

A 1 × 0.5 excavation unit placed on the soil surface inside the cavity yielded sparse faunal material including marine shell (echinoid and gastropod), and rodent, bird, and fish bone (Beardsley 2001:IV.76). The recovered bird bone was identified as the Common Myna bird (*Acridotheres tristis*).

Figure 100. SIHP 50-80-12-05100, Feature 2 mound (view to east).

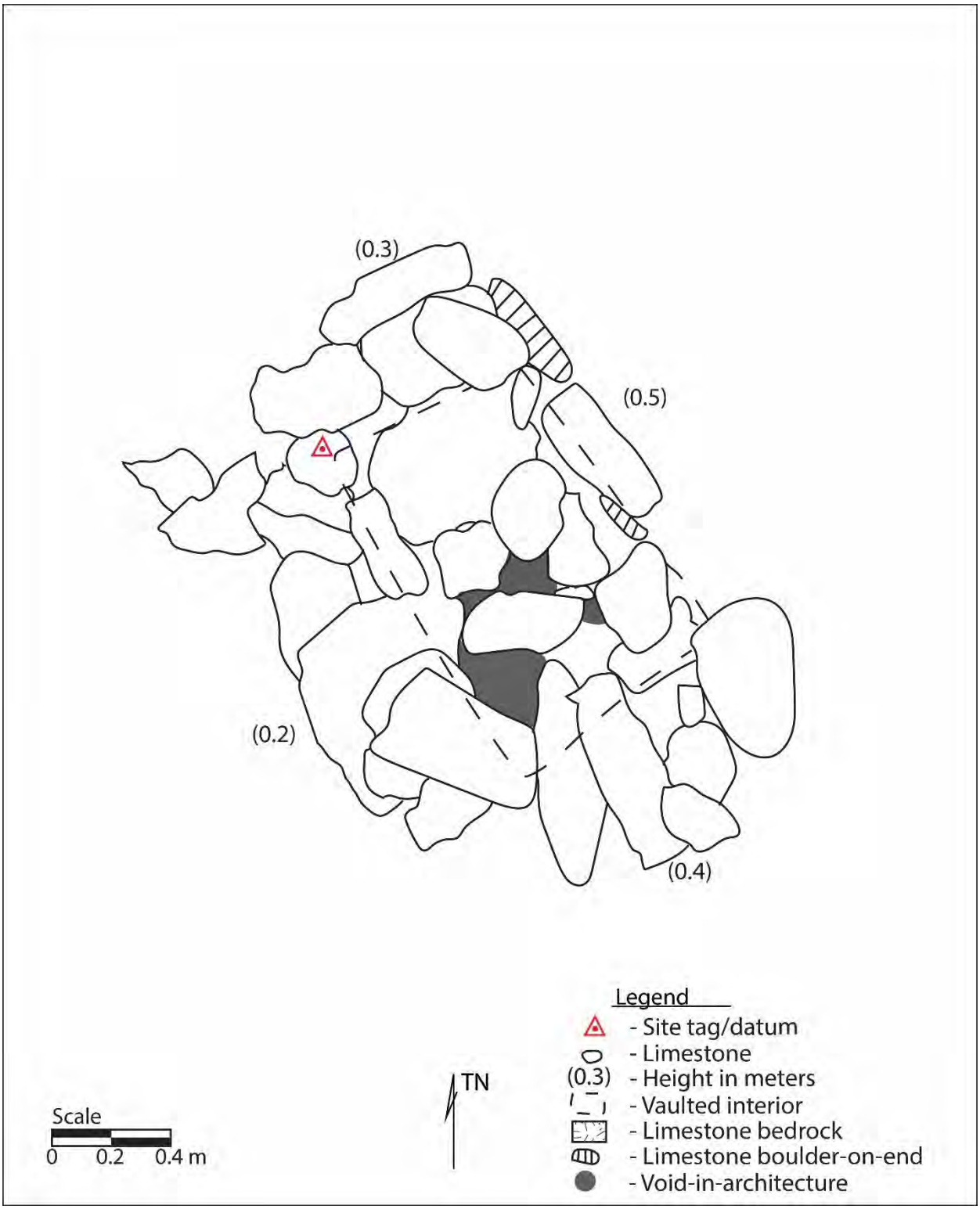

Figure 101. Plan-view map of SIHP 50-80-12-05100, Feature 2 mound.

Feature 3 (Figure 102 and Figure 103) is a roughly circular platform 2.5 m south of Feature 4. The platform is 2.4 m (N/S) × 2.7 m (E/W) and 0.7 m high at its highest point. The platform has a sunken surface at the center, 0.2 m below the platform's surface. The sunken surface might suggest it was excavated by Beardsley (2001); however, this could not be confirmed based on the available site data. The platform is constructed with piled and roughly stacked limestone cobbles and small boulders. Feature 3 is likely a habitation structure.

Figure 102. SIHP 50-80-12-05100, Feature 3 platform (view to northwest).

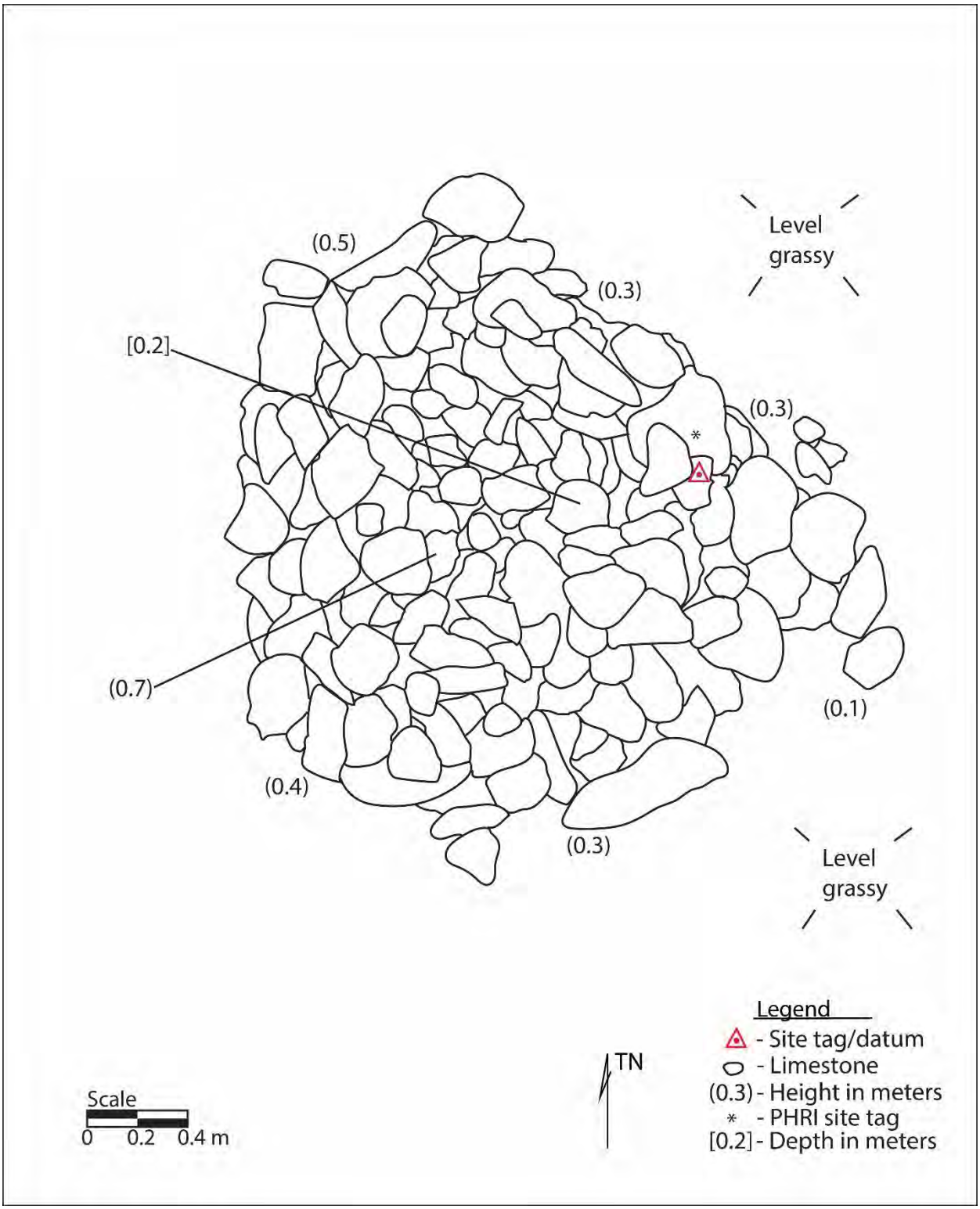

Figure 103. Plan-view map of SIHP 50-80-12-05100, Feature 3 platform.

Feature 4 (Figure 104 and Figure 105) is a circular mound 2.5 m north of Feature 3. The feature was previously recorded by Beardsley (2001:IV.73) as Feature G and described as a "habitation cairn" that was mostly collapsed. The mound measures 2.0 m (NW/SE) × 1.5 m (NE/SW) and is 0.3 m at its highest point. The mound contains a sunken surface and a void in construction in the south end, suggesting the feature once had an interior cavity. A boulder slab on-end in the southwest corner might delineate the edge of this internal cavity. The mound is constructed of limestone cobbles and small boulders and was likely used for permanent habitation. Feature 4 is in fair condition.

Figure 104. SIHP 50-80-12-05100, Feature 4 mound (view to northwest).

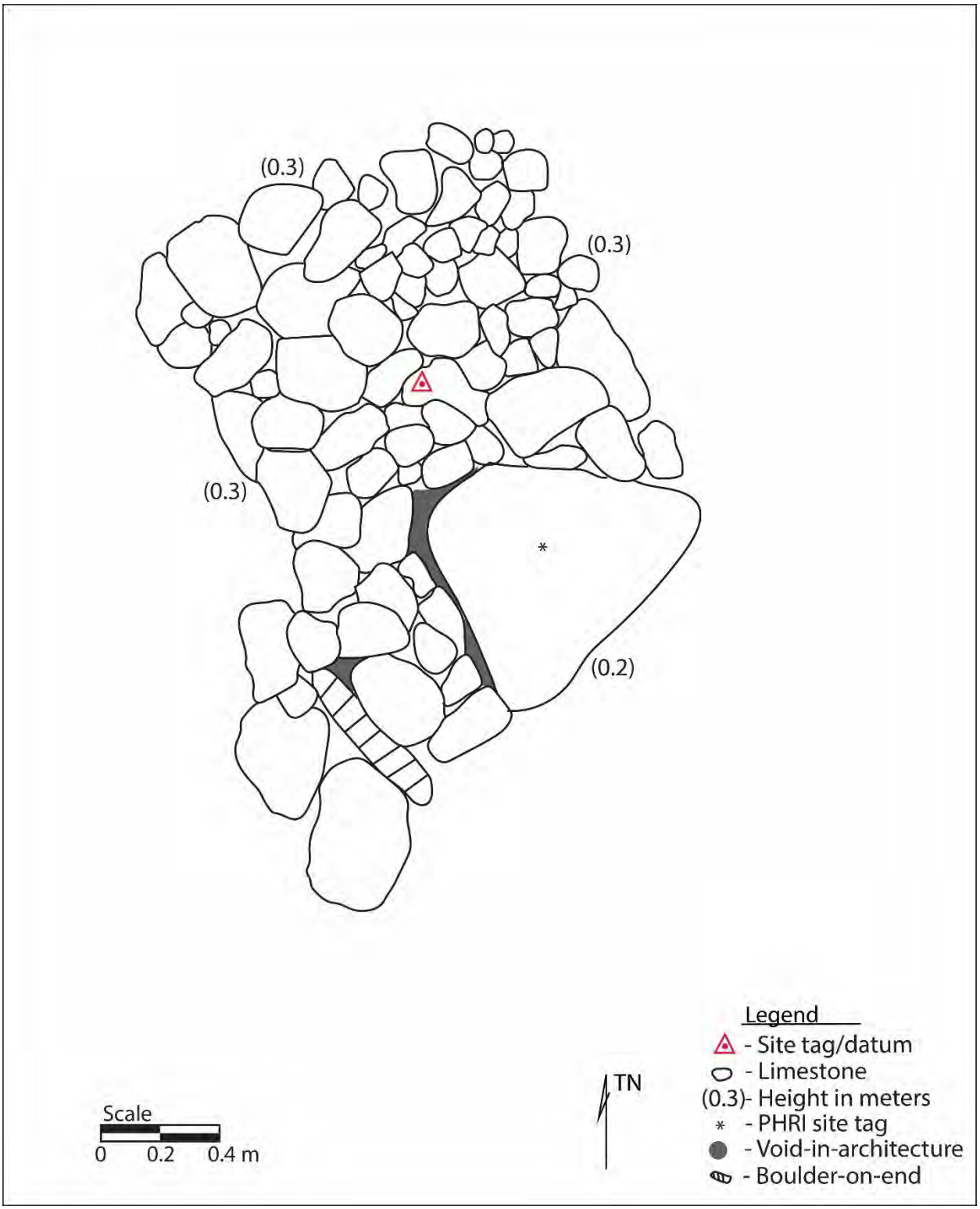

Figure 105. Plan-view map of SIHP 50-80-12-05100, Feature 4 mound.

Feature 5 is a vaulted platform representing the most formal and well-preserved feature in the SIHP -5100 complex (Figure 106 through Figure 108). The platform is situated roughly at the center of most of the site features. The platform was previously documented and excavated by Beardsley (2001:IV.71) as Feature B and was described as follows:

> This cairn contains a cavity lined with vertical, upright on-edge slabs. The cavity is capped with slabs, and has an interior space 1 m wide, 1.2 m long, and 50 cm high. The walls of the cavity, which constitute the body of the cairn, consist of eight courses of limestone cobbles, boulders, and slabs. The outer edges of the feature are vertical, although some collapse is evident. The regularity of construction suggests a relatively recent origin; this is possibly an early historic burial vault. Excavation, however, revealed evidence that suggests use of the feature in a capacity other than burial. Ash mixed with sparse midden offers the possible explanation that this was an oven (Beardsley 2001:IV.71).

During the current investigation, the feature was reclassified as a platform, and in concurrence with Beardsley's (2001) testing results that identified a hearth and food remains (see below) and consultation with Hawaiian cultural descendant Kimberly Kalama, Feature 5 is interpreted as a permanent house structure possibly functioning as a food storage or cooking house.

Feature 5 measures 3.8 m (NE/SW) × 2.5 m (SE/NW) with a maximum height of 0.8 m along its northwest wall. The top of the interior cavity is open in the northeast half of the platform likely as the result of the previous excavation; the southwest half remains capped with a large limestone boulder slab and cobbles and boulders stacked on top. The exterior wall is faced with 5–6 courses of large limestone cobbles and small boulder slabs stacked flat to each other. Possible steps leading to the platform surface are suggested on the northeast side of the platform, with the lowest step raised 0.3 m high. Feature 5 is in fair to good condition.

Beardsley (2001:IV.71) excavated two units (EU-220 and -246) on the exposed ground surface inside Feature B's constructed cavity, which identified three stratigraphic layers on top of bedrock. The excavations yielded sparse cultural material from all three layers including a coral abrader; *kukui* nuts; marine shell (gastropods, bivalves, and echinoid); fish, mongoose, and rodent bone; and fire-altered limestone, ash, and charcoal (Beardsley 2001: IV.71). Radiometric dating analysis of unknown charred material from Layer II returned pre-Contact dates of AD 1325–1340 and AD 1390–1460 (Beardsley 2001:IV.71).

Figure 106. SIHP 50-80-12-05100, Feature 5 vaulted platform (view to south).

Figure 107. SIHP 50-80-12-05100, Feature 5 vaulted platform (view to east).

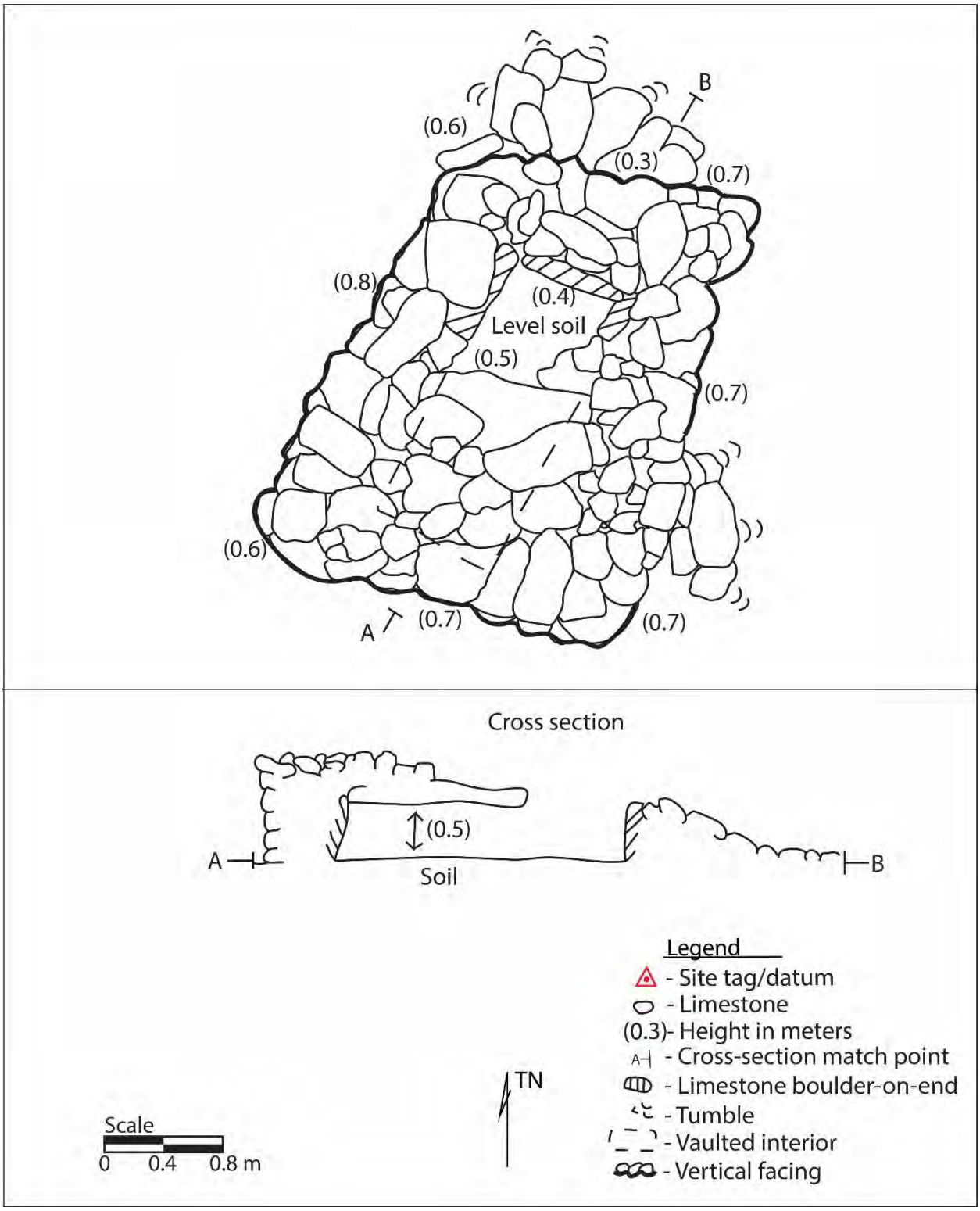

Figure 108. Plan-view map of SIHP 50-80-12-05100, Feature 5 vaulted platform.

Feature 6 is a mound located between two habitation structures of the site (Figure 109 and Figure 110). The mound measures 1.6 m (E/W) × 1 m (N/S) and is 0.4 m high. It is constructed of piled small and medium limestone boulders and cobble mix near the center. Feature 6 is likely an agricultural mound or clearing pile. It is in fair condition.

Figure 109. SIHP 50-80-12-05100, Feature 6 mound (view to northeast).

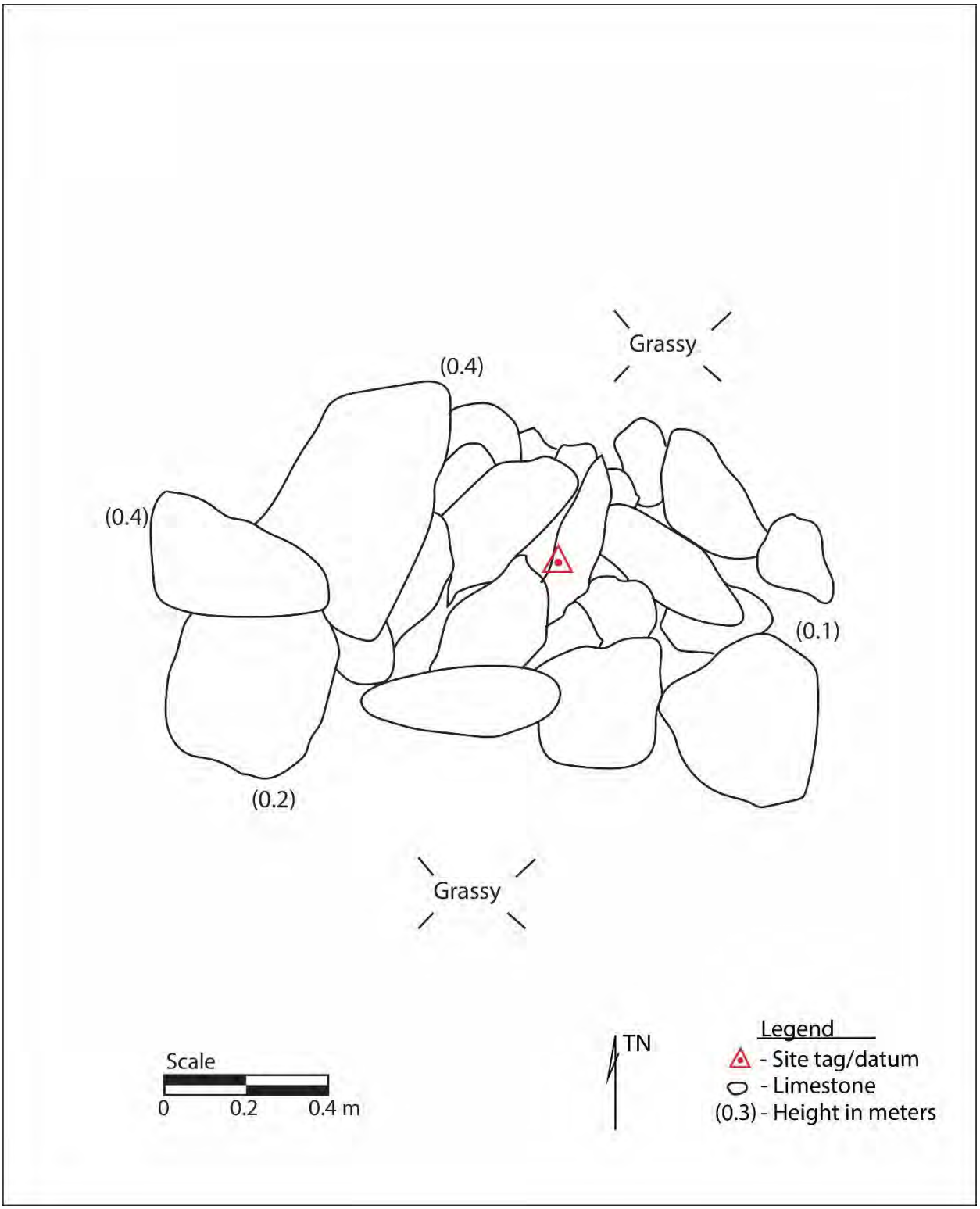

Figure 110. Plan-view map of SIHP 50-80-12-05100, Feature 6 mound.

Feature 7 consists of a remnant structure that appears to be two adjacent mounds with an interior cavity evident in the northernmost mound (Figure 111 and Figure 112). Feature 7 was previously documented by Beardsley (2001:IV.73) as Feature H and described as a C-shaped wall with the northernmost portion containing a collapsed interior cavity measuring 0.5 × 0.5 m. The interior cavity was indicated on the surface of the mound by an alignment of limestone boulder slabs, two of which were placed on-end. Beardsley (2001) excavated one test unit (EU-221) inside the collapsed cavity and documented four stratigraphic layers. The upper three layers yielded sparse faunal material including marine midden (gastropods, bivalves, and echinoid), and fish, bird, and rodent bone.

The feature measures 3.8 m (NW/SE) × 2.2 m (NE/SW) by a maximum 0.75 m high on the northern mound. The mounds are constructed of piled limestone cobbles and small and medium boulders. Feature 7 is likely a habitation structure and is currently in fair condition.

Figure 111. SIHP 50-80-12-05100, Feature 7 mound (view to northeast).

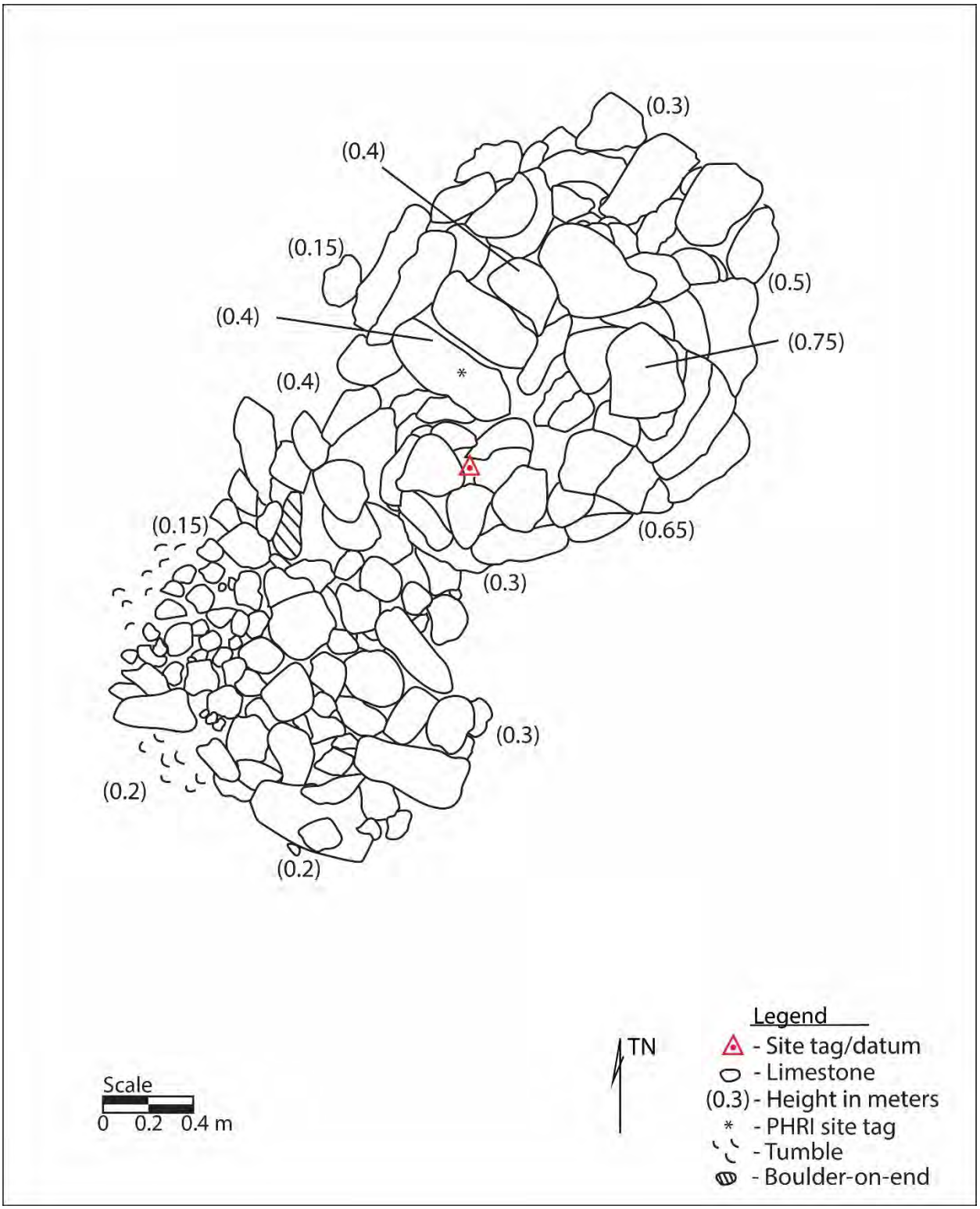

Figure 112. Plan-view map of SIHP 50-80-12-05100, Feature 7 mound.

Feature 8 is a circular mound 2.5 m northeast of Feature 7 (Figure 113 and Figure 114). The mound measures 2.2 m (N/S) × 1.8 m (E/W) × 0.6 m high. It is constructed of piled limestone cobbles and small and medium boulders. The western half of the mound is lower than the eastern half and is 0.1 m high. Feature 8 is in fair condition and is likely a remnant habitation structure.

Figure 113. SIHP 50-80-12-05100, Feature 8 mound (view to northeast).

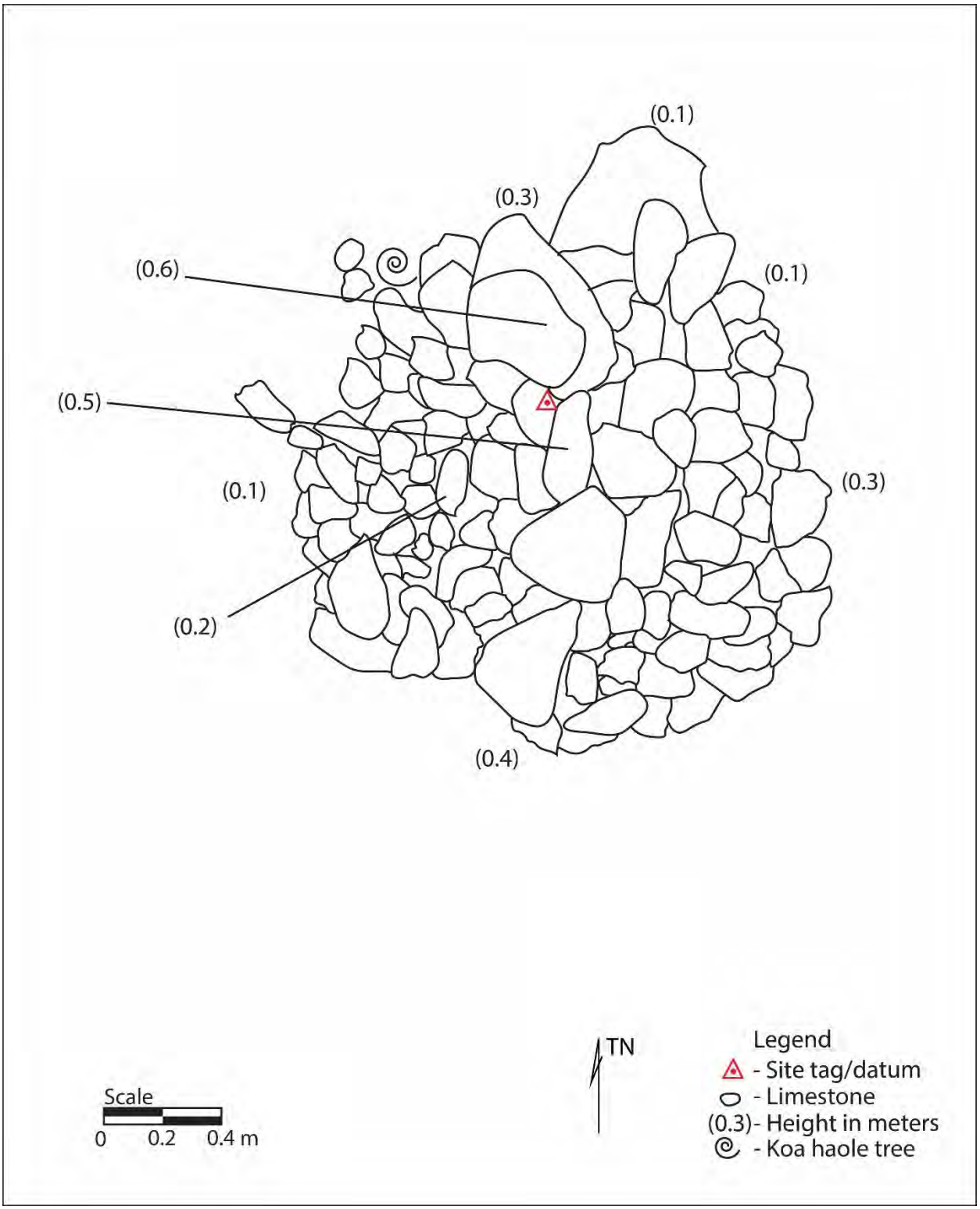

Figure 114. Plan-view map of SIHP 50-80-12-05100, Feature 8 mound.

Feature 9 (Figure 115 and Figure 116) is a mound that is 2.6 m northwest of Feature 7. Feature 9 was previously documented by Beardsley (2001:IV.71) as a habitation feature (Feature A) and described as a square-shaped cairn with a cavity edged with limestone boulder slabs placed on-end and capped with limestone boulder slabs. Beardsley (2001:IV.71) excavated a test unit (EU-216) inside the cavity and identified three stratigraphic layers. The testing yielded sparse faunal material, including marine midden (gastropod, bivalve, and echinoid), and fish and rodent bone.

The mound is constructed of stacked and piled limestone cobbles and small boulders and currently contains an 0.3 m wide opening in the western half that exposes a cavity within. The mound measures 2.1 (NW/SE) × 1.8 m (NE/SW) and is 0.6 m high. In agreement with Beardsley (2001), Feature 9 is interpreted as a habitation structure. It is currently in fair to good condition.

Figure 115. SIHP 50-80-12-05100, Feature 9 mound (view to south).

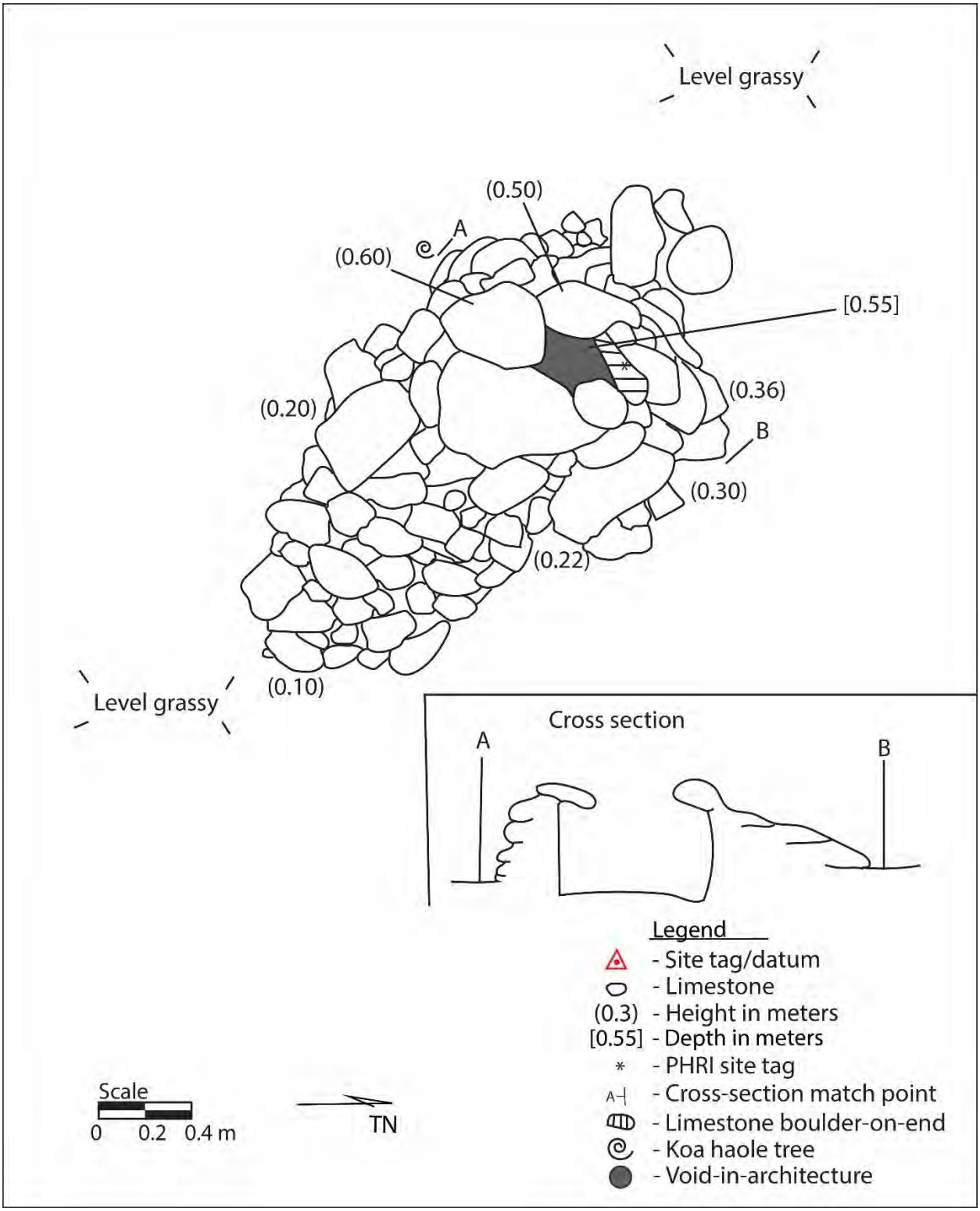

Figure 116. Plan-view map of SIHP 50-80-12-05100, Feature 9 mound.

Feature 10 is a roughly rectangular platform located equidistant between Features 3 and 5 (Figure 117 and Figure 118). The platform has a sunken surface with gaps that suggests an underlying internal cavity. The platform measures 2.2 m (E/W) × 2.0 m (N/S) with a maximum height of 0.4 m. It is constructed of piled limestone cobbles and small boulders. Feature 10 is in fair to good condition and is likely a habitation structure.

Figure 117. SIHP 50-80-12-05100, Feature 10 mound (view to northeast).

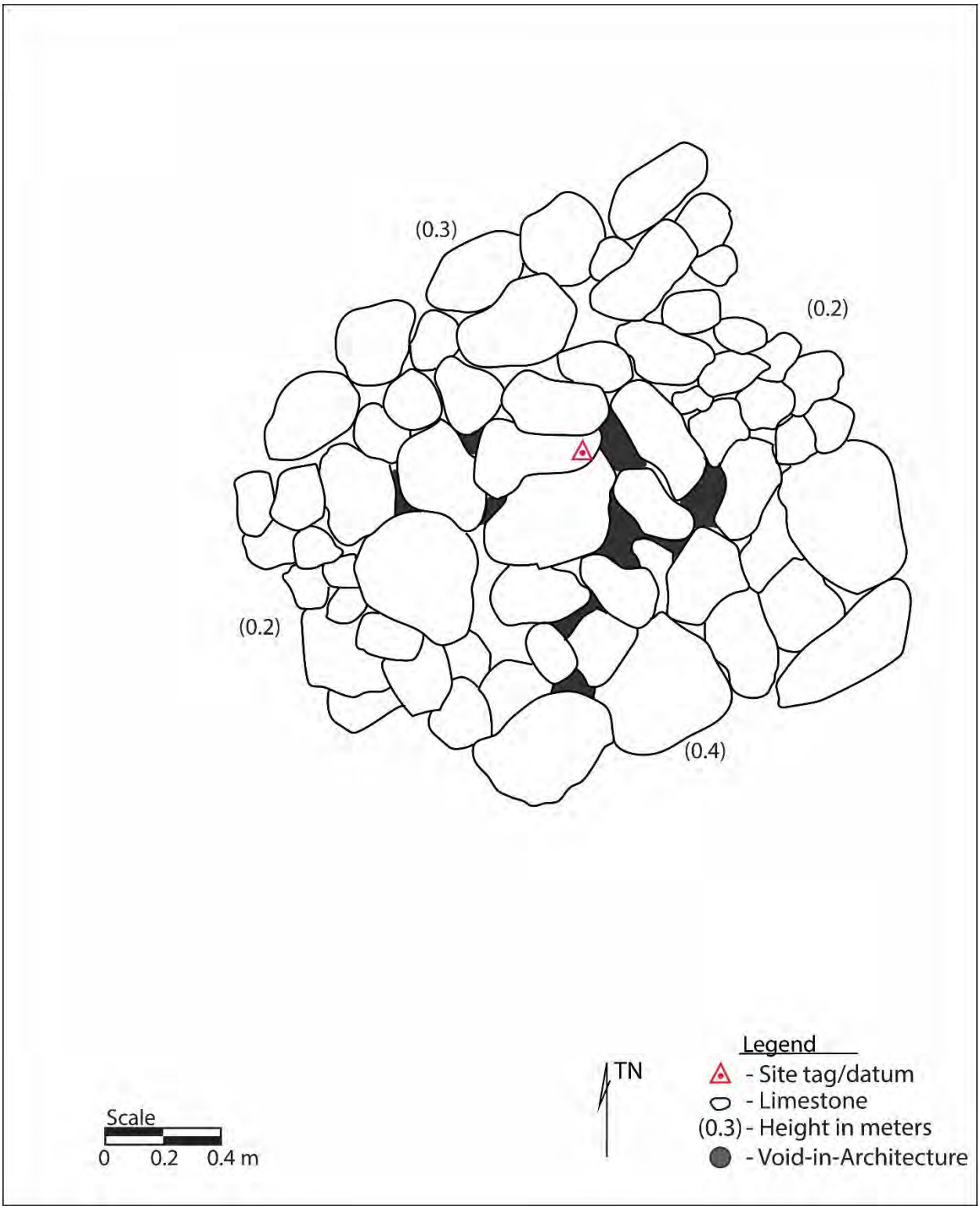

Figure 118. Plan-view map of SIHP 50-80-12-05100, Feature 10 mound.

Feature 11 is a small mound 4.5 m northwest of Feature 4 (Figure 119 and Figure 120). The mound is constructed of piled limestone cobbles and small boulders (1–2 high) measuring 1.25 m (N/S) × 1.5 m (E/W) and 0.4 m high. Feature 1 is likely an agricultural feature.

Figure 119. SIHP 50-80-12-05100, Feature 11 mound (view to northeast).

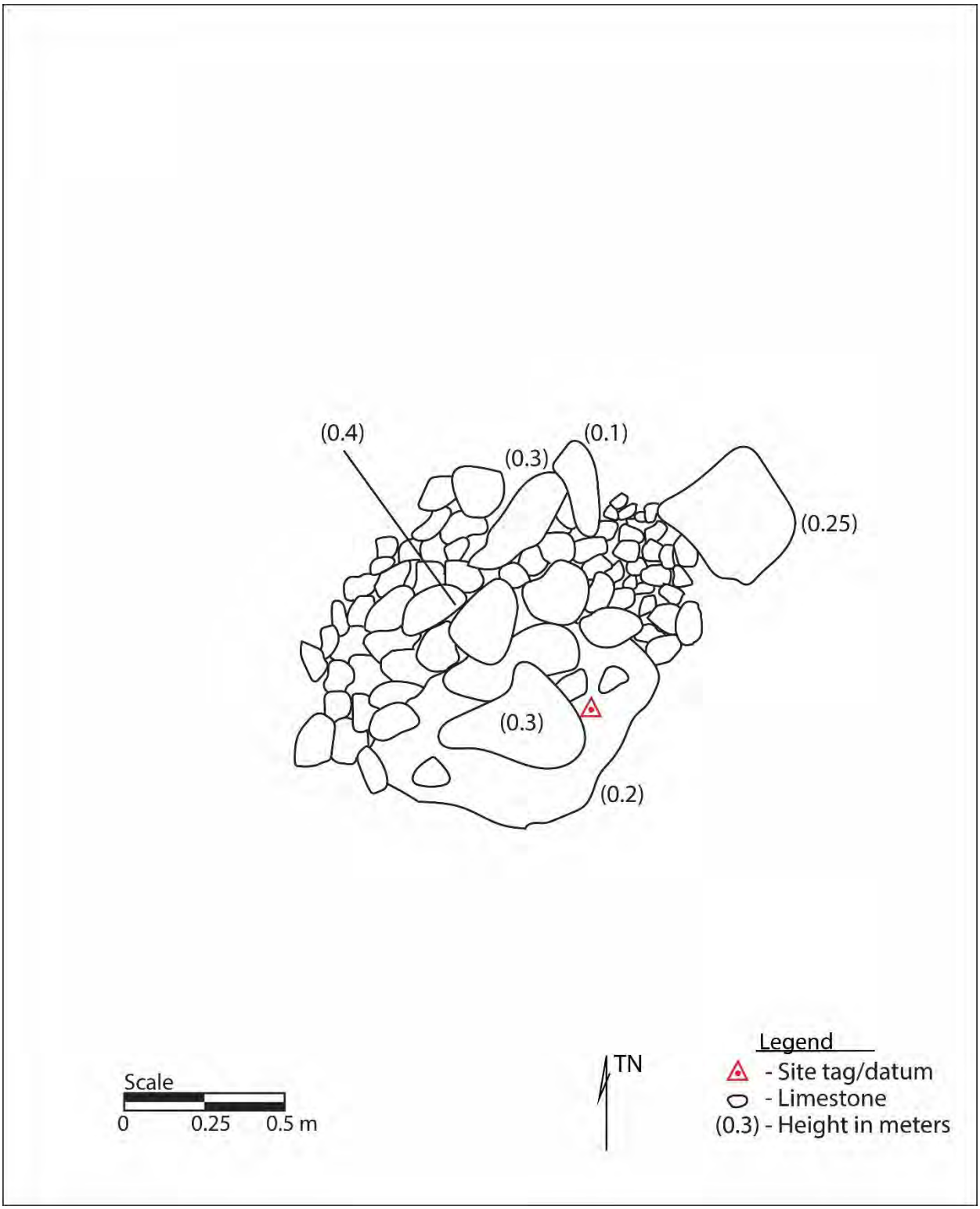

Figure 120. Plan-view map of SIHP 50-80-12-05100, Feature 11 mound.

Feature 12 is a terraced enclosure 3 m east of Feature 11 (Figure 121 and Figure 122). Overall, the feature measures 7 m (NW/SE) × 5 m NE/SW. A triangular-shaped terrace is attached to the northern corner of the enclosure. The terrace is constructed of piled limestone cobbles and small boulders and measures 2.5 m (N/S) × 2.5 m (E/W) by a maximum of 0.3 m high. The enclosure comprises a T-shaped wall with the base of the "T" attached to the terrace. The enclosure contains a soil floor measuring 2.5 m in diameter and the enclosure wall is constructed of piled limestone cobbles and small boulders ranging between 0.3 and 1 m wide by a maximum 0.2 m high. Feature 12 is in fair condition and might have been impacted on the northwest side by recent land modifications. The feature is likely a habitation structure.

Figure 121. SIHP 50-80-12-05100, Feature 12 terraced enclosure (view to south).

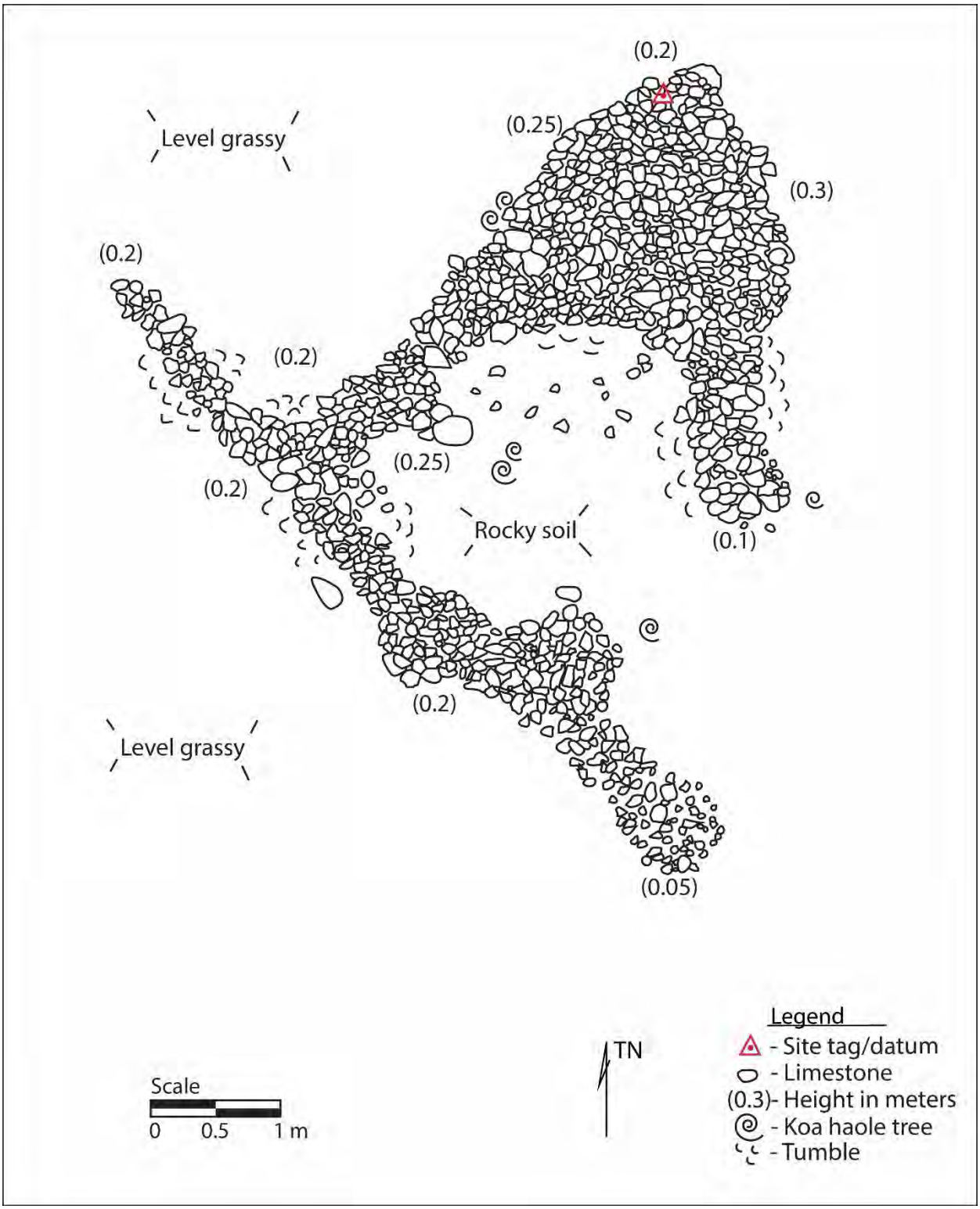

Figure 122. Plan-view map of SIHP 50-80-12-05100, Feature 12 terraced enclosure.

Feature 13 is a stone mound located 3 m east of Feature 12 (Figure 123 and Figure 124). It is roughly oval-shaped and composed of piled limestone cobbles and small to medium boulders. The mound measures 2 m (N/S) × 1.2 m (E/W) and maximum 0.4 m high. Feature 13 is in fair condition and was likely an agricultural mound.

Figure 123. SIHP 50-80-12-05100, Feature 13 mound (view to north).

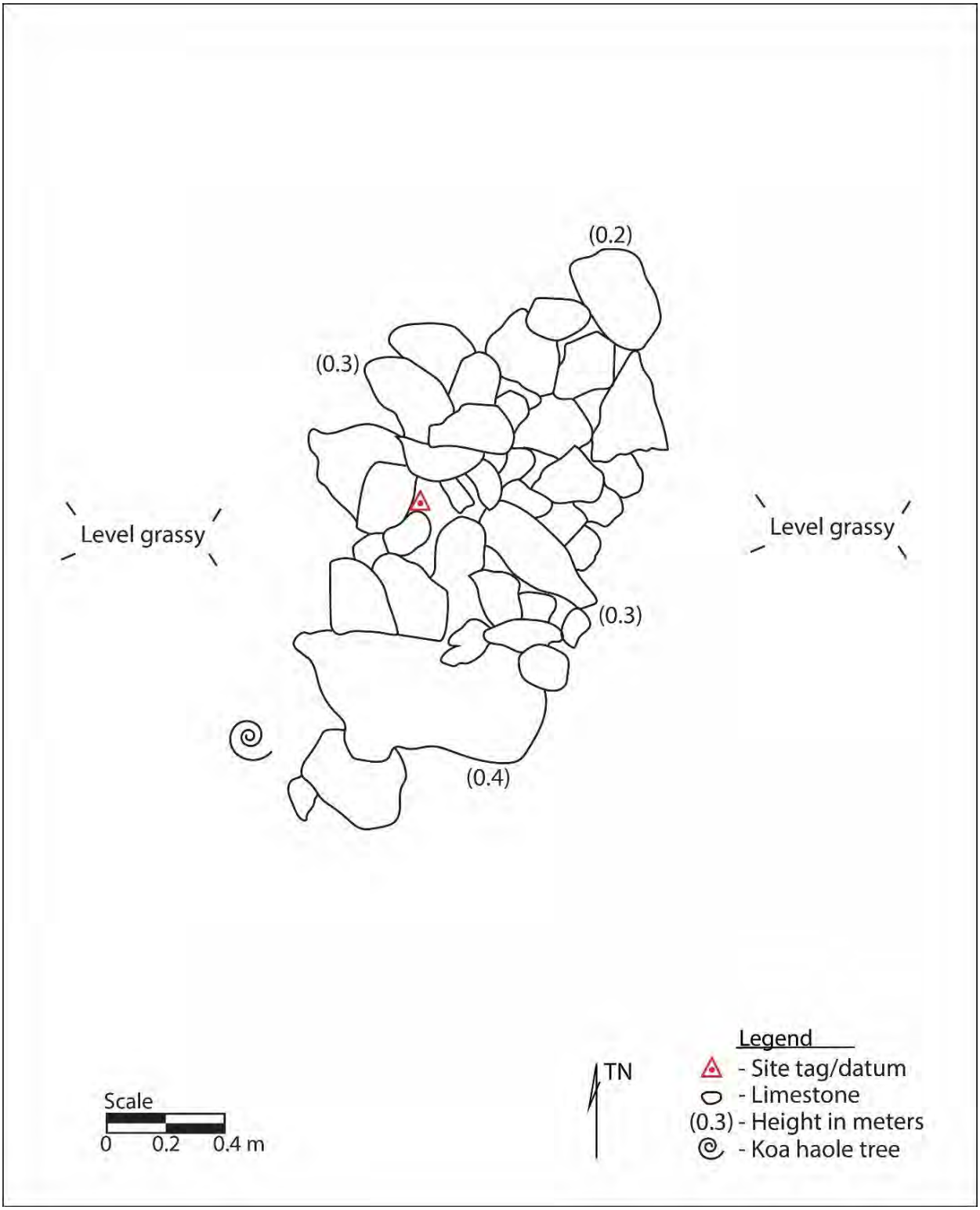

Figure 124. Plan-view map of SIHP 50-80-12-05100, Feature 13 mound.

Feature 14 is limestone mound 2 m northeast of the Feature 15 mound (Figure 125 and Figure 126). The mound is composed of piled limestone medium and large cobbles measuring 1.5 m (N/S) × 1.25 m (E/W) and 0.2 m high. Feature 14 is in fair condition and was likely an agricultural mound.

Figure 125. SIHP 50-80-12-05100, Feature 14 mound (view to north).

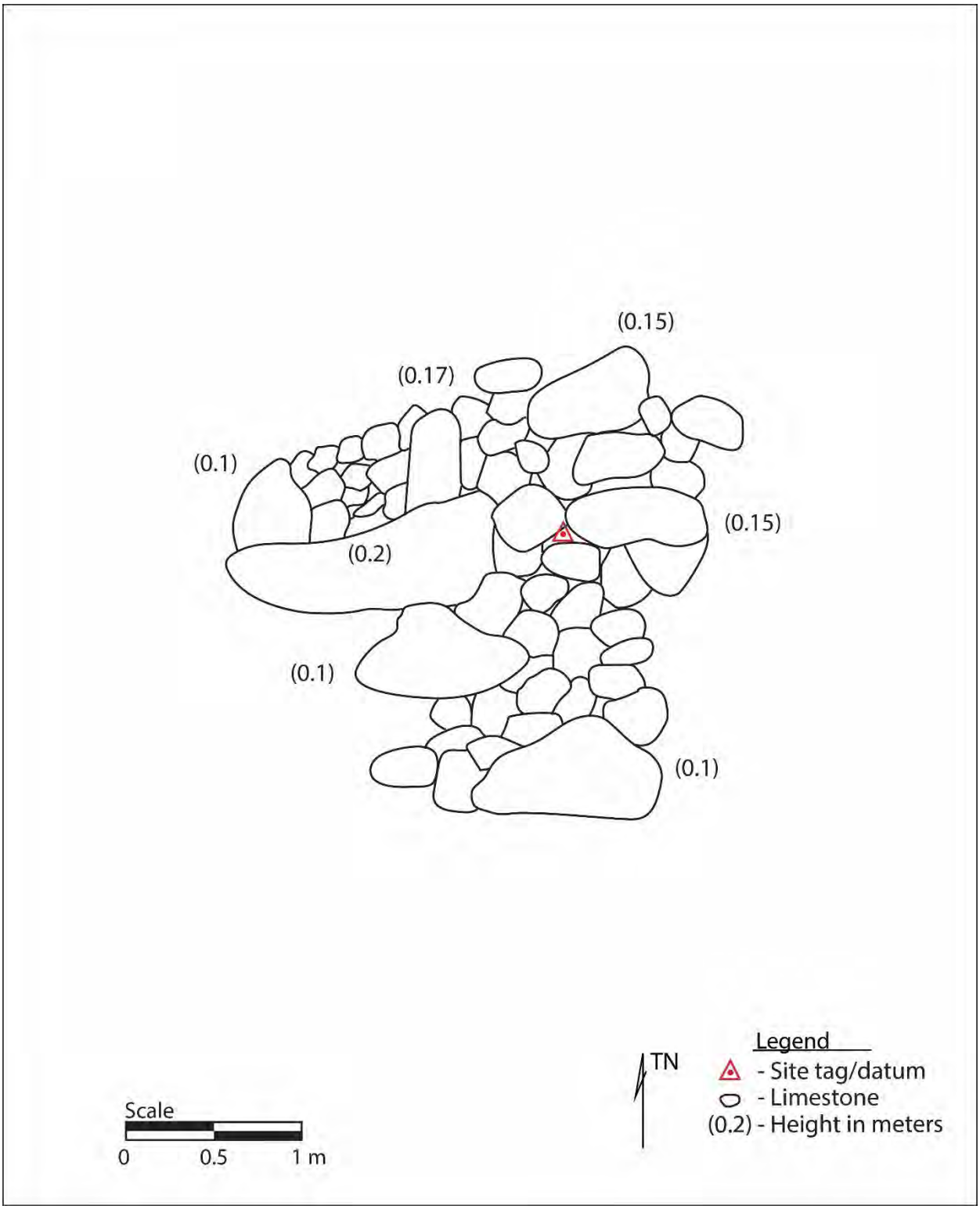

Figure 126. Plan-view map of SIHP 50-80-12-05100, Feature 14 mound.

Feature 15 is a limestone mound 2 m southwest of Feature 14 (Figure 127 and Figure 128). The mound is composed of piled limestone cobbles bordered by small limestone boulders along its west side. The mound measures 1.5 m (N/S) × 0.75 m (E/W), with a maximum height of 0.3 m. Feature 15 is in fair condition and was likely an agricultural mound.

Figure 127. SIHP 50-80-12-05100, Feature 15 mound (view to east).

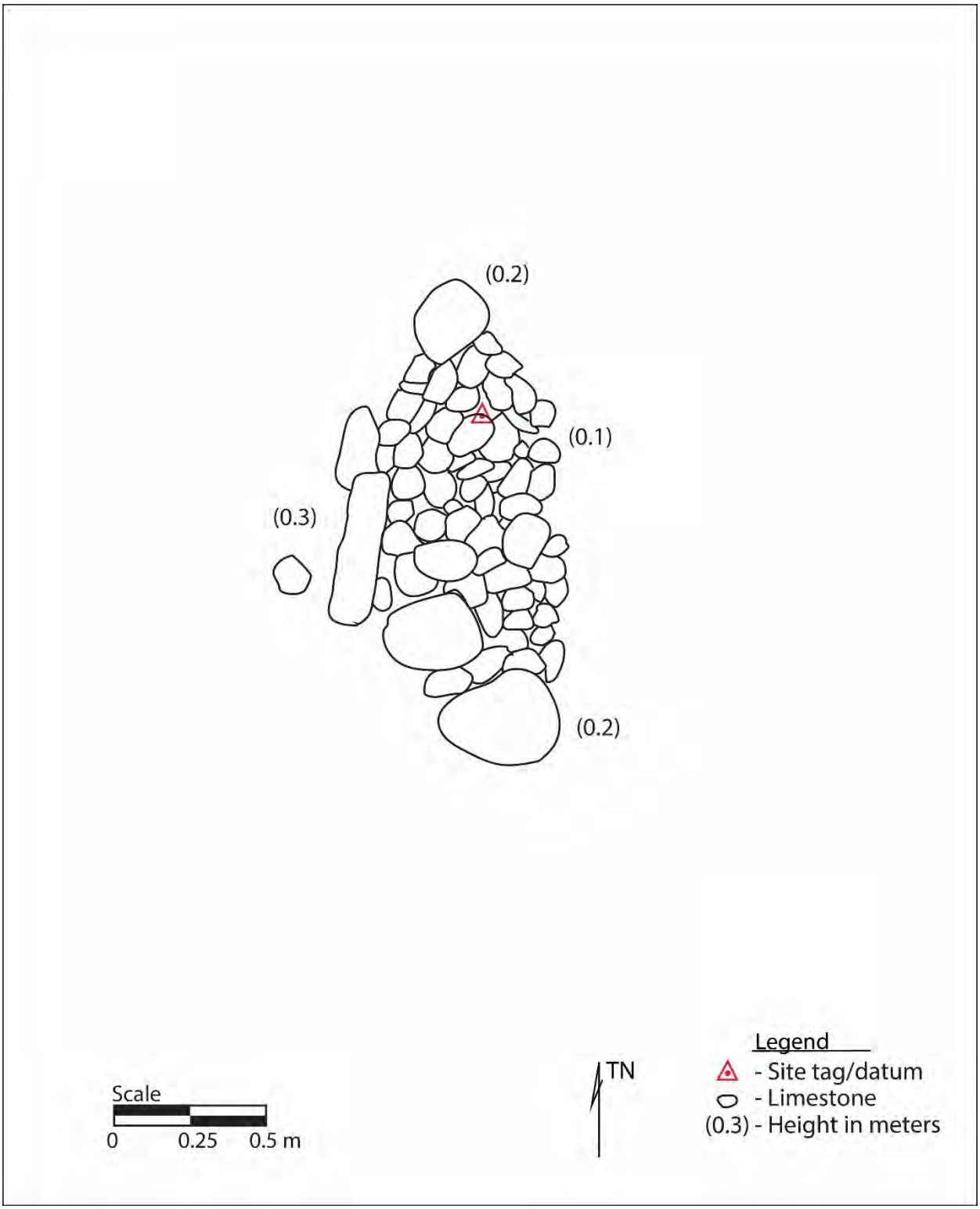

Figure 128. Plan-view map of SIHP 50-80-12-05100, Feature 15 mound.

Feature 16 is a linear limestone mound 3.2 m southeast of the Feature 8 mound (Figure 129 and Figure 130). The mound is composed of piled cobbles and small boulders measuring 2 m (N/S) × 1.25 m (E/W) and a maximum of 0.2 m high. Feature 15 is in fair condition and was likely an agricultural mound.

Figure 129. SIHP 50-80-12-05100, Feature 16 mound (view to northeast).

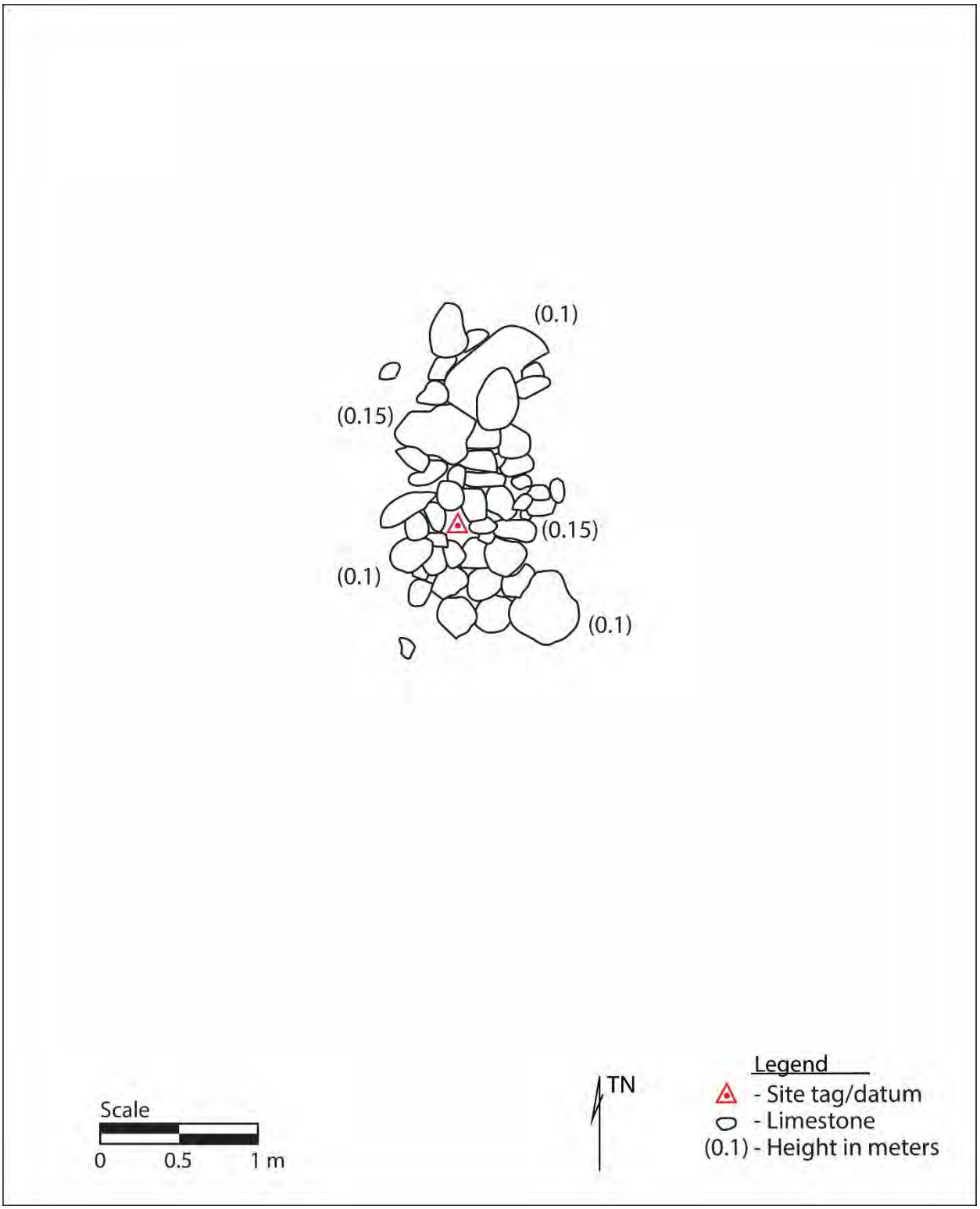

Figure 130. Plan-view map of SIHP 50-80-12-05100, Feature 16 mound.

Feature 17 is a C-shaped wall and adjacent limestone mound that together form a remnant, roughly circular enclosure (Figure 131 and Figure 132). The feature is 2.5 m northeast of a larger habitation enclosure, Feature 12. The enclosure comprises a rough wall of piled cobbles and small boulders that encloses a soil floor measuring 1.75 m (NW/SE) × 2 m (NE/SW). The enclosure wall ranges between 0.5 and 1 m wide by a maximum of 0.4 m high. The enclosure exterior is 3.7 m (NW/SE) × 3 m (NE/SW) and contains openings 0.75 m and 1 m wide in the southwest and northeast sides, respectively. Feature 17 is likely a habitation structure and is in fair to poor condition.

Figure 131. SIHP 50-80-12-05100, Feature 17 C-shaped wall (view to north).

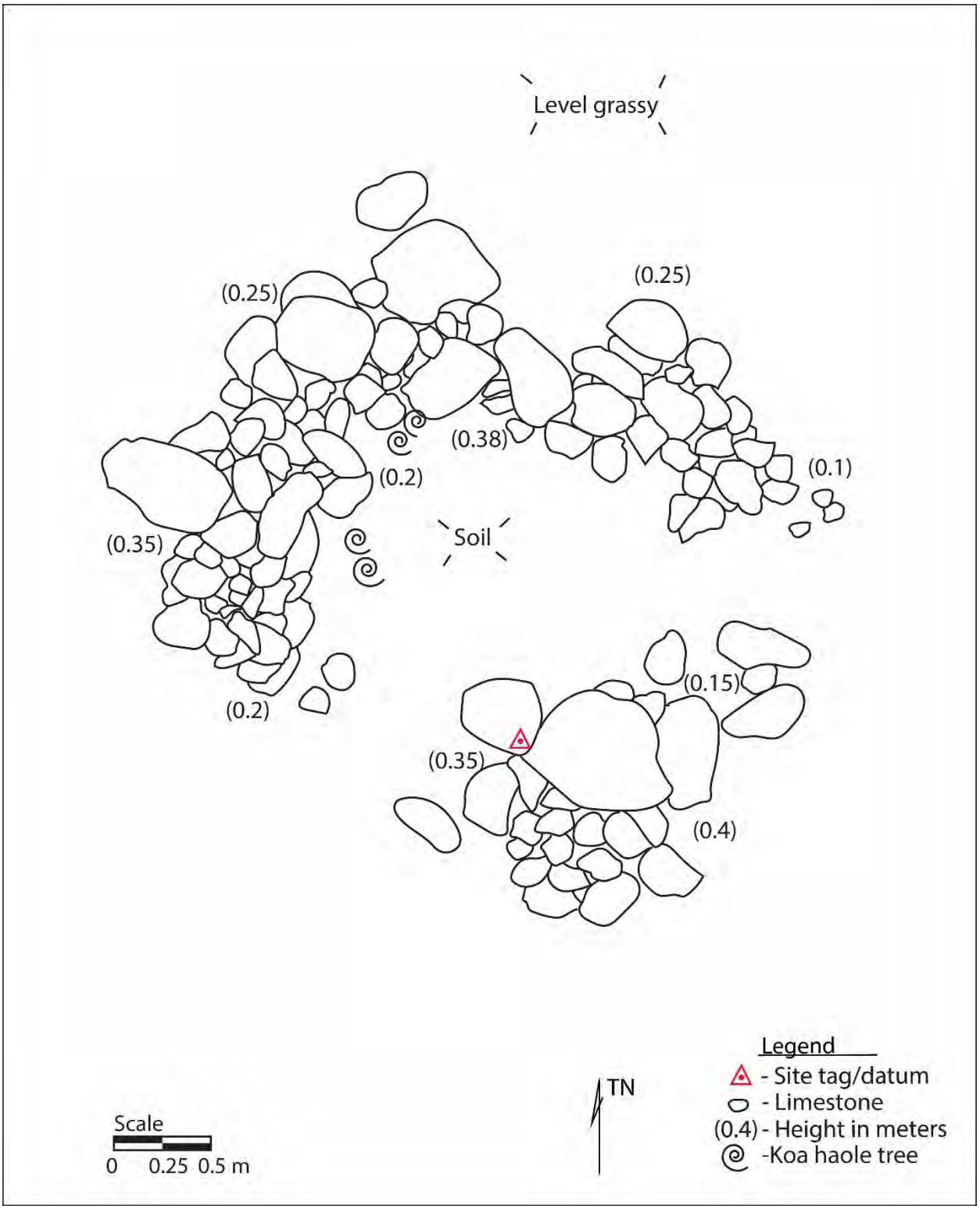

Figure 132. Plan-view map of SIHP 50-80-12-05100, Feature 17 C-shaped wall and mound.

Feature 18 is an L-shaped wall situated in a more isolated location from the main site cluster, 27 m northeast of Feature 17 (Figure 133 and Figure 134). The L-shaped wall is constructed of piled limestone cobbles and small boulders measuring a maximum of 1 m wide and 0.4 m high. The wall is 3.8 m (N/S) × 3.2 m (E/W) and retains a level soil floor. An ammunition cartridge likely from a 10 mm round was observed next to the highest point of the wall, suggesting it was used as an informal gun mount during military training in the area. It is unclear whether the structure was built by 20th-century military personnel or if they reused a traditional Hawaiian structure for military training. Feature 18 is in fair condition.

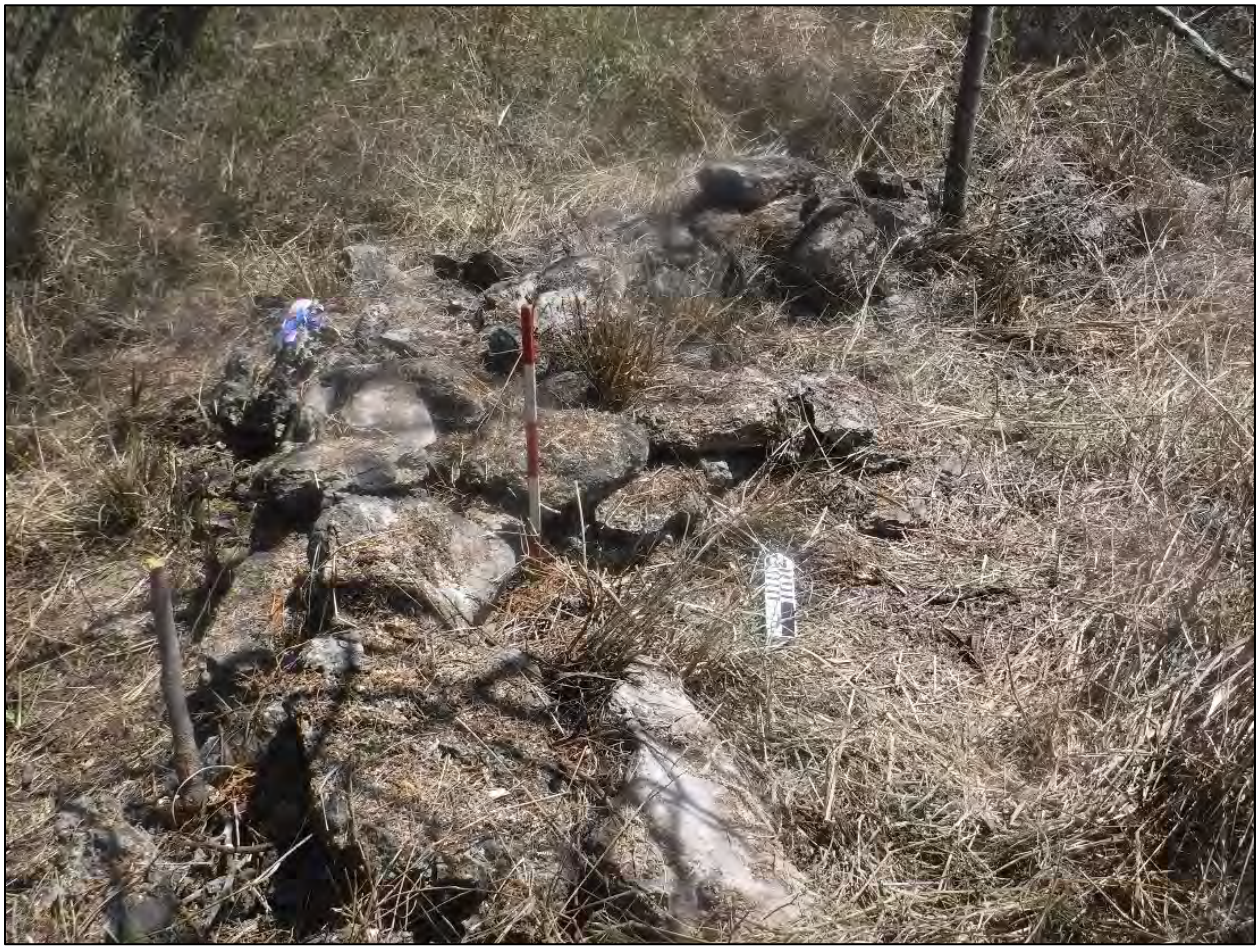

Figure 133. SIHP 50-80-12-05100, Feature 18 L-shaped wall (view to north).

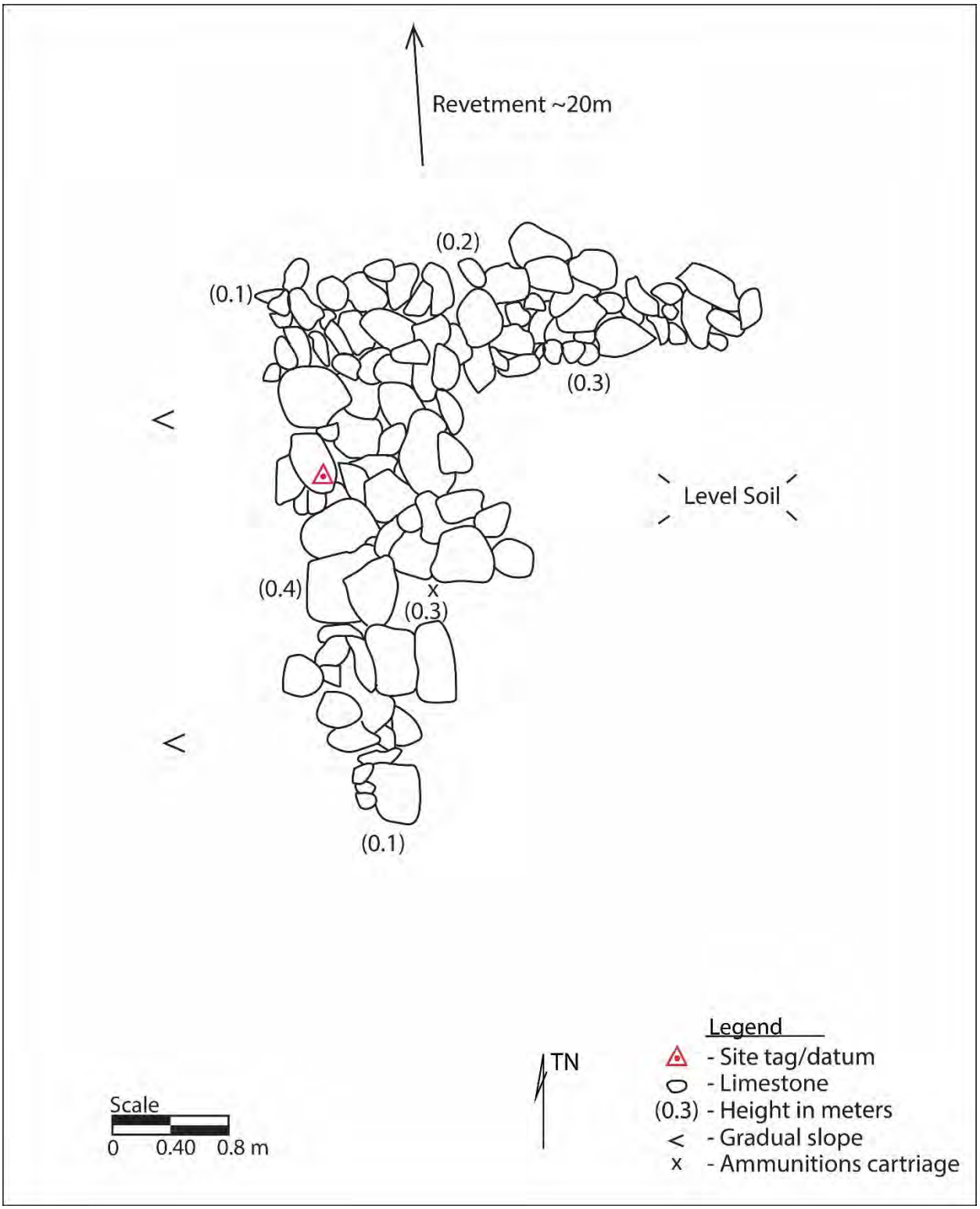

Figure 134. Plan-view map of SIHP 50-80-12-05100, Feature 18 L-shaped wall.

Feature 19 is a roughly rectangular limestone mound 12 m east of Feature 18 (Figure 135 and Figure 136). The mound is constructed of piled limestone cobbles and small boulders with tumbled stones on the north side. It measures 3.5 m (N/S) × 2.7 m (E/W). The surface of the mound is level and less than 0.2 m high. Feature 19 is in fair to poor condition and might represent a remnant habitation structure given its large size and flat surface.

Figure 135. SIHP 50-80-12-05100, Feature 19 rectangular mound (view to southwest).

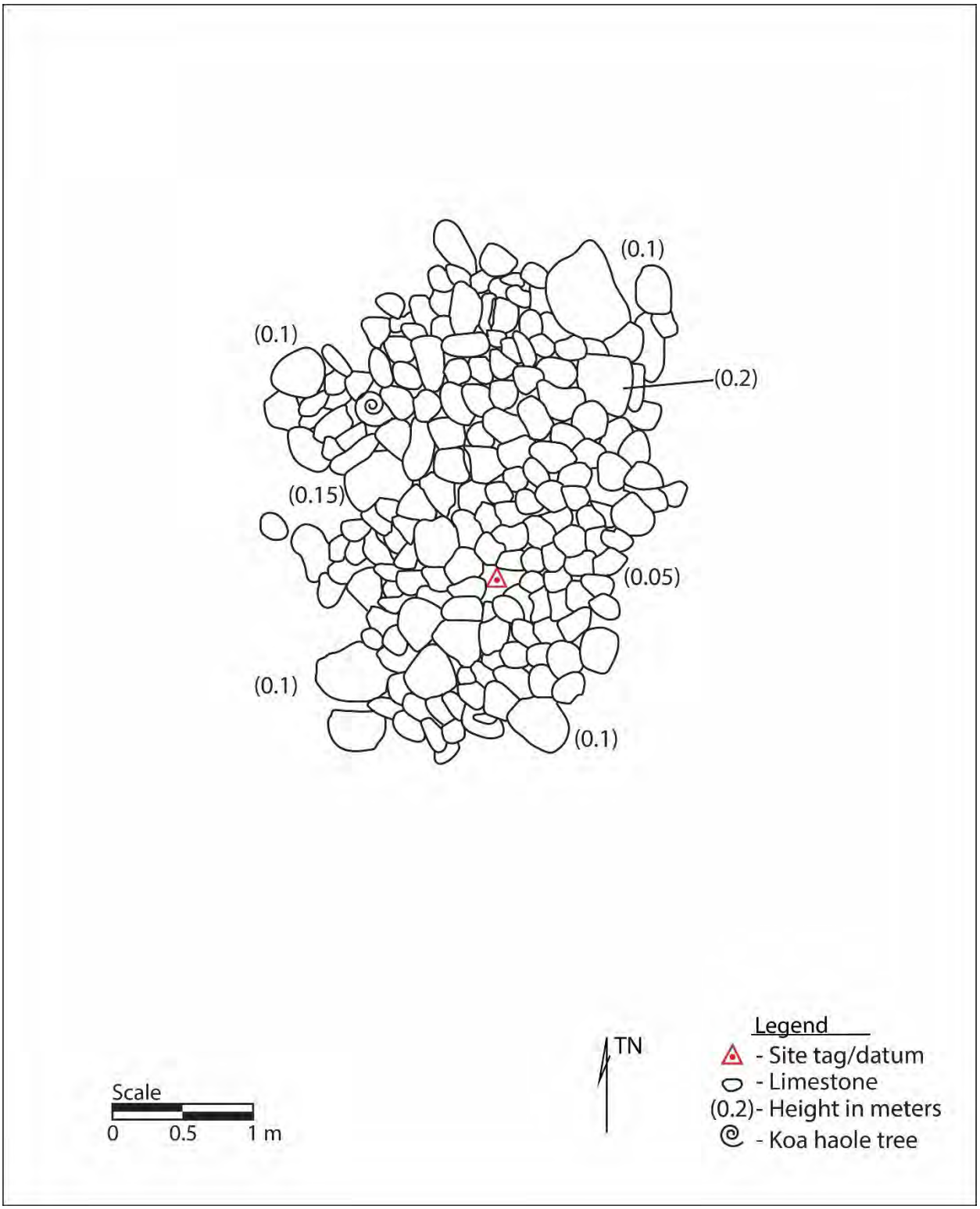

Figure 136. Plan-view map of SIHP 50-80-12-05100, Feature 19 rectangular mound.

Feature 20 is a rough wall section or bulldozer push, 26 m northeast of Feature 19 and 8 m north of Feature 23 (Figure 137 and Figure 138). The wall is constructed of roughly piled limestone cobbles and small and medium boulders, measuring 5.5 m long (NW/SE) × 0.5 to 1 m wide. Two limestone boulders placed on-end are at the center of the feature and might represent an original wall edge. The wall ranges between 0.2 and 0.5 m high. The function of Feature 20 is undetermined. It is in fair to poor condition.

Figure 137. SIHP 50-80-12-05100, Feature 20 wall section (view to northeast).

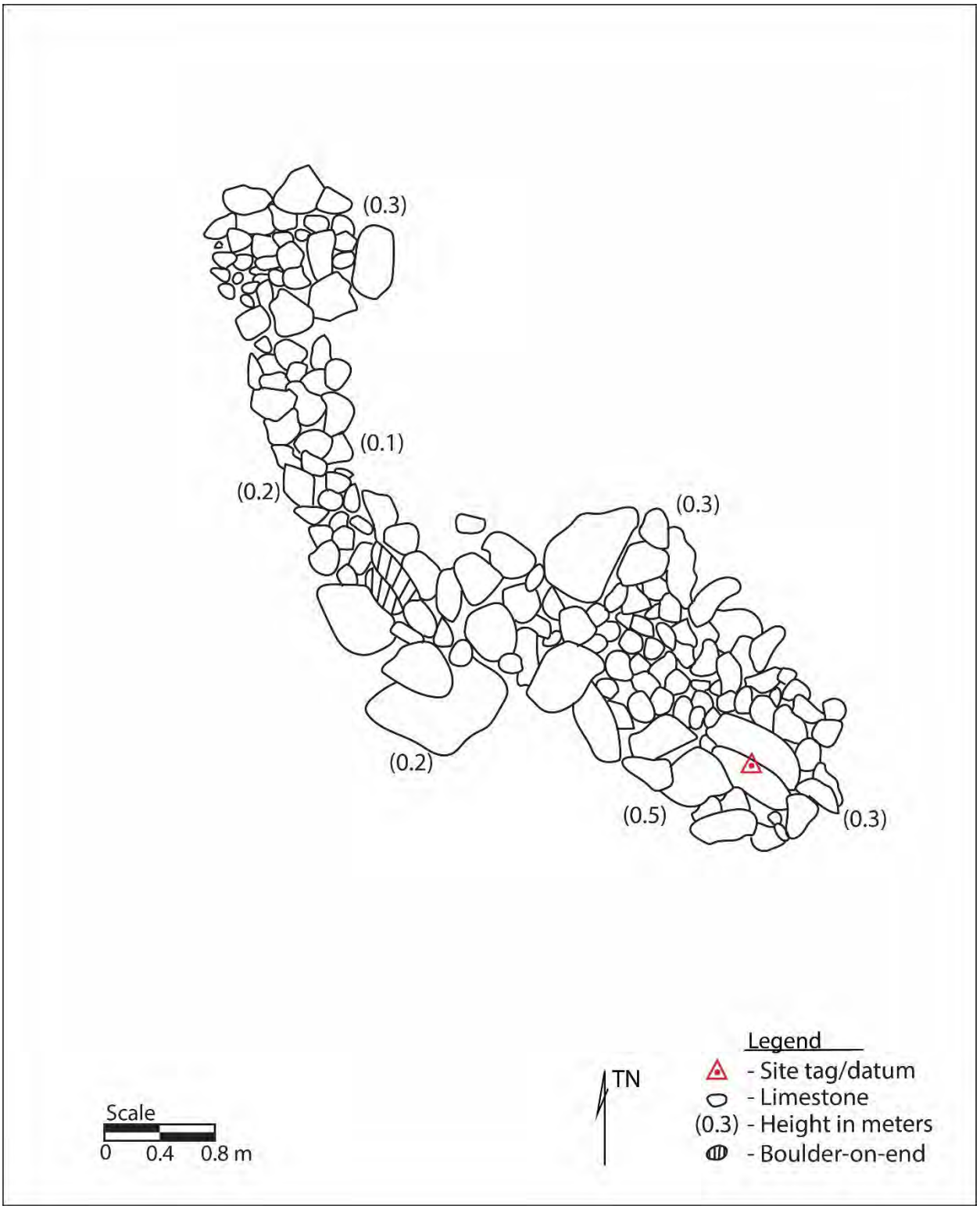

Figure 138. Plan-view map of SIHP 50-80-12-05100, Feature 20 wall.

Feature 21 (Figure 140 and Figure 139) is a limestone mound 8 m northeast of Feature 20. The mound is composed of piled limestone cobbles and a few small boulders, measuring 1.5 m (N/S) × 2 m (E/W) and 0.25 m high. The feature is in fair condition and likely functioned as an agricultural mound.

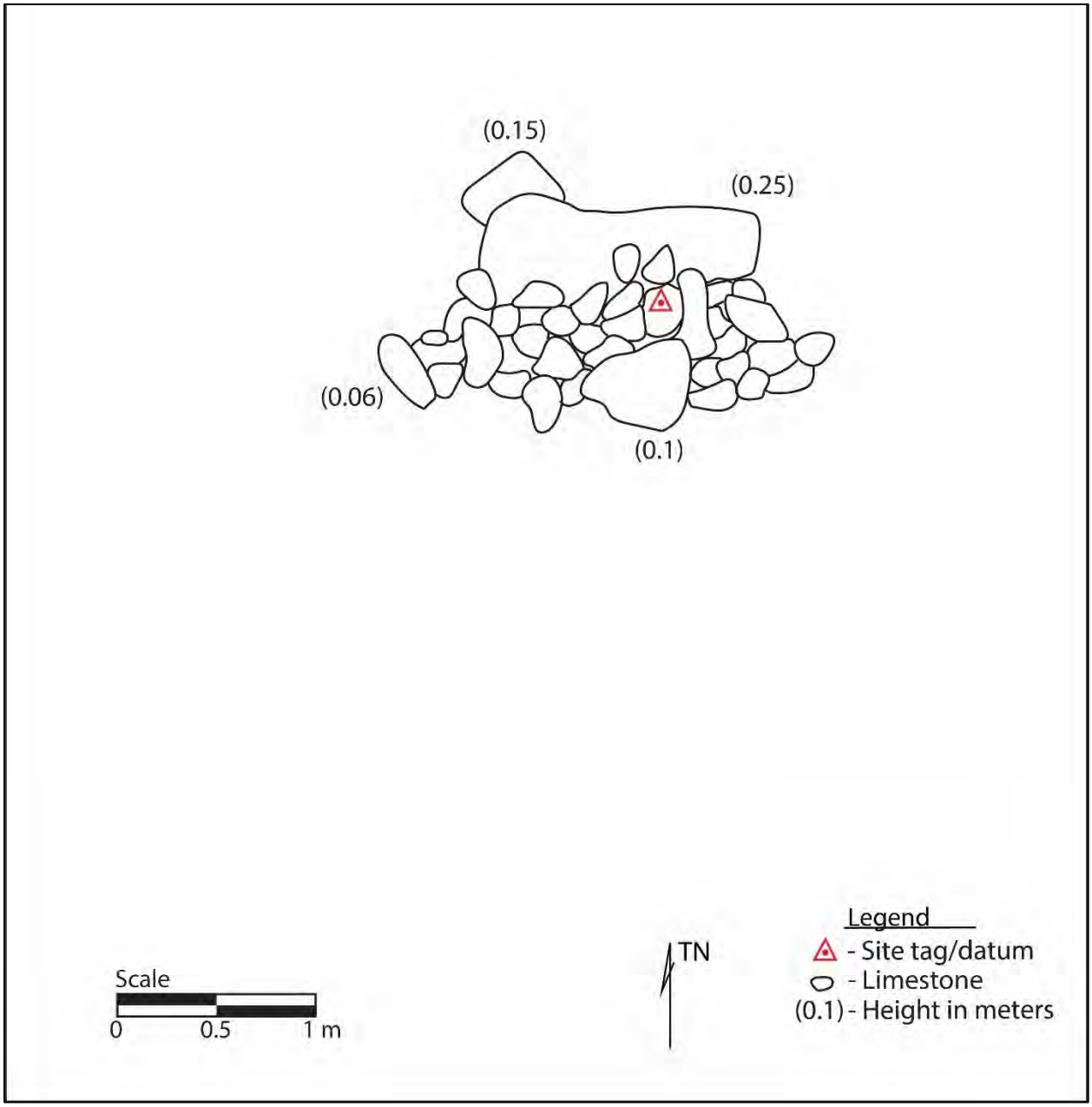

Figure 139. Plan-view map of SIHP 50-80-12-05100, Feature 21 mound.

Figure 140. SIHP 50-80-12-05100, Feature 21 mound (view to southeast).

Feature 22 (Figure 141 and Figure 142) is a rectangular limestone mound 6 m northeast of Feature 21. Feature 22 was previously documented by Beardsley (2001:IV.75) as Feature M and described as a "platform-like mound" that, based on testing results, functioned as a habitation structure. At the center of the mound is a rectangular sunken surface and 0.2 m deep depression marking the former test unit (EU-222) excavated by Beardsley (2001:IV.75).

EU-222 consisted of a 1 × 1 m unit excavated through four stratigraphic layers (Layers I–IV). A relatively varied cultural deposit was identified in the upper three layers, including the recovery of faunal bone (fish, bird, and rodent bone), marine shell (gastropods, bivalves, and echinoid), a basin-shaped charcoal feature, and artifacts, including a two-piece bone fishhook with a crescent point, volcanic glass flake, and modified bone. The cultural feature was bulk-collected and archived for future analysis (Beardsley 2001:IV.75).

The mound is constructed of piled limestone cobbles and small boulders with a roughly stacked edge on the western side. It measures 3.6 m in diameter and is 0.2 m high. Substantial stone tumble surrounds the feature, especially on the western side of the mound. The feature is in fair to poor condition. In agreement with Beardsley (2001), Feature 22 is interpreted as a habitation structure.

Figure 141. SIHP 50-80-12-05100, Feature 22 rectangular mound (view to north).

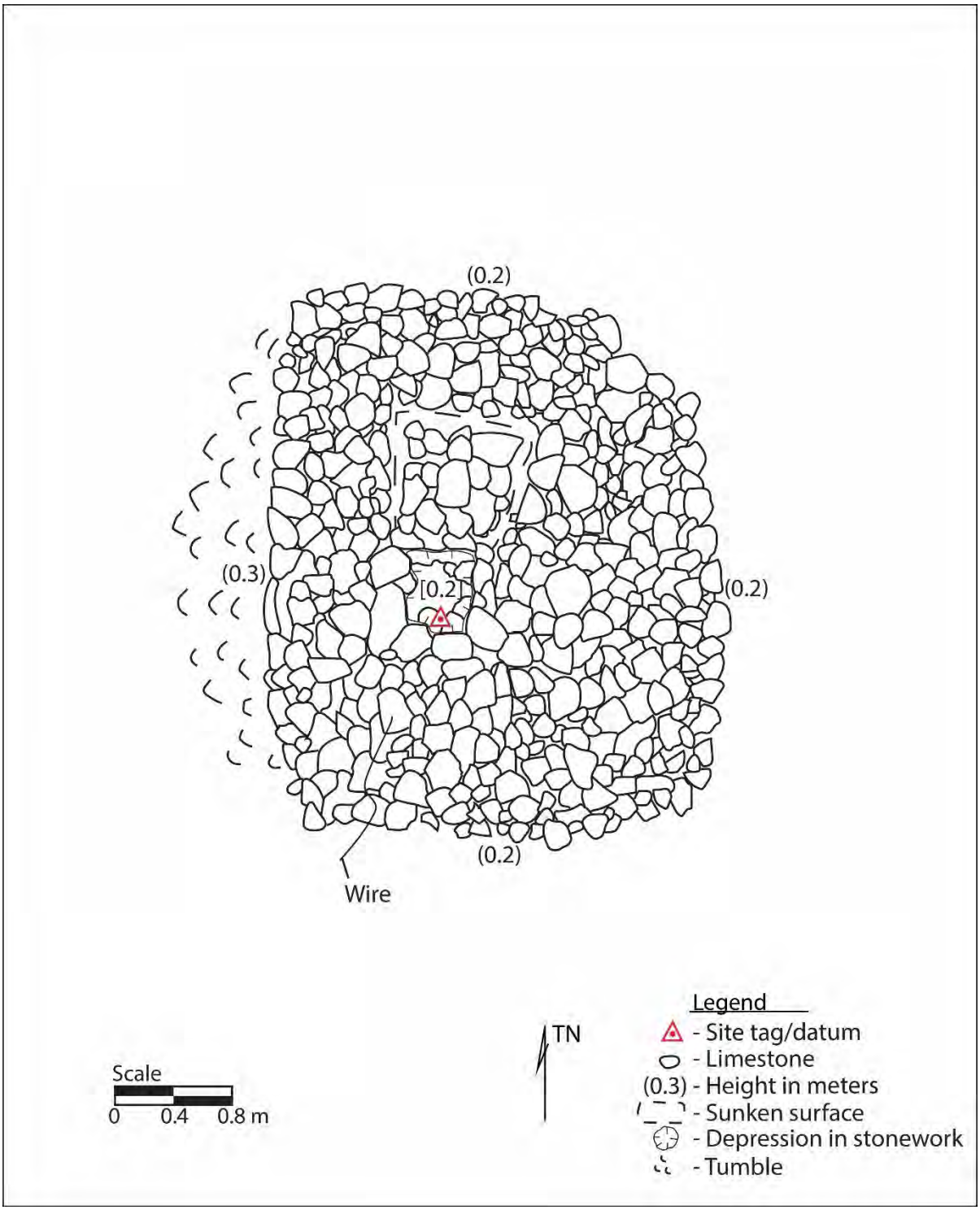

Figure 142. Plan-view map of SIHP 50-80-12-05100, Feature 22 rectangular mound.

Feature 23 (Figure 143) is a large unmodified limestone pit 8 m south of the Feature 20 wall. The limestone pit measures 2.5 m long × 1.8 m wide and 1 m deep to the soil surface within. The current floor has a 0.4 m deep soil deposit. A rusted metal container is inside. Feature 23 is in good condition.

Figure 143. SIHP 50-80-12-05100, Feature 23 unmodified limestone pit (view to east).

Feature 24 (Figure 144) is a wall remnant located near the project area boundary, 30 m east of Feature 22. The wall is composed of piled limestone cobbles and small and medium limestone boulders and measures 12 m long (NE/SW) × 1.5 m wide (NW/SE) at its widest point. The wall is 0.5 m high. Two *kiawe* tree trunks are aligned along the southeast side of the wall and a piece of metal sheeting was observed on the northwest side of the wall. Both elements suggest the feature was disturbed or created by previous land modifications. Feature 24 is in poor condition and its function is undetermined. No photograph was taken of the feature.

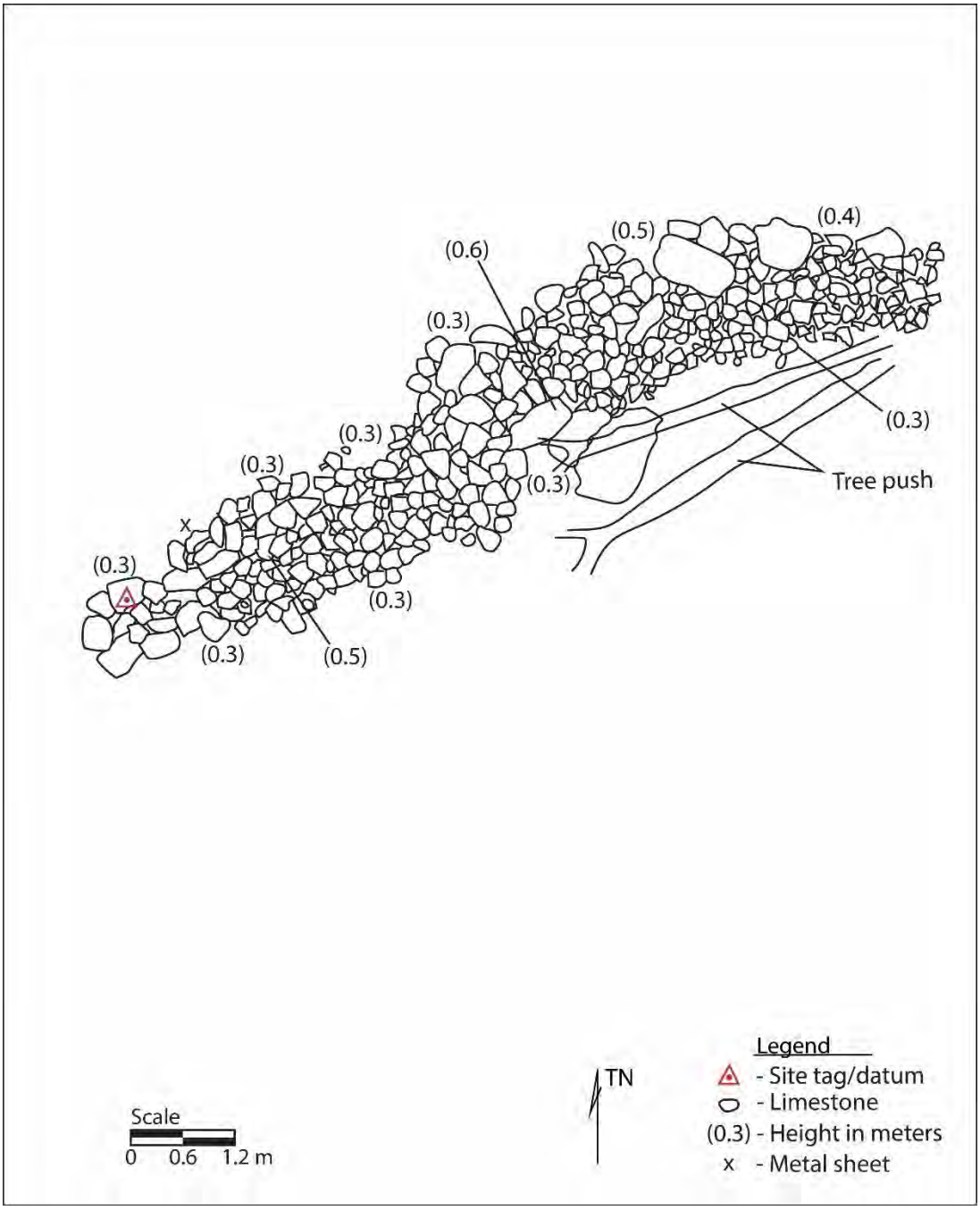

Figure 144. Plan-view map of SIHP 50-80-12-05100, Feature 24 wall.

SIHP No.: 50-80-12-05106
Site Type: Complex of limestone structures and unmodified limestone pit caves
No. of Features: 99
Dimensions: 365 m L × 185 m W
Condition: Poor to Good
Possible Age: Pre-Contact to Early Post-Contact
Possible Function: Habitation, agriculture, ceremonial
Significance: d, e
Recommended Treatment: Preservation; Data Recovery if impacted; No Further Work for documented U.S. military features and previously tested feature
Previous Investigations: Documented during archaeological surveys of Tuggle and Tomonari-Tuggle (1997) and Wickler and Tuggle (1997); re-evaluated and tested by Beardsley (2001)

SIHP 50-80-12-05106 is a complex of 99 features (designated Features 1 through 99), distributed within Parcel 40 (Figure 145 and Table 8). SIHP -5106 was previously identified during the Tuggle and Tomonari-Tuggle (1997) survey and subsequently documented by IARII (Wickler and Tuggle 1997) and PHRI (Beardsley 2001).

Wickler and Tuggle (1997:48, 49, 339, and 340) recorded SIHP -5106 as a U.S. military complex containing seven features (Features A though G) distributed within the Parcel 40 area (Figure 147). The features included two C-shaped enclosures (Features A and D), a large rectangular enclosure (Feature B), a stone-constructed channel (Feature C), and two barbed-wire fence alignments (Features F and G). A stacked rubble berm was noted on their plan map but not documented as a feature.

During Beardsley's (2001) investigation, SIHP -5106 was revised to include only surface features (stone-built structures) that consisted of previously and newly identified features. All limestone pit caves, regardless of spatial associations, were grouped with SIHP 50-80-12-05107, which was originally assigned by Tuggle and Tomonari-Tuggle (1997) to a cluster of pit caves in the northwest corner of Parcel 40. Two of the military features, originally designated Features A and D by Wickler and Tuggle (1997), were tested and re-evaluated by Beardsley (2001) as traditional Hawaiian habitation or agricultural in function. Feature A retained its designation while Feature D was reassigned as Feature L. Feature C, originally documented by Wickler and Tuggle (1997) as a military obstacle course, was reclassified by Beardsley (2001) as a historic homestead feature associated with SIHP 50-80-12-05105. The remaining military features of SIHP -5106, Feature B enclosure and Features F and G fencing, were not documented by Beardsley (2001) and their feature designations were reused for newly identified features (see correlation of previous site and feature designations in Table 8).

During the current investigation, archaeological features identified within most of Parcel 40 were grouped under the SIHP -5106 nomenclature and assigned sequential feature numbers. The site features consist of all U.S. military and traditional Hawaiian features, including limestone pit caves. The stone channel structure originally documented as a military obstacle course by Wickler and Tuggle (1997) (Feature C) was later combined with the nearby historic homestead (SIHP -5105) by Beardsley (2001). During the current study, the feature was regrouped with SIHP -5106 as a military training structure and was assigned Feature 28.

Given the absence of a feature distribution map, correlations between the current site inventory and those documented and tested by Beardsley could only be made using feature plan maps (if present) and descriptions provided in her 2001 report. Of the 99 features documented during the current survey, 16 features were correlated with the previous site inventory.

Of the 99 site features, 84 are interpreted as Native Hawaiian in origin (pre-Contact and early post-Contact) and include clusters of mounds; C-shaped, L-shaped, and linear walls; modified and unmodified limestone pit caves; and a large rectangular enclosure (Feature 34) originally documented as Feature B by Wickler and Tuggle (1997). These features likely functioned as short-term or recurrent-use habitation, agriculture, and for ceremonial activities. Although the Feature 34 enclosure was originally interpreted as a military training enclosure, consultation with cultural practitioner Shad Kane suggests it was originally traditional Hawaiian in origin and functioned as a *kahua* (an open place for sports) during the *makahiki*. The makahiki was an event that began around the middle of October and lasted about four months with sports and religious festivities and *kapu* on war.

The remaining 15 features are classified as U.S. military features associated with training activities and landscape modifications. The landscape modifications are evidenced by rough linear mounds or walls formed along the edges of bulldozed tracks or temporary roads. Some of the land modifications might also be associated with pre-military ranching or recent unauthorized road building (see Previous Archaeology section of this report).

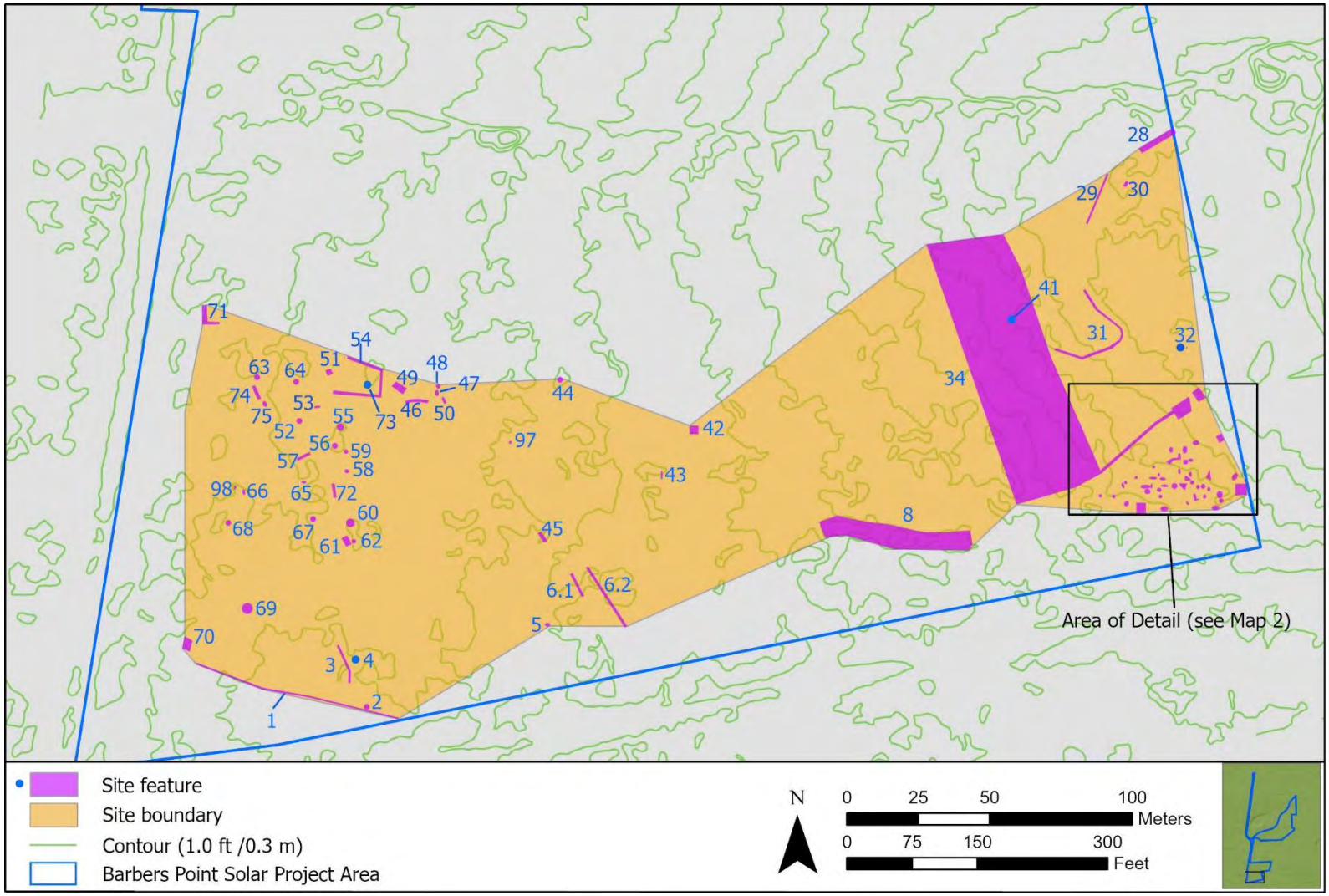

Figure 145. SIHP 50-80-12-05106, Map 1, location of features and inset showing area of detail of Map 2 (see following figure); overlaid on contours created from aerial LiDAR data, 2019.

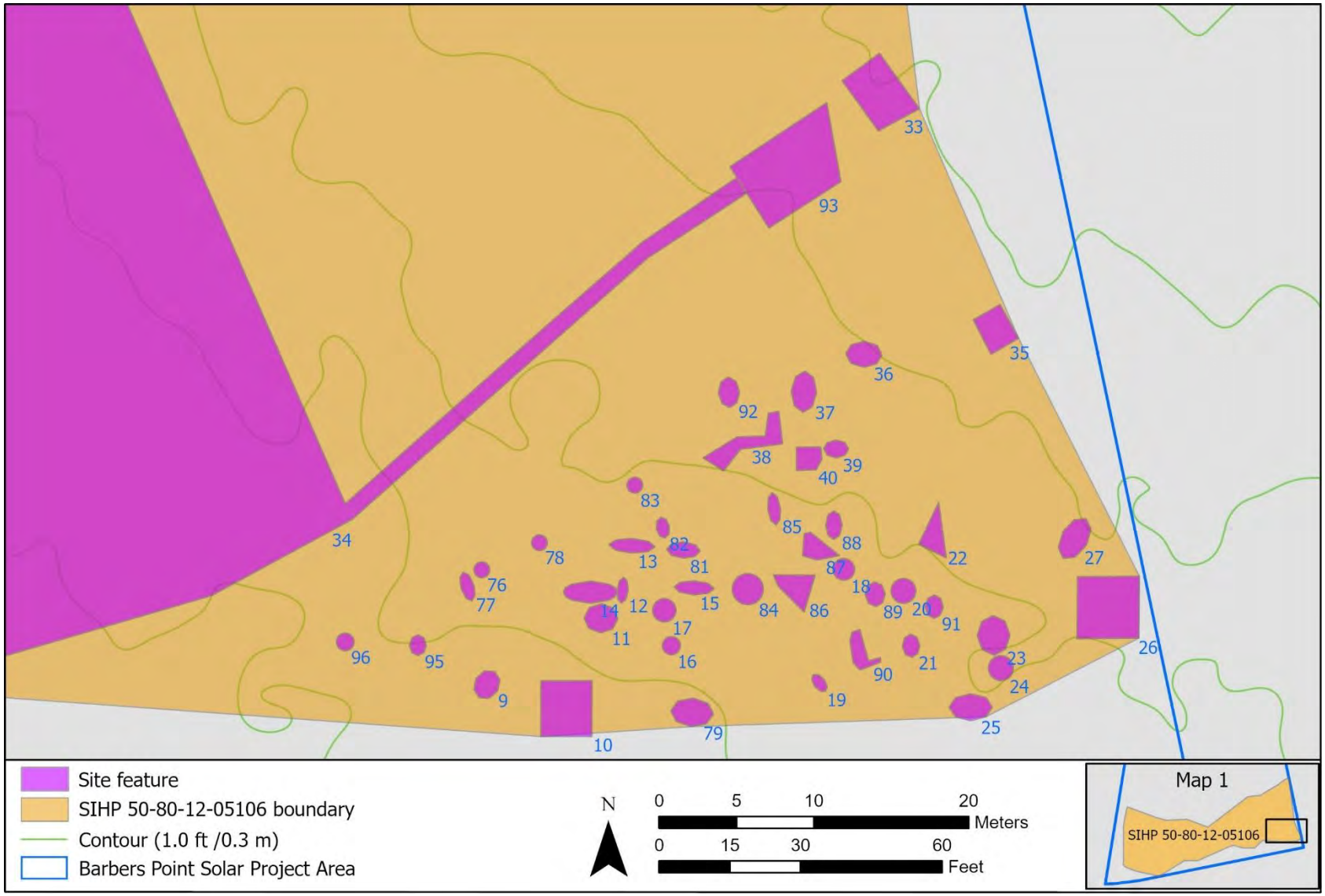

Figure 146. Map 2 showing location of features in southeast corner of SIHP 50-80-12-05106; overlaid on contours created from aerial LiDAR data, 2019.

Table 8. Summary of SIHP 50-80-12-05106, Features 1 through 99

Feature	Temporary Field No.	IARII/ PHRI Feature No.	Type	Possible Function
1	T-003	-	Barbed-wire fencing	Military
2	T-004	-	Limestone pit (modified)	Agriculture
3	T-005	-	Wall	Military land modification
4	T-006	-	Wall	Military land modification
5	T-008	-	Mound	Agriculture (possible)
6	T-009	-	Wall (A)	Military land modification
7	T-009	-	Wall (B)	Military land modification
8	T-015	-	Berm	Military training
9	T-017	-	Mound	Agriculture
10	T-018	D/L	Enclosure	Temporary Habitation
11	T-019	-	Mound	Agriculture
12	T-020	-	Mound	Agriculture
13	T-021	-	Mound	Agriculture
14	T-022	-	Mound	Agriculture
15	T-023	-	Wall	Agriculture
16	T-024	-	Mound	Agriculture
17	T-025	-	Mound	Agriculture
18	T-026	-	Wall	Agriculture
19	T-027	-	Mound	Agriculture
20	T-028	-	Mound	Agriculture
21	T-029	-	Mound	Agriculture
22	T-030	22	L-shaped Wall	Agriculture
23	T-031	-	Mound	Agriculture
24	T-032	-	Mound	Agriculture
25	T-033	-	Mound	Agriculture
26	T-034	-	Enclosure	Temporary Habitation
27	T-035	-	Mound	Agriculture
28	T-037	C (5105)	Stone-constructed channel	Military obstacle course
29	T-039	-	Wall remnant	Military land modification
30	T-041	-	Mound	Military land modification
31	T-044	-	Wall	Military training
32	T-045	-	Enclosure; ammo box	Military training
33	T-046	-	C-shaped wall	Ceremonial
34	T-047	B/Q	Rectangular enclosure	Ceremonial
35	T-048	-	Mound	Agriculture
36	T-049	/M	Mound	Agriculture
37	T-050	/G	Mound	Agriculture
38	T-051	/F	Enclosure	Temporary Habitation
39	T-052	/Y (5107)	Mound	Agriculture

Feature	Temporary Field No.	IARII/ PHRI Feature No.	Type	Possible Function
40	T-053	-	Mound	Agriculture
41	T-059	-	Limestone pit	Undetermined
42	T-066	-	C-shaped wall	Temporary Habitation
43	T-067	-	Wall	Military training
44	T-070	-	Limestone pit	Undetermined
45	T-071	/P	Mound	Military land modification
46	T-073	-	Wall remnant	Agriculture
47	T-074	-	Mound	Agriculture
48	T-075	-	Mound	Agriculture
49	T-076	-	Enclosure	Temporary Habitation
50	T-077	-	Mound	Agriculture
51	T-081	/AA	Limestone pit (modified)	Agriculture
52	T-082	-	Limestone pit (modified)	Agriculture
53	T-083	-	Mound	Boundary
54	T-084	-	Enclosure	Agriculture
55	T-085	/L (5107)	Limestone pit (modified)	Agriculture
56	T-086	-	Limestone pit	Undetermined
57	T-087	-	Wall	Agriculture
58	T-088	I (5107)	Limestone pit (modified)	Agriculture
59	T-089	X (5107)	Limestone pit	Undetermined
60	T-090	-	Limestone pit (modified)	Undetermined
61	T-091	A	C-shaped wall	Temporary Habitation
62	T-092	B/W (5107)	Limestone pit	Undetermined
63	T-096	-	Limestone pit (modified)	Agriculture
64	T-097	-	Mound	Agriculture
65	T-098	-	Limestone pit (modified)	Agriculture
66	T-099	-	Mound	Agriculture
67	T-100	-	Mound	Agriculture
68	T-101	-	Limestone pit	Undetermined
69	T-102	/Z (5107)	Limestone pit (modified)	Agriculture
70	T-103	-	Enclosure (remnant)	Temporary Habitation
71	T-107	-	Wall	Military land modification
72	T-493	B-2	Wall	Agriculture
73	T-494	-	Boulder on-end	Undetermined
74	T-495	-	Wall	Agriculture
75	T-496	-	Mound	Agriculture
76	T-497	-	Mound	Agriculture
77	T-498	-	Mound	Agriculture
78	T-499	-	Mound	Agriculture
79	T-500	-	Mound	Agriculture

Feature	Temporary Field No.	IARII/ PHRI Feature No.	Type	Possible Function
80	T-501	-	Mound	Agriculture
81	T-502	-	Mound	Agriculture
82	T-503	-	Mound	Agriculture
83	T-504	-	Mound	Agriculture
84	T-505	-	Mound	Agriculture
85	T-506	-	Mound	Agriculture
86	T-507	-	Mound	Agriculture
87	T-508	-	Mound	Agriculture
88	T-509	-	Mound	Agriculture
89	T-510	-	Mound	Agriculture
90	T-511	-	L-shaped Wall	Temporary Habitation
91	T-512	-	Mound	Agriculture
92	T-513	-	Mound	Agriculture
93	T-514	-	Platform-enclosure	Ceremonial
94	T-515	-	Mound	Agriculture
95	T-516	-	Mound	Agriculture
96	T-517	-	Mound	Agriculture
97	T-522	-	Limestone pit	Undetermined
98	T-492	-	Mound	Agriculture
99	T-105	-	Wall	Military land modification

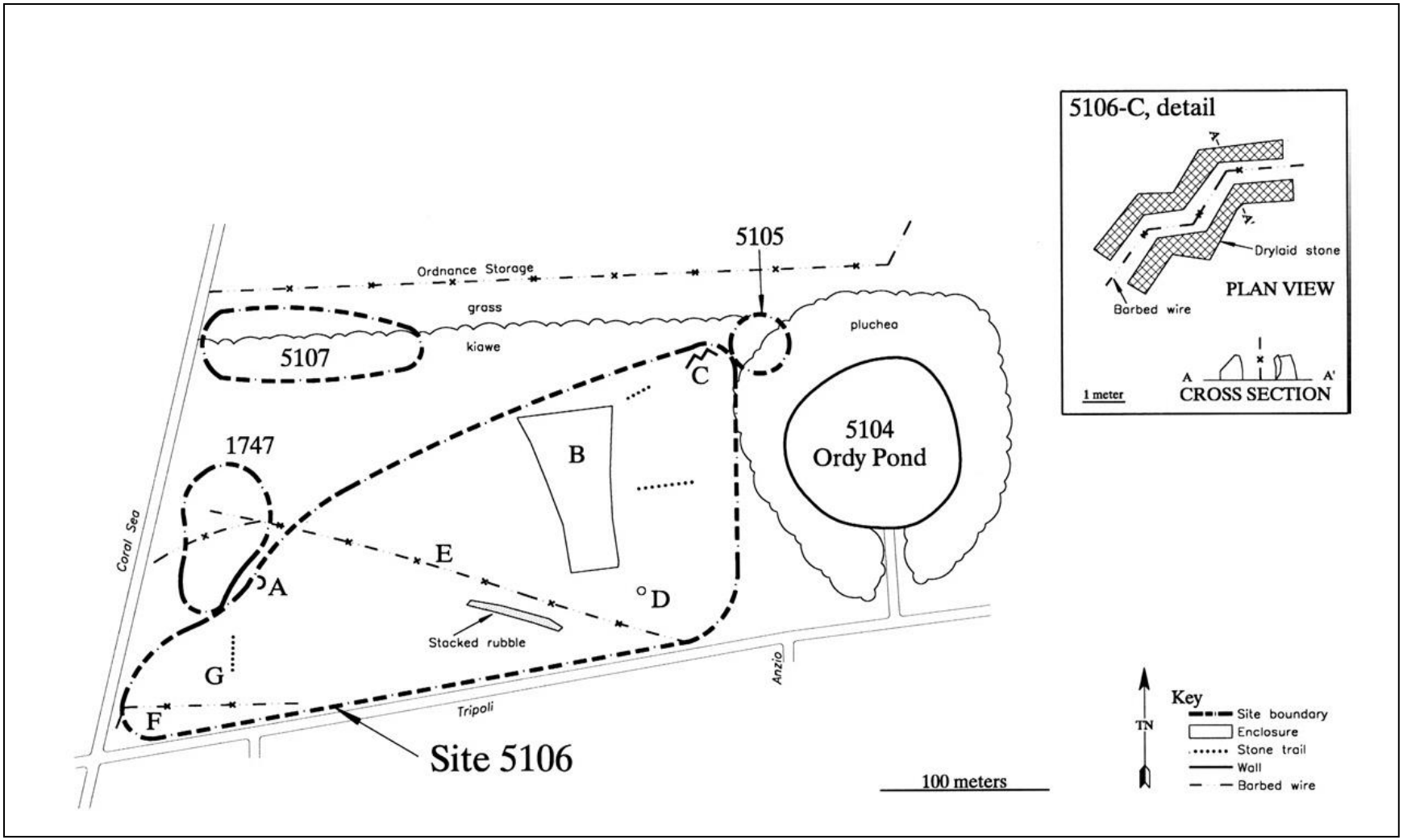

Figure 147. Plan-view map of SIHP 50-80-12-05106, Features A through G, and surrounding site complexes (from Wickler and Tuggle 1997:49; Figure 12).

Feature 1 (Figure 148) consists of two remnant alignments of barbed-wire fencing located in the western half of Parcel 40. The site was previously identified by Tuggle and Tomonari-Tuggle (1997) as Site 50-80-12-05106, Features G and E.

Extensive land modifications are visible in the site area and have adversely impacted the site by flattening and bisecting the fence features. Both fence alignments are aligned northwest-southeast and spaced approximately 90 m apart. The southern alignment measures approximately 73 m long and is in poor condition based on its horizontal position on the ground surface. The northern alignment measures approximately 280 m long (NW/SE) and is also in poor condition based on its horizontal position on the ground surface.

According to Tuggle and Tomonari-Tuggle (1997), Feature 1 was associated with U.S. military use of the parcel. The current investigation concurs with this functional interpretation and identified the fence wire as the type commonly used by the U.S. military that was rolled out from large spools during installation.

Figure 148. SIHP 50-80-12-05106, Feature 1 barbed-wire fence (view to east).

Feature 2 (Figure 149 and Figure 150) consists of a modified limestone pit located in the southwestern corner of Parcel 40, approximately 20 m north of Tripoli Road. Feature 1 is aligned on the south side of Feature 2. The modified limestone pit measures 1 m (N/S) × 0.9 m (E/W) and 0.9 m deep. Modification consists of a single layer of medium and large limestone cobbles and small limestone boulders placed on the western side of the pit opening. The stone layer measures roughly 1 m in diameter and 0.1 m high. Medium and large boulders appear to have been mechanically pushed to the southern edge of the limestone pit. The limestone pit has a level soil floor. The structural modification of the site appears to be in fair condition because it is not well formed. Feature 2 was likely a pre-Contact to early post-Contact agricultural feature.

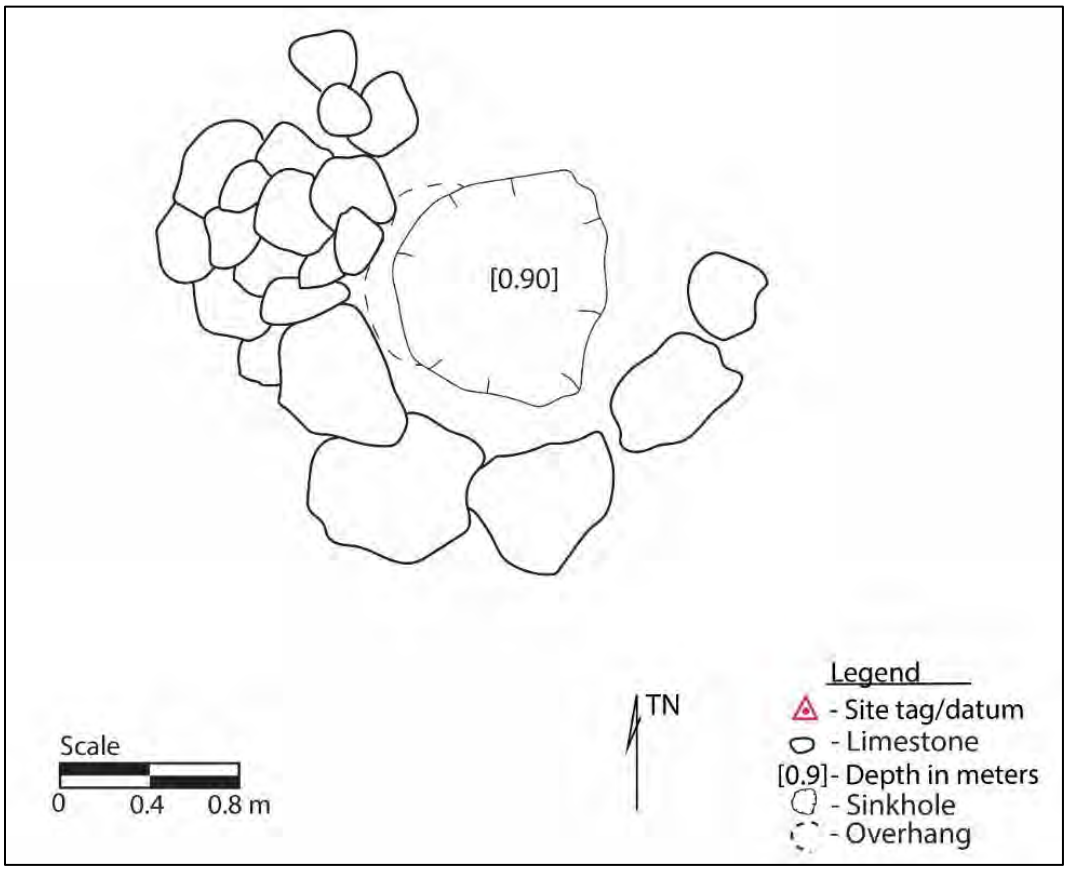

Figure 149. Plan-view map of SIHP 50-80-12-05106, Feature 2 modified pit.

Figure 150. SIHP 50-80-12-05106, Feature 2 modified pit (view to south).

Feature 3 (Figure 152 and Figure 151) is a remnant slightly curved wall in the southwest portion of Parcel 40, approximately 30 m north of Tripoli Road. The wall measures 18 m (N/S) with an approximate height of 0.5 m and a varying width of 0.8 to 1.2 m (E/W). The site is in fair condition. The wall is mainly composed of small to large cobbles, and small and medium boulders. The north and south ends of the wall are both disturbed. Feature 3 likely reflects military development of the surrounding training area and creation of roads through the parcel.

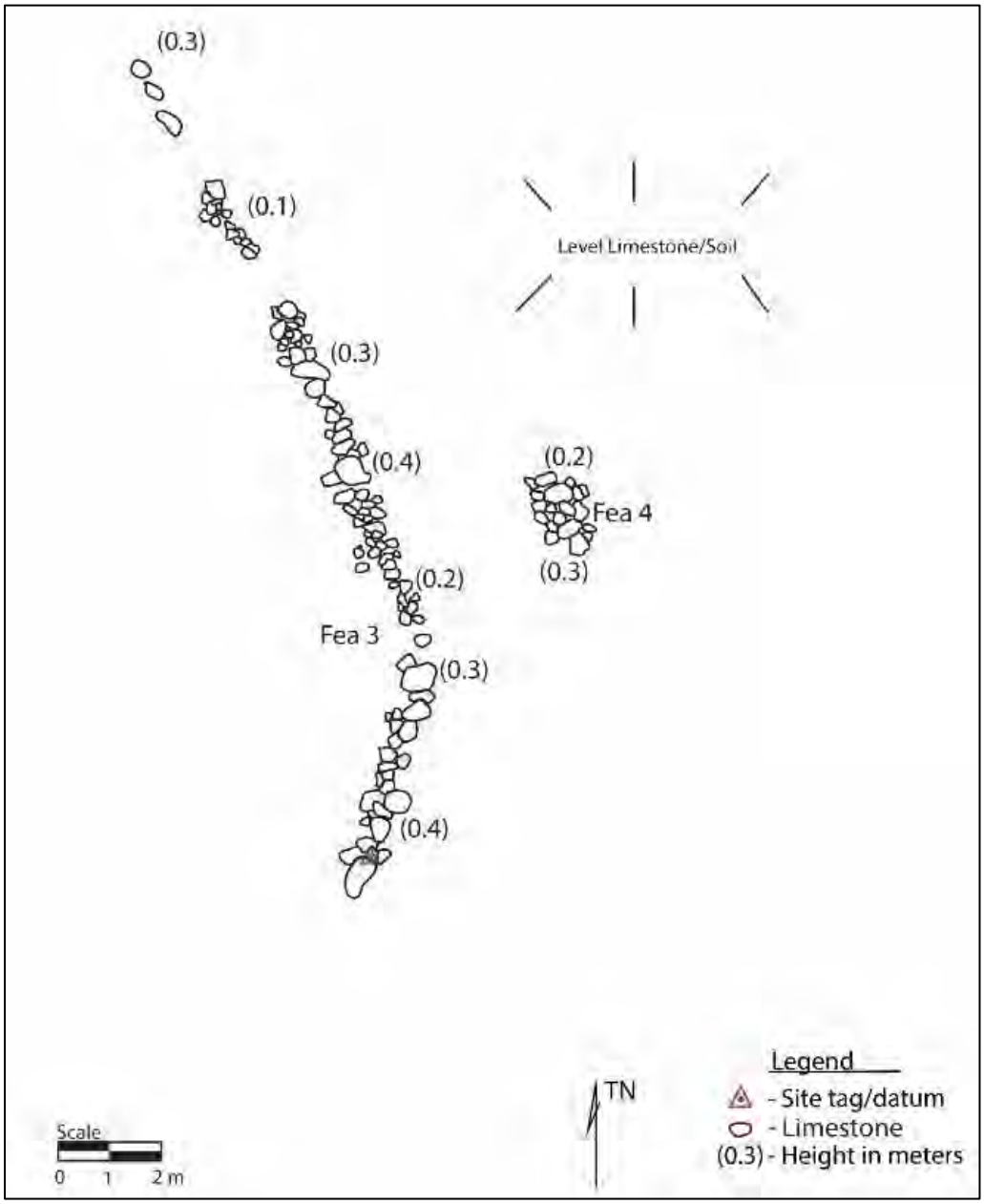

Figure 151. Plan-view map of SIHP 50-80-12-05106, Feature 3 wall and Feature 4 mound.

Figure 152. SIHP 50-80-12-05106, Feature 3 wall (view to south).

Feature 4 (see Figure 151 and Figure 153) is a stone mound composed of cobbles and small boulders, 2.0 m east of Feature 3. The mound is 1.3 m (SW/NE) × 1.8 m (NE/SW) and 0.5 m high. Feature 4 is in fair condition and is interpreted (in combination with Feature 3) as the edge of a post-Contact military road.

Figure 153. SIHP 50-80-12-05106, Feature 4 mound (view to southwest).

Feature 5 (Figure 154 and Figure 155) is a mound that is adjacent to a pile of limestone uplifted in exposed tree roots. It measures 1.2 m (N/S) × 1.6 m (E/W) and is a maximum 0.3 m high. It is composed of piled subangular limestone cobbles and small boulders. The site is in fair condition. Feature 5 might have functioned as a pre-Contact or early post-Contact agricultural feature. However, the adjacent stone pile formed from uplifted tree roots suggests an amorphous mound such as Feature 5 could also be a natural formation in this fragile limestone landform.

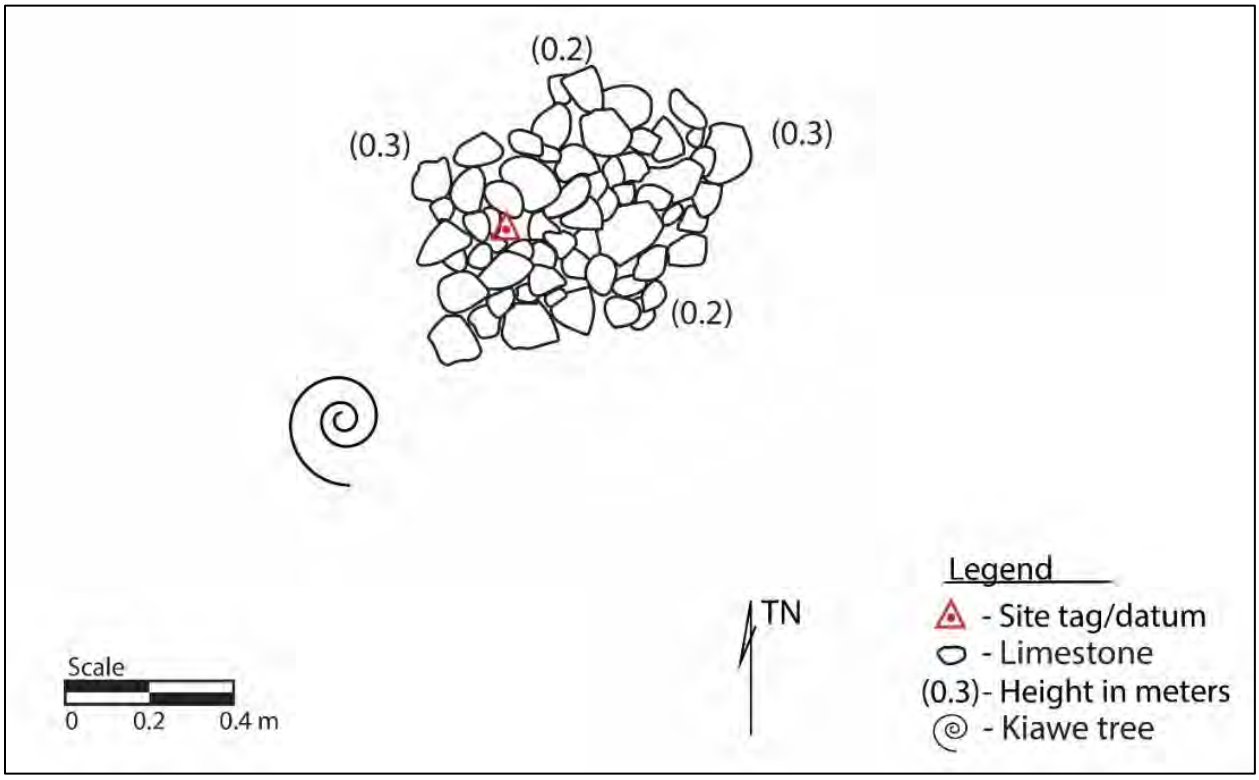

Figure 154. Plan-view map of SIHP 50-80-12-05106, Feature 5 mound.

Figure 155. SIHP 50-80-12-05106, Feature 5 overview of mound (view southwest).

Features 6 and 7 (Figure 156 through Figure 158) are parallel walls aligned northwest-southeast beginning approximately 40 m north of Tripoli Road. The southwest wall is 3.5 m (NW/SW) × 1.2 m (SW/NE) and has a maximum height of 0.3 m. The northeast wall is 26.0 m (NW/SW) × 1.5 m (SW/NE) and has a maximum height of 0.5 m high. The walls are spaced roughly 5 m apart. The site is in fair condition. The two walls are likely remnants of a former historic road cut extending northwest through the parcel.

Figure 156. SIHP 50-80-12-05106, Feature 6 wall (view to northwest).

Figure 157. SIHP 50-80-12-05106, Feature 7 wall (view to southeast).

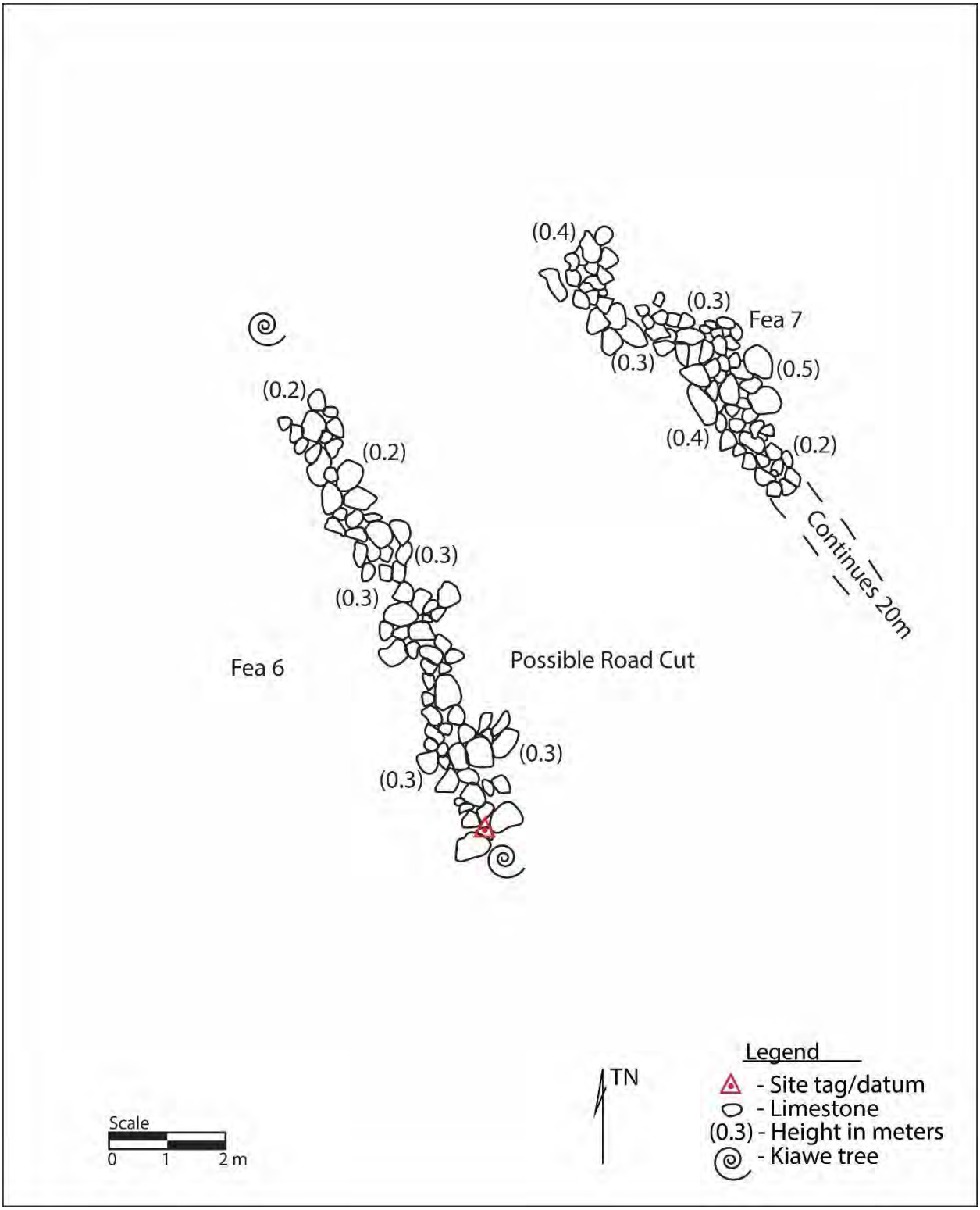

Figure 158. Plan-view map of SIHP 50-80-12-05106, Features 6 and 7 walls.

Feature 8 (Figure 159 and Figure 160) is a limestone and soil berm located in the southeastern portion of Parcel 40 approximately 30 m north of Tripoli Road. The berm measures 54.0 m (E/W) × 7.0 m wide. The site is partially disturbed by tree roots and is in fair condition. Feature 8 was constructed by the U.S. military as part of their training area.

Figure 159. SIHP 50-80-12-05106, Feature 8 berm (view to southwest).

Figure 160. Plan-view map of SIHP 50-80-12-05106, Feature 8 berm.

Feature 9 (Figure 161 and Figure 162) is a limestone mound located in the southeast portion of Parcel 40, 30 m north of Tripoli Road. The mound measures 1.8 m (N/S) × 1.5 m (E/W) and is has a maximum height of 0.2 m. It is constructed primarily of limestone cobbles and small boulders piled one to two courses high. The mound is in good condition and likely functioned as an agricultural mound during the pre-Contact or early post-Contact era.

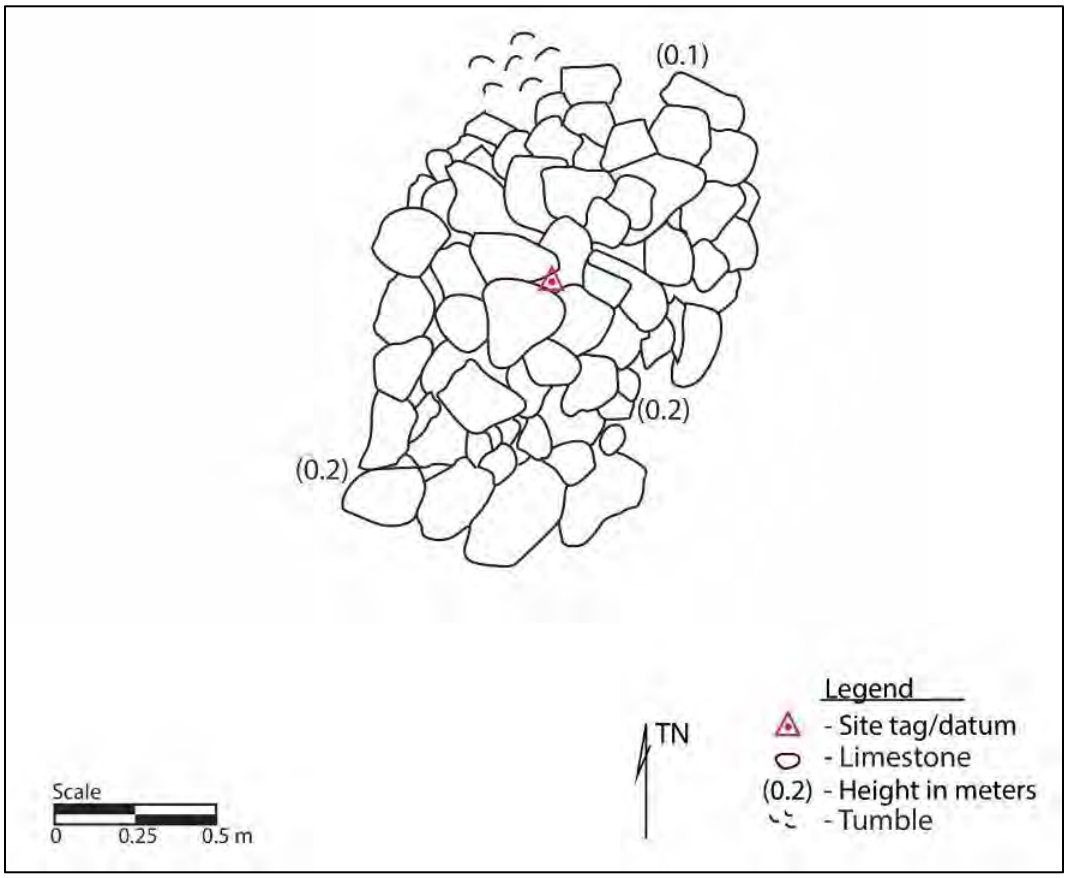

Figure 161. Plan-view map of SIHP 50-80-12-05106, Feature 9 mound.

Figure 162. SIHP 50-80-12-05106, Feature 9 mound (view to northwest).

Feature 10 (Figure 163 through Figure 165) is a small, roughly square enclosure located in the southeast corner of Parcel 40. Feature 10 is surrounded on the west, north, and east by a concentration of agricultural features. The feature was previously recorded by Beardsley (2001) as Feature L and a 1.0 × 1.0 m test unit was excavated inside the enclosure. No archaeological material was recovered from the excavation. The enclosure is 3.6 m (N/S) × 3.3 m (E/W) with a maximum height of 0.72 m and a maximum width of 0.7 m. The walls are constructed of limestone boulder slabs, with a stacking of 3 to 4 courses on the north, east, and south sides of the enclosure. The internal wall is lined with limestone boulder slabs placed on-end. No entrance was visible. The west end of the enclosure has fallen and is surrounded by tumble. Beardsley (2001) classified Feature 10 as an agricultural enclosure. Feature 10 is in fair to good condition. During the current investigation, this feature was classified as a temporary habitation feature.

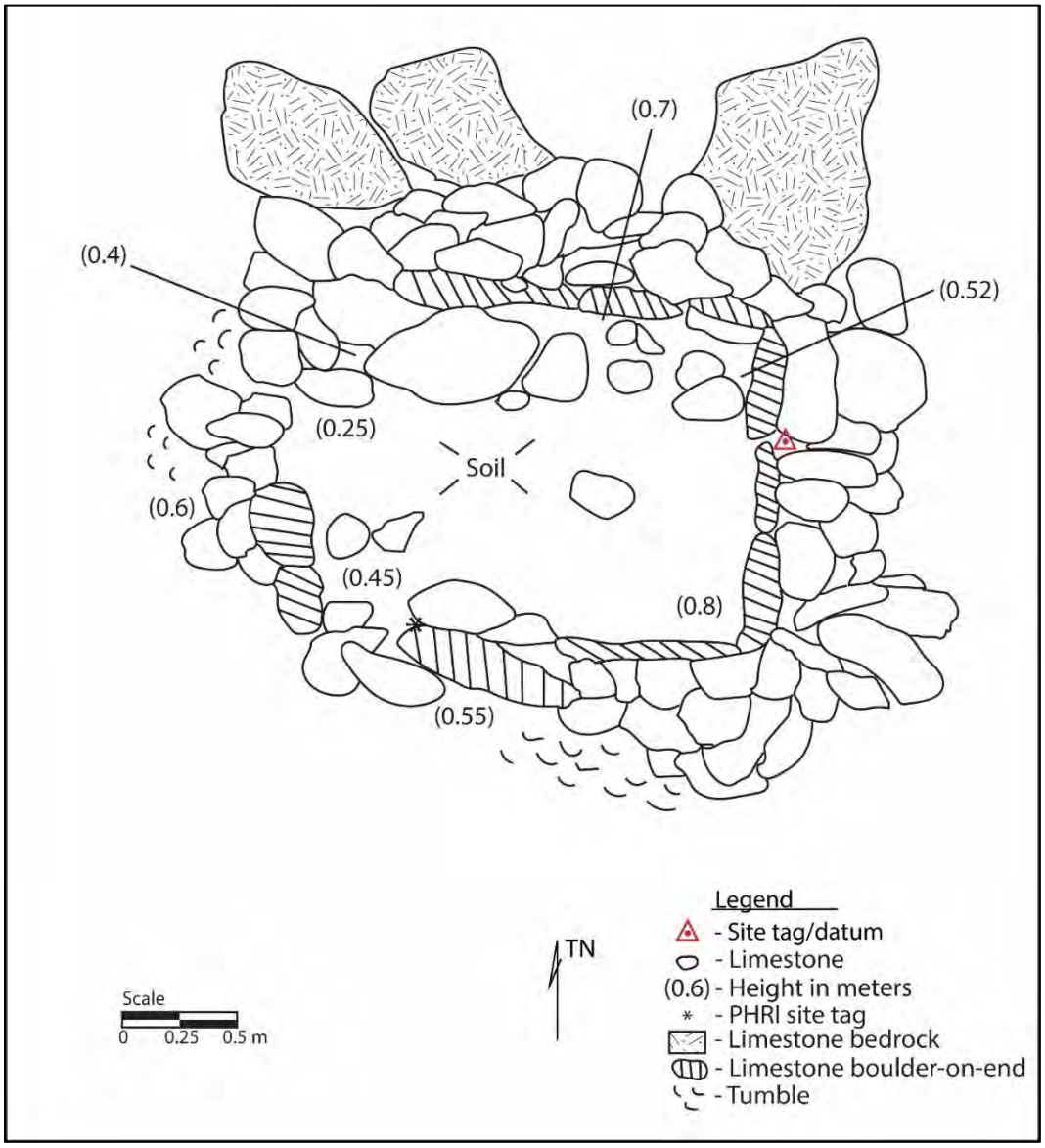

Figure 163. Plan-view map of SIHP 50-80-12-05106, Feature 10 enclosure.

Figure 164. SIHP 50-80-12-05106, Feature 10 overview of enclosure (view to southeast).

Figure 165. SIHP 50-80-12-05106, Feature 10 inner view of enclosure (view to east).

Feature 11 (Figure 166 and Figure 167) is a small oval-shaped mound located in the southeast corner of Parcel 40. The mound is 2.25 m (E/W) × 2.0 m (N/S) with a maximum height of 0.45 m. The feature is constructed of piled small and medium cobbles and boulders, with no obvious stacking or facing. Site T-019 is likely an agricultural mound used during the pre-Contact or early post-Contact era. The site is in fair condition.

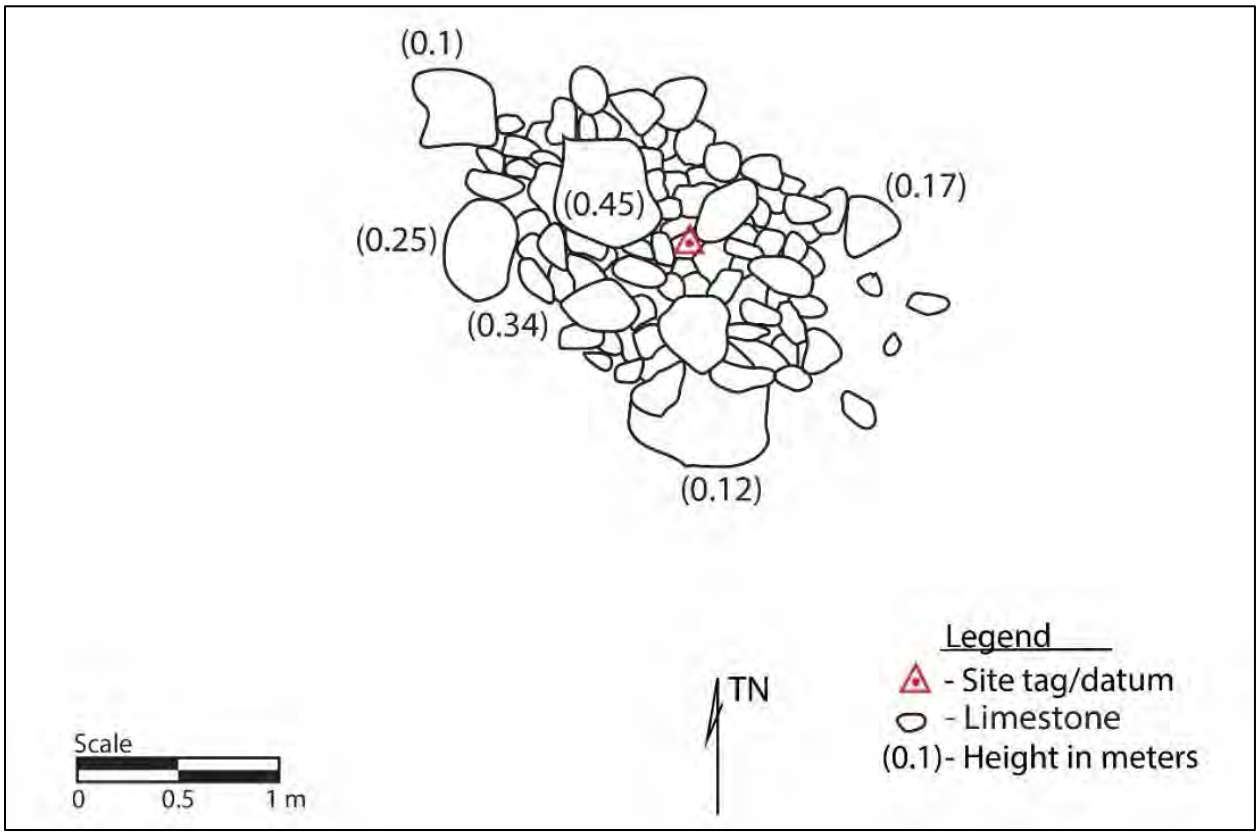

Figure 166. Plan-view map of SIHP 50-80-12-05106, Feature 11 mound.

Figure 167. SIHP 50-80-12-05106, Feature 11 overview of mound (view to west).

Feature 12 (Figure 168 and Figure 169) is a small mound located in the southeast corner of Parcel 40, just 35 m north of Tripoli Road. The mound is mainly made from two large stone slabs, covered in small, medium, and large rounded limestone cobbles. It is roughly 1.5 m (N/S) × 1 m (E/W) with a maximum height of 0.3 m. Feature 12 is likely an agricultural mound. It is in fair condition.

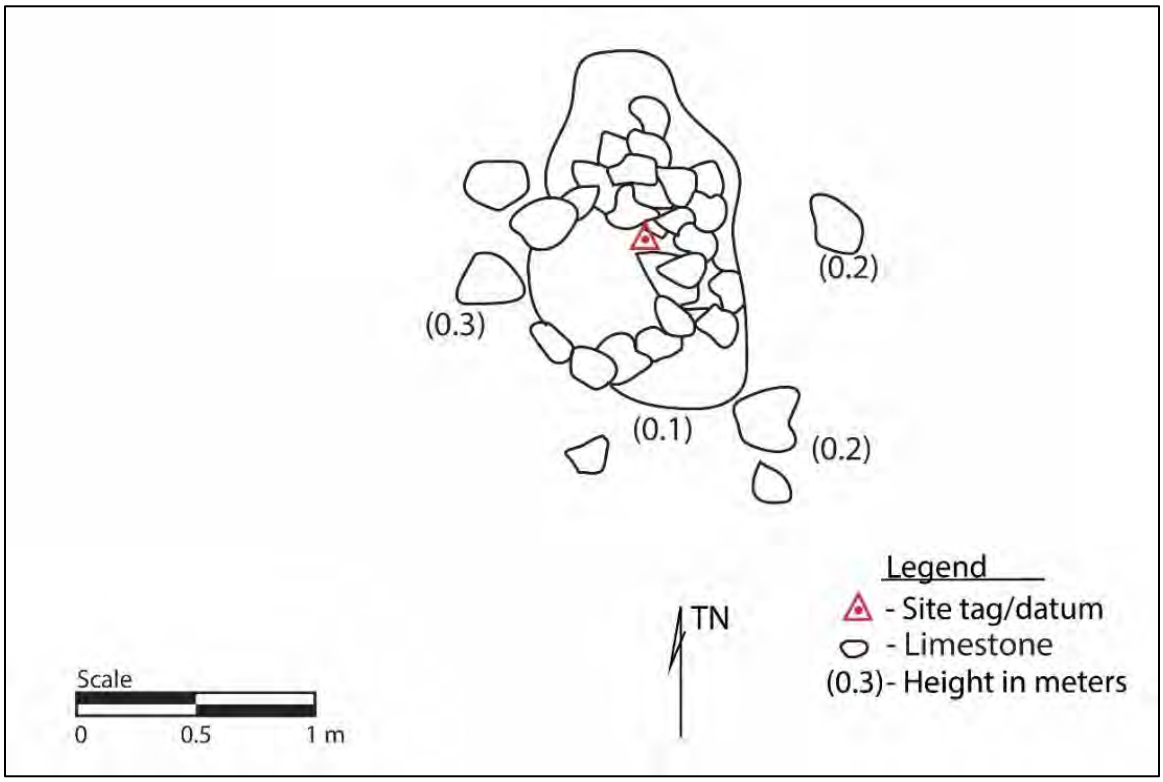

Figure 168. Plan-view map of SIHP 50-80-12-05106, Feature 12 mound.

Figure 169. SIHP 50-80-12-05106, Feature 12 mound (view to north).

Feature 13 (Figure 170 and Figure 171) is a relatively low-lying linear mound. It is one of several limestone features clustered in this area. Feature 13 is a small, linear mound roughly 1.5 m (N/S) × 3 m (E/W) with a maximum height of 0.3 m. The feature is constructed of 3–4 small- and medium-sized limestone boulders and small, medium, and large piled limestone cobbles. Feature 13 is interpreted as an agricultural mound in fair condition.

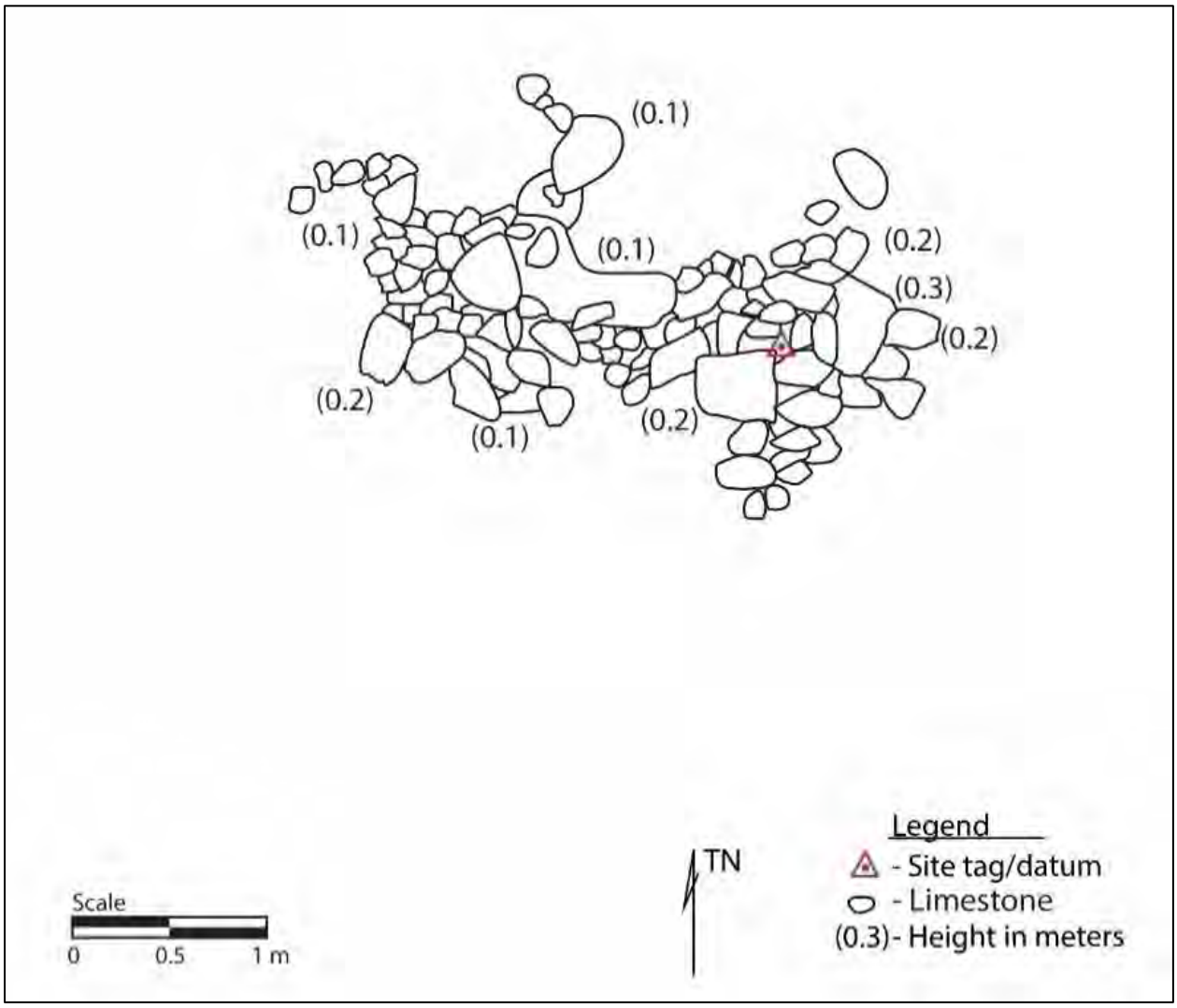

Figure 170. Plan-view map of SIHP 50-80-12-05106, Feature 13 mound.

Figure 171. SIHP 50-80-12-05106, Feature 13 mound (view to northeast).

Feature 14 (Figure 172 and Figure 173) is a mound 1.5 m (N/S) × 3.5 m (E/W) with a maximum height of 0.28 m. The feature is constructed of 6–7 medium to large limestone boulders, with small, medium, and large limestone cobbles piled on top. There is some fall out on the peripheries of the site. Feature 14 is interpreted as an agricultural mound in fair condition.

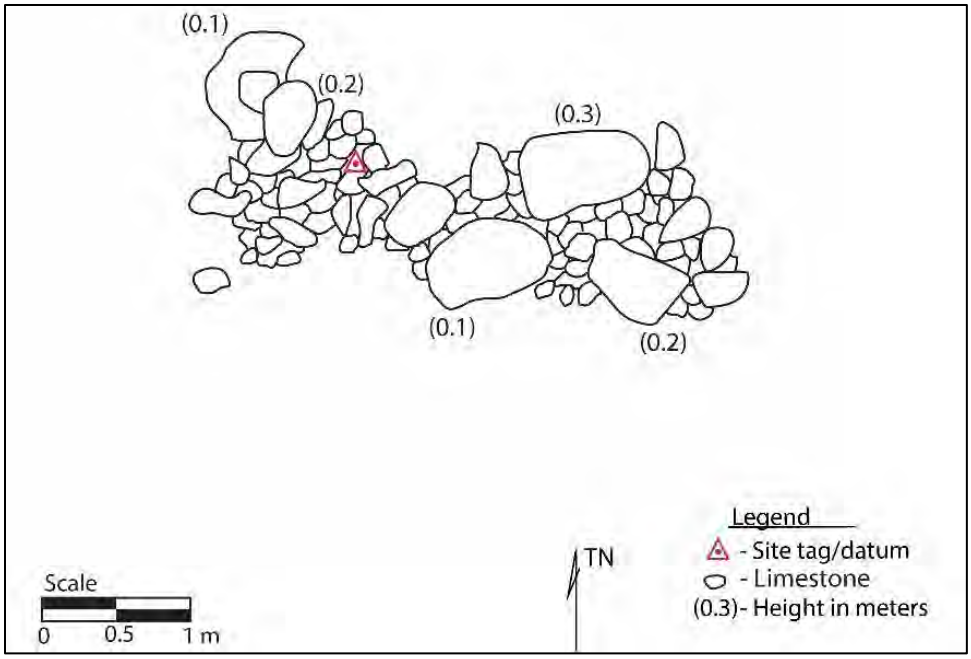

Figure 172. Plan-view map of SIHP 50-80-12-05106, Feature 14 mound.

Figure 173. SIHP 50-80-12-05106, Feature 14 mound (view to west).

Feature 15 (Figure 174 and Figure 175) is an elongated, oval-shaped mound. It is one of several limestone features clustered in this area. Feature 15 is 1.5 m (N/S) × 3 m (E/W) with a maximum height of 0.23 m. The feature is constructed of one large, flat limestone boulder with small, medium, and large limestone cobbles piled on top. Feature 15 is interpreted as an agricultural mound in fair condition.

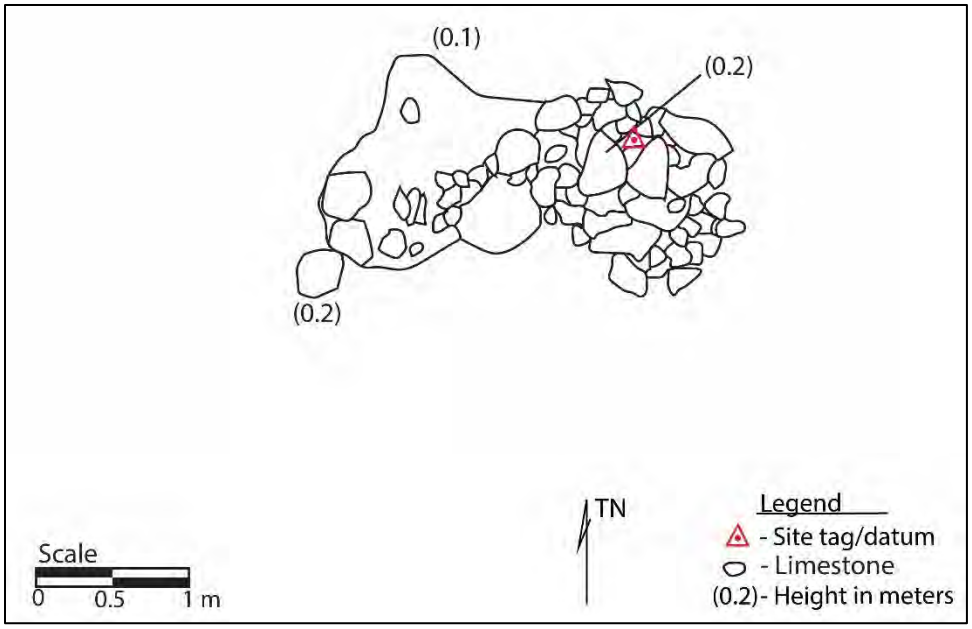

Figure 174. Plan-view map of SIHP 50-80-12-05106, Feature 15 mound.

Figure 175. SIHP 50-80-12-05106, Feature 15 mound (view to north).

Feature 16 (Figure 176 and Figure 177) is a mound that measures 1.2 m (N/S) × 1.25 m (E/W) with a maximum height of 0.45 m. The feature is constructed of several small limestone boulders with small, medium, and large limestone cobbles piled on top. This feature is almost double in height compared to other surrounding stone features. It is interpreted as an agricultural mound in fair condition.

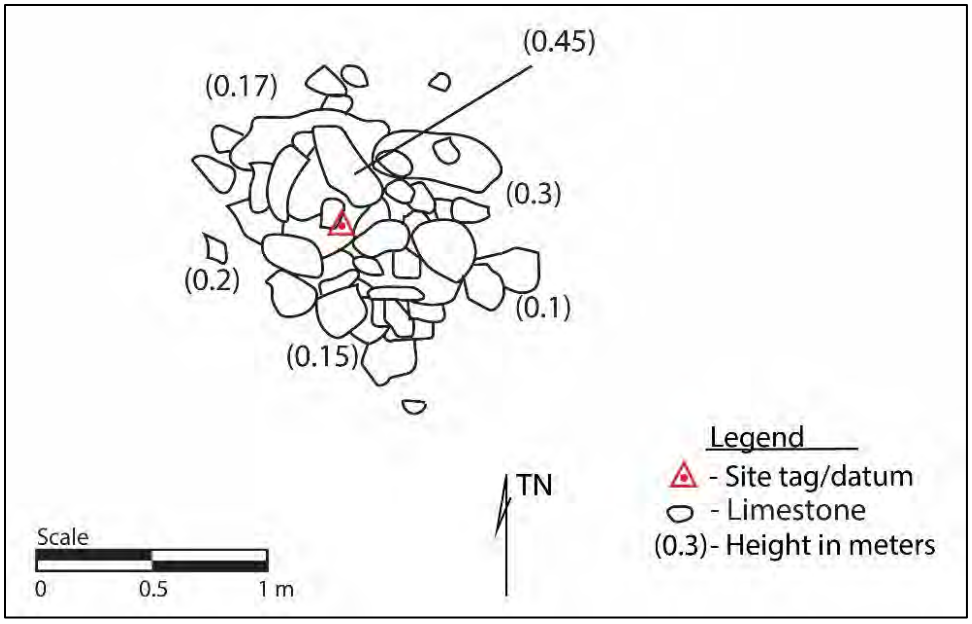

Figure 176. Plan-view map of SIHP 50-80-12-05106, Feature 16 mound.

Figure 177. SIHP 50-80-12-05106, Feature 16 mound (view to southwest).

Feature 17 (Figure 178 and Figure 179) is a small and relatively low-lying mound. It is one of several stone features clustered in this area. It measures 1.5 m (N/S) × 1.5 m (E/W) with a maximum height of 0.28 m. The feature is constructed of small, medium, and large limestone cobbles, with several small limestone boulders as a foundation. Feature 17 is interpreted as an agricultural mound in fair condition.

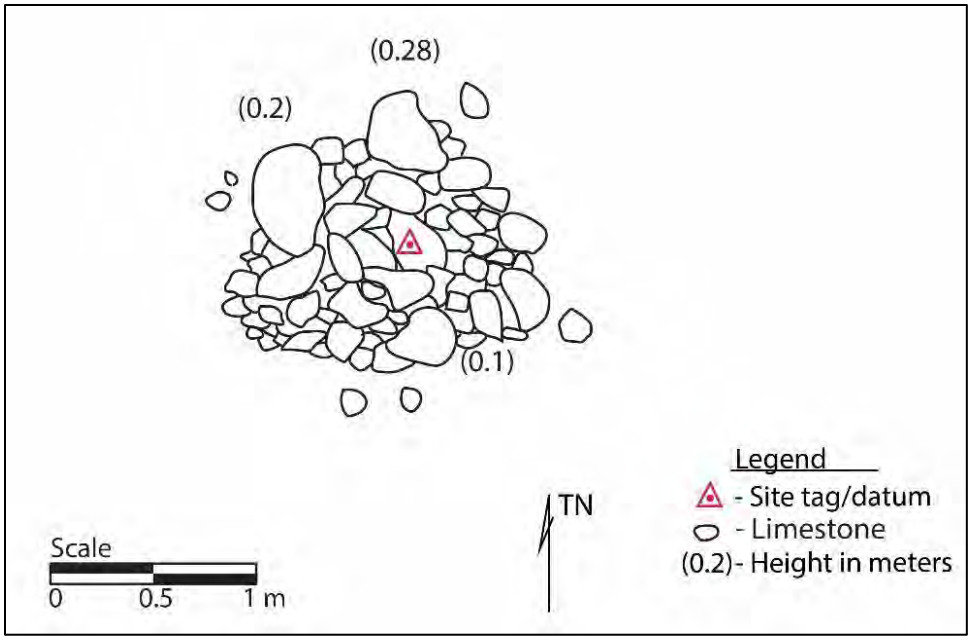

Figure 178. Plan-view map of SIHP 50-80-12-05106, Feature 17 mound.

Figure 179. SIHP 50-80-12-05106, Feature 17 mound (view to northwest).

Feature 18 (Figure 180 and Figure 181) is a relatively low-lying mound. It is on the eastern side of the cluster of other stone features found in this area. It is 1.3 m (N/S) × 1.5 m (E/W) with a maximum height of 0.3 m. The feature is constructed of several small- and medium-sized limestone boulders, with large limestone cobbles piled on top. Feature 18 is interpreted as an agricultural mound in fair condition.

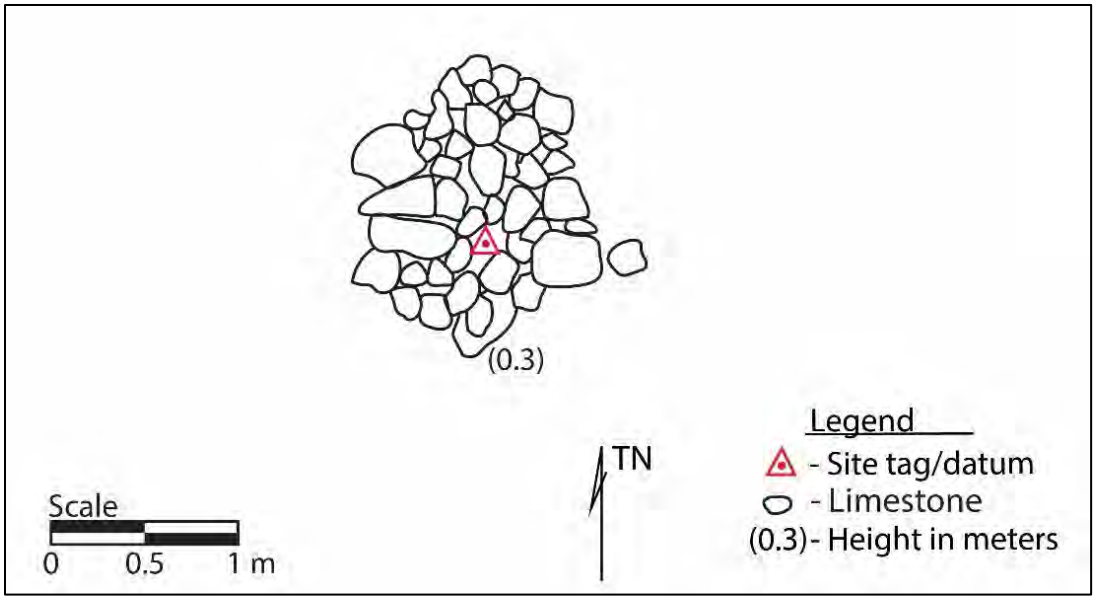

Figure 180. Plan-view map of SIHP 50-80-12-05106, Feature 18 mound.

Figure 181. SIHP 50-80-12-05106, Feature 18 limestone mound (view to north).

Feature 19 (Figure 182 and Figure 183) is a mound located along the southern edge of a cluster of limestone features found in this area. It is 1.4 m (NW/SE) × 1.1 m (E/W) with a maximum height of 0.4 m. The feature is constructed of several large limestone slabs with small, medium, and large cobbles piled on top. Feature 19 is interpreted as an agricultural mound in fair condition.

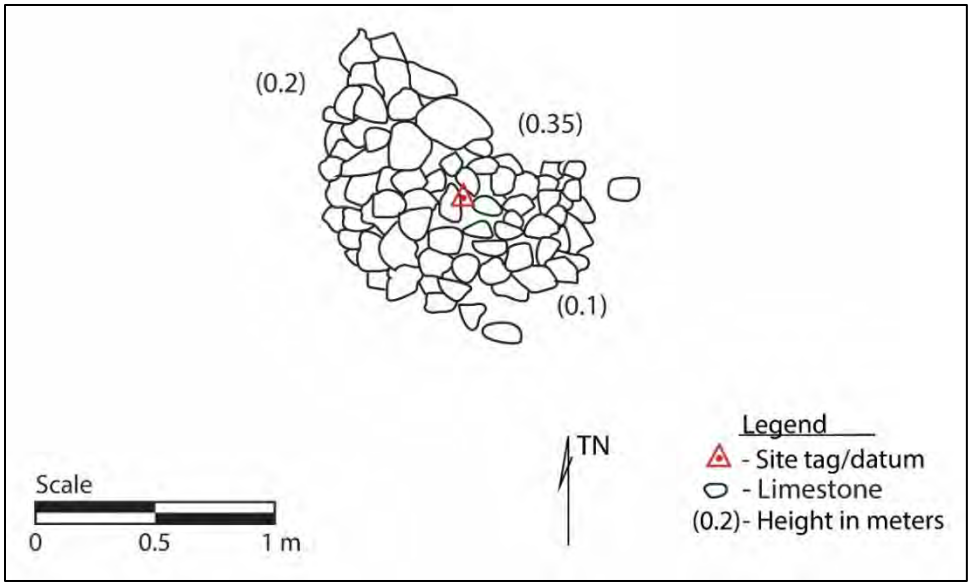

Figure 182. Plan-view map of SIHP 50-80-12-05106, Feature 19 mound.

Figure 183. 50-80-12-05106, Feature 19 mound (view to southeast).

Feature 20 (Figure 184 and Figure 185) is a rounded mound located along the southern edge of a cluster of limestone features found in this area. It is 1.8 m (N/S) × 1.8 (E/W) with a maximum height of 0.5 m. The feature is constructed of small and medium limestone boulders with large lcobbles piled on top. There is one large limestone boulder slab set on-end along the west side of the mound. Feature 20 is interpreted as an agricultural mound in fair condition.

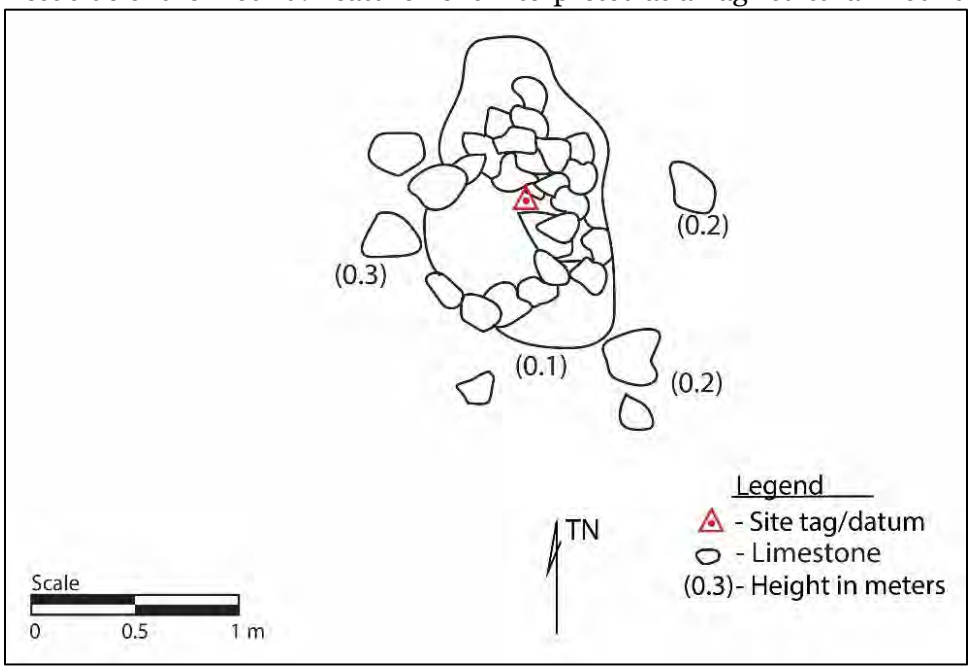

Figure 184. Plan-view map of SIHP 50-80-12-05106, Feature 20 mound.

Figure 185. SIHP 50-80-12-05106, Feature 20 mound (view to northwest).

Feature 21 (Figure 186 and Figure 187) is an oval-shaped mound in the southeast corner of Parcel 40, just 25 m north of Tripoli Road. Feature 21 lies along the eastern edge of a cluster of limestone features found in this area. Feature 21 is 1.2 m (N/S) × 1.6 m (E/W) with a maximum height of 0.4 m. The mound is slightly larger on the western side of the mound (0.75 m) and smaller on the eastern edge (0.2 m). The feature is constructed of small limestone boulders and medium and large piled limestone cobbles. Feature 21 is interpreted as an agricultural mound in fair condition.

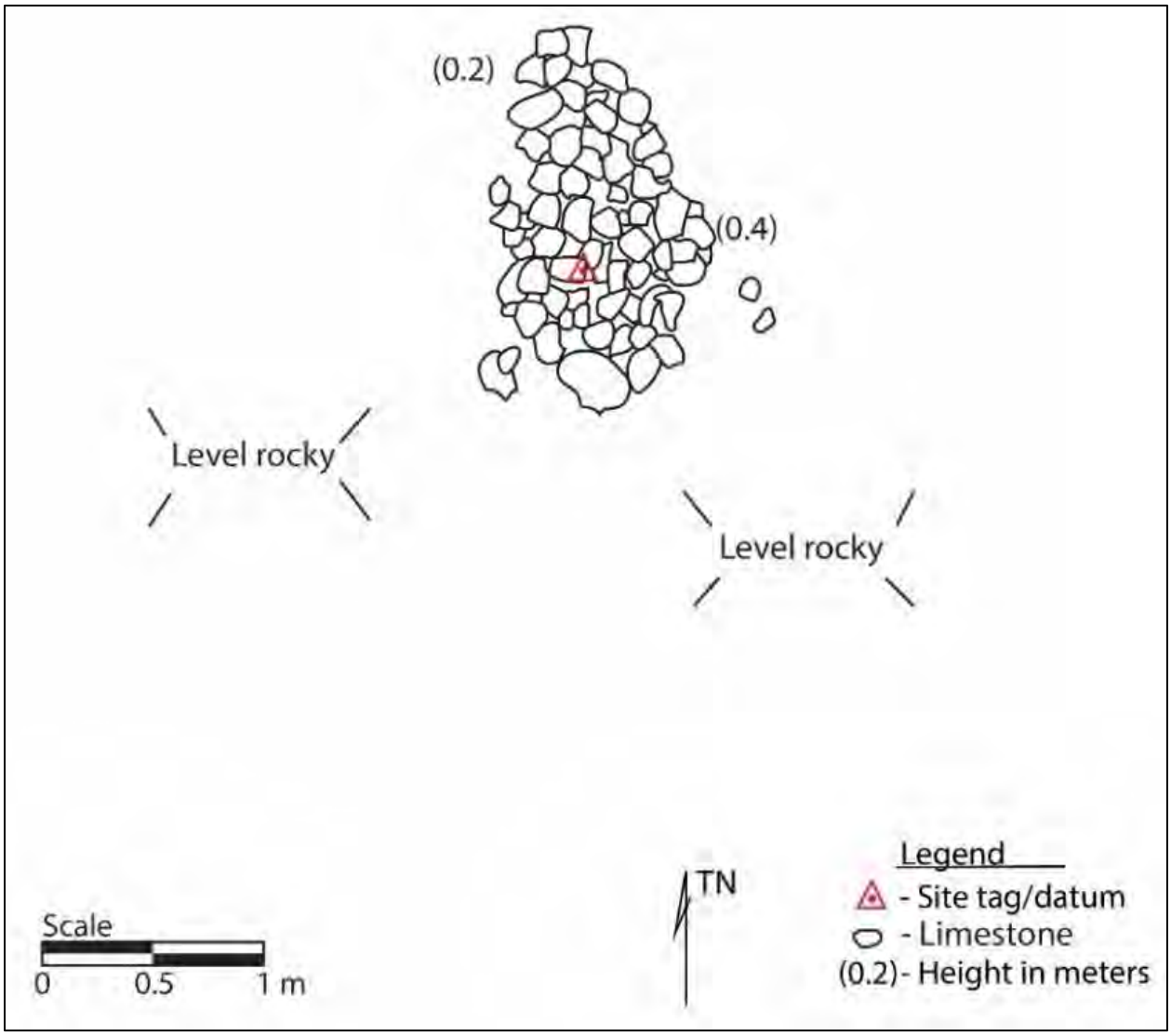

Figure 186. Plan-view map of SIHP 50-80-12-05106, Feature 21 oval-shaped mound.

Figure 187. SIHP 50-80-12-05106, Feature 21 oval-shaped mound (view to east).

Feature 22 (Figure 188 and Figure 189) is an L-shaped mound located along the eastern edge of a cluster of limestone features found in this area. It is 4.3 m (NW/SE) × 4.7 m (NE/SW) with a maximum height of 0.45 m. The L-shaped enclosure has a width that is 1 m at its largest and 0.25 m at its smallest. It is constructed of small, medium, and large limestone boulders with medium and large piled limestone cobbles. This feature is larger and more formal in construction than the other features in this area with a single upright slab located on the southern end of the linear mound. Feature 22 is interpreted as a more formal agricultural feature at the site. It is in fair to good condition.

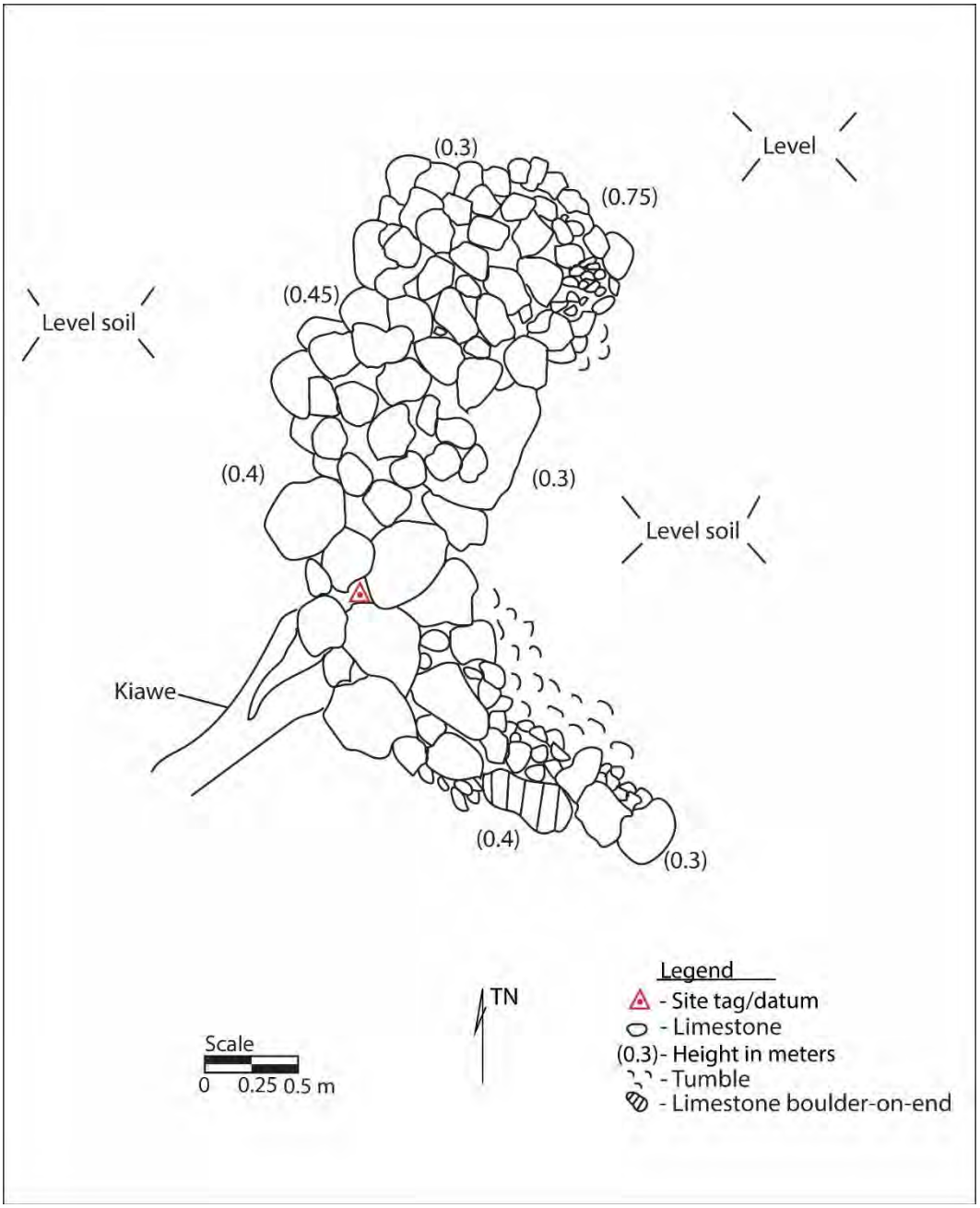

Figure 188. Plan-view map of SIHP 50-80-12-05106, Feature 22 L-shaped mound.

Figure 189. SIHP 50-80-12-05106, Feature 22 L-shaped mound overview (view to northwest).

Feature 23 (Figure 190 and Figure 191) is a diamond-shaped mound located in the southeastern portion of Parcel 40. It is southeast of other limestone features clustered in this area. Feature 23 is 2.2 m (N/S) × 2.5 m (E/W) with a maximum height of 0.3 m. This mound is constructed of small and medium limestone boulders with large limestone cobbles piled on top. There are small limestone boulders lining the southwest, southeast, and southern edges of the mound. Feature 23 is interpreted as an agricultural mound in fair condition.

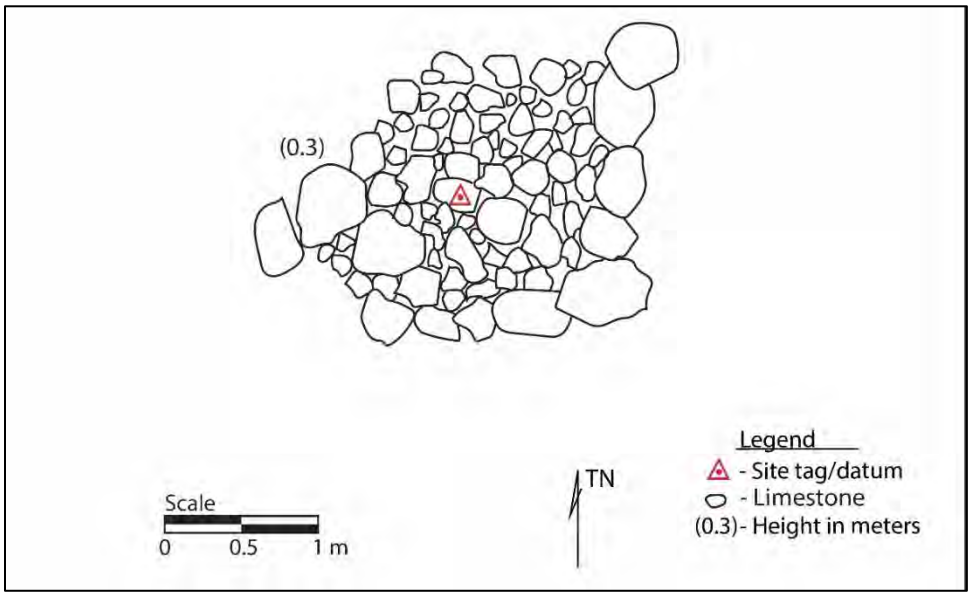

Figure 190. Plan-view map of SIHP 50-80-12-05106, Feature 23 mound.

Figure 191. SIHP 50-80-12-05106, Feature 23 mound (view to east).

Feature 24 (Figure 192 and Figure 193) is a small, rounded mound located in the southeastern portion of Parcel 40, just 15 m north of Tripoli Road. This site is in the southern portion of a cluster of limestone features in this area. Feature 24 is 1.6 m (N/S) × 1.7 m (E/W) with a maximum height of 0.35 m. It is constructed of small and medium limestone boulders with large limestone cobbles piled on top. Feature 24 is interpreted as an agricultural mound in fair condition.

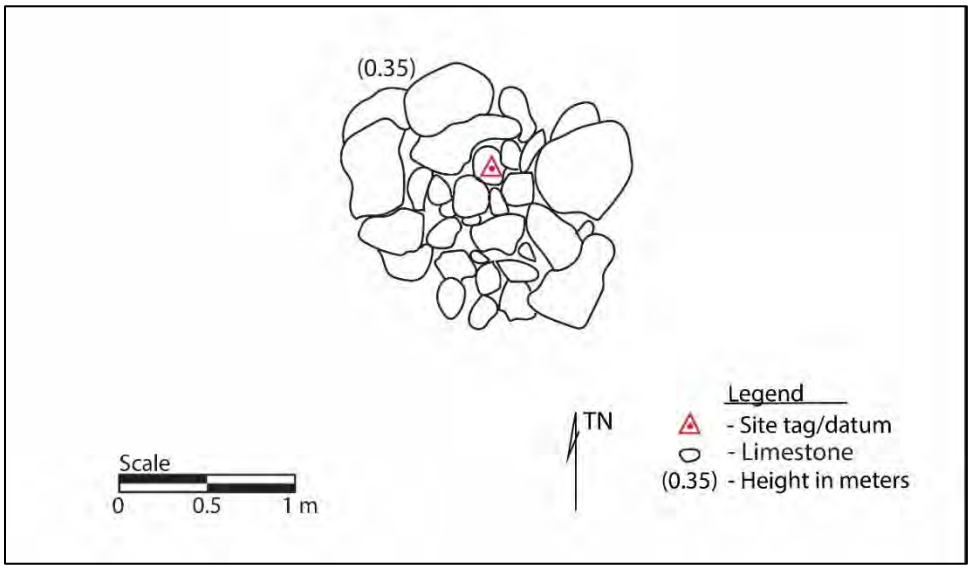

Figure 192. Plan-view map of SIHP 50-80-12-05106, Feature 24 mound.

Figure 193. SIHP 50-80-12-05106, Feature 24 small mound (view to north).

Feature 25 (Figure 194 and Figure 195) is a mound located in the southeastern portion of Parcel 40. It is 2.1 m (N/S) × 2.7 m (E/W) with a maximum height of 0.4 m. The western part measures 0.6 m in width and the eastern portion has a maximum width of 2.1 m. Feature 25 is constructed of several small and medium limestone boulders, with medium and large subangular cobbles piled on top. It is interpreted as an agricultural mound in fair condition.

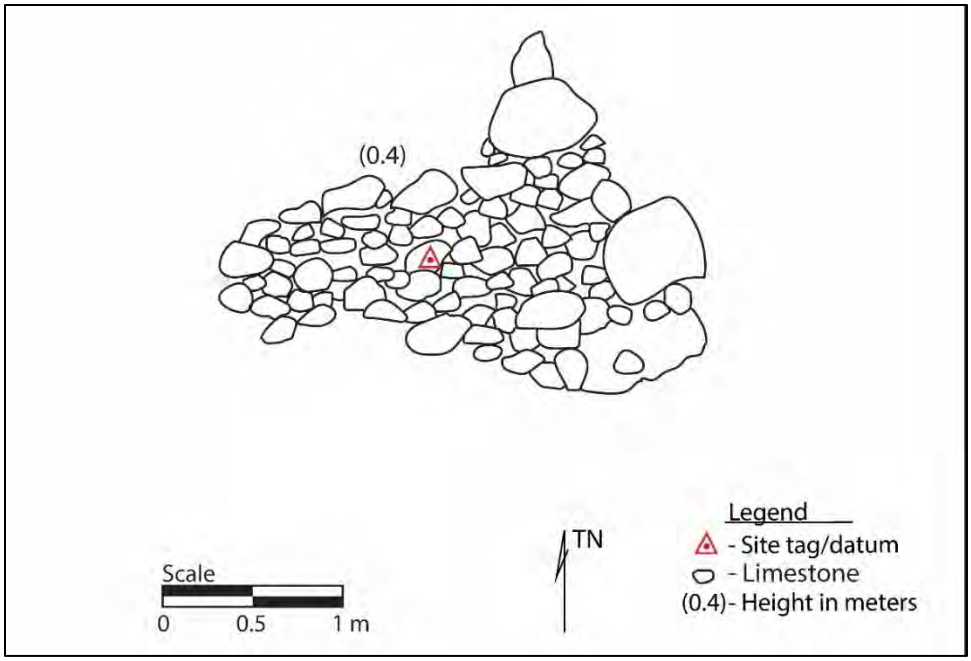

Figure 194. Plan-view map of SIHP 50-80-12-05106, Feature 25 mound.

Figure 195. SIHP 50-80-12-05106, Feature 25 mound (view to southwest).

Feature 26 (Figure 196 and Figure 197) is an enclosure located in the southeastern portion of Parcel 40, just 25 m north of Tripoli Road. Feature 26 is 4 m (N/S) × 4 m (E/W) with a maximum height of 0.5 m. The remnant enclosure is best defined by a rectangular soil floor 0.6 m (E/W) × 2 m (N/S) in size. Another small level soil area is at the southern end of the enclosure and is roughly 0.8 m (N/S) × 0.8 m (E/W). The remnant walls of the enclosure are composed of roughly piled small, medium, and large limestone cobbles. Feature 26 has small cobble fall out along the southwest edge of the enclosure and is surrounded by uplifted *kiawe* on the southern and western edges. Feature 26 most likely served as a temporary habitation feature. It is in fair to poor condition.

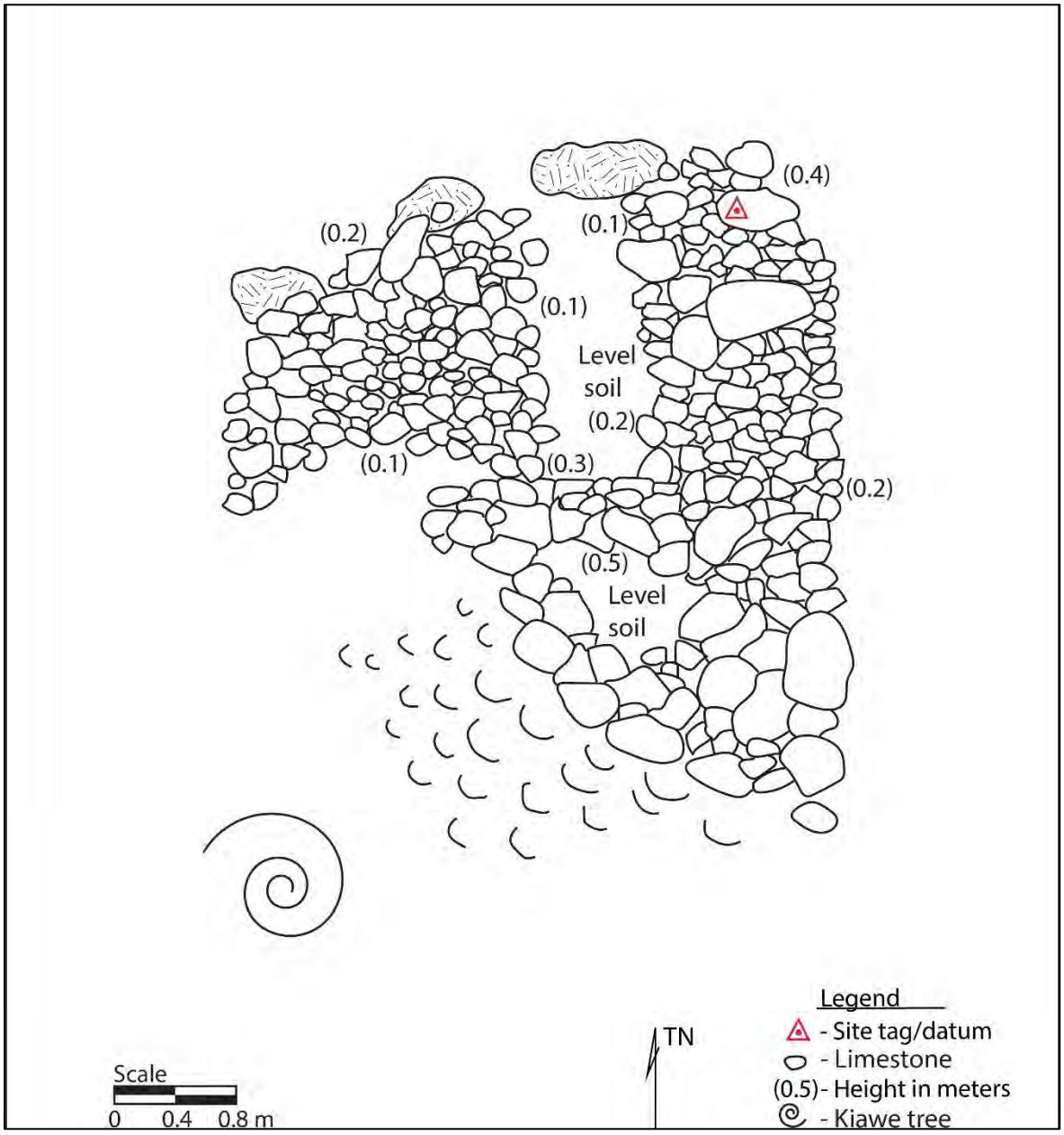

Figure 196. Plan-view map of SIHP 50-80-12-05106, Feature 26 remnant enclosure.

Figure 197. SIHP 50-80-12-05106, Feature 26 remnant enclosure (view to southwest).

Feature 27 (Figure 198 and Figure 199) is a small circular mound located in the southeastern portion of Parcel 40. Feature 27 is 3 m (NE/SW) × 2.1 m (NW/SE) with a maximum height of 0.4 m. This mound differs from other mounds in this area because of its large size and predominantly mixed cobble nature. Feature 27 is interpreted as an agricultural mound in fair condition.

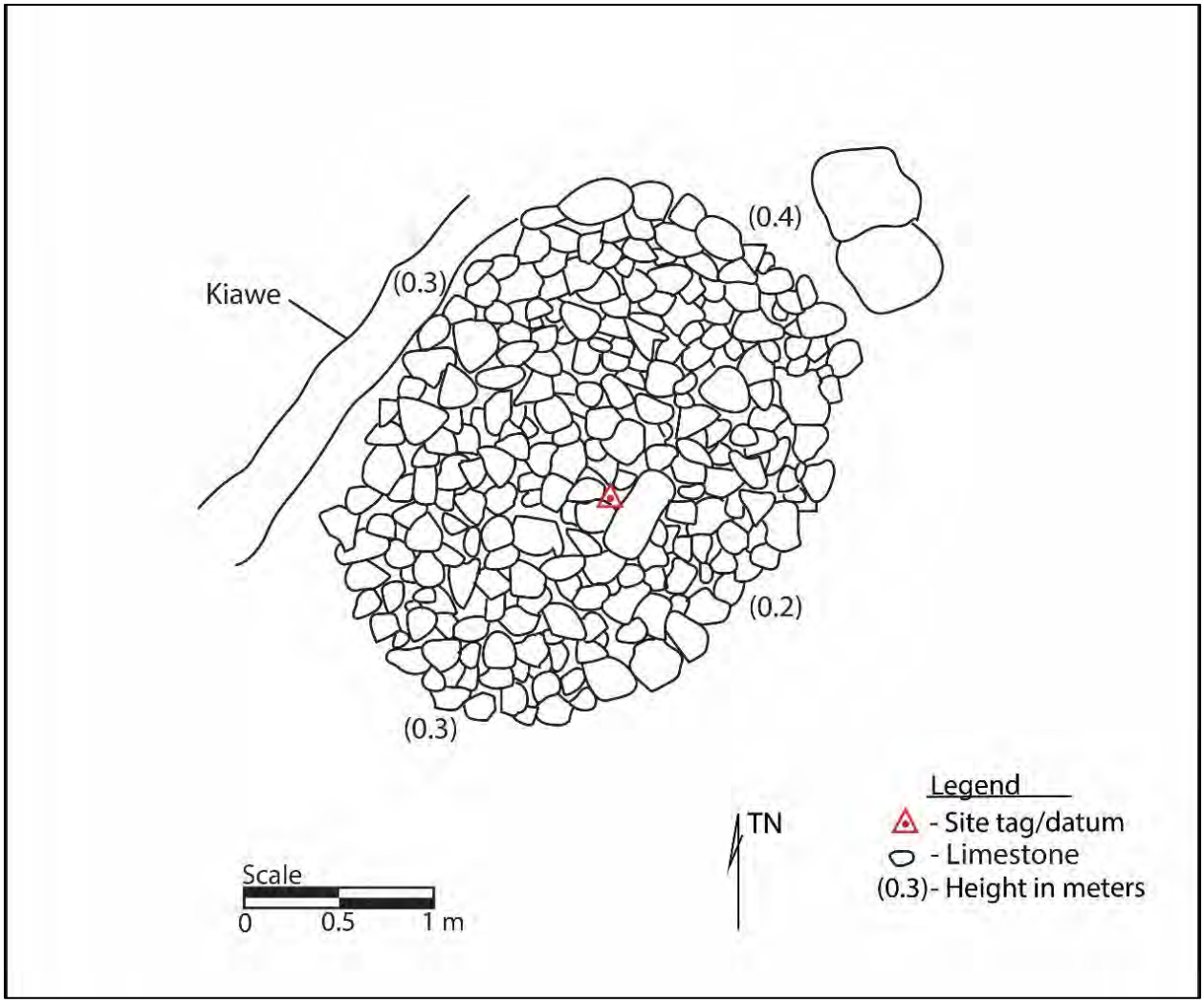

Figure 198. Plan-view map of SIHP 50-80-12-05106, Feature 27 remnant circular mound.

Figure 199. SIHP 50-80-12-05106, Feature 27 remnant circular mound (view to west-northwest).

Feature 28 (Figure 200 and Figure 201) is a stone-constructed channel in Parcel 40 located immediately south of the developed military bunker area (Site T-001) and is immediately west of a dilapidated homestead structure (SIHP 50-80-12-05105, Feature B). The feature consists of two parallel drylaid limestone walls forming a zig-zag in plan and oriented southwest-northeast. The walls are spaced 0.8 m apart and are constructed of stacked cobbles and small boulders mostly faced along the interior and a portion of the exterior eadges, two to four courses high. The walls are 11.0 m in length and average 0.4 m wide by 0.6 m high (maximum). Marine sand is mounded along the outside of the feature and occurs within the channel floor. Barbed-wire fencing is aligned along the interior edge of the stone-constructed channel.

Three different archaeological investigations documented Feature 28, including the Tuggle and Tomonari-Tuggles' 1997 reconnaissance survey, and the Phase II intensive surveys by Wickler and Tuggle (1997) and Beardsley (2001). Wickler and Tuggles' 1997 investigation concurred with Tuggle and Tomonari-Tuggles' assessment that the feature was a U.S. military obstacle course, as evidenced by the introduced sand found elsewhere at military sites in the area (e.g., SIHP 50-80-12-05112) (Wickler and Tuggle 1997: 341) and the presence of the barbed wire fencing. Beardsley's 2001 investigation excavated a 1x1 unit at the east end of the feature that yielded historic artifacts and sparse faunal material. It is important to note that an abundance of historic artifacts were documented on the surface in the area particularly at the nearby SIHP 50-80-12-05105 historic homestead locale. Beardsley's 2001 investigation evaluated Feature 28 as a historic channel or military training trench. Given the presence of the introduced sand, barbed wire fencing, and its well-preserved condition, the current investigation concurs with the military obstacle course interpretation.

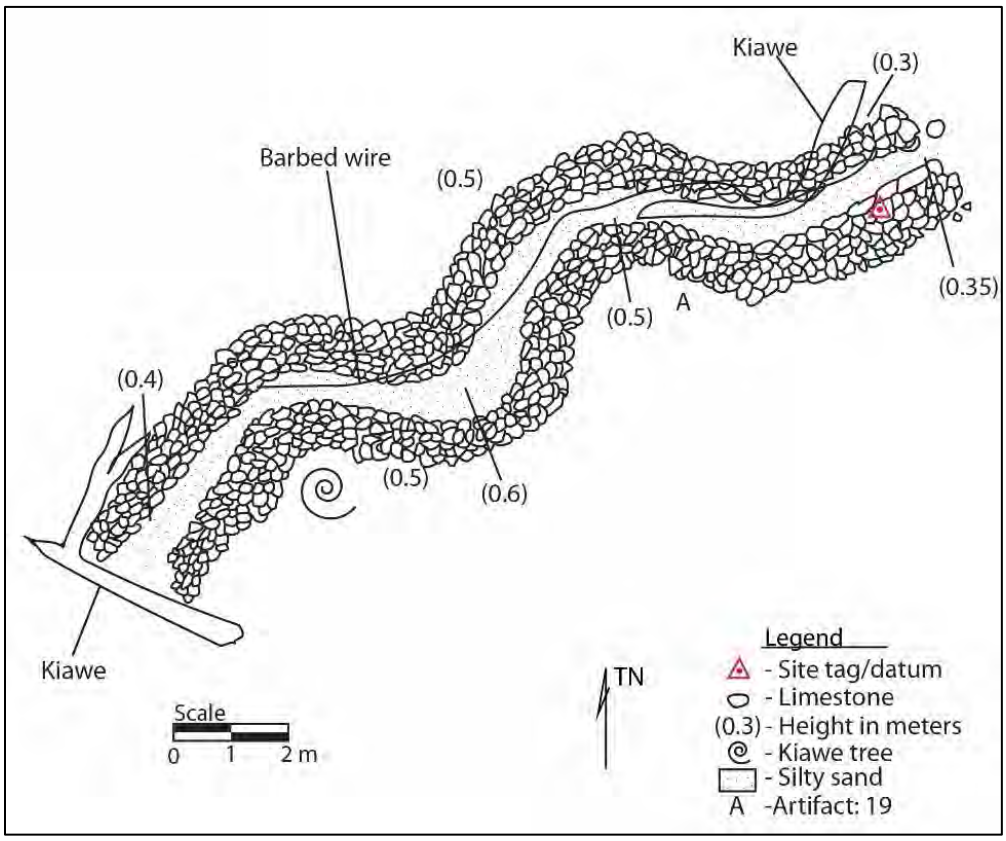

Figure 200. Plan-view map of SIHP 50-80-12-05106, Feature 28 stone channel.

Figure 201. SIHP 50-80-12-05106, Feature 28 stone constructed channel (view to southwest).

Feature 29 (Figure 202 and Figure 203) is a wall located in the eastern portion of Parcel 40, roughly 90 m north of Tripoli Road. This feature is one of several other features clustered along the eastern boundary of this project site area. The Feature 29 wall is aligned southwest-northeast and is 16.0 m in length. This feature ranges from linear piles of small limestone boulders, and small, medium, and large, angular, and subangular cobbles, with a maximum wall width of 0.8 m and a range of wall height between 0.2 and 0.5 m. The Feature 29 wall likely represents a bulldozed edge of a former road. The feature is in good condition.

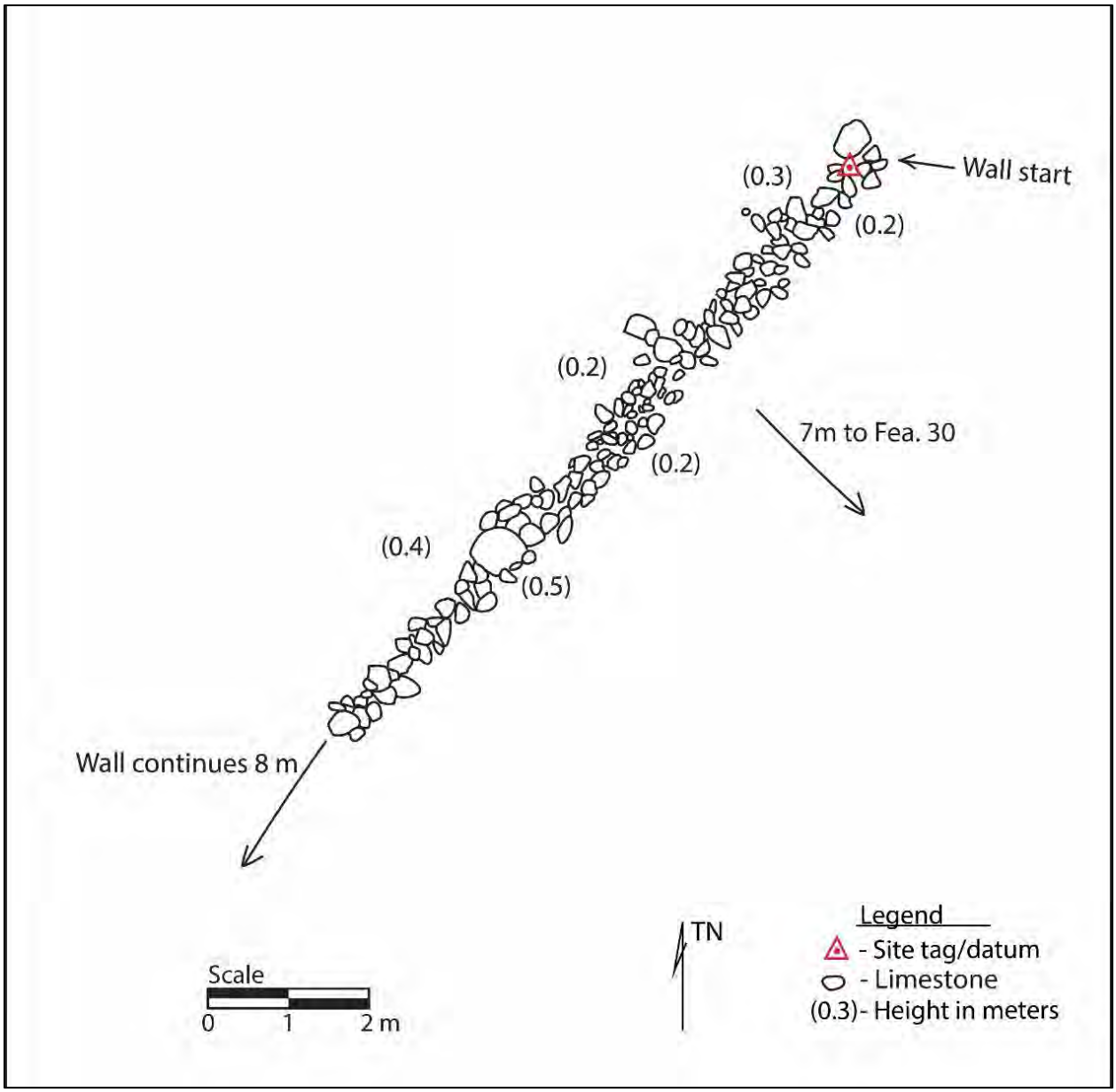

Figure 202. Plan-view map of SIHP 50-80-12-05106, Feature 29 remnant wall.

Figure 203. SIHP 50-80-12-05106, Feature 29 remnant wall (view to west).

Feature 30 (Figure 204 and Figure 205) is a small mound located in the eastern portion of Parcel 40. This feature is one of several other stone features clustered along the eastern boundary of the project site area. Feature 30 is a small, irregularly shaped limestone mound roughly 2 m (N/S) × 2 m (E/W) with a maximum height of 0.4 m. The feature is constructed of small, medium, and large subangular limestone cobbles that are irregularly piled. Small rock fall out surrounds the peripheries of this feature. There is a slight triangle shape to the mound, but heavy amounts of *kiawe* uplift and fallen vegetation leave this site in poor condition, offering poor excavation potential. The feature is thought to be associated with Feature 29 (wall or possible road push), which is just 7 m southeast. Feature 30 is of unknown age but the association with Feature 29 suggests that it could have been an agricultural feature or the result of a wall push.

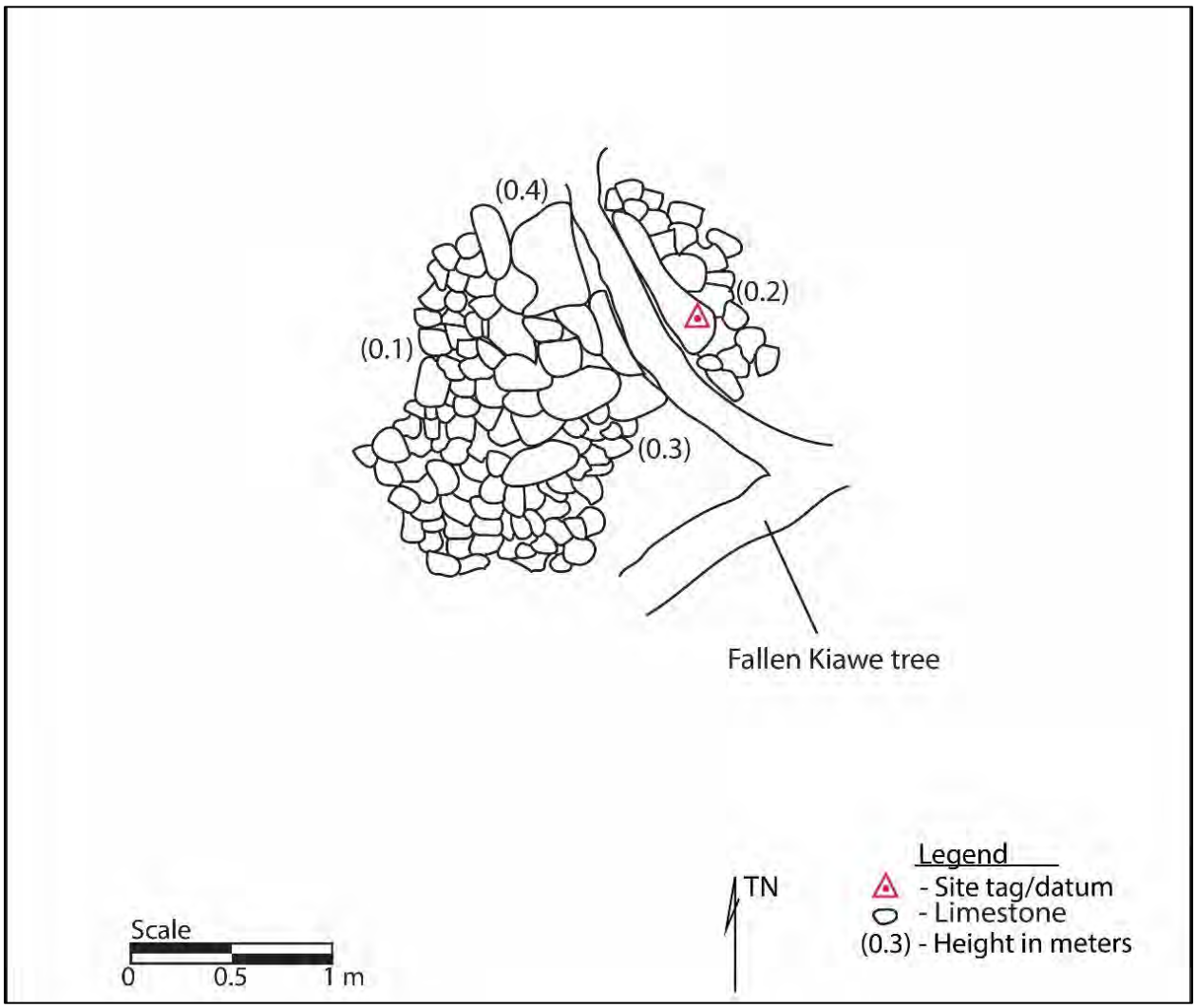

Figure 204. Plan-view map of SIHP 50-80-12-05106, Feature 30 mound.

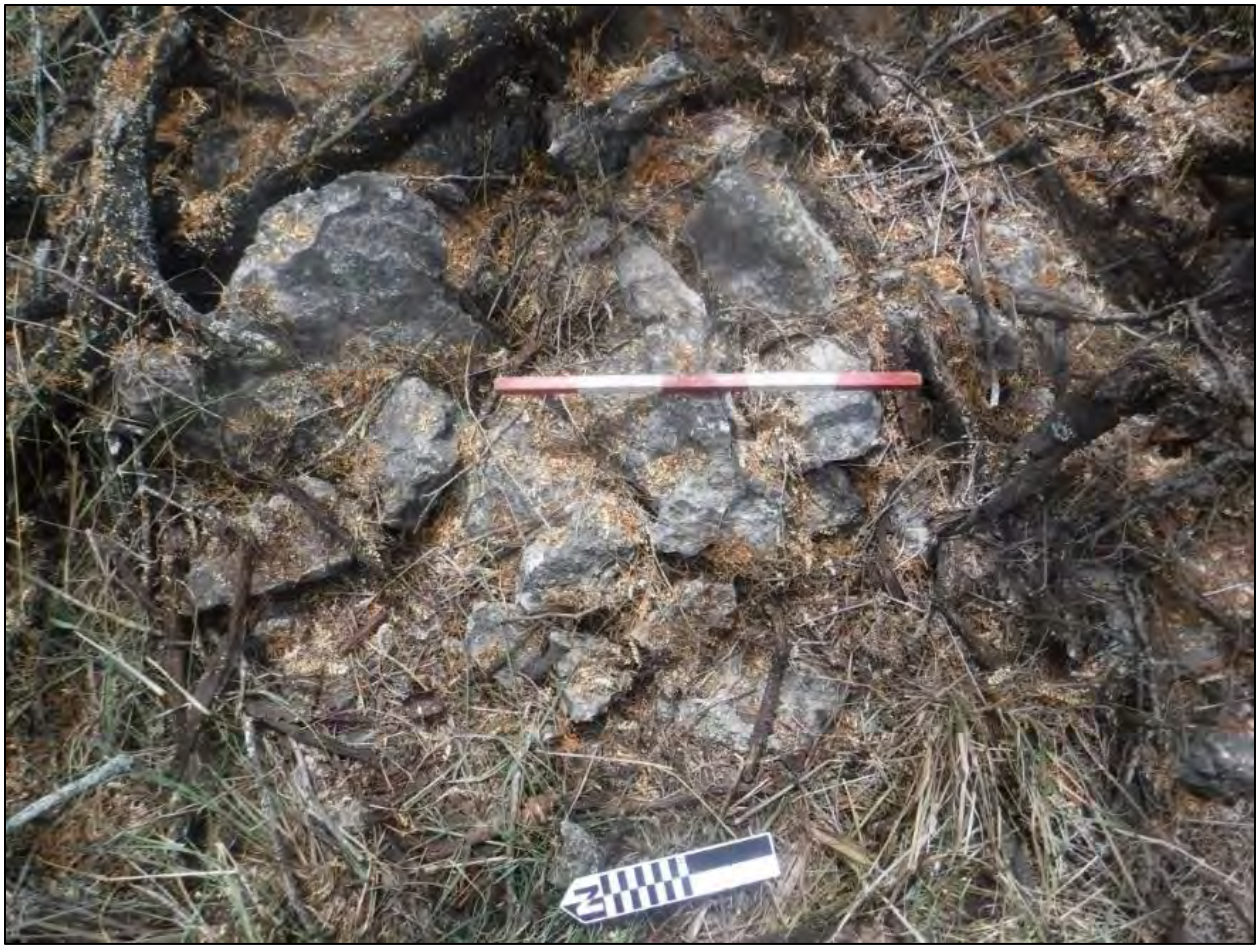

Figure 205. SIHP 50-80-12-05106, Feature 30 mound (view to south).

Feature 31 (Figure 206 and Figure 207) is a rough C-shaped wall located in the eastern portion of Parcel 40, 85 m north of Tripoli Road. This feature is one of several other stone features clustered along the eastern boundary of the project area. Feature 31 is 40 m in total length with a maximum width of 1.2 m and a maximum height of 0.5 m. The wall itself is made of small and medium limestone boulders, with small, medium, and large angular and subangular limestone cobbles piled and stacked on top. The southwest end of this feature is aligned with a breached portion of Feature 34 (enclosure wall). Feature 31 is most likely a wall remnant associated with Feature 34 but has been altered by landscape modifications including a possible road cut through Feature 34. The northeast side of the wall is in poor condition as evidenced by a linear layer of stones and piling on the northwest end. There is also a small push pile on the south side of the site that might be indicative of later modification. Feature 31 is of unknown age and is in relatively poor condition.

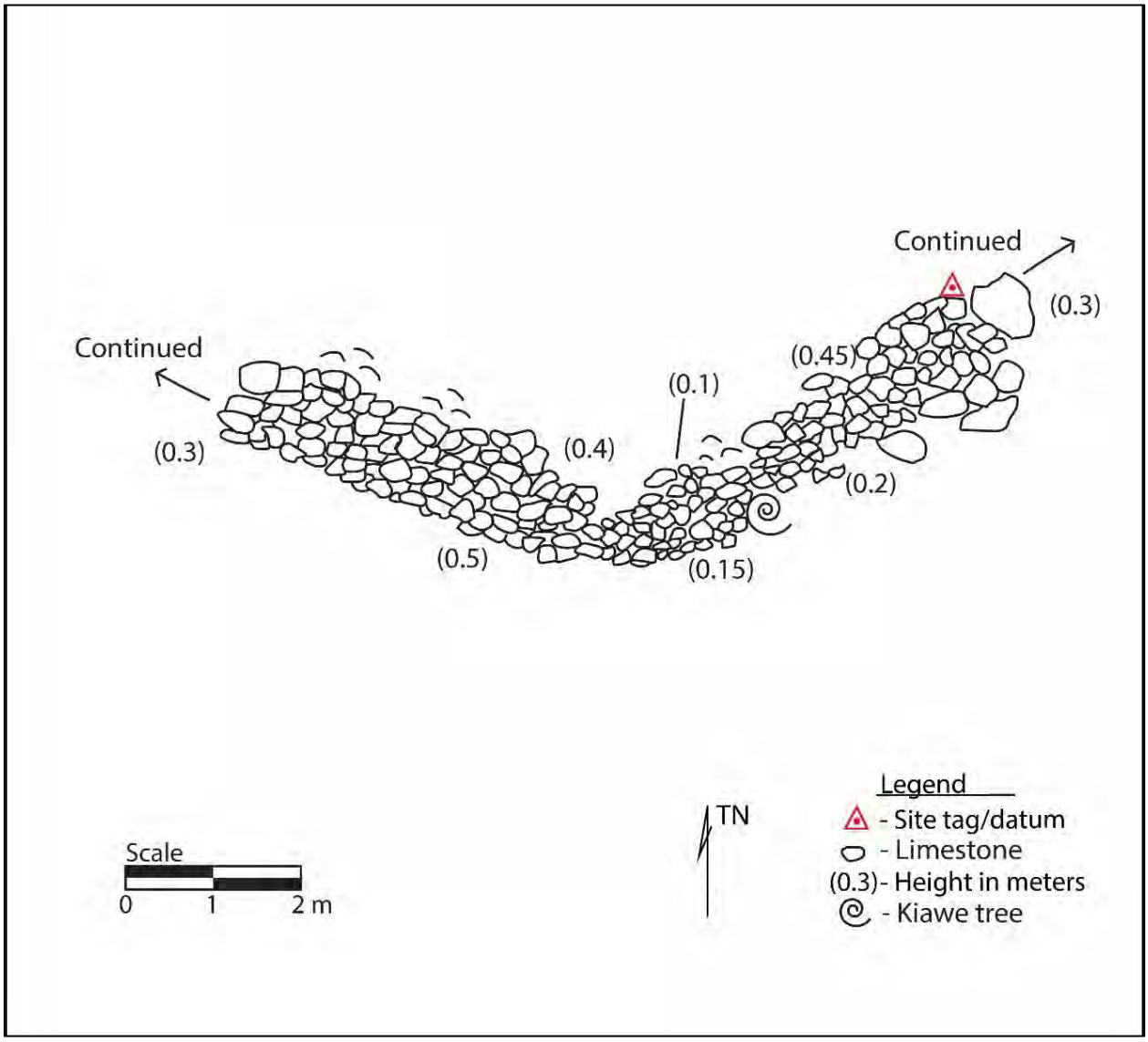

Figure 206. Plan-view map of SIHP 50-80-12-05106, Feature 31 C-shaped enclosure.

Figure 207. SIHP 50-80-12-05106, Feature 31 C-shaped enclosure (view to northeast).

Feature 32 (Figure 208) is a small, circular enclosure located near the eastern project boundary of Parcel 40. The wall of stones encloses an area of 1.0 m in diameter and 0.4 m high. A U.S. military ammunition storage case was on the edge of the feature. Feature 32 is a military training feature likely used as a fire hearth. No plan map was drawn for the military feature. It is in good condition.

Figure 208. SIHP 50-80-12-05106, Feature 32 small enclosure (view to northwest).

Feature 33 (Figure 210 and Figure 209) is a C-shaped wall located in the southeastern corner of Parcel 40, adjacent to the Feature 93 platform. The wall is 4 m (NE/SW) × 3 m (NW/SE) with a maximum height of 0.5 m. It is constructed of several small and medium boulders, with small, medium, and large limestone cobbles piled on top. Feature 33 has well-constructed and defined corners along the western and eastern edges of the enclosure, which are denoted on the map. The elongated west/southwest portion of the enclosure is piled higher than other portions of the enclosure and contains larger stones than the tapering north and south ends of this feature. The overall height of Feature 33 decreases as you move from the west to east end of the feature. Feature 33 is interpreted as a habitation feature associated with ceremonial activities associated with the adjacent Feature 93 platform and the larger Feature 34 enclosure located further to the west. The feature is in poor condition.

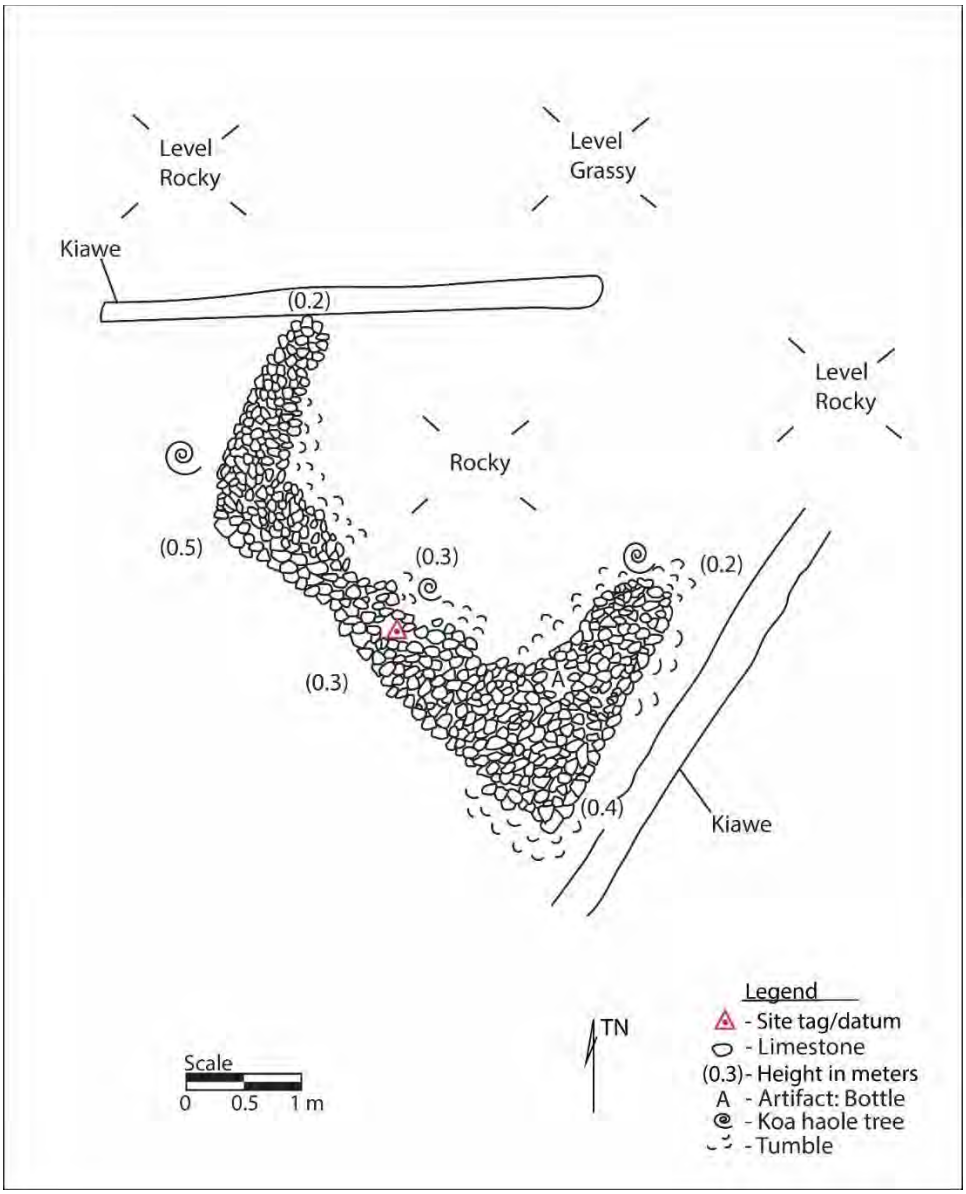

Figure 209. Plan-view map of SIHP 50-80-12-05106, Feature 33 C-shaped enclosure.

Figure 210. SIHP 50-80-12-05106, Feature 33 C-shaped enclosure (view to southwest).

Feature 34 (Figure 211) is a large enclosure with an attached wall located in the eastern portion of Parcel 40, roughly 90 m west of Ordy Pond. The enclosure was previously documented as a military training feature (Feature B) by Tuggle and Tomonari-Tuggle (1997) and re-interpreted by Beardsley (2001) as a ranching feature (Feature Q). As discussed in the summary of SIHP 50-80-12-05106, cultural practitioner Shad Kane identified Feature 34 as a Native Hawaiian *kahua* (Makahiki grounds) that served as an open place for sports and games during the *makahiki*.

The enclosure wall has been disturbed at various points, particularly along its north and east sides, the latter of which appears to be breached by a road. Four sections of the wall, designated Section 1 through 5, were mapped to scale and photographed (Figure 212 through Figure 218). Section 1 of the wall extends between the southeast corner of the enclosure to the west side of Feature 93 platform. Given its attachment to Feature 34, Feature 93 is interpreted as a possible ceremonial feature associated with the *makahiki* events that took place at Feature 34.

The enclosure measures 94 m (NW/SE) × 28 m (NE/SW) with a minimum wall height of 0.15 m and a maximum wall height of 1.2 m. The wall is constructed of a mix of cobbles and small and medium boulders with one section (Section 5) retaining a vertical facing. Sections 1 and 2 have platform-like surfaces ranging from 1.2 to 2.5 m wide. These sections were either constructed that way or were disturbed as a result of previous land modifications. The interior of the enclosure is relatively clear of vegetation and contains a layer of sand, similar to what was observed at the nearby military training feature (Feature 28). *Kiawe* branches have been mechanically pushed against the northeast and southwest wall sections. Feature 34 is in fair to poor condition.

Figure 211. Plan view of SIHP 50-80-12-05106, Feature 34 enclosure and Feature 93; section locations discussed in description.

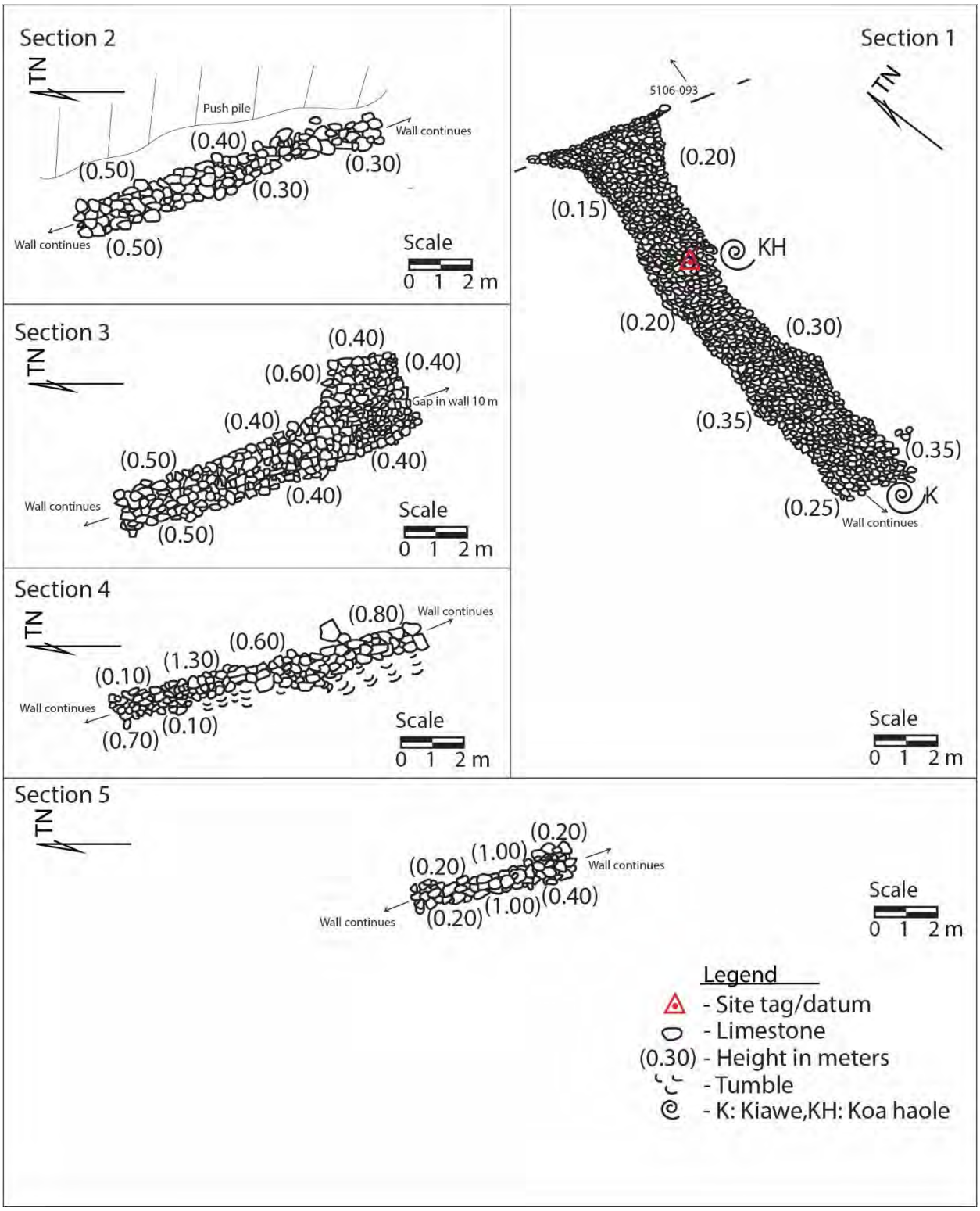

Figure 212. Plan-view map of SIHP 50-80-12-05106, Feature 34 wall sections.

Figure 213. SIHP 50-80-12-05106, Feature 34, Section 1 (view to southwest).

Figure 214. SIHP 50-80-12-05106, Feature 34, Section 2 (view to northwest).

Figure 215. SIHP 50-80-12-05106, Feature 34, Section 3 wall (view to southwest).

Figure 216. SIHP 50-80-12-05106, Feature 34, top of Section 3 wall (view to northwest).

Figure 217. SIHP 50-80-12-05106, Feature 34, Section 5 wall (view to southwest).

Figure 218. SIHP 50-80-12-05106, Feature 34, Section 5 wall (view to northwest).

Feature 35 (Figure 219 and Figure 220) is a relatively large mound clustered with several other limestone features along the eastern project boundary. Feature 35 is 2.7 m (N/S) × 2.7 m (E/W) with a maximum height of 0.2 m. The site is of unknown age and its relatively large size suggests that it was not used for pre-Contact agriculture. Feature 35 might be the result of possible land clearing during the ranching era in this area and is in poor condition, most likely due to possible push clearing on the east side of the mound.

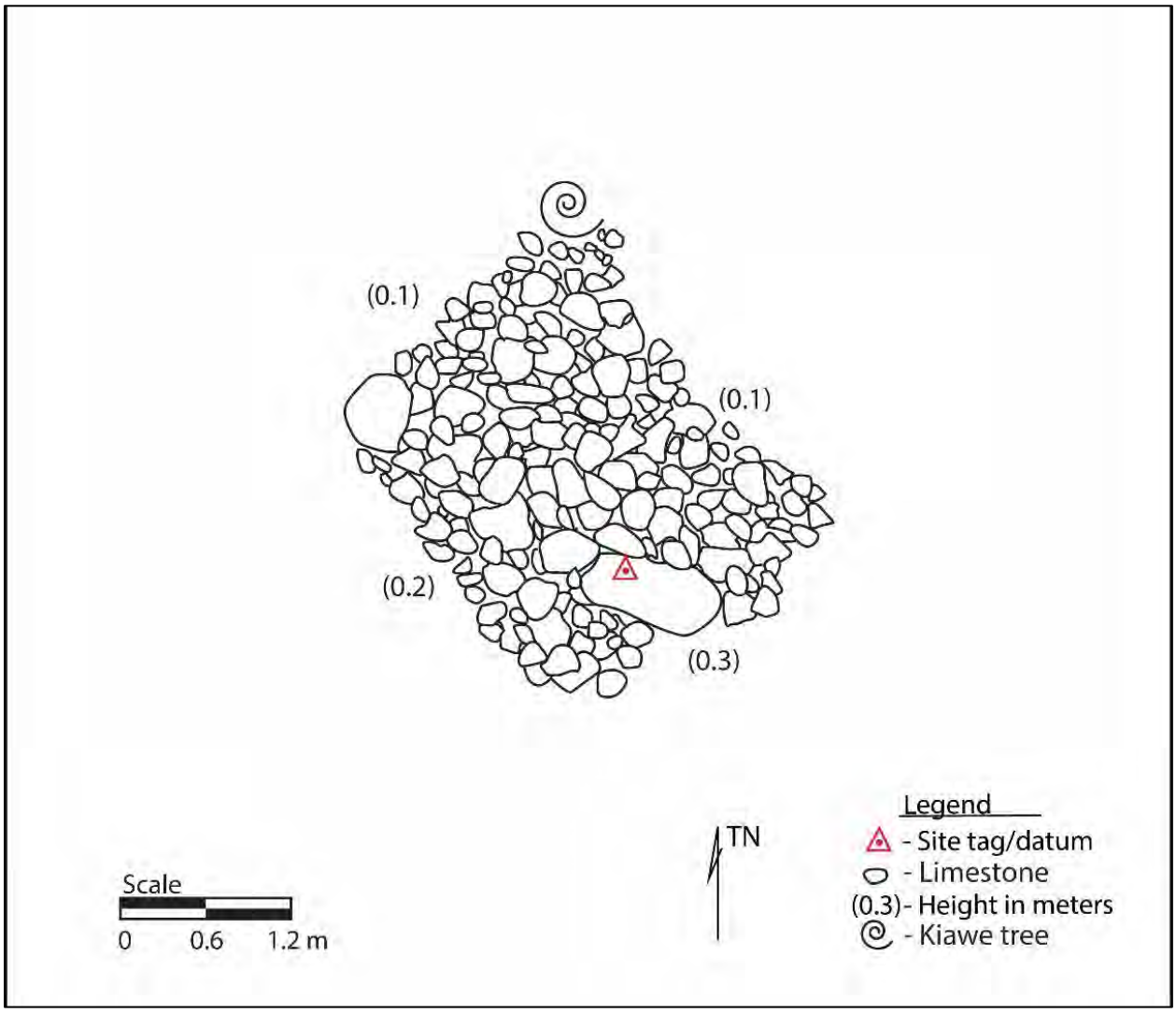

Figure 219. Plan-view map of SIHP 50-80-12-05106, Feature 35 mound.

Figure 220. SIHP 50-80-12-05106, Feature 35 limestone mound (view to northwest).

Feature 36 (Figure 221 and Figure 222) is a small diamond-shaped mound roughly 1.75 m (N/S) × 2.5 m (E/W) with a maximum height of 0.6 m. Although small in overall size, this stone feature is built up higher than most of the other mounds in the surrounding area. Feature 36 is constructed of small and medium limestone boulders, with small, medium, and large subangular limestone cobbles. Feature 36 is interpreted as an agricultural mound in fair condition.

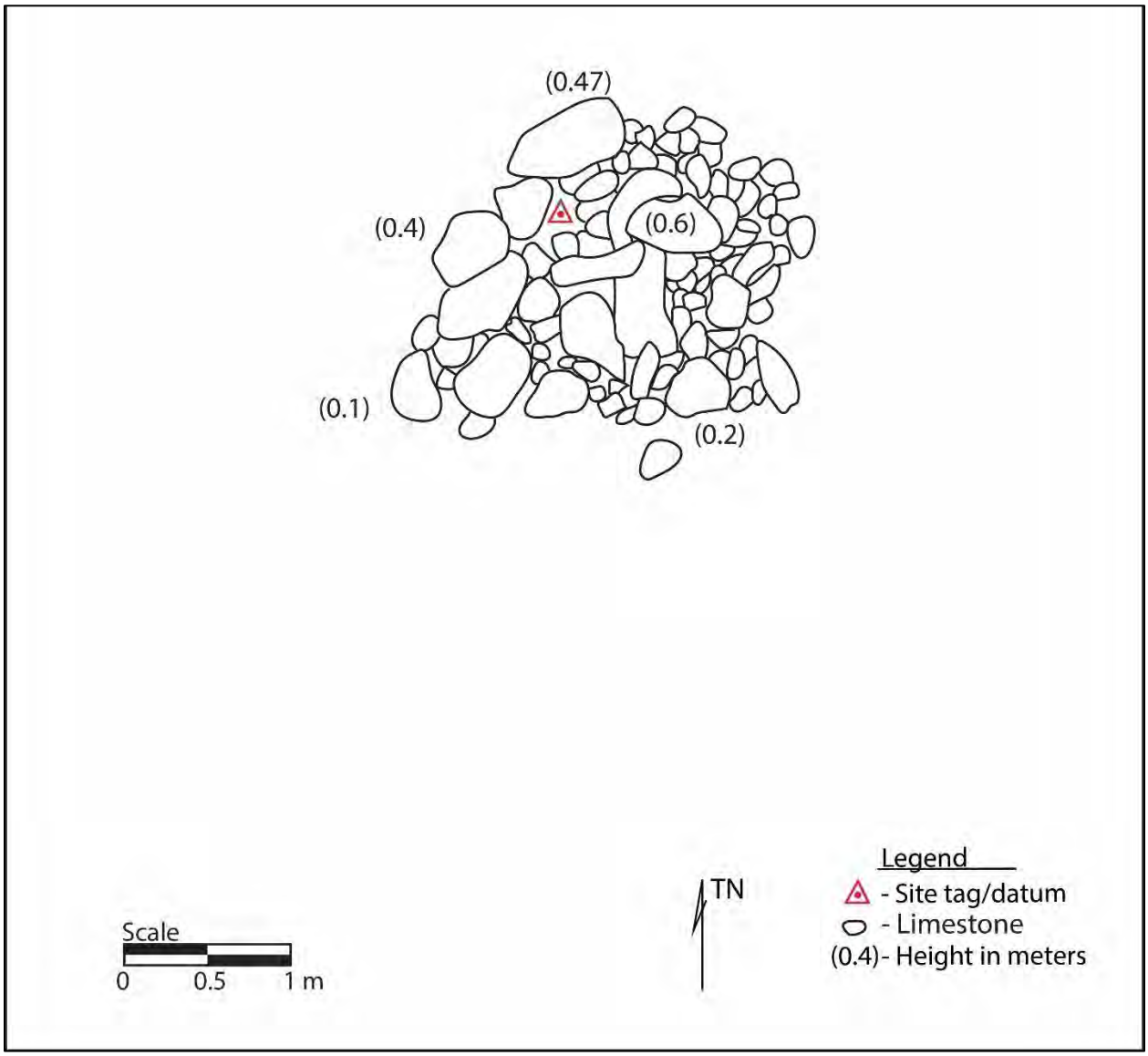

Figure 221. Plan-view map of SIHP 50-80-12-05106, Feature 36 small limestone mound.

Figure 222. SIHP 50-80-12-05106, Feature 36 small limestone mound (view to northeast).

Feature 37 (Figure 223 and Figure 224) is a small, triangular mound that measures roughly 2.5 m (N/S) × 2 m (E/W) with a maximum height of 0.5 m. The feature is constructed of small and medium limestone boulders, with small, medium, and large subangular limestone cobbles piled on top. The points of this feature are very distinguishable, with larger boulders located on the vertices of the triangle, as noted in the site map. Feature 37 was previously documented as an agricultural mound (Feature G) by Beardsley (2001). In agreement with Beardsley (2001), Feature 37 is interpreted as an agricultural mound. It is in fair to good condition.

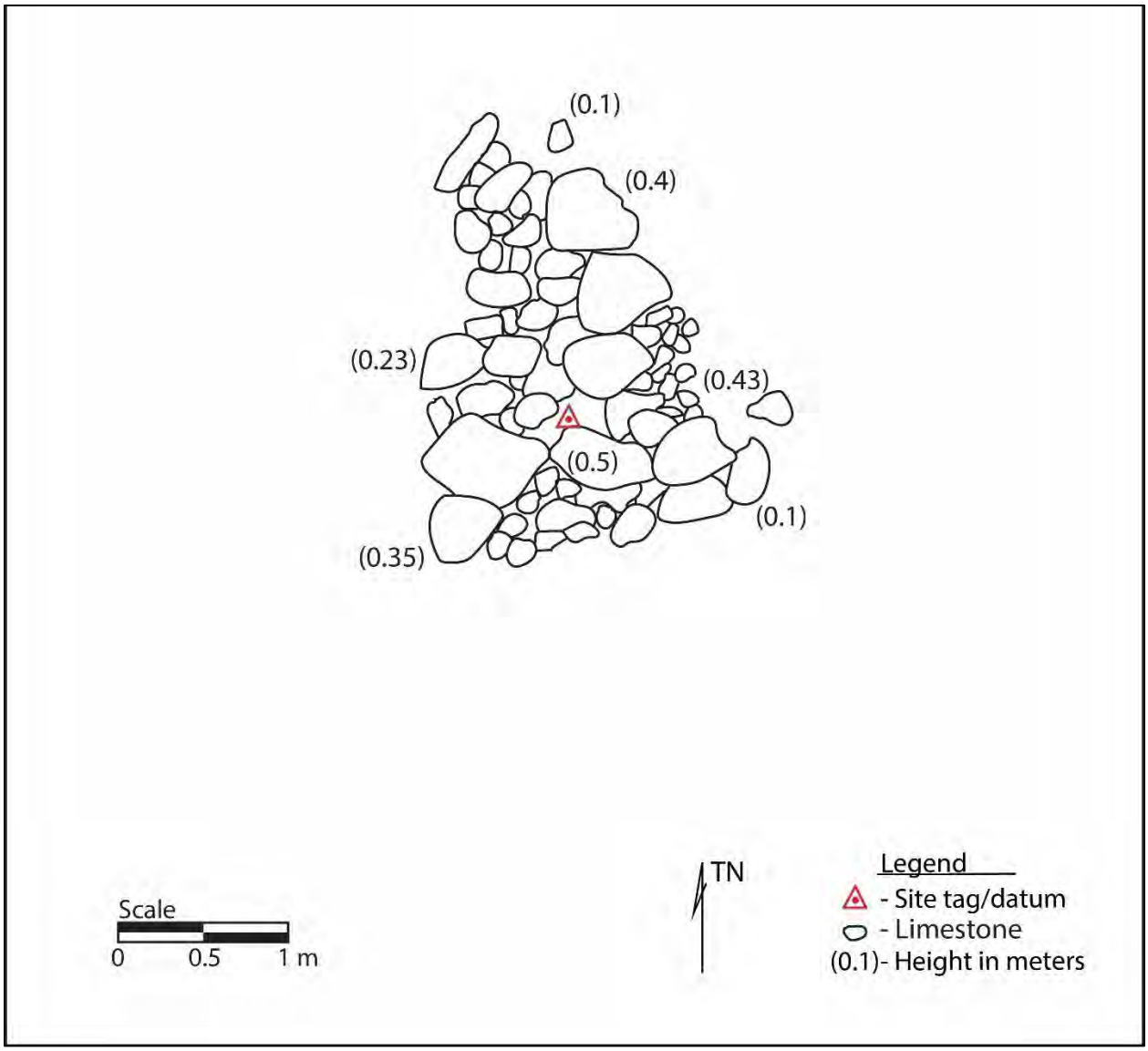

Figure 223. Plan-view map of SIHP 50-80-12-05106, Feature 37 triangular mound.

Figure 224. SIHP 50-80-12-05106, Feature 37 triangular mound (view to north).

Feature 38 (Figure 225 and Figure 226) is an S-shaped enclosure measuring 4.0 m (N/S) × 4.2 m (E/W) with a maximum height of 0.4 m. The enclosure comprises low piled walls constructed of small and medium limestone boulders, with small, medium, and large subangular limestone cobbles piled and stacked on top. There is a large, on-end limestone slab placed at the midway point, just between where the two curves of the enclosure meet and is noted on the site map. Feature 38 was previously recorded by Beardsley (2001) as an agricultural feature (Feature F) and a test unit was excavated in the interior of the enclosure, which yielded no archaeological materials. In agreement with Beardsly (2001), the feature is interpreted as an agricultural enclosure. It is in fair condition.

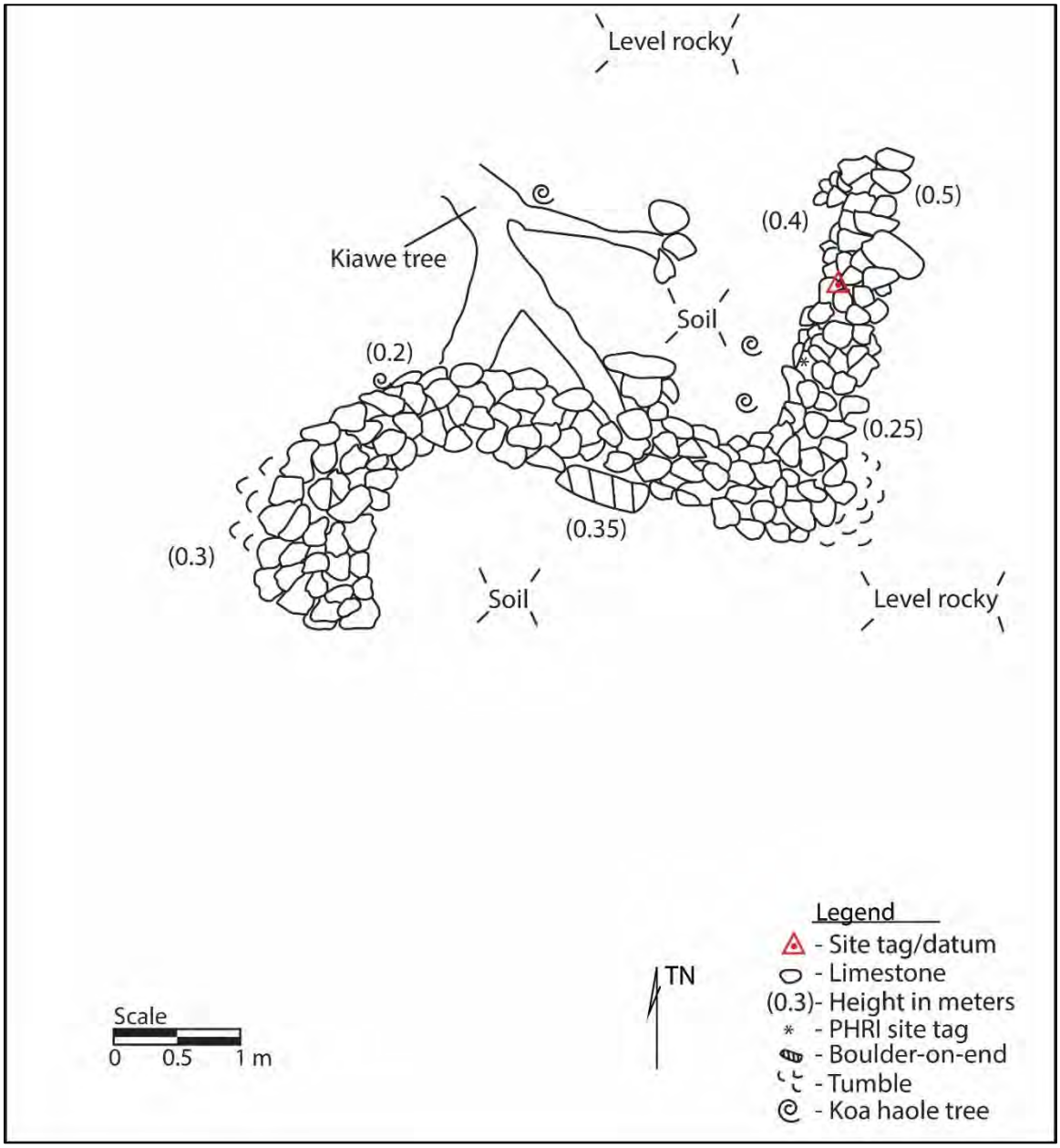

Figure 225. Plan-view map of SIHP 50-80-12-05106, Feature 38 S-shaped enclosure.

Figure 226. SIHP 50-80-12-05106, Feature 38 S-shaped enclosure (view to southwest).

Feature 39 (Figure 227 and Figure 228) is an oval-shaped mound located in the southeastern portion of Parcel 40, just 30 m north of Tripoli Road. This site is clustered with several other limestone features found along the southeasternmost extent of the project area. Feature 39 is 1.25 m (N/S) × 1.75 m (E/W) with a maximum height of 0.32 m. The mound is relatively low-lying compared to other stone features in this area. The mound is constructed of small, medium, and large subangular limestone cobbles. Feature 39 is in fair condition. It likely dates to the pre-Contact period and was likely used for agricultural purposes.

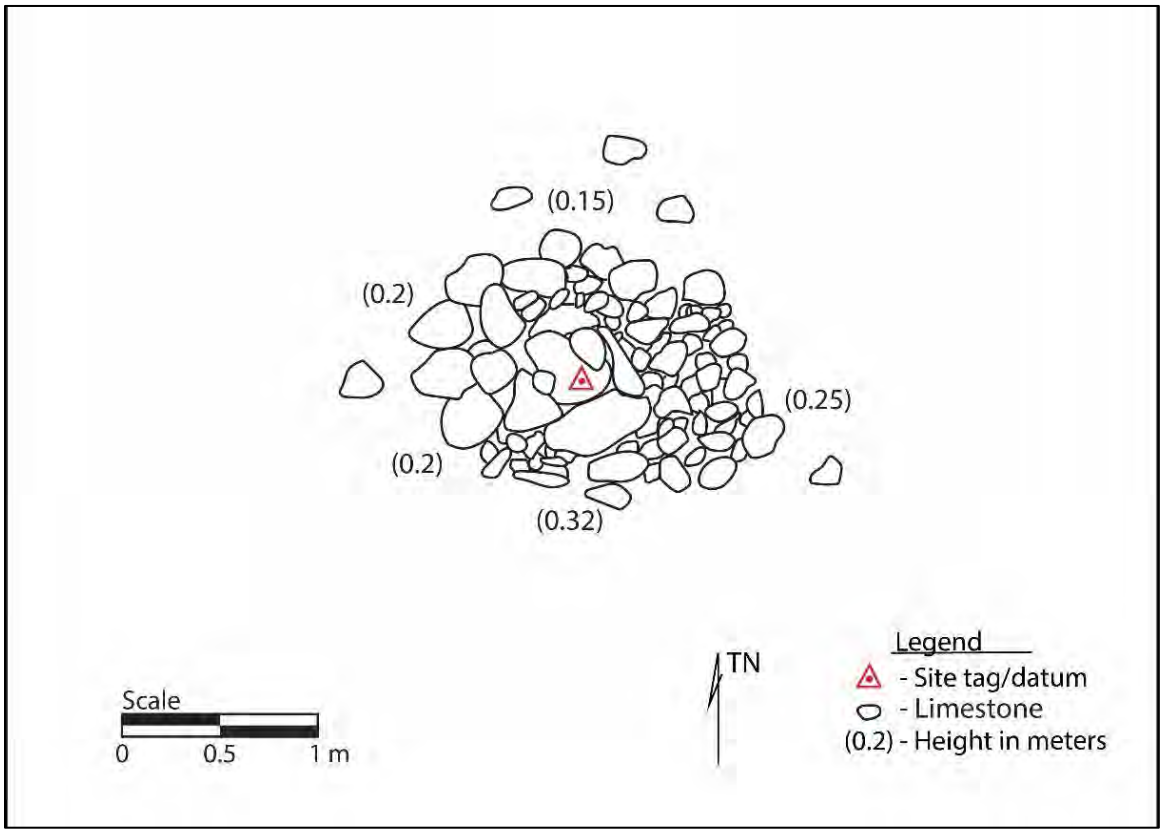

Figure 227. Plan-view map of SIHP 50-80-12-05106, Feature 39 mound.

Figure 228. SIHP 50-80-12-05106, Feature 39 mound (view to southwest).

Feature 40 (Figure 229 and Figure 230) is a small, square-shaped mound located in the southeastern portion of Parcel 40, just 30 m north of Tripoli Road. This site is clustered with several other stone features found along the southeasternmost extent of the project area. Feature 40 is 1.45 m (N/S) × 1.75 m (E/W) with a maximum height of 0.5 m. The feature tapers slightly in shape moving from north to south and is stacked highest in the center of the mound than on the edges. The feature is constructed of small limestone boulders with small, medium, and large subangular limestone cobbles piled on top. Feature 40 is thought to date to the pre-Contact period and is in fair condition, offering fair potential for excavation. The feature was potentially used for agricultural purposes.

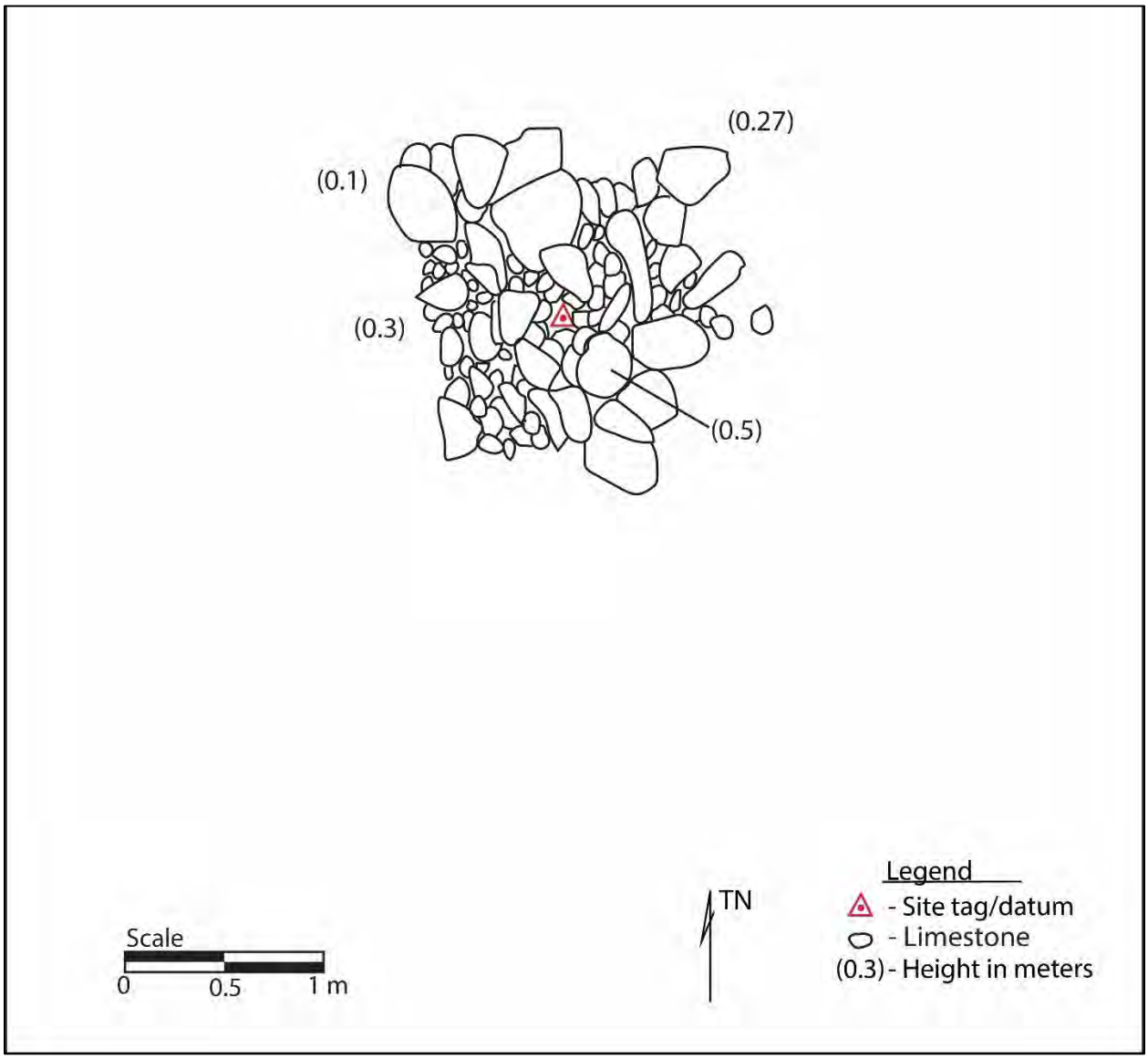

Figure 229. Plan-view map of SIHP 50-80-12-05106, Feature 40 mound.

Figure 230. SIHP 50-80-12-05106, Feature 40 mound (view to south).

Feature 41 (Figure 231 and Figure 232) is a modified limestone pit located in the eastern portion of Parcel 40 inside the Feature 34 enclosure. The pit is filled with soil and sand is on the surface. It measures 1.8 m (N/S) × 1.75 m (E/W) with a maximum depth of 0.3 m. A 0.4 m high limestone and soil mound, possibly formed during land clearing, is on the northwest side of the pit. Feature 41 is in fair condition and is interpreted as an agricultural feature.

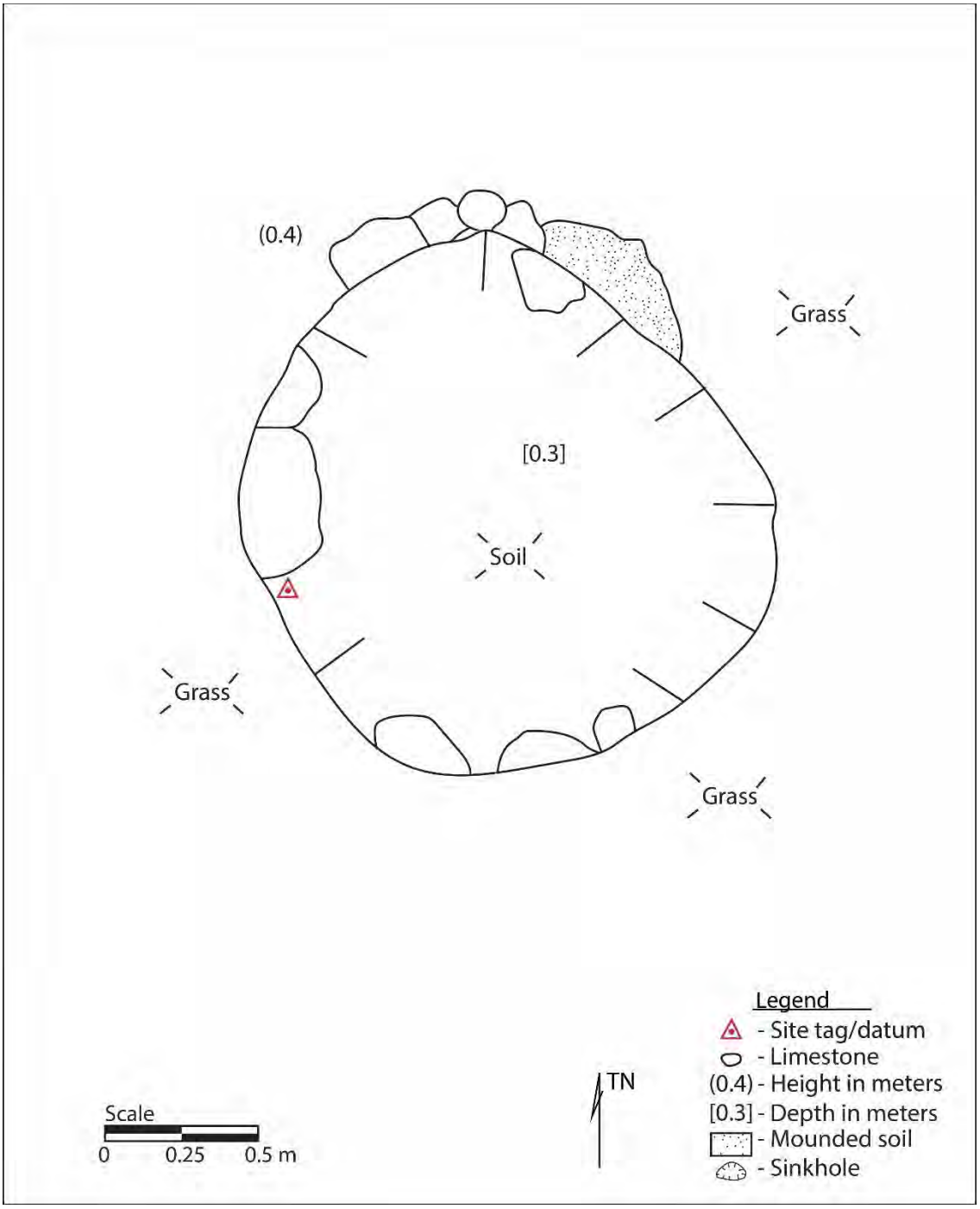

Figure 231. Plan-view map of SIHP 50-80-12-05106, Feature 41 modified limestone pit.

Figure 232. SIHP 50-80-12-05106, Feature 41 filled limestone pit (view to northwest).

Feature 42 (Figure 233 and Figure 234) is a C-shaped wall in the central-western portion of Parcel 40, approximately 85 m north of Tripoli Road. Feature 42 is 3.2 m (N/S) × 1.3 m (E/W) with a maximum height of 0.35 m. The site is constructed of small limestone boulders, with small, medium, and large subangular limestone cobbles piled on top. The southernmost portion of the wall contains larger boulders than any other area, with the northern portion mainly consisting of cobbles. Feature 42 is just southwest of a large pile of limestone that is either naturally occurring or the result of previous disturbance. It is in fair condition and interpreted as a temporary habitation feature.

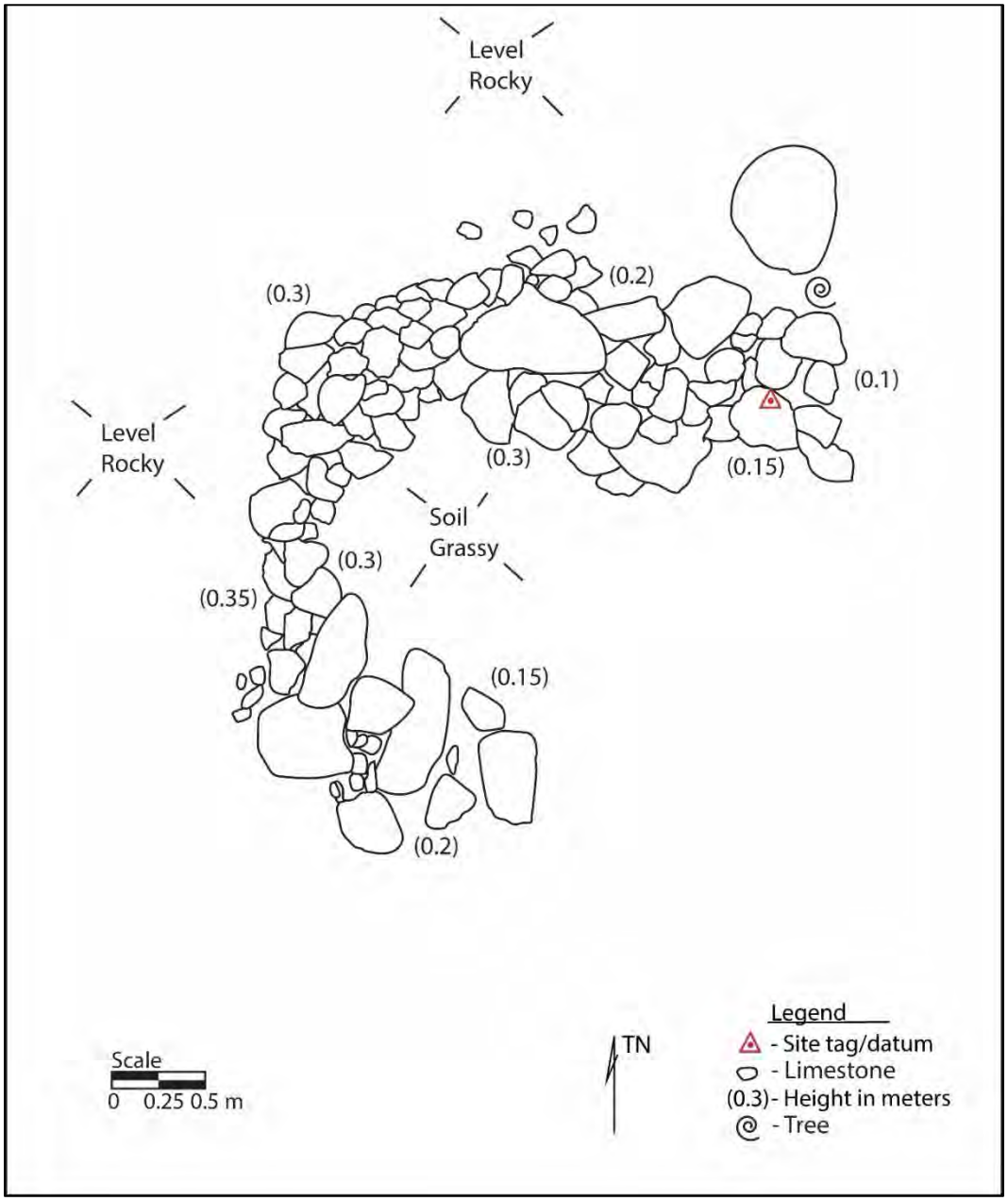

Figure 233. Plan-view map of SIHP 50-80-12-05106, Feature 42 C-shaped wall.

Figure 234. SIHP 50-80-12-05106, Feature 42 C-shaped wall (view to west-northwest).

Feature 43 (Figure 235 and Figure 236) is a wall section located in the central-western portion of Parcel 40, approximately 80 m north of Tripoli Road. Feature 43 is roughly 2.5 m (N/S) × 0.6 m (E/W) with a maximum height of 0.6 m. The feature is 1 to 2 courses high, constructed mainly of small and medium cobbles. Based on size and style of construction, Feature 43 most likely dates to the 20th century and served as a small blind for military training. The site is in fair condition.

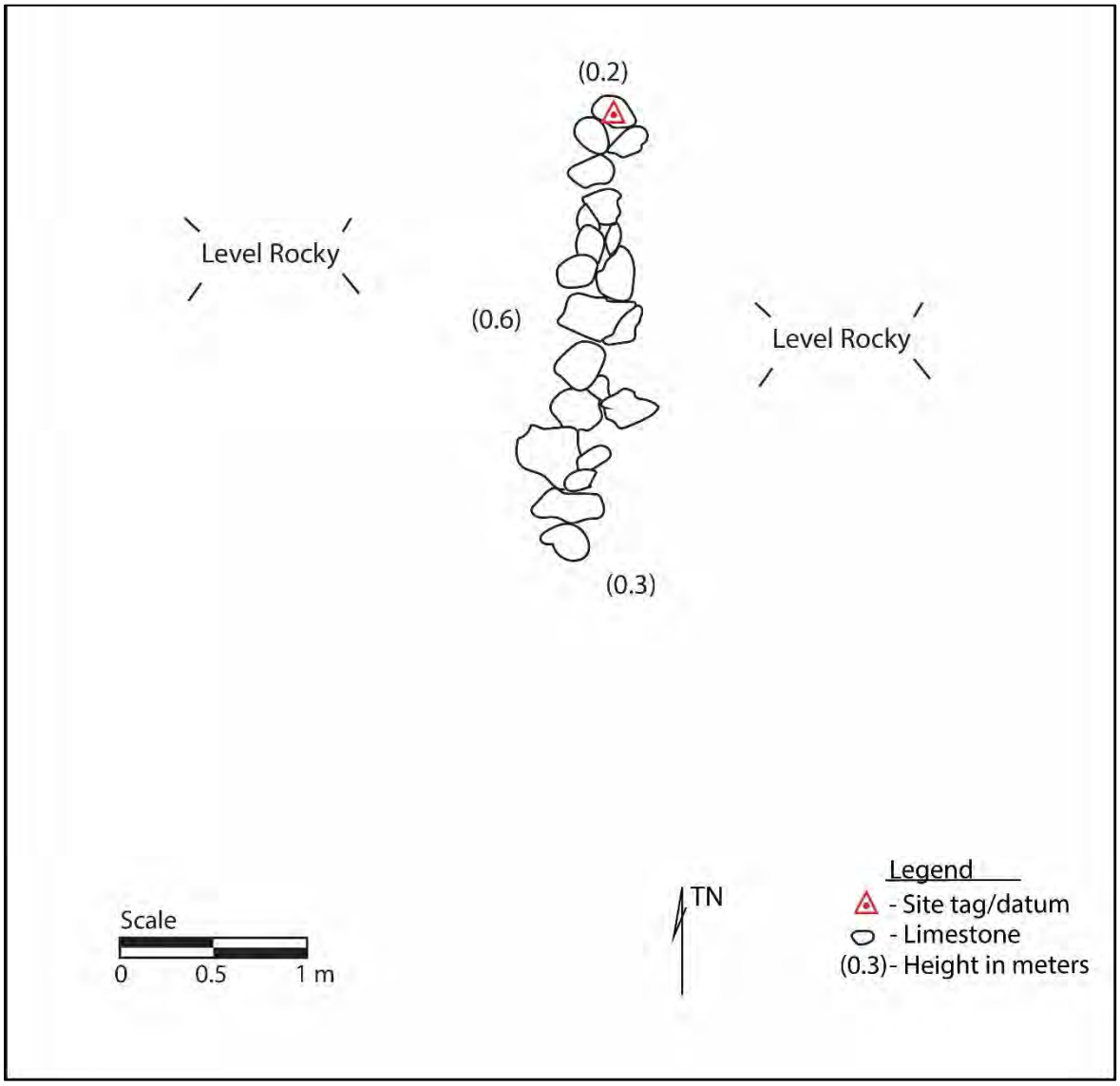

Figure 235. Plan-view map of SIHP 50-80-12-05106, Feature 43 wall.

Figure 236. SIHP 50-80-12-05106, Feature 43 wall (view to southeast).

Feature 44 (Figure 237) is a limestone pit located at the center of the site. The pit measures 1 m long × 0.9 m wide × 0.4 m deep. The floor of the pit has a soil deposit at least a 0.1 m deep. The function of Feature 44 is undetermined.

Figure 237. SIHP 50-80-12-05106, Feature 44 limestone pit (view to east).

Feature 45 (Figure 238) is a linear mound located in the central-western portion of Parcel 40, about 50 m north of Tripoli Road. Feature 45 is 1.3 m (NE/SW) × 4 m (NW/SE) with a maximum wall height of 0.7 m. The feature is composed of small and medium limestone boulders, with medium and large limestone cobbles piled on top, about 3 to 4 cobbles high. The feature was previously recorded by Beardsley (2001) as Feature P and a test unit was excavated in the mound, which yielded no archaeological materials. A modern brown glass bottle was observed at Feature 45. Although previously identified as an agricultural mound, the current study interprets the mound as being related to military land clearing. It is in fair condition.

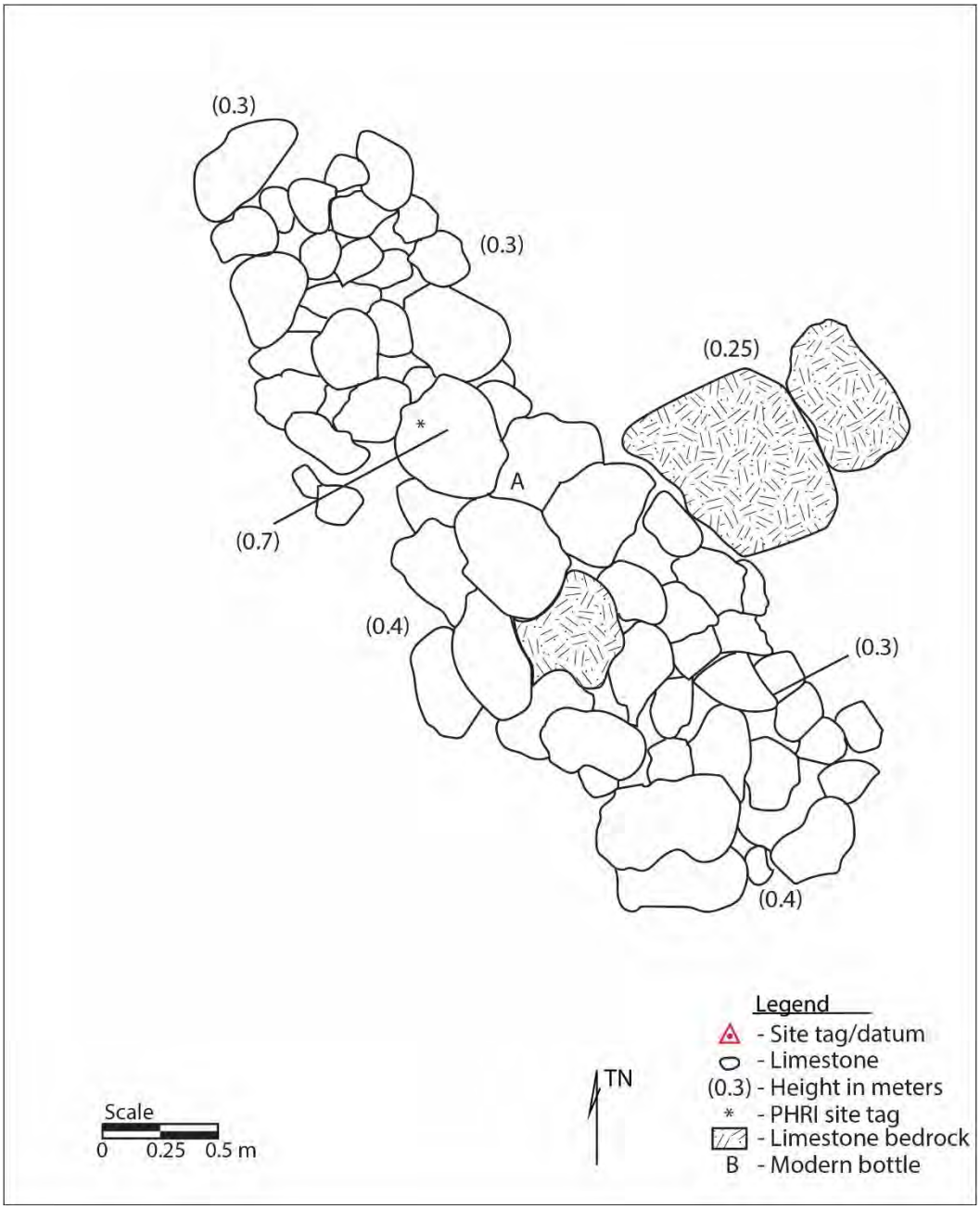

Figure 238. Plan-view of SIHP 50-80-12-05106, Feature 45 mound.

Feature 46 (Figure 239 and Figure 240) is a remnant wall segment located in the central-western portion of Parcel 40, about 125 m north of Tripoli Road. Feature 46 measures 7.5 m long (E/W) × 0.5 to 1.0 m wide (N/S) and a maximum 0.4 m high. The east and west ends of the wall are curved forming an arc shape. The site is mainly constructed of small and medium limestone boulders with small, medium, and large subangular limestone cobbles piled on top. There is a large, natural bedrock outcrop on the west end of the segment. Feature 46 is interpreted as an agricultural wall in fair condition.

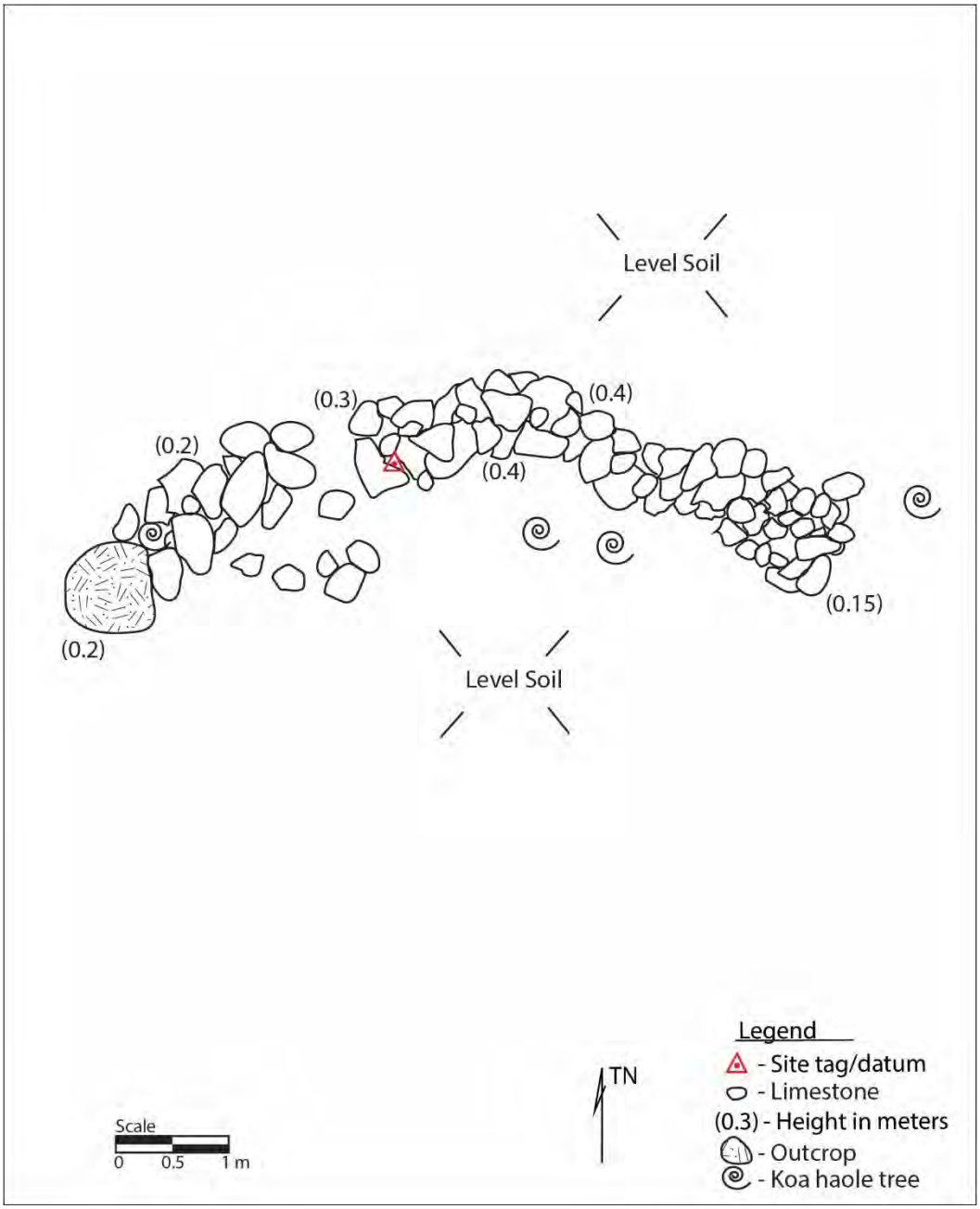

Figure 239. Plan-view map of SIHP 50-80-12-05106, Feature 46 wall segment.

Figure 240. SIHP 50-80-12-05106, Feature 46 wall segment (view to south).

Feature 47 (Figure 241 and Figure 242) is a small mound located in the central-western portion of Parcel 40, about 125 m north of Tripoli Road. The mound is 1.5 m (N/S) × 1 m (E/W) with a maximum height of 0.2 m. The mound is relatively low lying and composed of piled small, medium, and large subangular limestone cobbles. This is one of three stone mound features clustered in this area and is just east of the Feature 46 wall. Feature 47 is interpreted as an agricultural mound in fair condition.

Feature 48 (Figure 241 and Figure 243) is an oval-shaped mound located in the central-western portion of Parcel 40. Feature 48 is 1.15 m (N/S) × 1.5 m (E/W) with a maximum height of 0.3 m, approximately 2 to 3 courses high. The mound is composed of small limestone boulders with small, medium, and large limestone cobbles piled on top. Feature 48 is interpreted as an agricultural mound in fair condition.

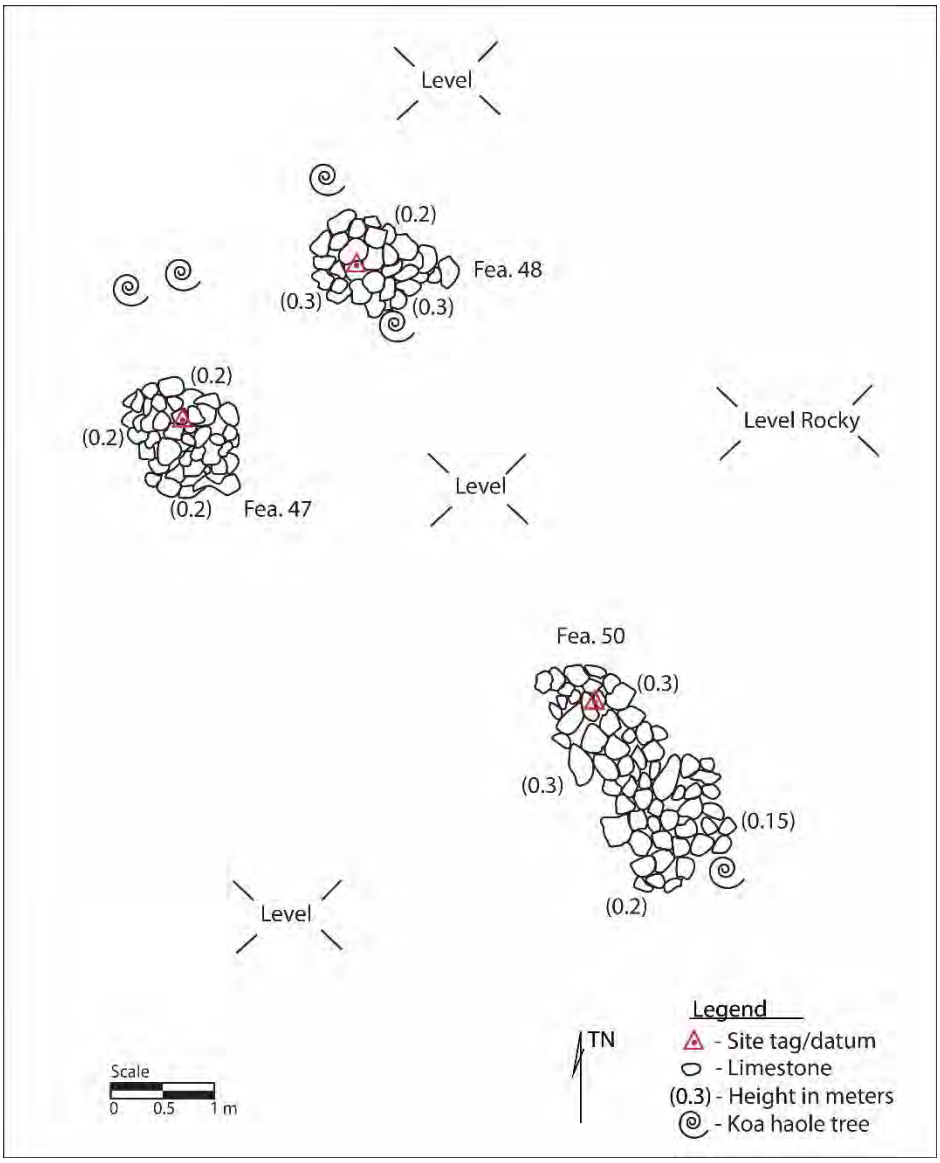

Figure 241. Plan-view map of SIHP 50-80-12-05106, Features 47, 48, and 50 (mounds).

Figure 242. SIHP 50-80-12-05106, Feature 47 limestone mound (view to northeast).

Figure 243. SIHP 50-80-12-05106, Feature 48 oval-shaped mound (view to south).

Feature 49 (Figure 244 and Figure 245) is a limestone enclosure located in the central-western portion of Parcel 40, approximately 125 m north of Tripoli Road. Feature 49 is 2.5 m (N/S) × 4.5 m (E/W) with a maximum height of 0.5 m. The remnant enclosure is rectangular in shape with a possible entrance on the northwest corner. This wall of the enclosure is composed of small and medium limestone boulders with small, medium, and large subangular limestone cobbles stacked on top. The northeastern edge of the enclosure is more defined than other parts of the enclosure, with medium boulders defining this edge and a small soil deposit area in the center of the enclosure. The site was previously recorded by Beardsley (2001) as Feature M and described as an agricultural platform. The current study interprets Feature 49 as a possible habitation feature. It is in fair to poor condition.

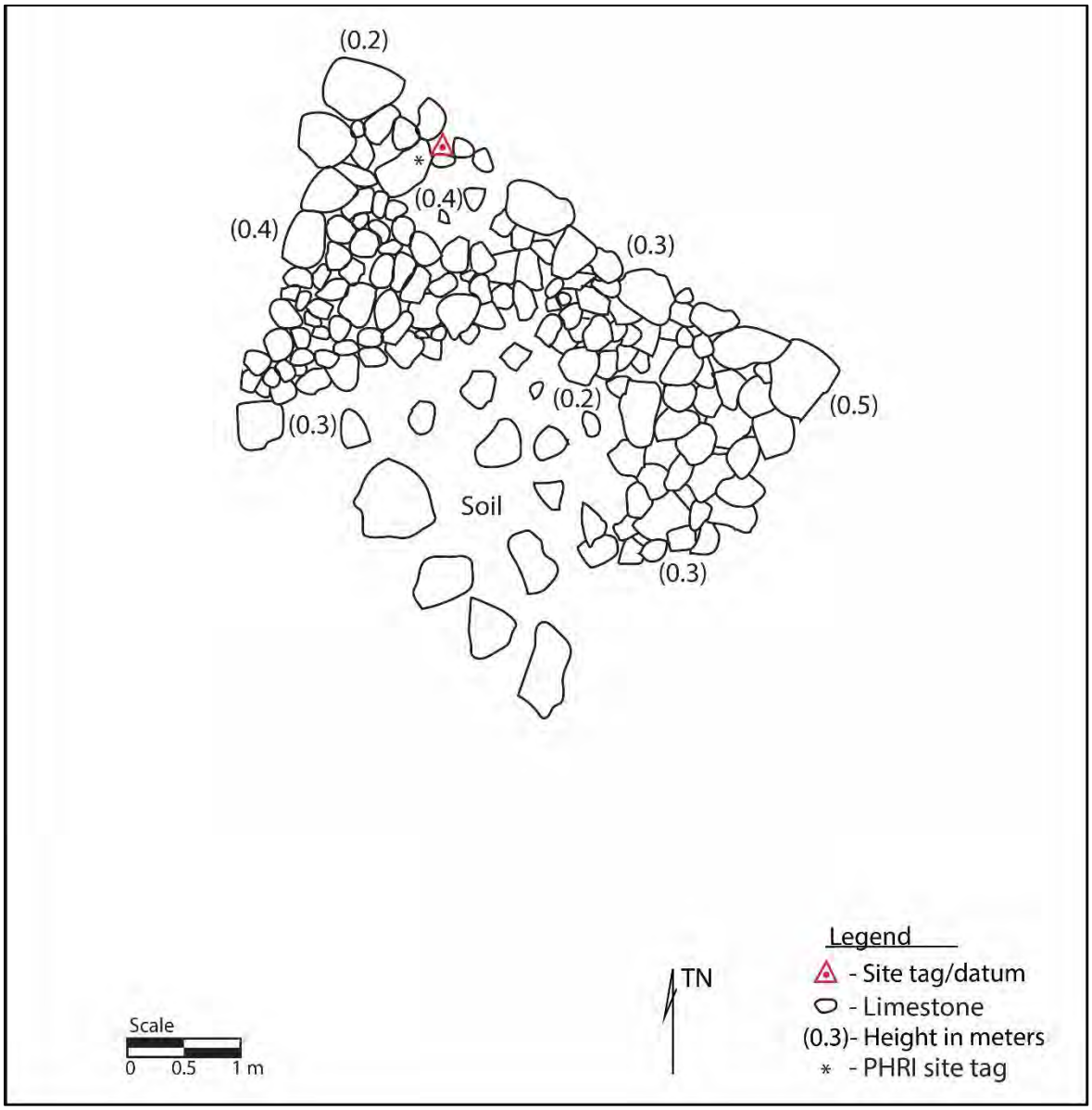

Figure 244. SIHP 50-80-12-05106, Feature 49 remnant enclosure.

Figure 245. SIHP 50-80-12-05106, Feature 49 remnant enclosure (view to southeast).

Feature 50 (see Figure 241 and Figure 246) is a linear mound located in the central-western portion of Parcel 40, about 125 m north of Tripoli Road. Feature 50 is 2.5 m (N/S) × 1.0 m (E/W) with a maximum height of 0.3 m. The mound is composed of small, medium, and large subangular limestone cobbles that are piled. This mound is the easternmost mound of the three stone mound features clustered in this area, just east of remnant wall Feature 46. Feature 50 is interpreted as an agricultural mound in fair condition.

Figure 246. SIHP 50-80-12-05106, Feature 50 mound (view to southeast).

Feature 51 (Figure 247 and Figure 248) is a limestone pit located in the westernmost portion of Parcel 40, about 130 m north of Tripoli Road and 50 m east of Coral Sea Road. Feature 51 is a potentially modified limestone pit that measures roughly 1.5 m (NW/SE) × 2 m (NE/SW) with a maximum depth of 2.5 m. The potential modifications include small and medium limestone cobbles piled along the western edges of the pit and on the floor of the pit. The pit is also surrounded by a concentration of small, medium, and large limestone cobbles and small limestone boulders. Beardsley (2001) documented Feature 51 as as an agricultural feature (Feature AA) of SIHP 50-80-12-05107. In agreement with Beardsley (2001), the modified pit is interpreted as an agricultural feature. It is in fair condition.

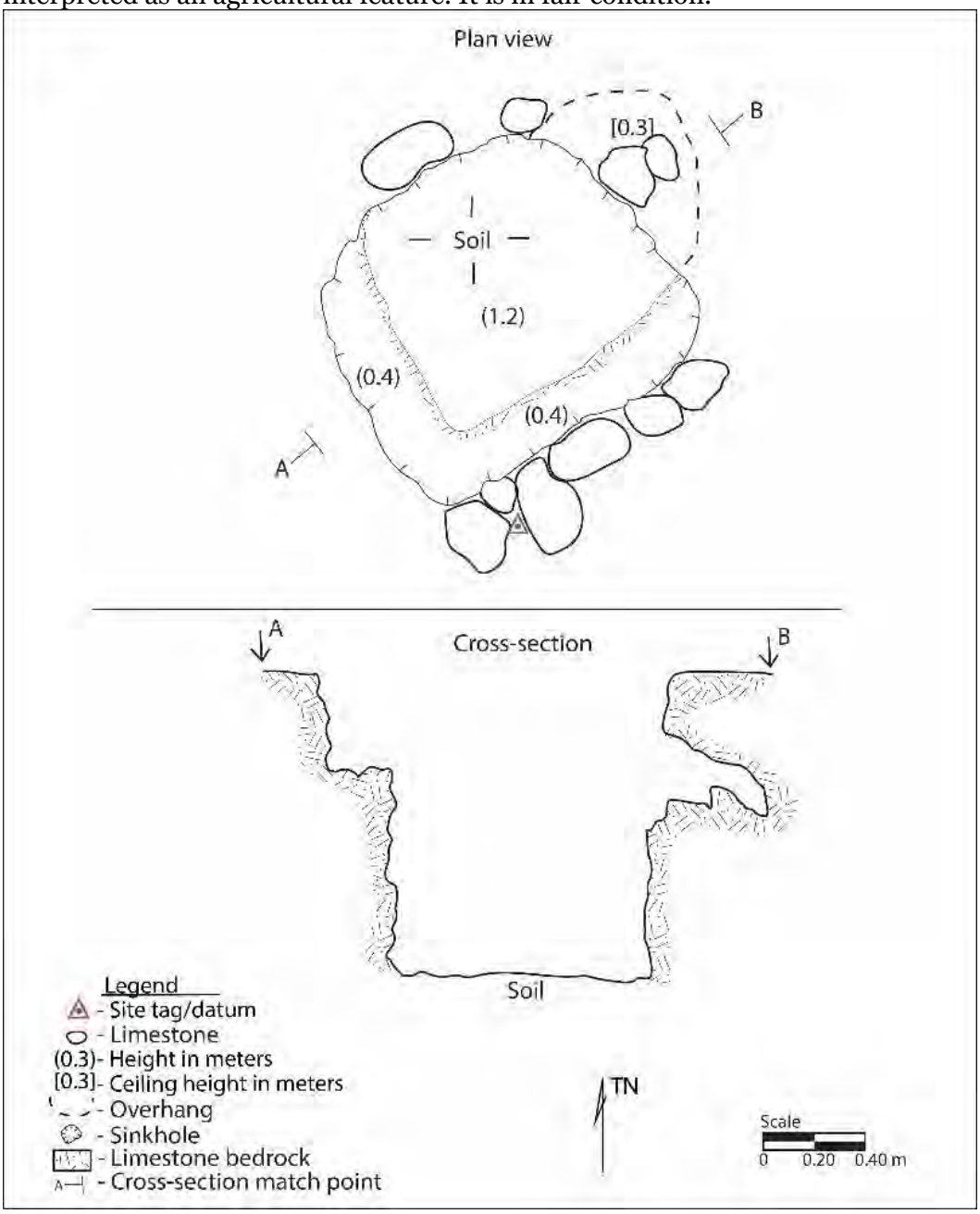

Figure 247. Plan-view map of SIHP 50-80-12-05106, Feature 51 modified limestone pit.

Figure 248. SIHP 50-80-12-05106, Feature 51 potentially modified sink (view to southwest).

Feature 52 (Figure 249 and Figure 250) is a modified limestone pit located in the westernmost portion of Parcel 40, approximately 120 m north of Tripoli Road and 45 m east of Coral Sea Road. Feature 52 is 2 m (NW/SE) × 2 m (NE/SW) with a maximum depth of 0.75 m. The pit is roughly rectangular in shape. There are small boulders and small, medium, and large limestone cobbles along the edges of the pit and several large limestone slabs are on top of the pit edge but do not look intentionally placed. The feature was previously recorded by Beardsley (2001) as as an agricultural feature of SIHP 50-80-12-05107, Feature Y. In agreement with Beardsley (2001), the modified pit is interpreted as an agricultural feature. It is in fair condition.

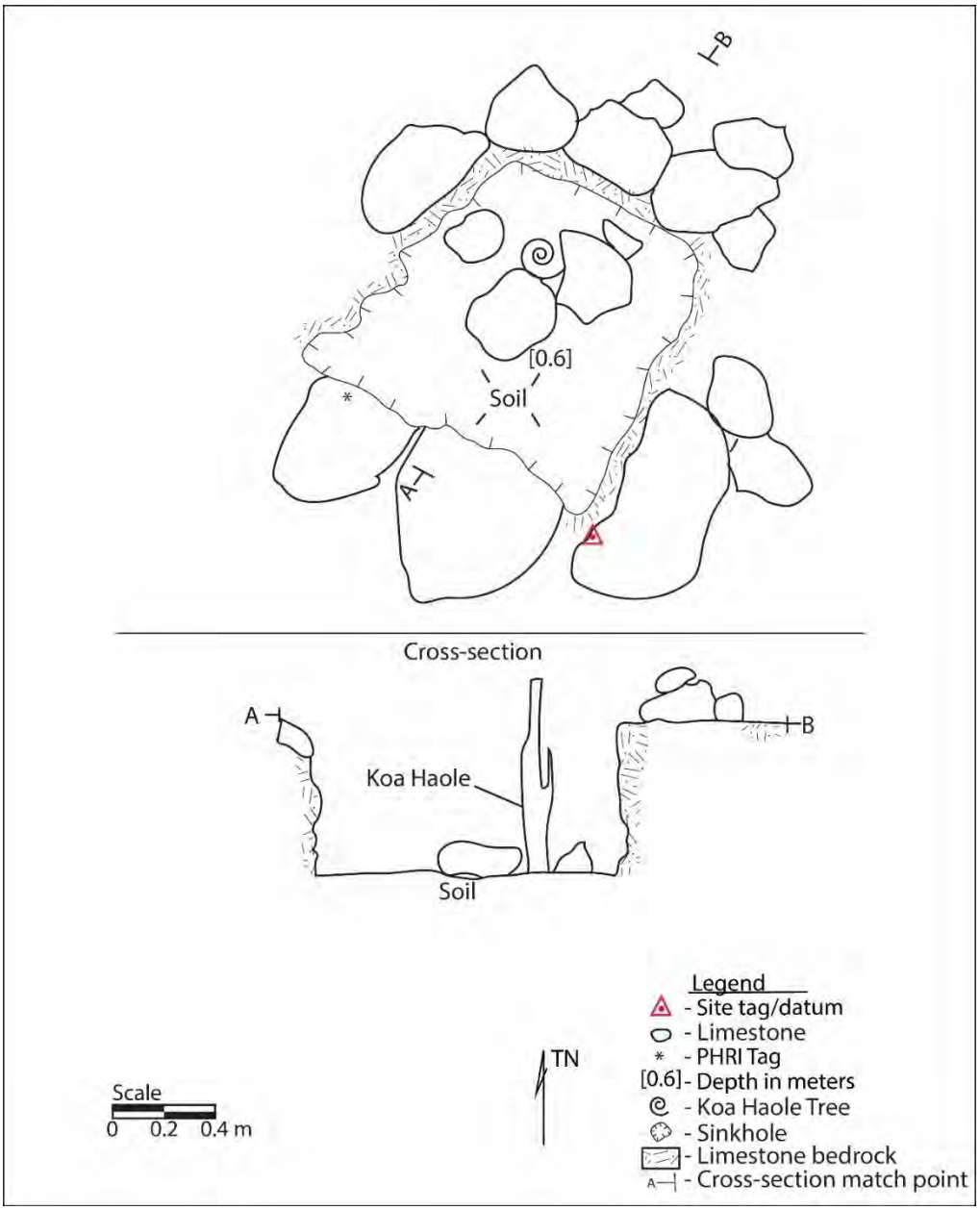

Figure 249. Plan-view map of SIHP 50-80-12-05106, Feature 52 modified limestone pit.

Figure 250. SIHP 50-80-12-05106, Feature 52 modified limestone pit (view to east-southeast).

Feature 53 (Figure 251 and Figure 252) is a linear mound located in the westernmost portion of Parcel 40, about 120 m north of Tripoli Road and 45 m east of Coral Sea Road. This is one of several features clustered in this area. Feature 53 is 0.7 m (N/S) × 2 m (E/W) with a maximum height of 0.3 m. The mound is composed of several small limestone boulders with small, medium, and large limestone cobbles piled on top. Feature 53 is interpreted as an agricultural mound in fair condition.

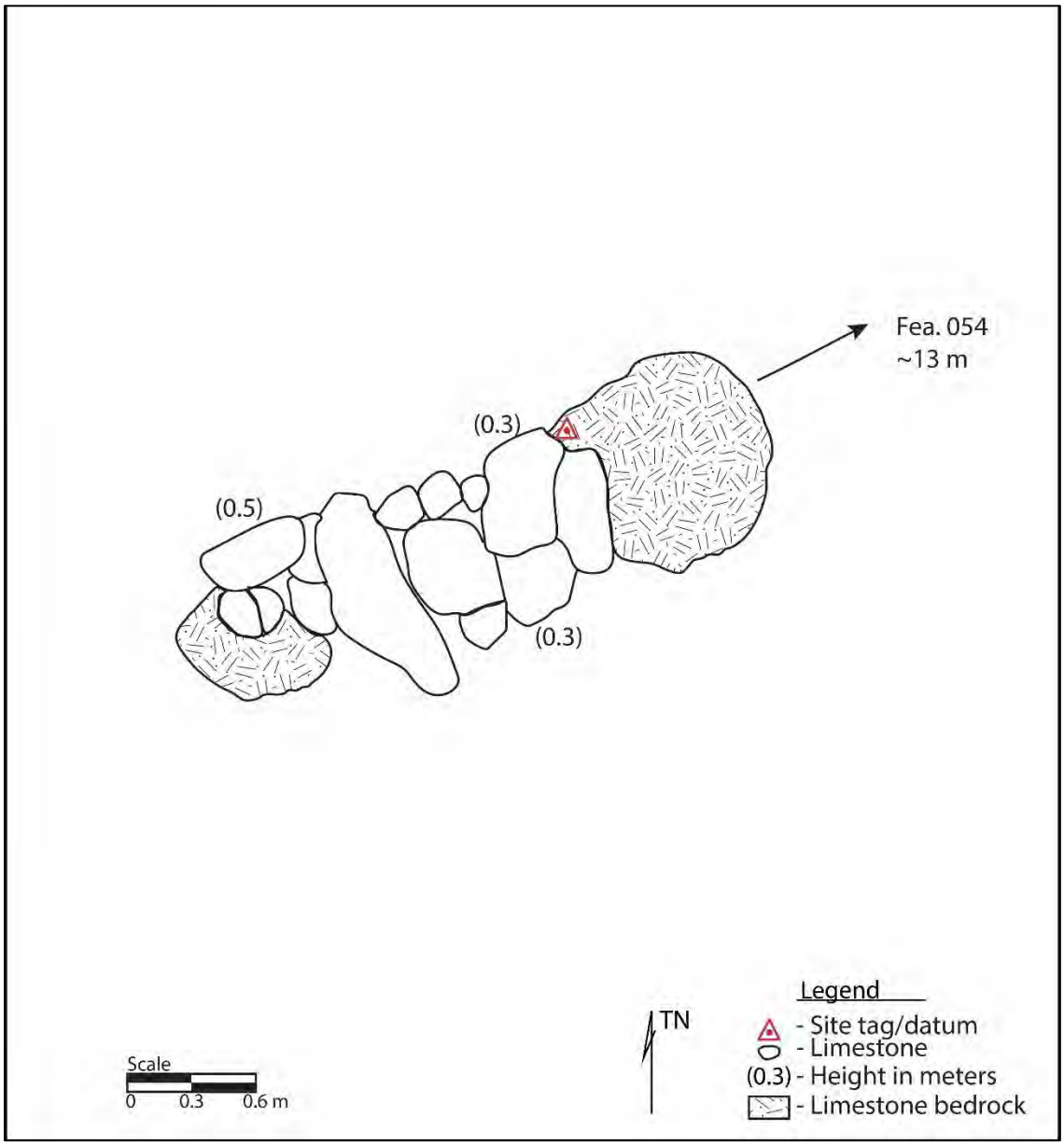

Figure 251. Plan-view map of SIHP 50-80-12-05106, Feature 53 linear mound.

Figure 252. SIHP 50-80-12-05106, Feature 53 linear mound (view to southeast).

Feature 54 (Figure 253 through Figure 255) is an enclosure located in the westernmost portion of Parcel 40, about 120 m north of Tripoli Road and 45 m east of Coral Sea Road. The enclosure is open on the southwest side and 18 m (NW/SE) × 12 m (N/S) with a maximum wall height of 0.7 m and a maximum wall width of 1.5 m. The wall is composed of piled medium limestone boulders with small, medium, and large subangular limestone cobbles piled on top. Feature 54 was likely as an agricultural planting area. A limestone boulder placed on-end (Feature 73) is in the southeastern corner of the enclosure.

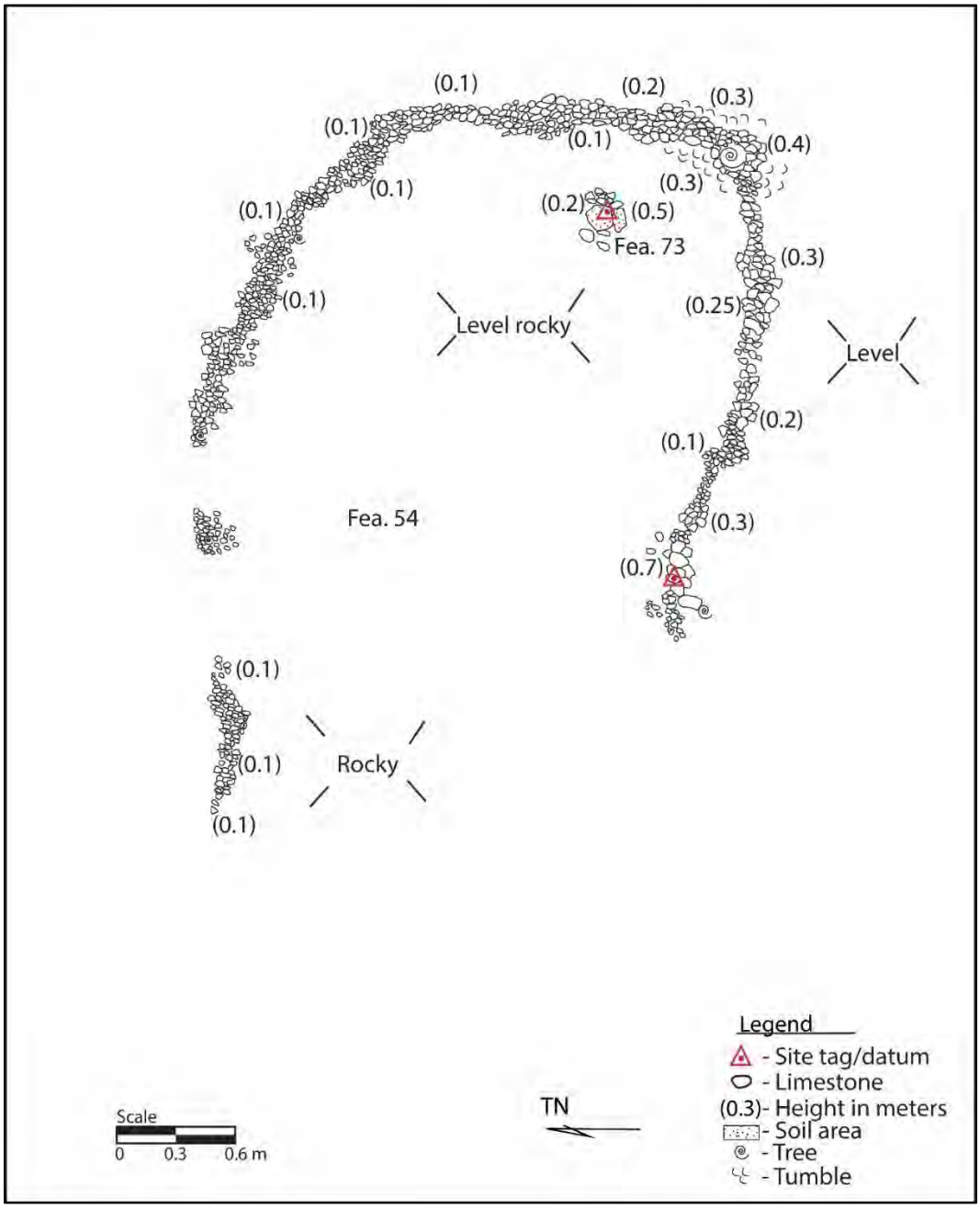

Figure 253. Plan-view map of SIHP 50-80-12-05106, Feature 54 enclosure and Feature 73 (a boulder on-end) in southeast corner.

Figure 254. SIHP 50-80-12-05106, Feature 54 overview of wall (view to northeast).

Figure 255. SIHP 50-80-12-05106, close-up of Feature 54 wall (view to north).

Feature 55 (Figure 256 and Figure 257) is a modified limestone pit located in the western portion of Parcel 40, about 120 m north of Tripoli Road and 45 m east of Coral Sea Road. It is 2.3 m (N/S) × 2.25 m (E/W) with a maximum depth of 0.45 m. Modifications include the placement of small and medium boulders along the upper edges of the pit. The pit interior is filled with limestone cobble and small boulders. Feature 55 was previously recorded by Beardsley (2001) as an agricultural feature of SIHP 50-80-12-05107, Feature L. A test unit excavated in the floor of the pit yielded no archaeological materials. In agreement with Beardsley (2001), the modified pit is interpreted as an agricultural feature. It is in fair condition.

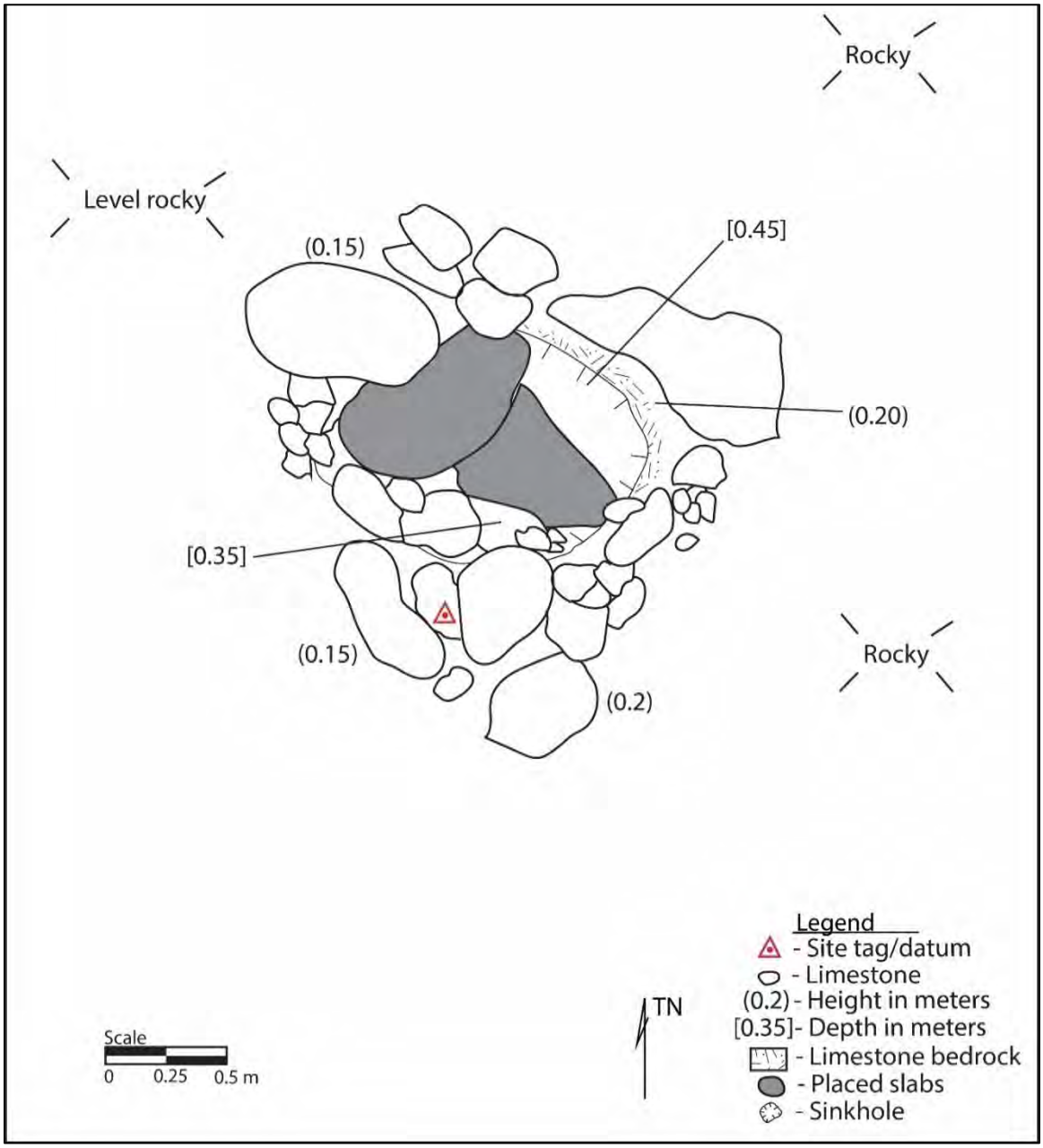

Figure 256. Plan-view map of SIHP 50-80-12-05106, Feature 55 modified pit.

Figure 257. SIHP 50-80-12-05106, Feature 55 modified limestone pit (view to north).

Feature 56 (Figure 258) is a limestone pit located in the western site cluster 65 m east of Coral Sea Road. The pit measures 1.9 × 2 m and is 1 m deep. Feature 1 barbed-wire fence is aligned across the pit. The function of Feature 56 is undetermined. It is in fair condition.

Figure 258. SIHP 50-80-12-05106, Feature 56 limestone pit (view south).

Feature 57 (Figure 259 and Figure 260) is a wall located in the central-western portion of Parcel 40, about 100 m north of Tripoli Road and 40 m east of Coral Sea Road.. Feature 57 is 5 m (NE/SW) × 1 m (NW/SW) at its widest, with a maximum wall height of 0.45 m. The wall is composed of small limestone boulders with small, medium, and large subangular limestone cobbles piled on top. Feature 57 is interpreted as an agricultural feature in fair condition.

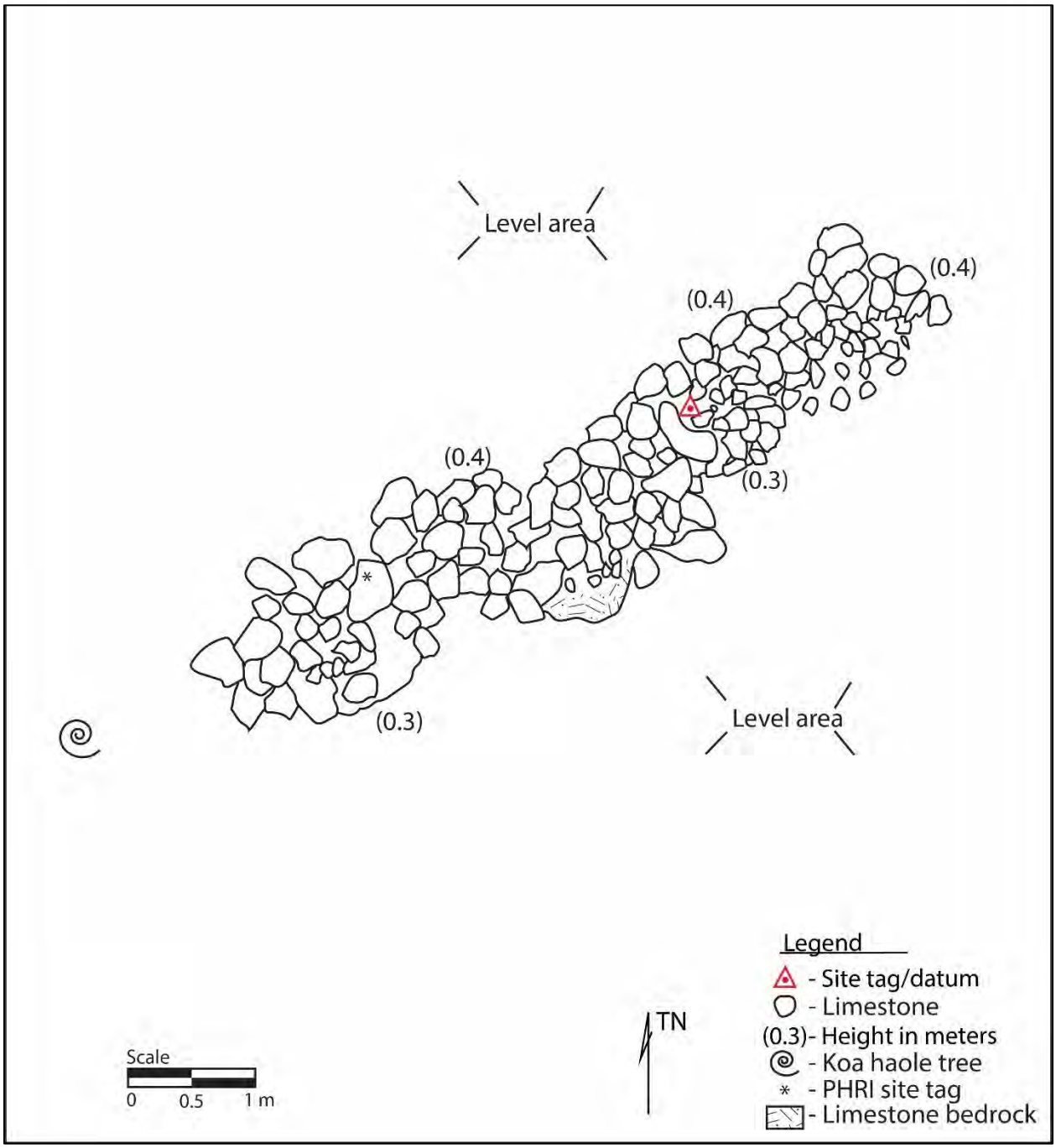

Figure 259. Plan-view map of SIHP 50-80-12-05106, Feature 57 wall remnant.

Figure 260. SIHP 50-80-12-05106, Feature 57 wall remnant (view to east).

Feature 58 (Figure 261 and Figure 262) is a modified limestone pit located in the central-western portion of Parcel 40. The pit is 1.5 m (N/S) × 2 m (E/W) with a maximum depth of 0.6 m. Medium and large limestone cobbles are piled around the edge of the pit and the interior is currently filled with limestone cobbles and boulders with some soil visible. The feature was previously recorded by Beardsley (2001) as an agricultural feature of SIHP 50-8012-5107 (Feature I) and a 1 × 0.5 m test unit was excavated at the center of the pit. Although fossilized shell was observed, no archaeological or paleontological material was recovered from the excavation. Feature 58 is in fair condition. In agreement with Beardsley 2001, the modified pit is interpreted as an agricultural feature.

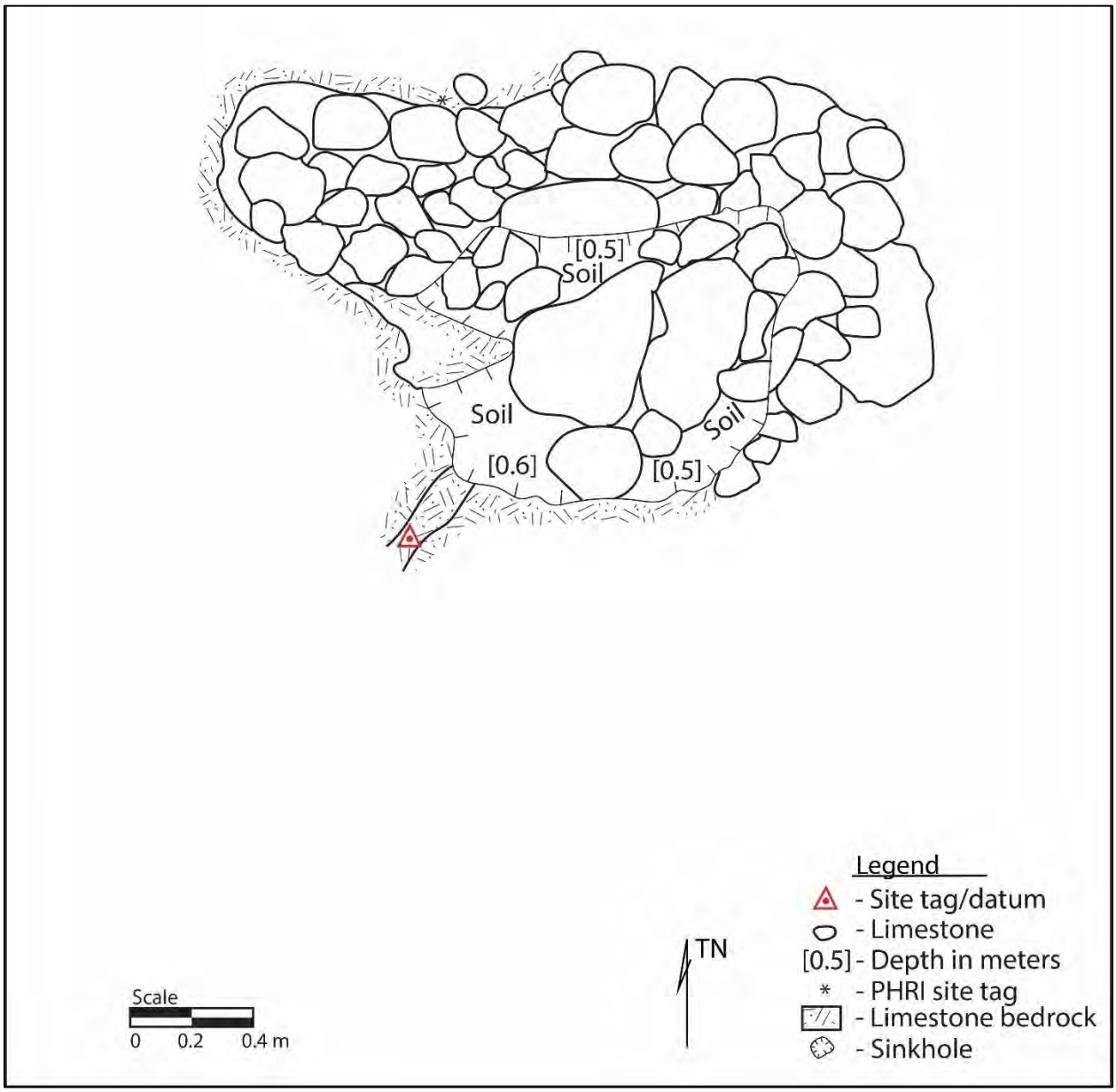

Figure 261. Plan-view map of SIHP 50-80-12-05106, Feature 58 modified limestone pit.

Figure 262. SIHP 50-80-12-05106, Feature 58 modified limestone pit (view to north).

Feature 59 (Figure 263) is a limestone pit 5.5 m north of Feature 58. It measures 1.2 × 1.3 m and is 1.3 m deep. The feature was previously recorded by Beardsley (2001) as a modified limeston pit (Feature X) of SIHP 50-80-12-05107; however, no evidence of modification was identified during the current survey. Beardsley (2001) interpreted Feature 59 as an agricultural feature. The function of Feature 59 was not confirmed during the current survey because of the absence of structural modification.

Figure 263. SIHP 50-80-12-05106, Feature 59 pit (view to north).

Feature 60 (Figure 264) is a double limestone pit immediately east of Feature 61. The northernmost pit is 1.7 × 1.6 m and 1 m deep. The southern pit is 1.2 m × 0.9 m × 0.25 m deep. The function of Feature 60 is undetermined. The limestone pit is in fair condition.

Figure 264. SIHP 50-80-12-05106, Feature 60 double pit (view to southeast).

Feature 61 (Figure 265 and Figure 266) is a C-shaped enclosure 3.7 m (N/S) × 2.4 m (E/W) with a maximum height of 0.8 m. The feature is composed of 5 to 6 courses of limestone cobbles and small boulders. The corners of the enclosure are composed of larger boulders with cobbles along the length and width of the enclosure walls. The site was previously recorded by Beardsley (2001) as a habitation feature of SIHP 50-80-12-05106 (Feature A) and a 1 × 1 m was excavated in the northern corner of the enclosure. The excavation yielded sparse faunal material, including fish, bird, and rodent bone from the upper two strata (Layers I and II) (Beardsley 2001:IV.189). The feature wall was embedded within the first layer (Layer I).

Feature 61 is interpreted as a temporary habitation feature used during the pre-Contact or early post-Contact era. The feature is in good condition.

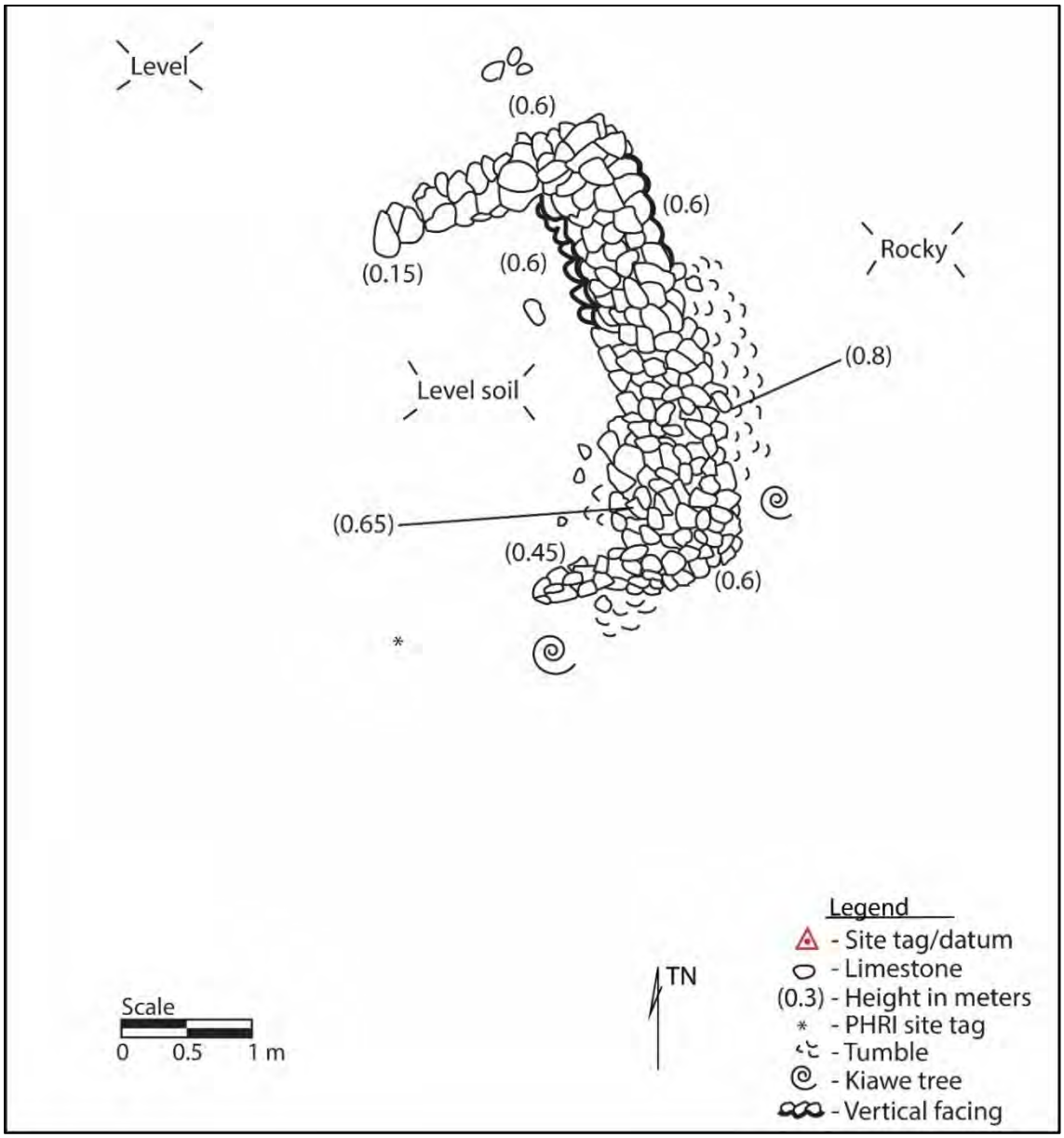

Figure 265. Plan-view map of SIHP 50-80-12-05106, Feature 61 C-shaped enclosure.

Figure 266. SIHP 50-80-12-05106, Feature 61 C-shaped enclosure (view to northeast).

Feature 62 (Figure 267) is unmodified limestone pit located immediately east of Feature 61 C-shape. The pit measures 1.1 × 1.2 m and has a depth of 0.25 m. The pit is currently filled with limestone cobbles and boulders. Haun (1991) recorded the pit as Feature B or C of SIHP 50-80-12-01747. Beardsley (2001) subsequently recorded the feature as SIHP 50-80-12-05107, Feature W and no function was assigned because of the lack of structural modifications. The function of Feature 62 is also undetermined during the current study. The pit is in poor condition.

Figure 267. SIHP 50-80-12-05106, Feature 62 pit.

Feature 63 (Figure 268 and Figure 269) is a modified limestone pit located in the northwestern portion of Parcel 40, about 135 m north of Tripoli Road and 30 m east of Coral Sea Road. Feature 63 is 2.0 m (N/S) × 1.75 m (E/W) with a maximum depth of 1.2 m. The outer edges of the limestone pit are modified with piled and stacked small, medium, and large limestone cobbles and medium and large limestone boulders. These limestone boulders are relatively flat with some larger subangular boulders throughout. The pit contains a concentration of small, medium, and large limestone cobbles. *Noni* (*Morinda citrifolia*) trees are currently growing within the pit. Feature 63 likely functioned as an agricultural feature. It is in fair condition.

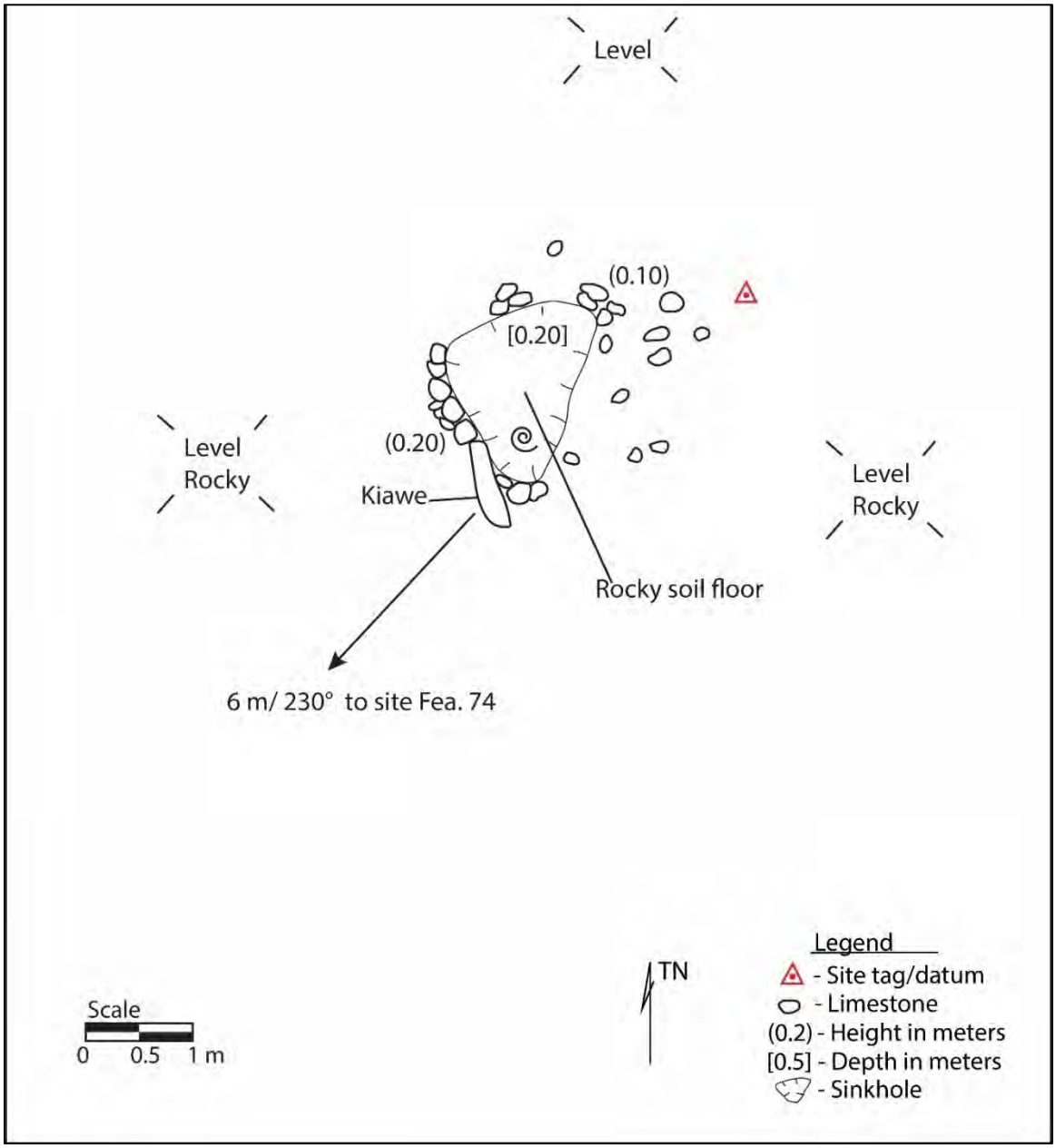

Figure 268. Plan-view of SIHP 50-80-12-05106, Feature 63 overview of pit.

Figure 269. SIHP 50-80-12-05106, Feature 63 top view of pit (view to south).

Feature 64 (Figure 270 and Figure 271) is a mound located in the northwestern portion of Parcel 40, 135 m north of Tripoli Road and 30 m east of Coral Sea Road. The mound is diamond-shaped and measures 1.6 m (N/S) × 1.8 m (E/W) with a maximum height of 0.4 m. The mound is composed of small, medium, and large limestone cobbles piled on top of several small limestone boulders. It is interpreted as an agricultural mound in fair condition.

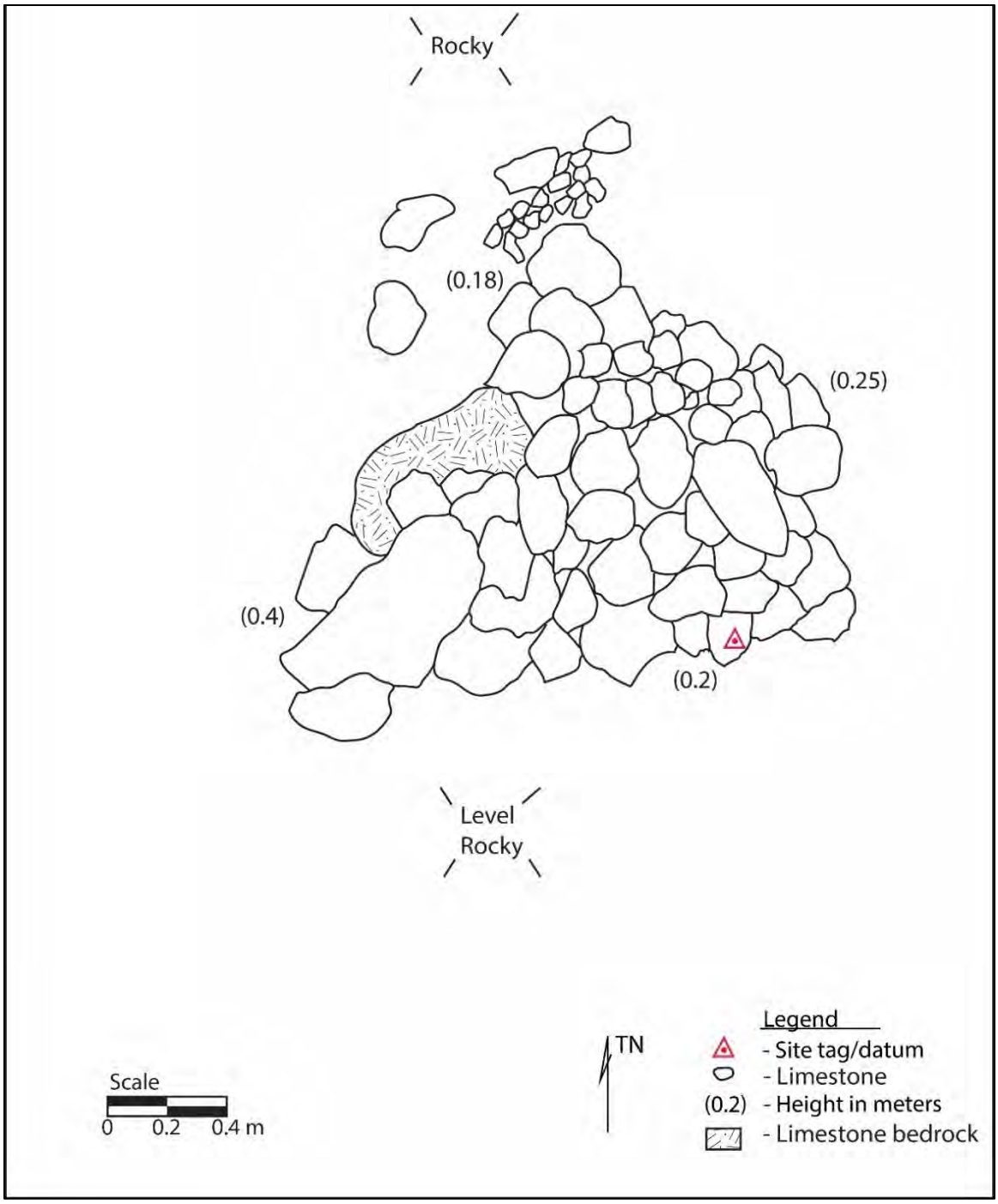

Figure 270. Plan-view map of SIHP 50-80-12-05106, Feature 64 mound.

Figure 271. SIHP 50-80-12-05106, Feature 64 mound (view to northwest).

Feature 65 (Figure 272 and Figure 273) is a modified limestone pit located in the southwestern portion of Parcel 40, about 85 m north of Tripoli Road and roughly 50 m east of Coral Sea Road. Feature 65 is 0.9 m (N/S) × 1.6 m (E/W) with a maximum depth of 0.2 m. The pit is modified with a piling of small limestone boulders and small, medium, and large limestone cobbles. The limestone pit is surrounded by flat, rocky outcrop. The pit is filled with soil. The feature was likely used as an agricultural feature and is in fair condition.

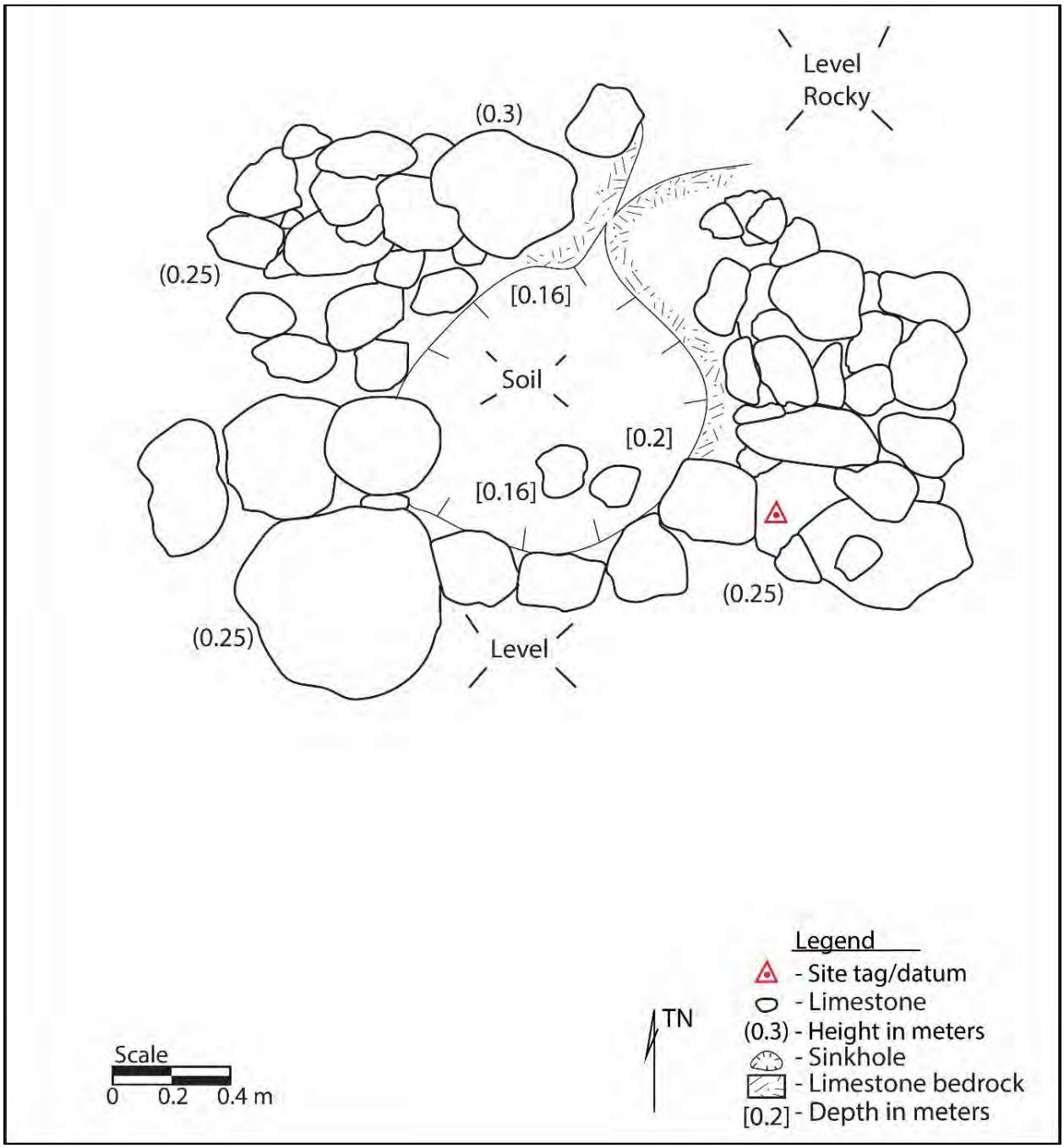

Figure 272. Plan-view map of SIHP 50-80-12-05106, Feature 65 modified limestone pit.

Figure 273. SIHP 50-80-12-05106, Feature 65 modified limestone pit (view to northwest).

Feature 66 (Figure 274and Figure 275) is a small, elongated limestone mound located in the southwestern portion of Parcel 40, just 75 m north of Tripoli Road and 30 m east of Coral Sea Road. Feature 66 is 2.9 m (N/S) × 1.45 m (E/W) with a maximum height of 0.4 m. This feature is oval- or almond-shaped and composed of small and medium limestone cobbles, with small, medium, and large subangular limestone pebbles piled on top. Feature 66 is interpreted as an agricultural mound in fair condition. Feature 98, another agricultural mound, is 1 m west.

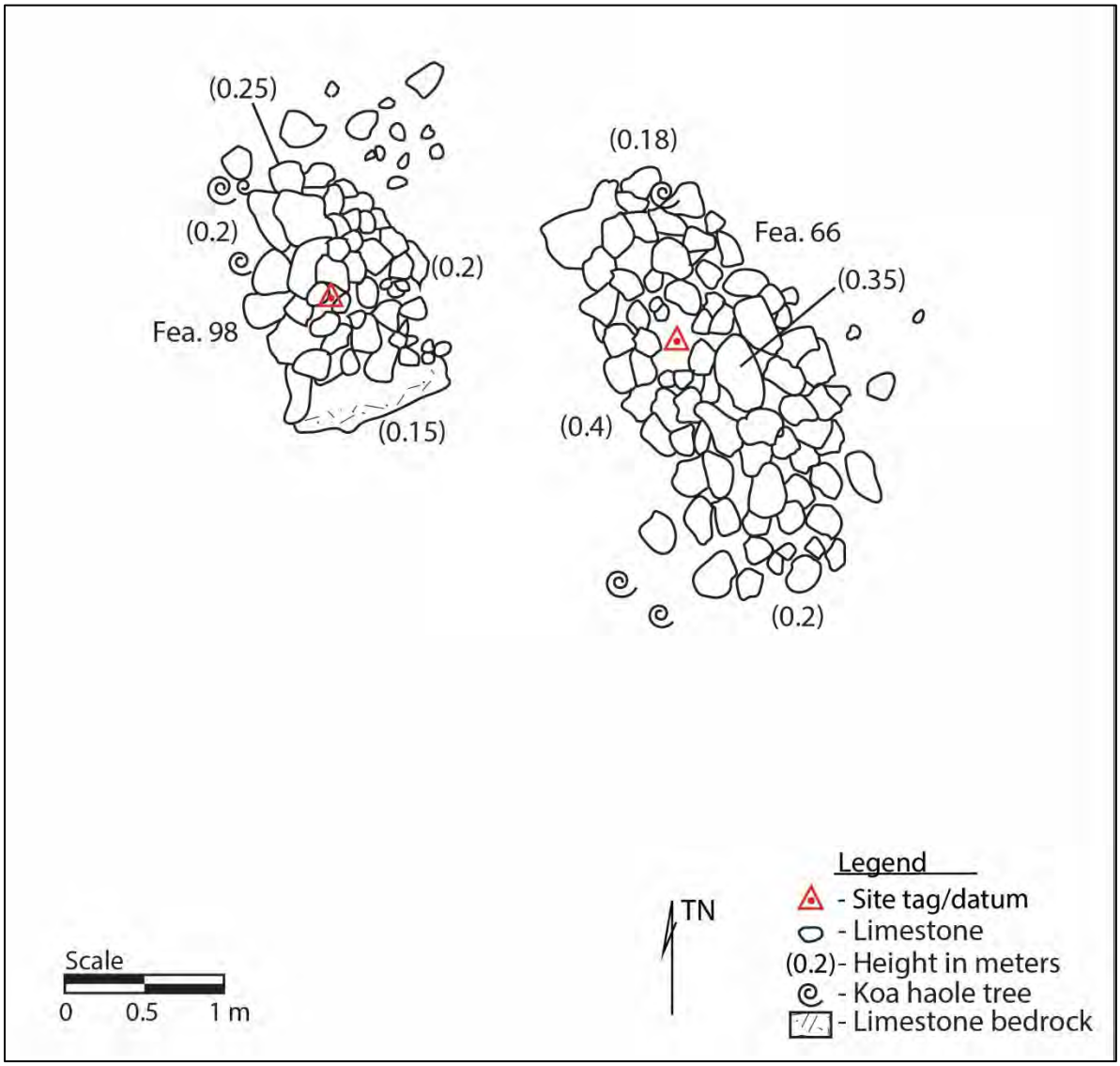

Figure 274. Plan-view map of SIHP 50-80-12-05106, Feature 66 and Feature 98 mounds.

Figure 275. SIHP 50-80-12-05106, Feature 66 mound (view to north-northeast).

Feature 67 (Figure 276 and Figure 277) is a small limestone mound located in the southwest corner of Parcel 40, about 70 m north of Tripoli Road and 60 m east of Coral Sea Road. Feature 67 is 1.2 m (N/S) × 1.68 m (E/W) with a maximum height of 0.28 m. The mound is placed on one large slab of limestone bedrock and is constructed with small boulders and small, medium, and large, subangular limestone cobbles. Feature 67 is interpreted as an agricultural mound in fair condition.

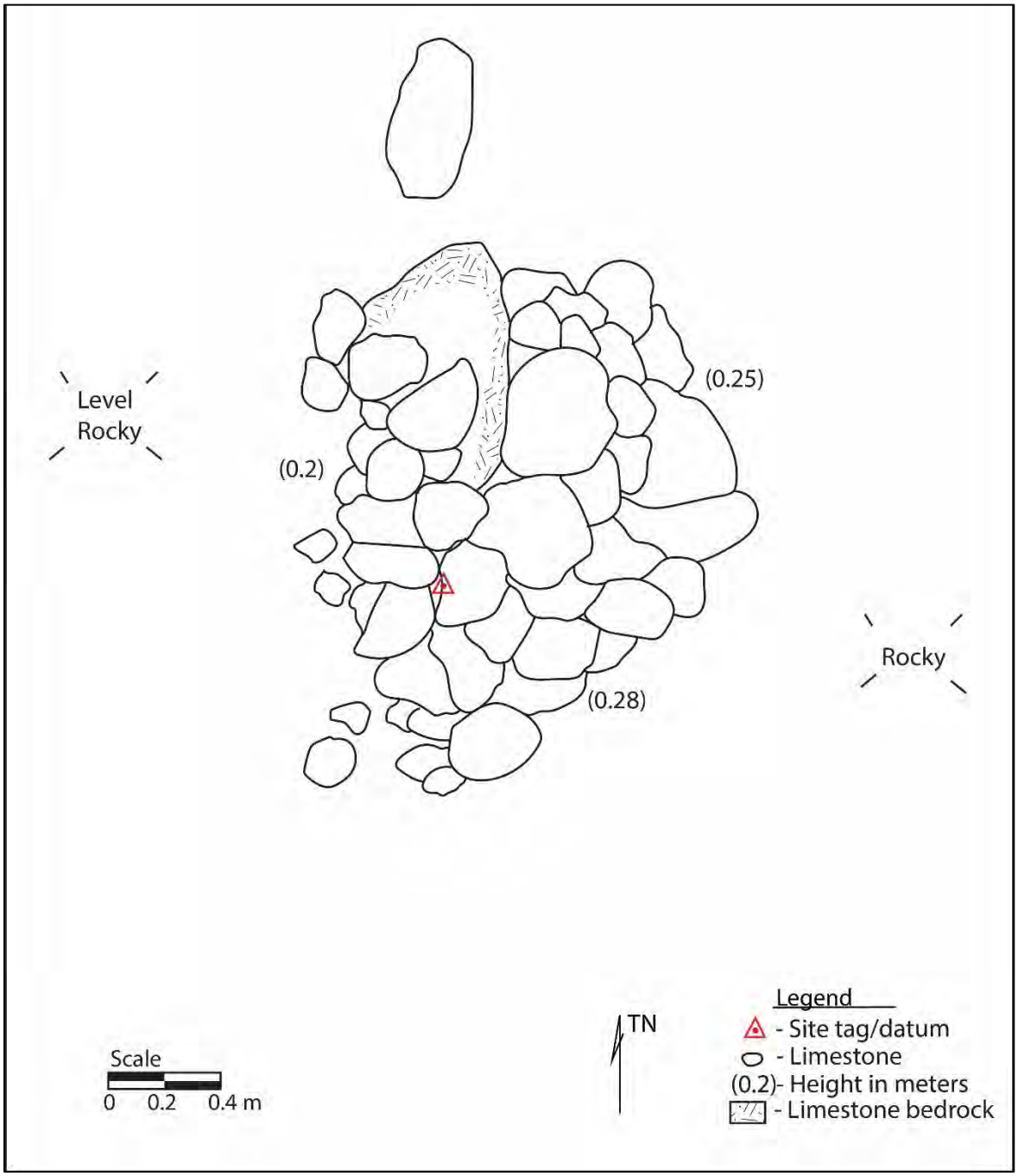

Figure 276. Plan-view map of SIHP 50-80-12-05106, Feature 67 mound.

Figure 277. SIHP 50-80-12-05106, Feature 67 mound (view to east).

Feature 68 (Figure 278) is a limestone pit located in the western portion of Parcel 40, approximately 30 m east of Coral Sea Road. The pit measures 0.9 m long × 0.7 m wide and has a depth of 2.5 m. Limestone rubble is inside the pit. The function of Feature 68 is undetermined. The feature is in fair condition.

Figure 278. SIHP 50-80-12-05106, Feature 68 pit (view to northwest).

Feature 69 (Figure 279 and Figure 280) is a modified limestone pit located 50 m north of Tripoli Road and just 30 m east of Coral Sea Road. Feature 69 is 1.5 m (E/W) × 2.5 m (N/S) with a maximum depth of 2.3 m. The pit is modified with a C-shaped wall (open to the east) that consists of piled and roughly stacked limestone cobbles and small boulders. The wall is about 0.8 m wide × 0.5 m on the exterior. Beardsley (2001) recorded Feature 69 as as an agricultural feature (Feature Z) of SIHP 50-80-12-05107 and excavated a test unit, which yielded no archaeological materials. In agreement with Beardsley (2001), Feature 69 is interpreted as an agricultural feature. It is in good condition.

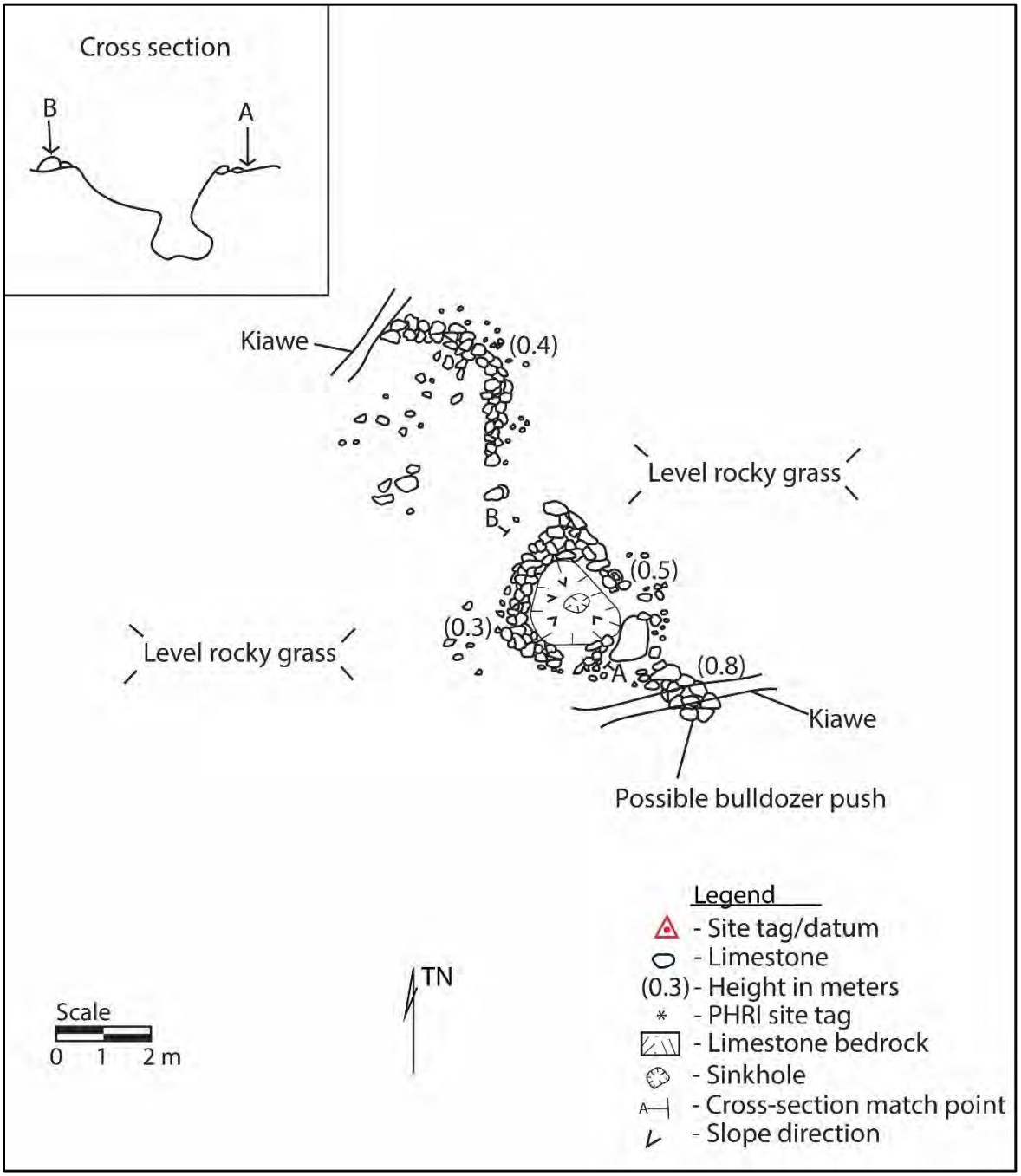

Figure 279. Plan-view map of SIHP 50-80-12-05106, Feature 69 modified pit.

Figure 280. SIHP 50-80-12-05106, Feature 69 modified pit (view to northwest).

Feature 70 (Figure 281 and Figure 282) is a roughly circular remnant enclosure located in the southwestern edge of Parcel 40, about 50 m north of Tripoli Road and 25 m east of Coral Sea Road. Feature 70 is 4 m (N/S) × 3 m (E/W) with a maximum height of 0.4 m and a maximum wall width of 1 m. The walls of the enclosure are collapsed and consist of roughly piled limestone cobbles and small boulders. The feature is in poor condition due to disturbance by historic and modern landscape modifications indicated by bulldozer push in the vicinity. Feature 70 might have functioned as a habitation feature.

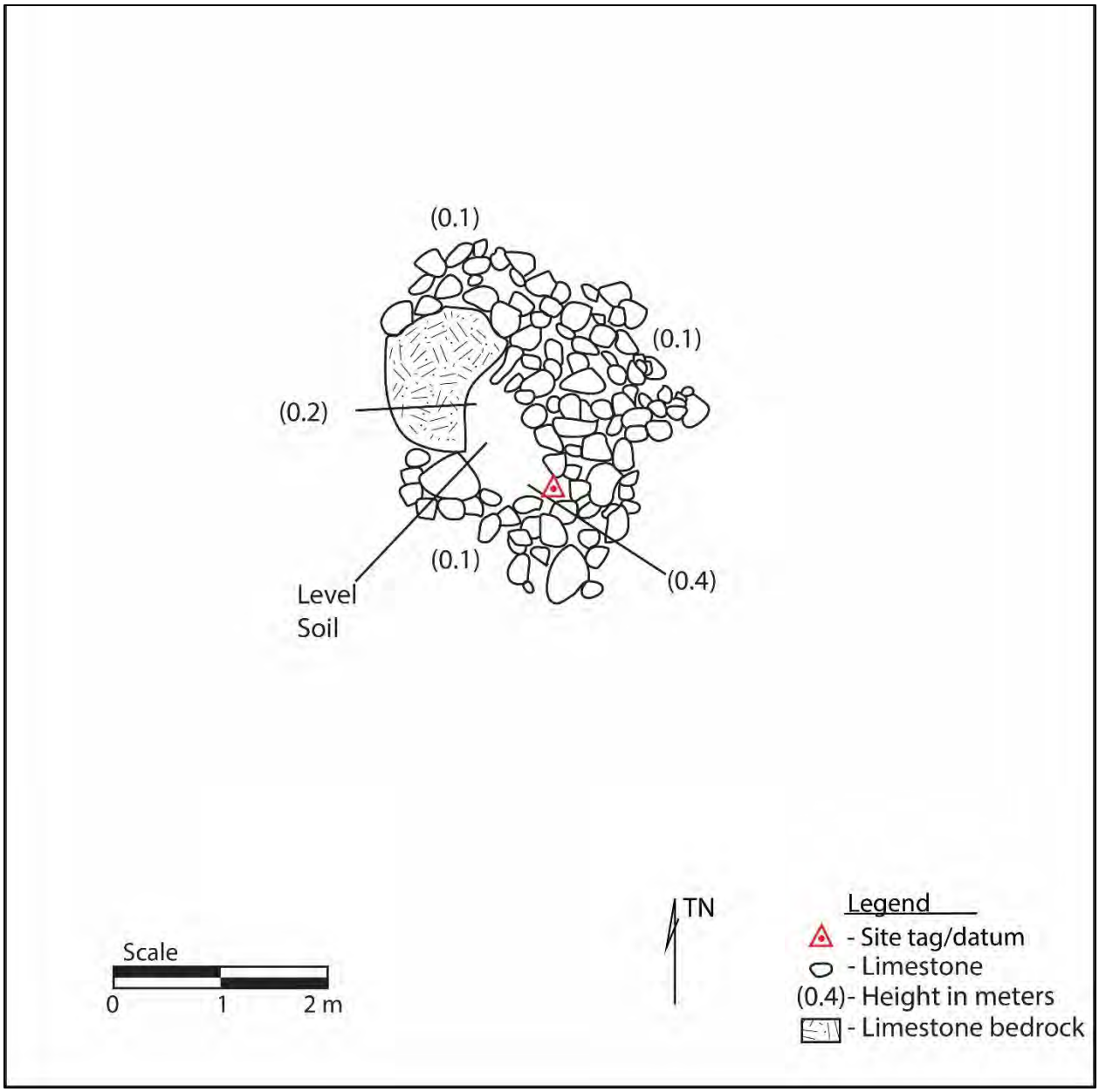

Figure 281. Plan-view map of SIHP 50-80-12-05106, Feature 70 remnant enclosure.

Figure 282. SIHP 50-80-12-05106, Feature 70 remnant enclosure (view to northeast).

Feature 71 (Figure 283 and Figure 284) is an L-shaped wall located along the southwestern edge of Parcel 40, 150 m north of Tripoli Road and about 20 m east of Coral Sea Road. The two walls of Feature 71 are 6.8 m (N/S) and 6.0 m (E/W), with a maximum height of 0.5 m. The wall is between 0.7 m and 1.6 m wide. The wall is loosely constructed of small and medium limestone boulders, with small, medium, and large cobbles and medium pebbles piled on top. There is a small break in the northwest portion of the wall possibly due to the construction of a nearby road. The feature appears to be the result of bulldozing in the area. It is in fair condition.

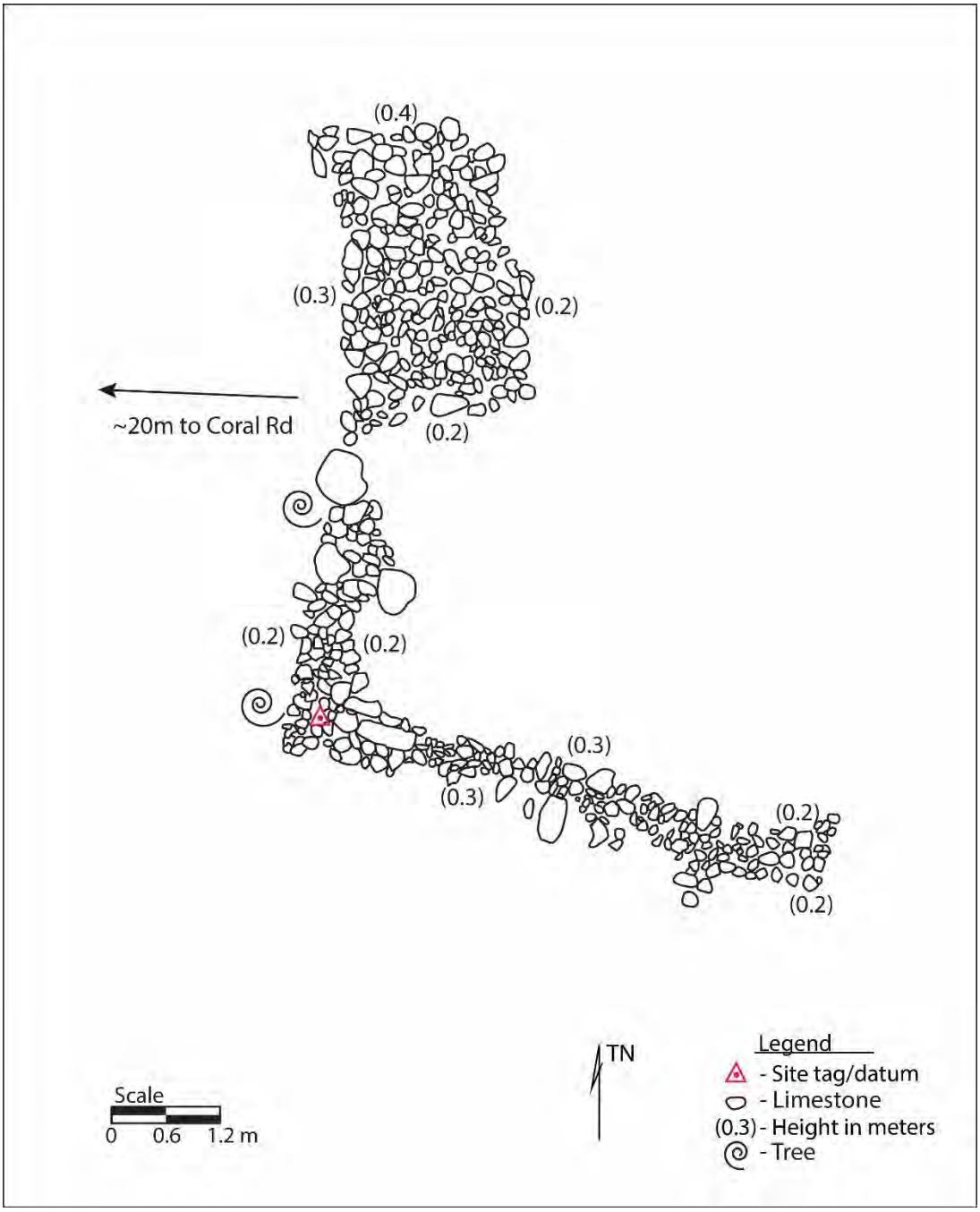

Figure 283. Plan-view map of SIHP 50-80-12-05106, Feature 71 L-shaped wall.

Figure 284. SIHP 50-80-12-05106, Feature 71 L-shaped wall (view to west).

Feature 72 (Figure 285 and Figure 286) is a wall measuring 5 m (N/S) × 1.2 m (E/W) with a maximum height of 0.5 m. The wall is constructed of piled small, medium, and large subangular limestone cobbles. It is possible that this wall once formed an enclosure with Feature 57 wall, located 13 m to the north. If so, both walls might have enclosed an agricultural plot. The wall is in fair condition and was likely used for agriculture. Feature 72 is likely the wall recorded by Beardsley (2001) as an agricultural feature (Feature B) at SIHP 50-80-12-05106. A PHRI site tag present on the wall was illegible but the feature designation looked like an "8".

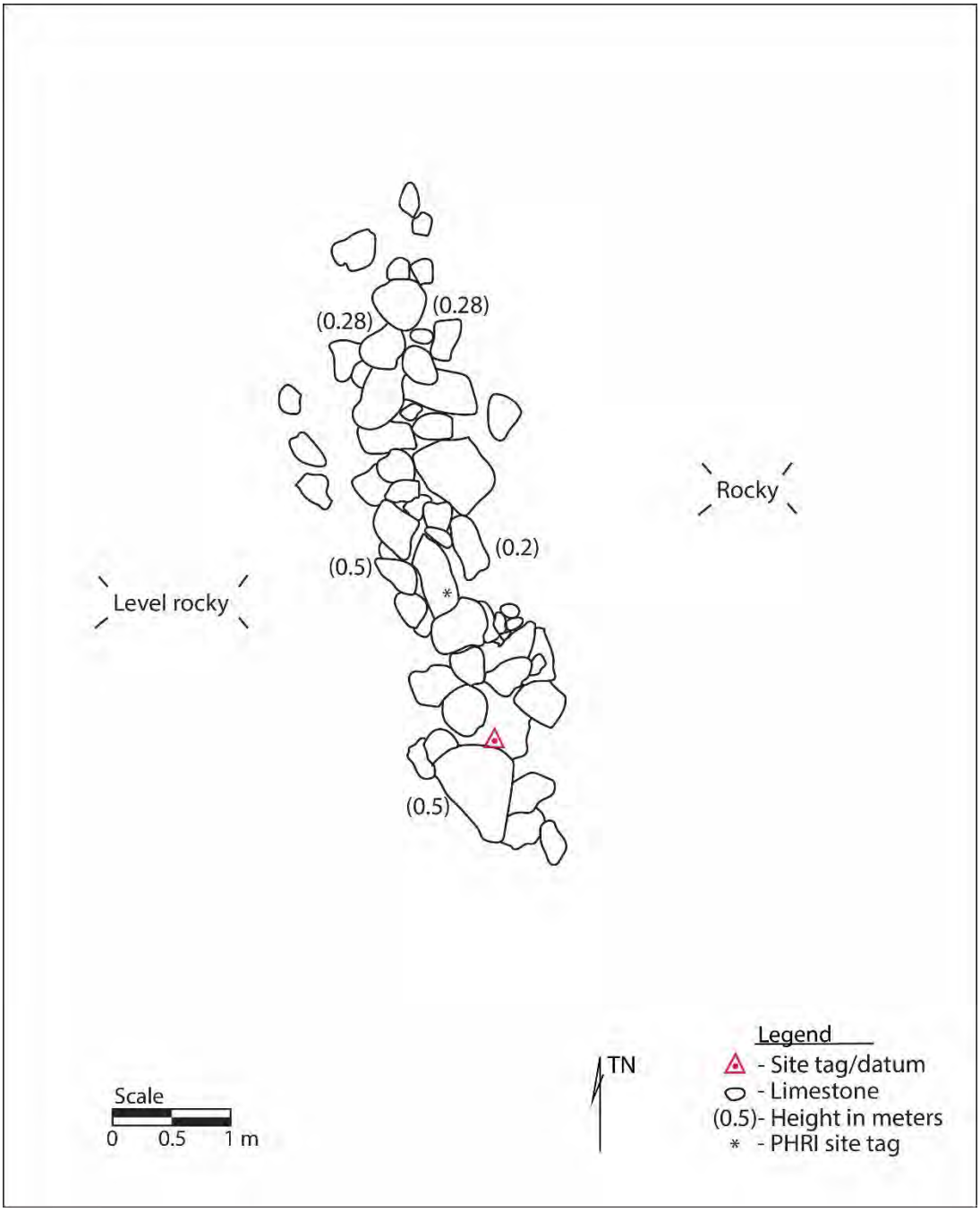

Figure 285. Plan-view map of SIHP 50-80-12-05106, Feature 72 wall.

Figure 286. SIHP 50-80-12-05106, Feature 72 wall (view to east).

Feature 73 (see Figure 253 and Figure 287) is a boulder placed on-end adjacent to a small soil area. The feature is inside Feature 54 enclosure, which is interpreted as a possible planting area. The feature is in good condition and its function is undetermined.

Figure 287. SIHP 50-80-12-05106, Feature 73 boulder on-end (view to south).

Feature 74 (Figure 288 and Figure 289) is a wall running between the Feature 63 modified limestone pit and Feature 75 mound. The feature consists of a rough pile of limestone cobbles and small boulders. It measures 5 m long (N/S) × 1.25 m wide with a maximum wall height of 1 m. The wall is interpreted as an agricultural feature in fair condition.

Feature 75 (Figure 288 and Figure 290) is limestone mound measuring 2 m in diameter and 0.3 m high. It is 3 m southeast of Feature 74. The mound is constructed of piled limestone cobbles and small boulders. The wall is interpreted as an agricultural feature in fair condition.

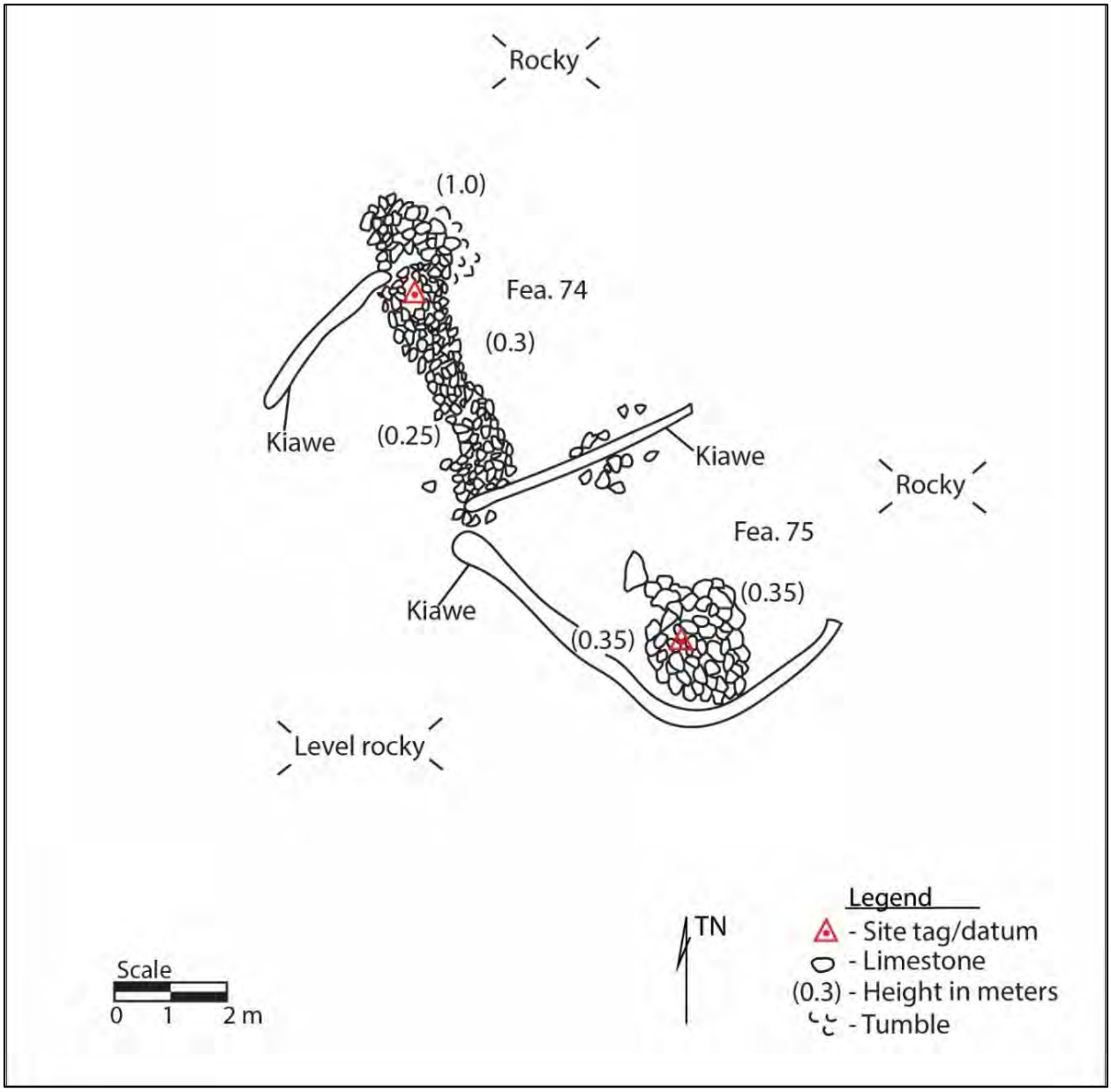

Figure 288. Plan-view map of SIHP 50-80-12-05106, Feature 74 wall and Feature 75 mound.

Figure 289. SIHP 50-80-12-05106, Feature 74 wall (view northwest).

Figure 290. SIHP 50-80-12-05106, Feature 75 mound (view to south).

Feature 76 (Figure 291 and Figure 292) is a limestone mound 1.1 m (N/S) × 0.9 m (E/W) with a maximum height of 0.2 m. The mound is constructed of small and medium boulders with small, medium, and large subangular limestone cobbles piled on top 1 to 2 courses high. Feature 76 is interpreted as an agricultural mound in fair condition.

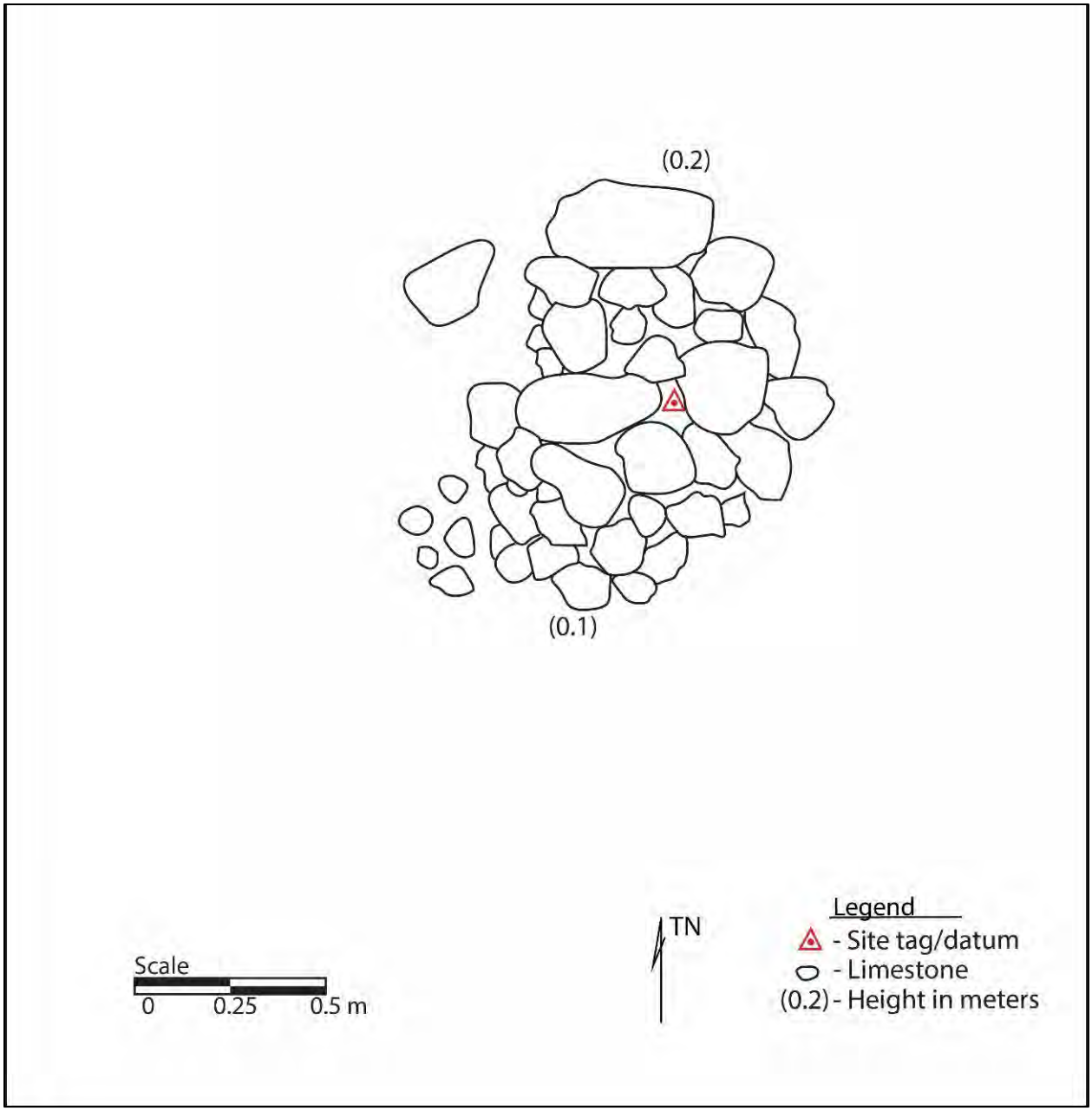

Figure 291. Plan-view map of SIHP 50-80-12-05106, Feature 76 mound.

Figure 292. SIHP 50-80-12-05106, Feature 76 mound (view southwest).

Feature 77 (Figure 293 and Figure 294) is a limestone mound 2 m (N/S) × 0.9 m (E/W) with a maximum height of 0.2 m. The mound is constructed of small, medium, and large subangular limestone cobbles and boulders piled 1 to 2 courses high. Feature 77 is interpreted as an agricultural mound in fair condition.

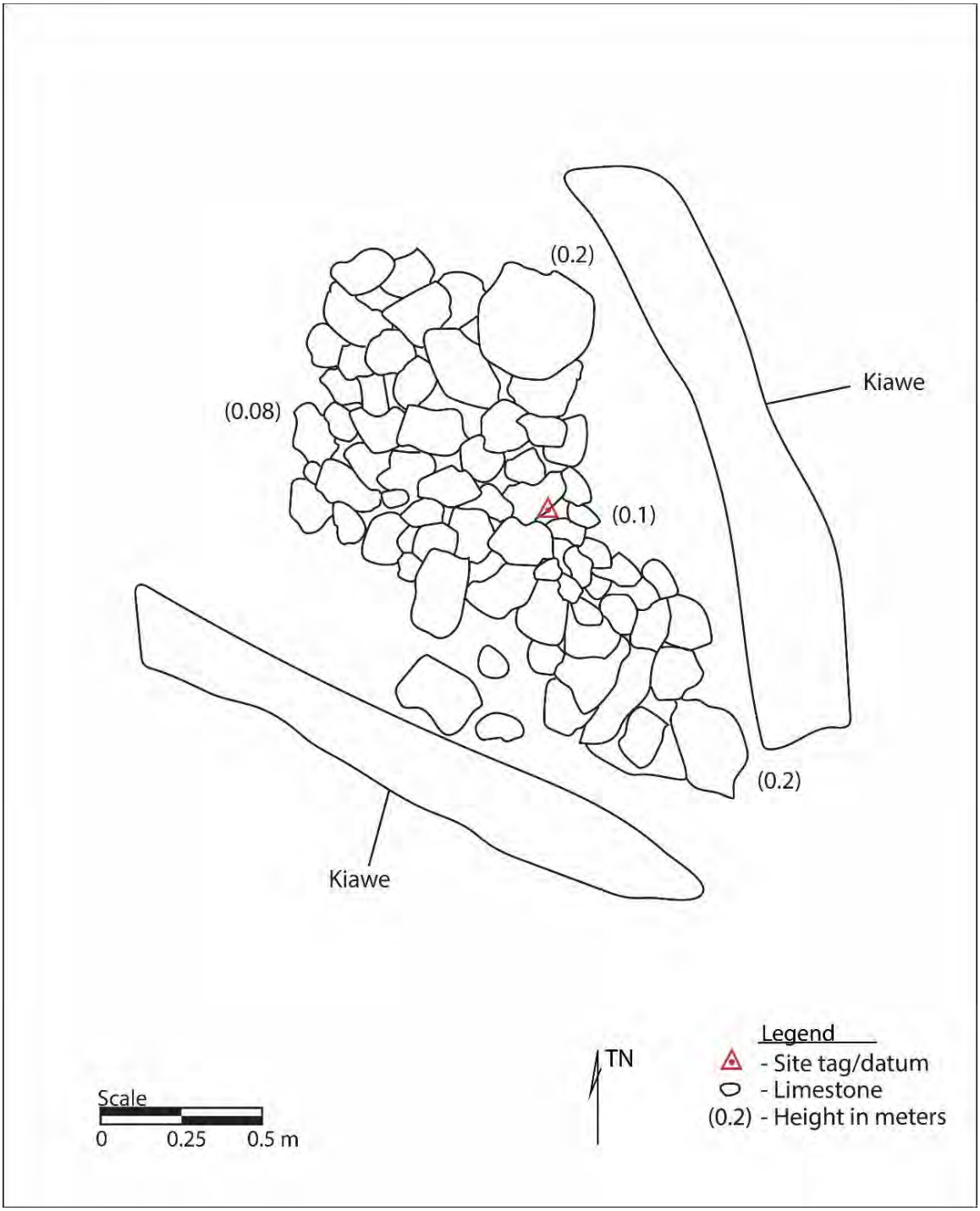

Figure 293. Plan-view map of SIHP 50-80-12-05106, Feature 77 mound.

Figure 294. SIHP 50-80-12-05106, Feature 77 mound (view southeast).

Feature 78 (Figure 295 and Figure 296) is a small triangular-shaped mound 1 m (N/S) × 1.2 m (E/W) with a maximum height of 0.2 m. The mound is constructed of small, medium, and large limestone cobbles and is surrounded by a shallow soil deposit on bedrock. Feature 78 is interpreted as an agricultural mound in fair condition.

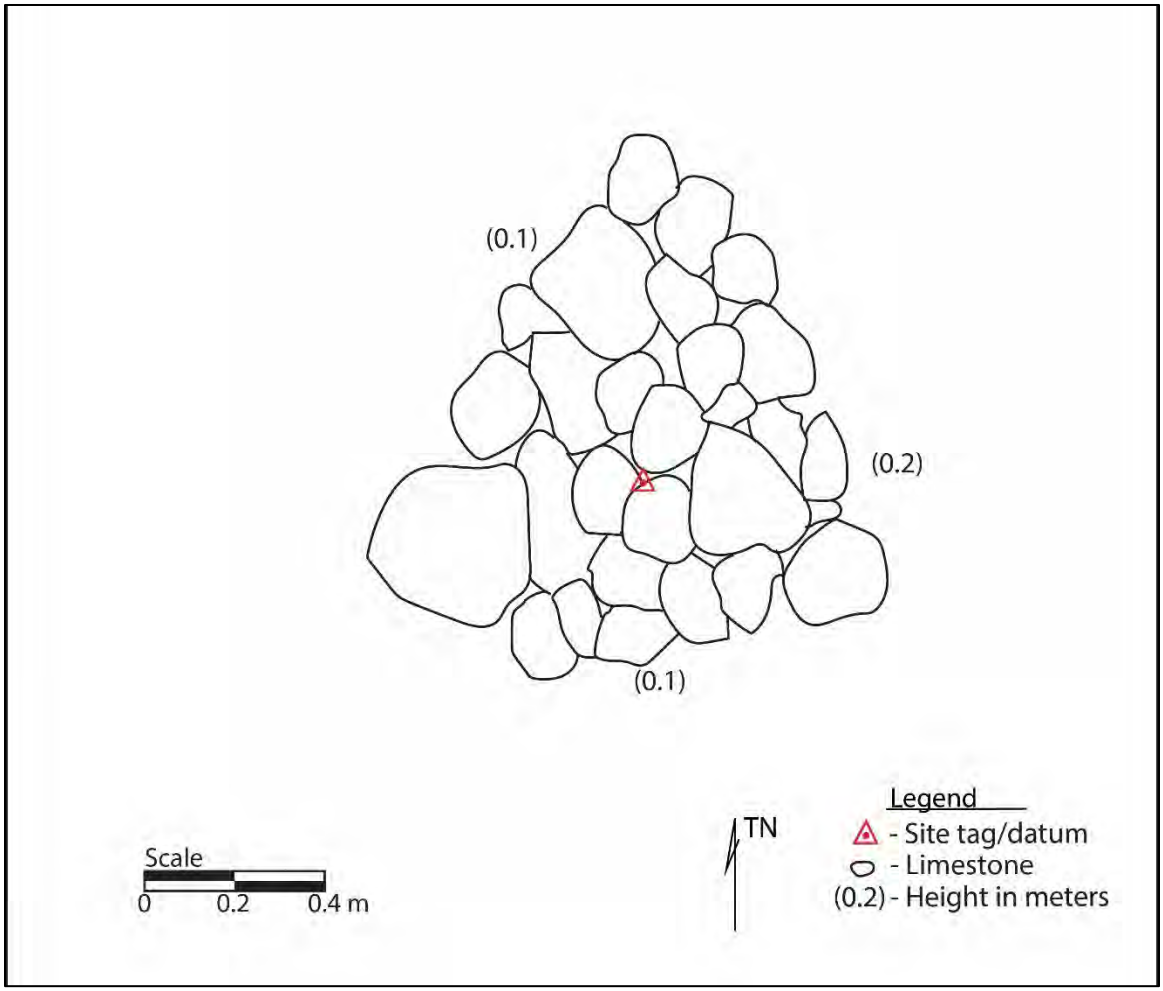

Figure 295. Plan-view map of SIHP 50-80-12-05106, Feature 78 mound.

Figure 296. SIHP 50-80-12-05106, Feature 78 mound (view southeast).

Feature 79 (Figure 297 and Figure 298) is a limestone mound 2 m (N/S) × 2.8 m (E/W) with a maximum height of 0.25 m. The feature is roughly square and constructed of piled limestone cobbles and small boulders. It is interpreted as an agricultural mound in fair condition.

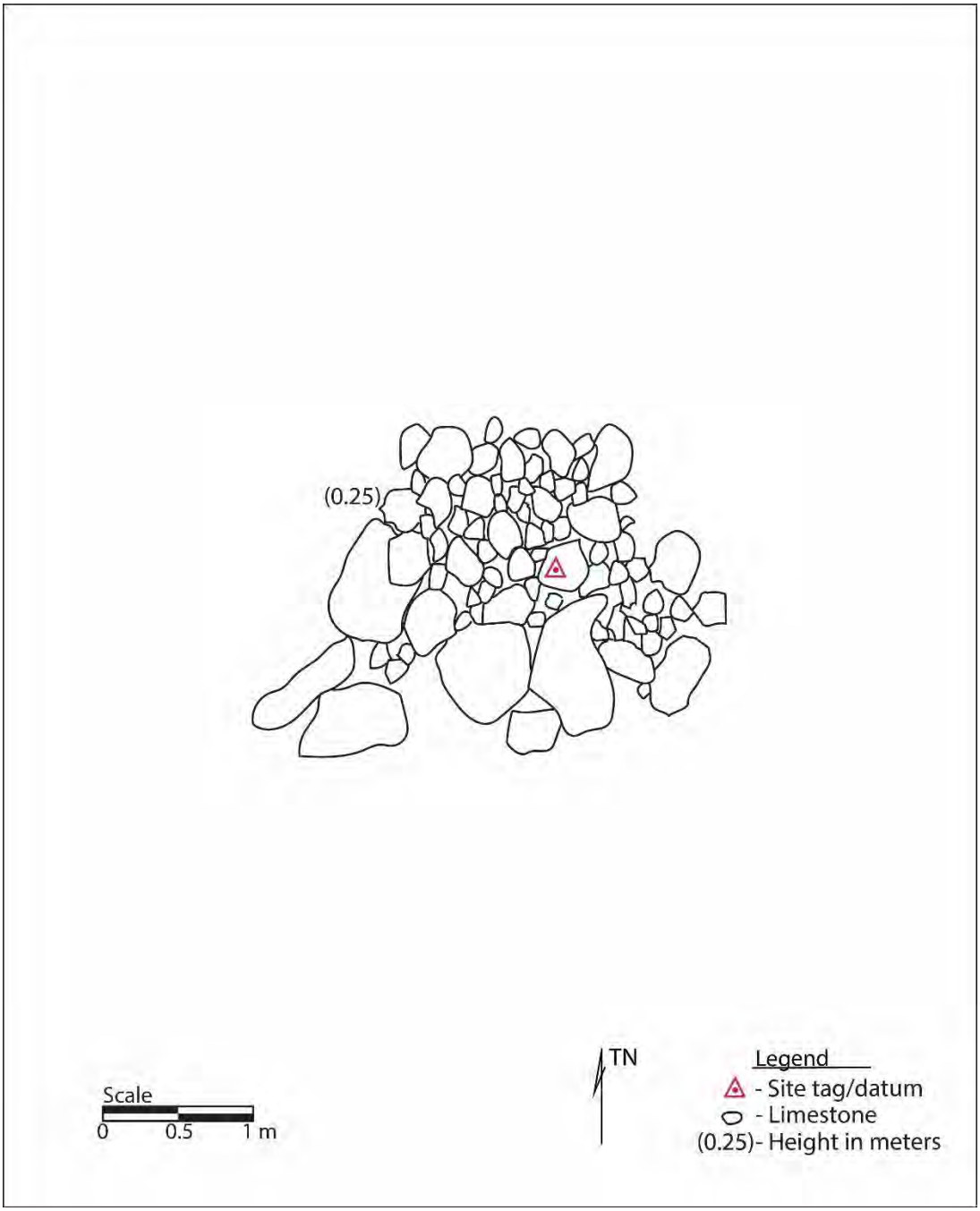

Figure 297. Plan-view map of SIHP 50-80-12-05106, Feature 79 mound.

Figure 298. SIHP 50-80-12-05106, Feature 79 mound (view to southwest).

Feature 80 (Figure 299 and Figure 300) is a triangular-shaped mound 1.7 m (N/S) × 1.4 m (E/W) with a maximum height of 0.3 m. The site is composed of small and medium limestone boulders with large subangular limestone cobbles piled on top. Feature 80 is interpreted as an agricultural mound in fair condition.

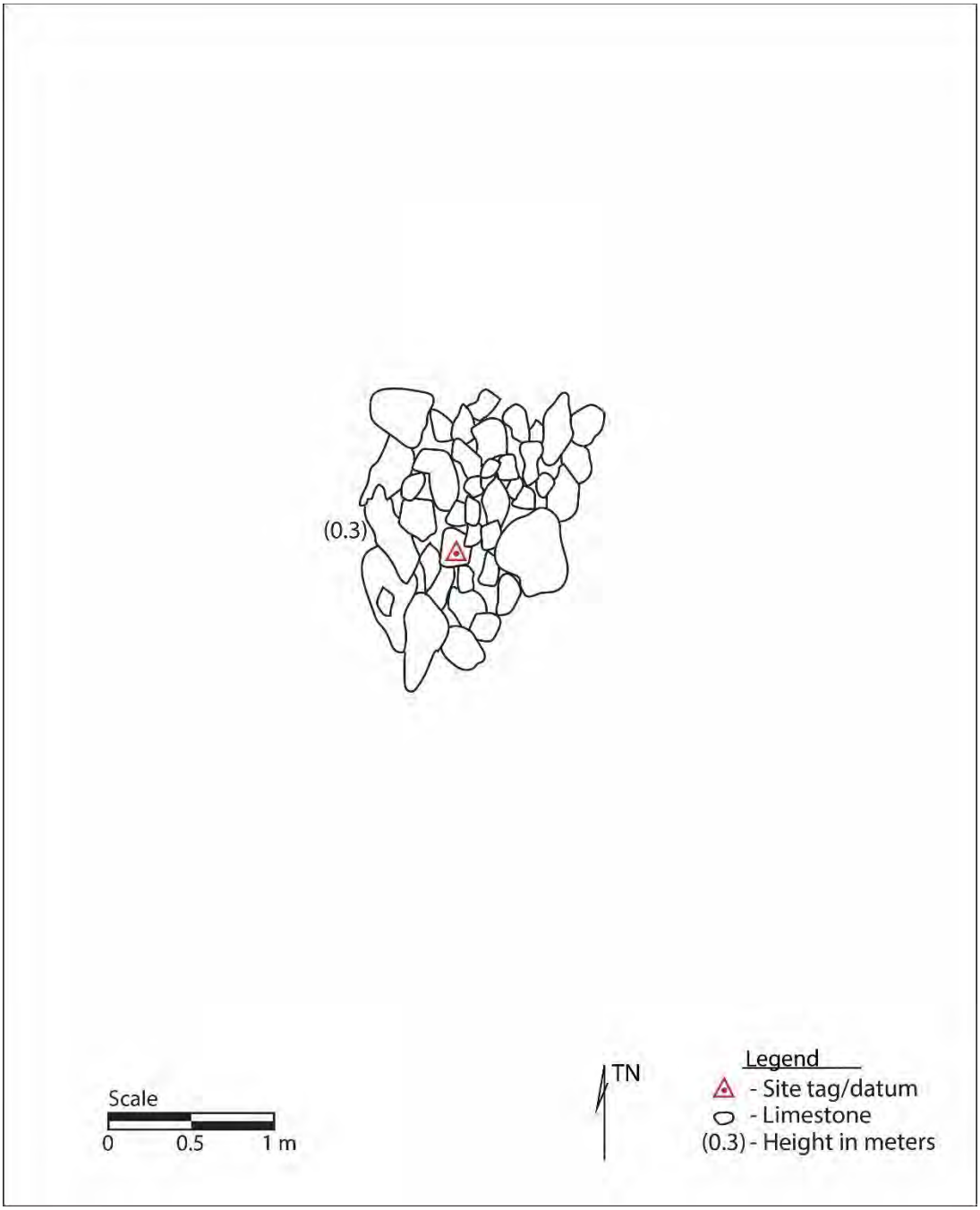

Figure 299. Plan-view map of SIHP 50-80-12-05106, Feature 80 triangular mound.

Figure 300. SIHP 50-80-12-05106, Feature 80 triangular mound (view to east).

Feature 81 (Figure 301 and Figure 302) is a small, linear limestone mound that measures 1.4 m (N/S) × 2.2 m (E/W) and has a maximum height of 0.3 m. The feature is composed of small and medium limestone boulders with large subangular limestone cobbles piled on top. Feature 81 is interpreted as an agricultural mound in fair condition.

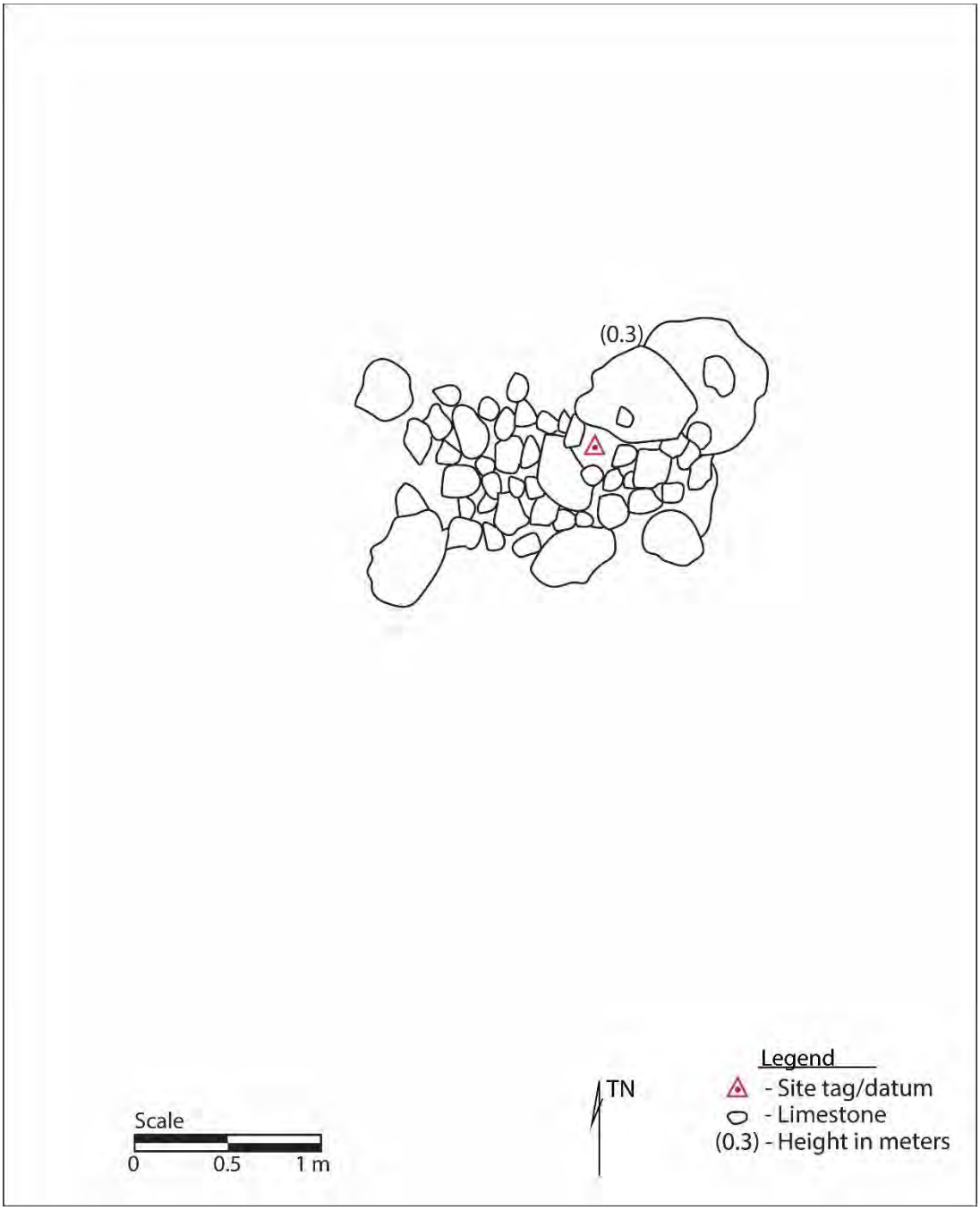

Figure 301. SIHP 50-80-12-05106, Feature 81 mound.

Figure 302. SIHP 50-80-12-05106, Feature 81 mound (view to northwest).

Feature 82 (Figure 303 and Figure 304) is a small, linear limestone mound that measures 1.25 m (N/S) × 1.5 m (E/W) with a maximum height of 0.5 m. The feature is constructed of small, medium, and large subangular limestone cobbles. The mound is interpreted as an agricultural mound in fair condition.

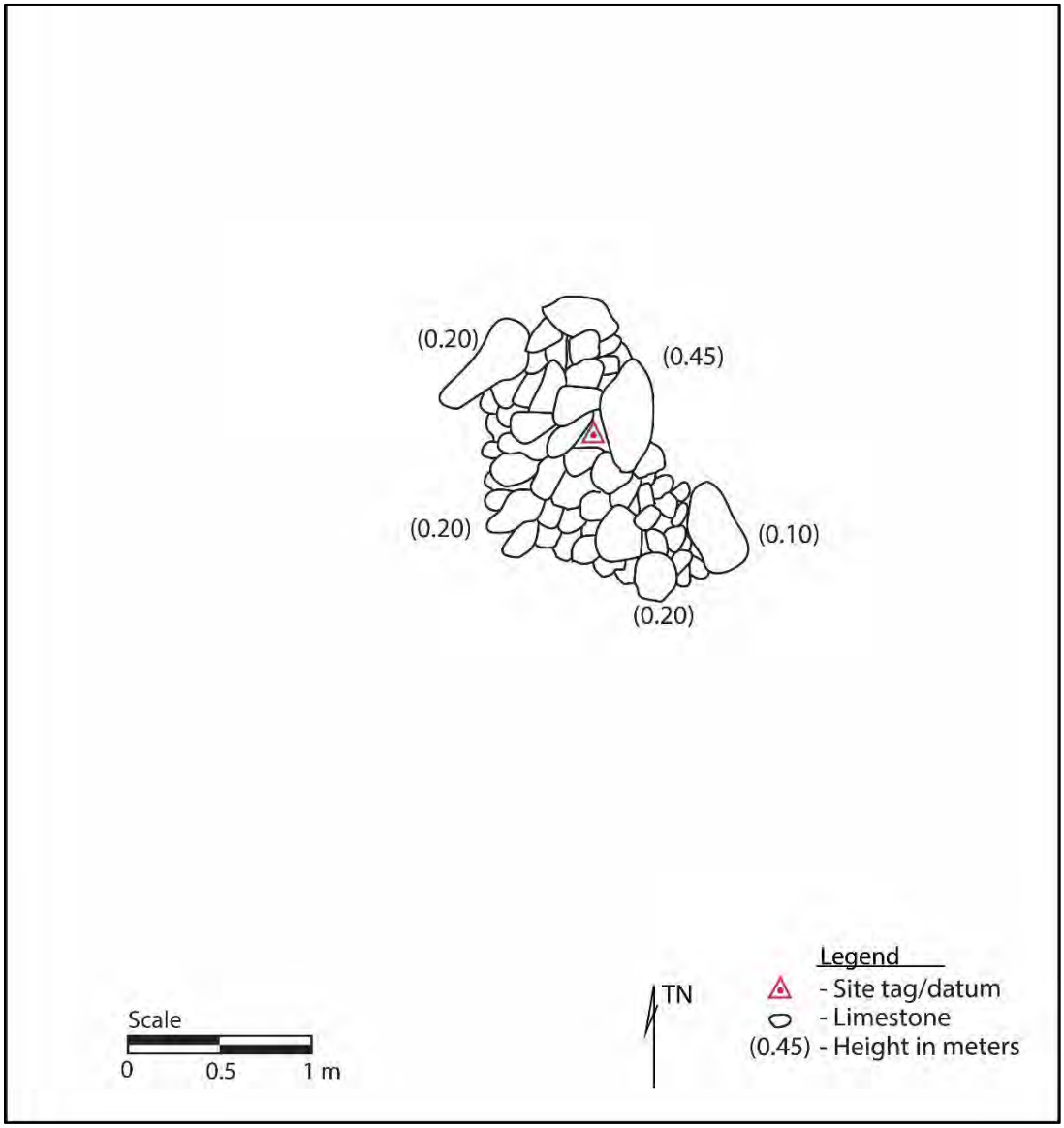

Figure 303. Plan-view map of SIHP 50-80-12-05106, Feature 82 linear mound.

Figure 304. SIHP 50-80-12-05106, Feature 82 linear mound (view to north).

Feature 83 (Figure 305 and Figure 306) is a diamond-shaped mound roughly 1.1 m (N/S) × 1 m (E/W) with a maximum height of 0.2 m. The small mound is composed of small, medium, and large pebbles, loosely piled 1 to 2 courses high. The mound is interpreted as an agricultural mound in fair condition.

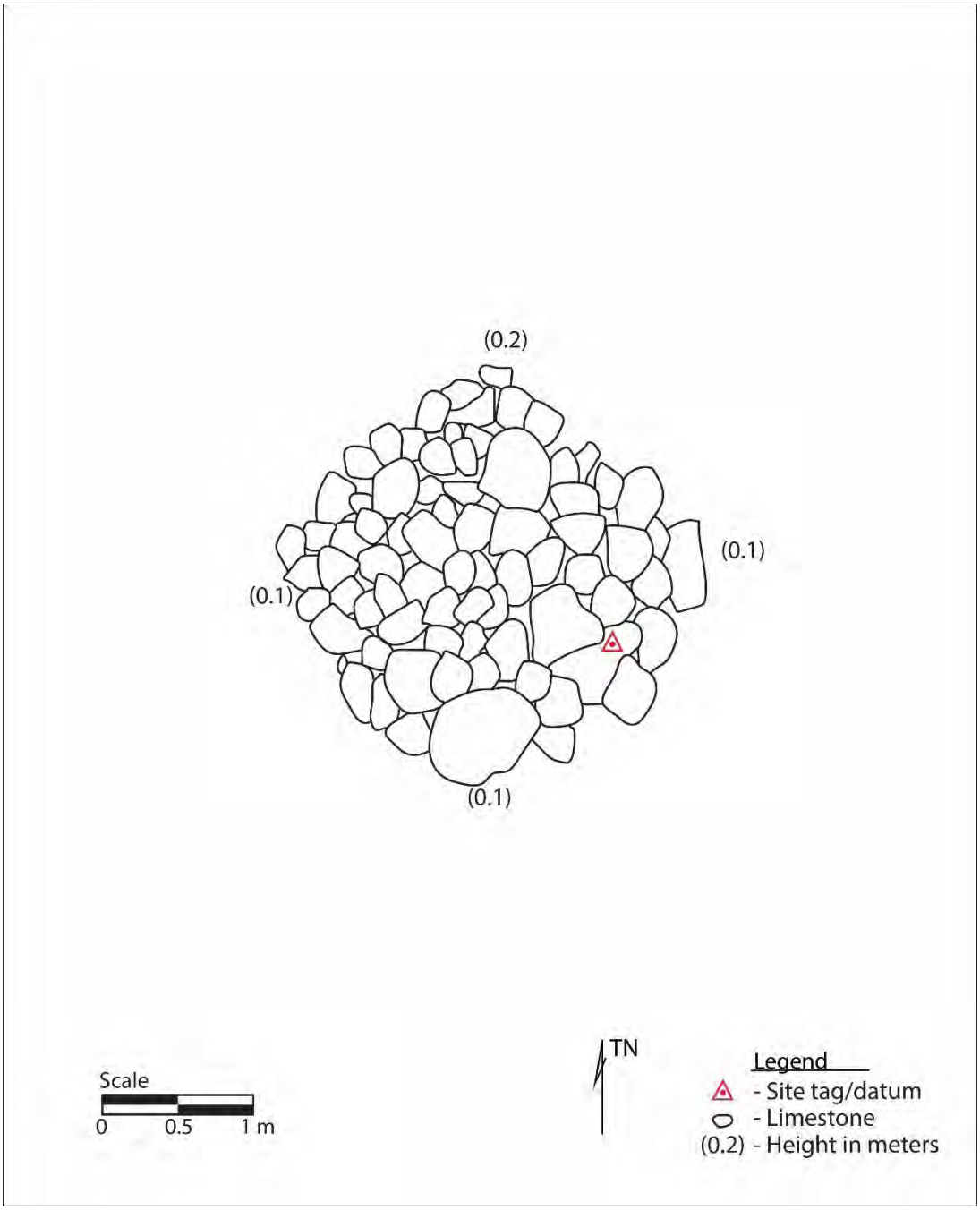

Figure 305. Plan-view map of SIHP 50-80-12-05106, Feature 83 mound.

Figure 306. SIHP 50-80-12-05106, Feature 83 mound (view northwest).

Feature 84 (Figure 307 and Figure 308) is a small, rounded limestone mound that measures 2 m (N/S) × 2 m (E/W) with a maximum wall height of 0.5 m. The small mound is composed of large limestone boulders with small, medium, and large limestone boulders stacked on top. The mound is interpreted as an agricultural feature in fair condition.

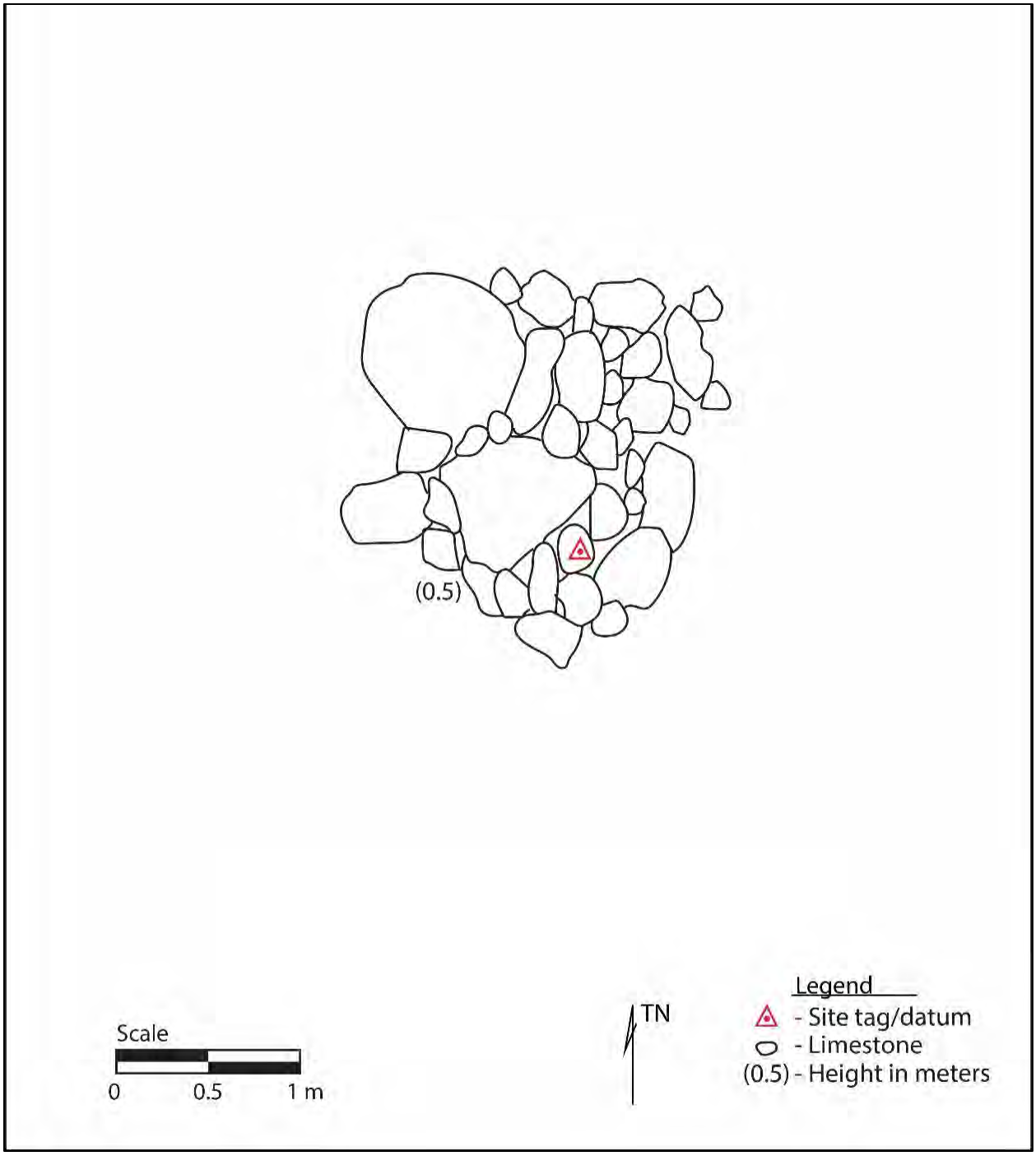

Figure 307. Plan-view of SIHP 50-80-12-05106, Feature 84 mound.

Figure 308. SIHP 50-80-12-05106, Feature 84 mound (view to east).

Feature 85 (Figure 309 and Figure 310) is an elongated, teardrop-shaped limestone mound that measures 1.8 m (N/S) × 1 m (E/W) with a maximum height of 0.2 m. The feature is constructed of small boulders and large limestone cobbles roughly piled together. Feature 85 is interpreted as an agricultural mound in good condition.

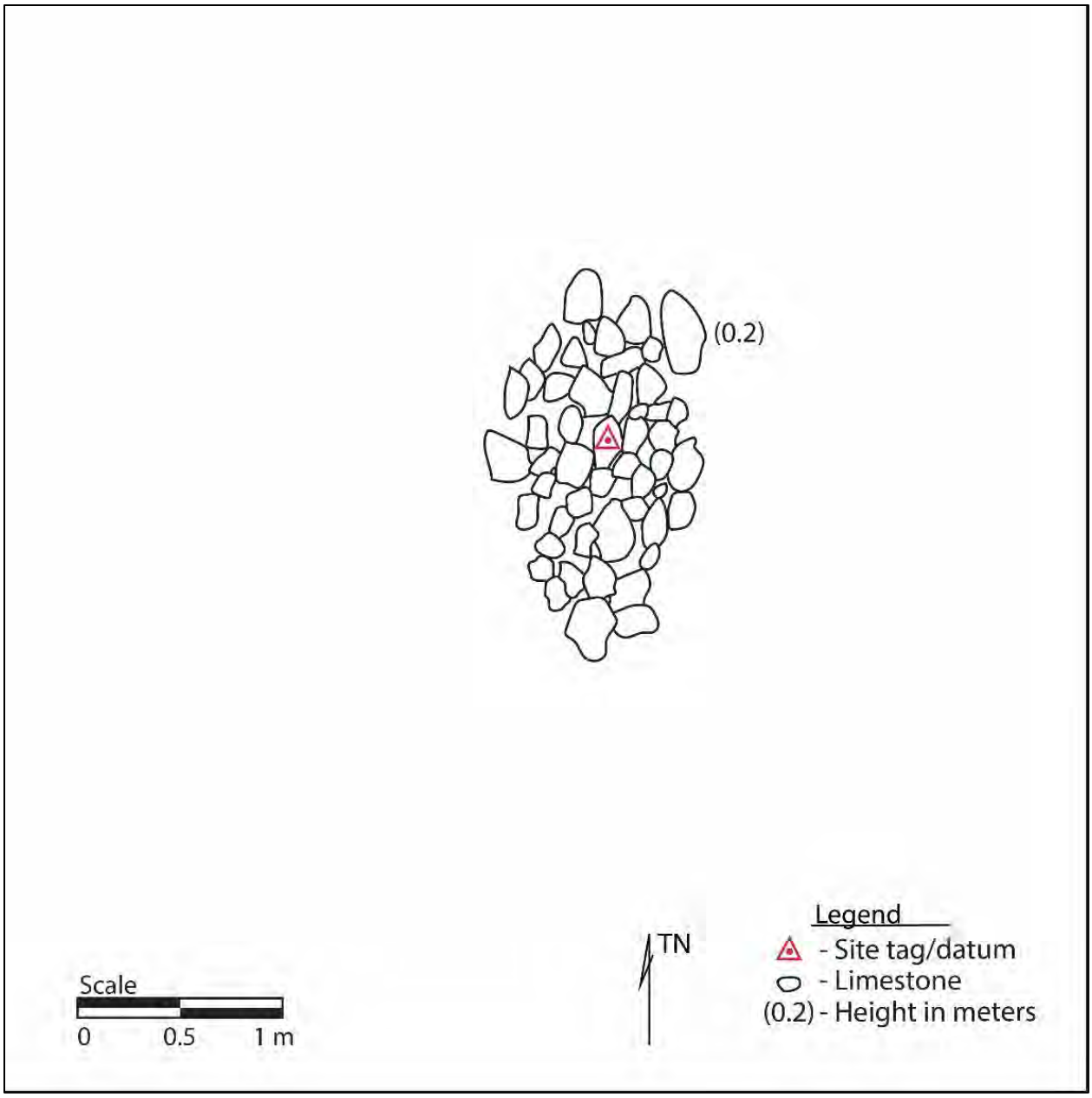

Figure 309. Plan-view map of SIHP 50-80-12-05106, Feature 85 elongated mound.

Figure 310. SIHP 50-80-12-05106, Feature 85 elongated mound (view to north).

Feature 86 (Figure 311 and Figure 312) is a small, triangular-shaped mound that measures 2.7 m (N/S) × 2.5 m (E/W) with a maximum height of 0.3 m. The mound is constructed of small and medium limestone boulders with medium and large limestone cobbles piled on top. Feature 86 is interpreted as an agricultural mound in fair condition.

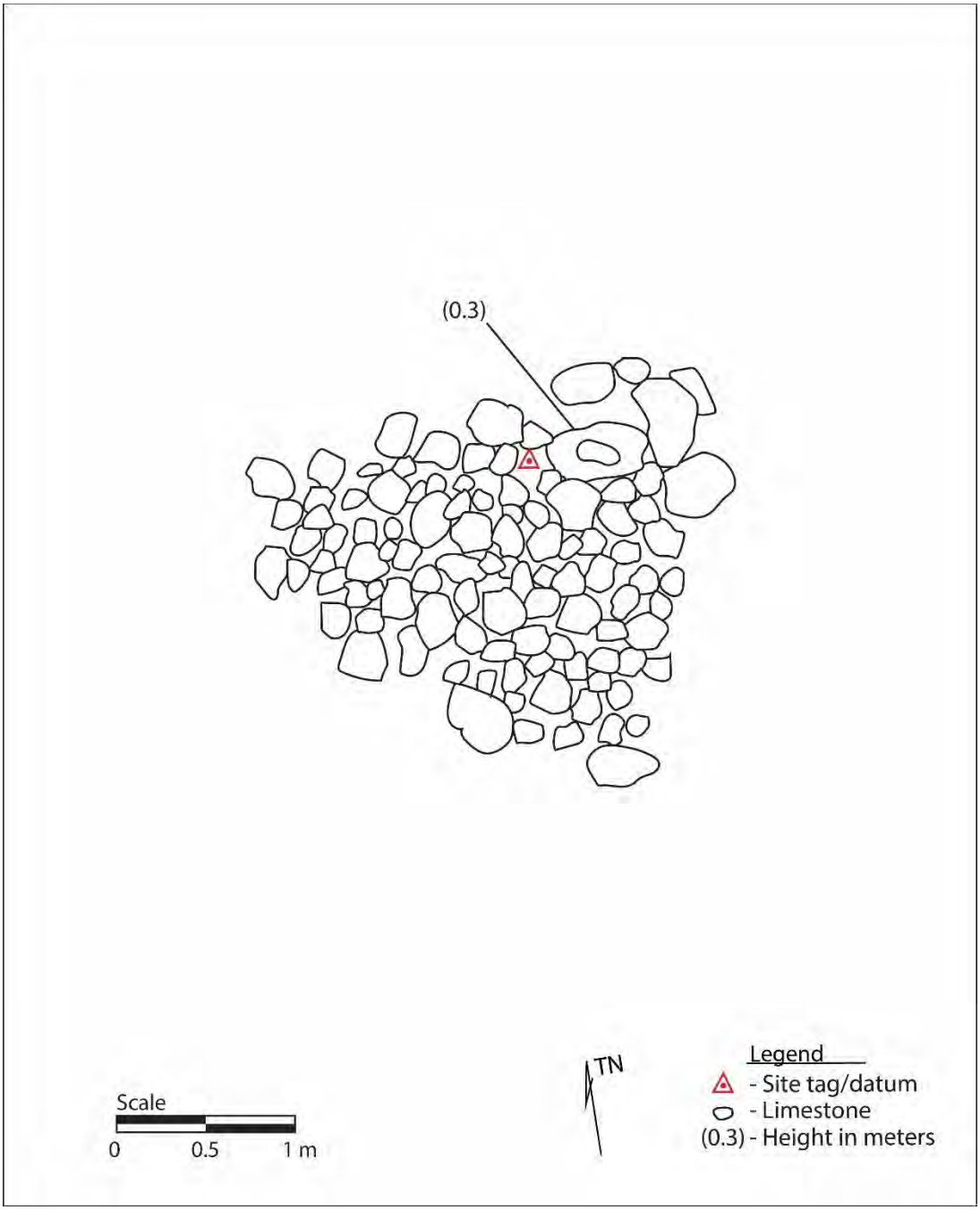

Figure 311. Plan-view map of SIHP 50-80-12-05106, Feature 86 triangular mound.

Figure 312. SIHP 50-80-12-05106, Feature 86 triangular mound (view to south).

Feature 87 (Figure 313 and Figure 314) is a small triangular-shaped mound that measures 1.4 m (N/S) × 1.7 m (E/W) with a maximum height of 0.55 m. The mound is composed of small and medium limestone boulders with large limestone cobbles piled on top. Feature 87 is interpreted as an agricultural mound in fair condition.

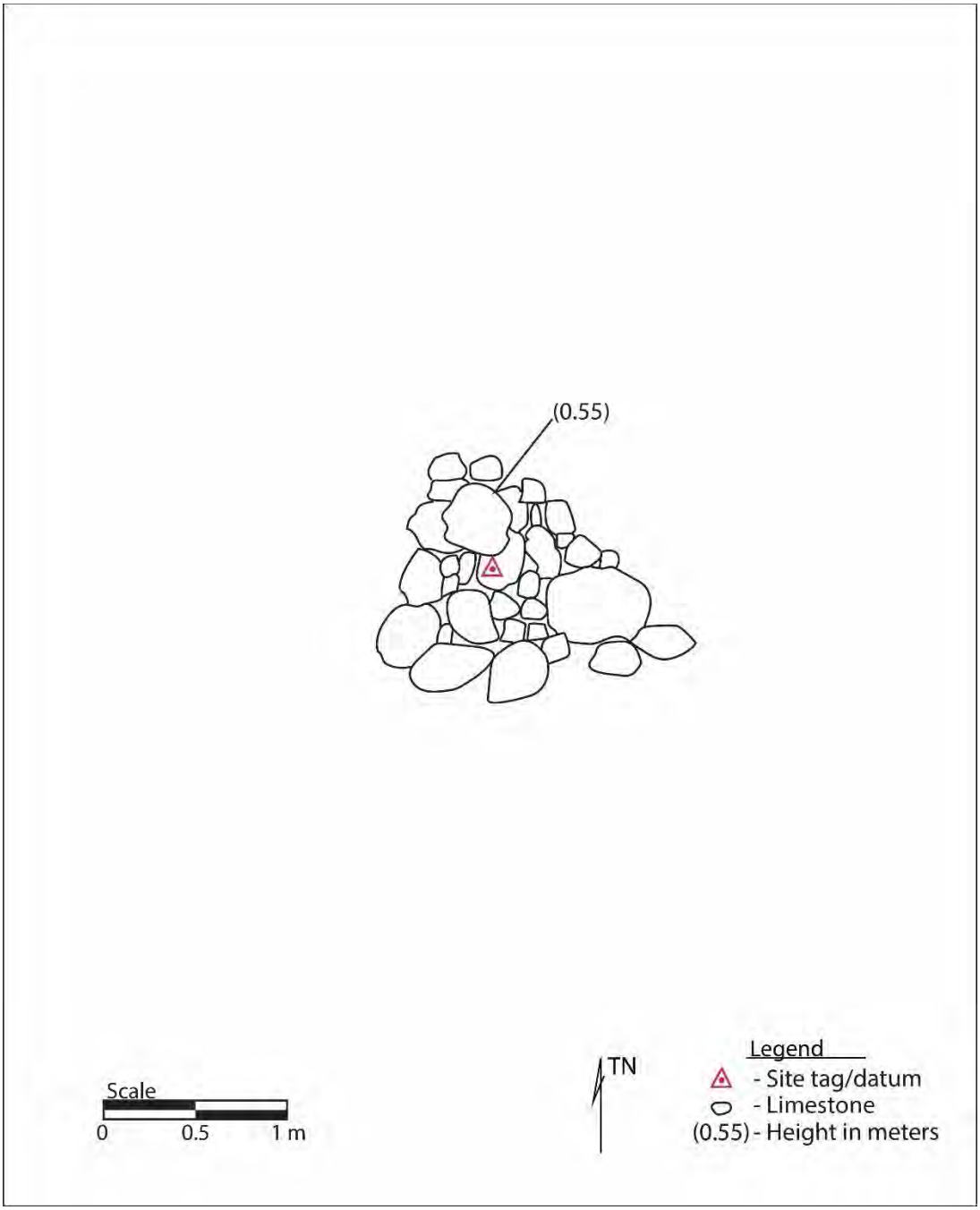

Figure 313. Plan-view map of SIHP 50-80-12-05106, Feature 87 triangular mound.

Figure 314. SIHP 50-80-12-05106, Feature 87 triangular mound (view to south).

Feature 88 (Figure 315 and Figure 316) is a small, elongated mound that measures 1.8 m (N/S) × 1.2 m (E/W) with a maximum height of 0.2 m. The mound is composed of small and medium limestone boulders with large limestone cobbles piled on top. Feature 88 is interpreted as an agricultural mound in fair condition.

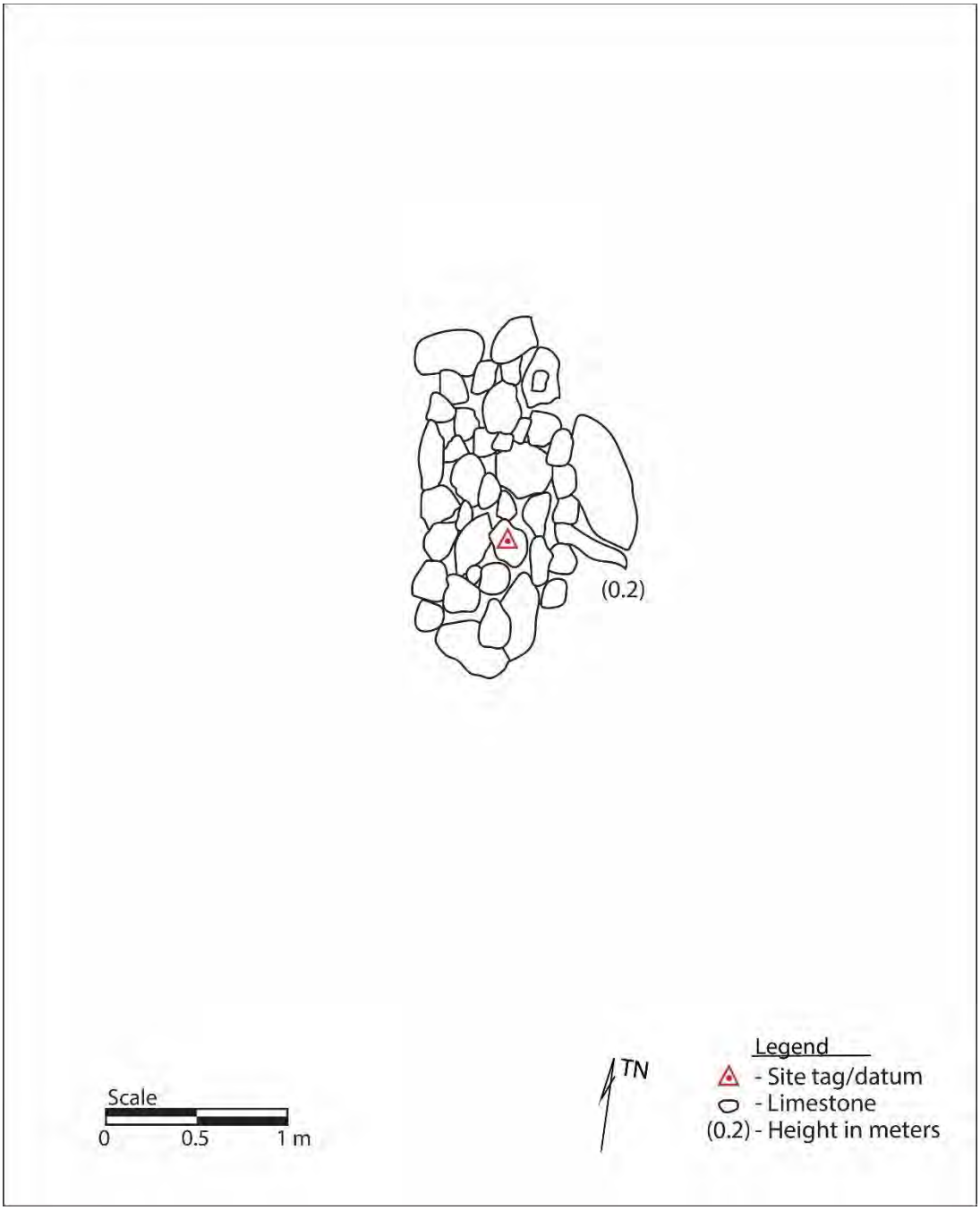

Figure 315. Plan-view map of SIHP 50-80-12-05106, Feature 88 elongated mound.

Figure 316. SIHP 50-80-12-05106, Feature 88 elongated mound (view to northwest).

Feature 89 (Figure 317 and Figure 318) is an oval-shaped mound that measures 1.6 m (N/S) × 1.2 m (E/W) with a maximum height of 0.2 m. This mound is composed of small and medium subangular limestone boulders. Feature 89 is interpreted as an agricultural mound in fair condition.

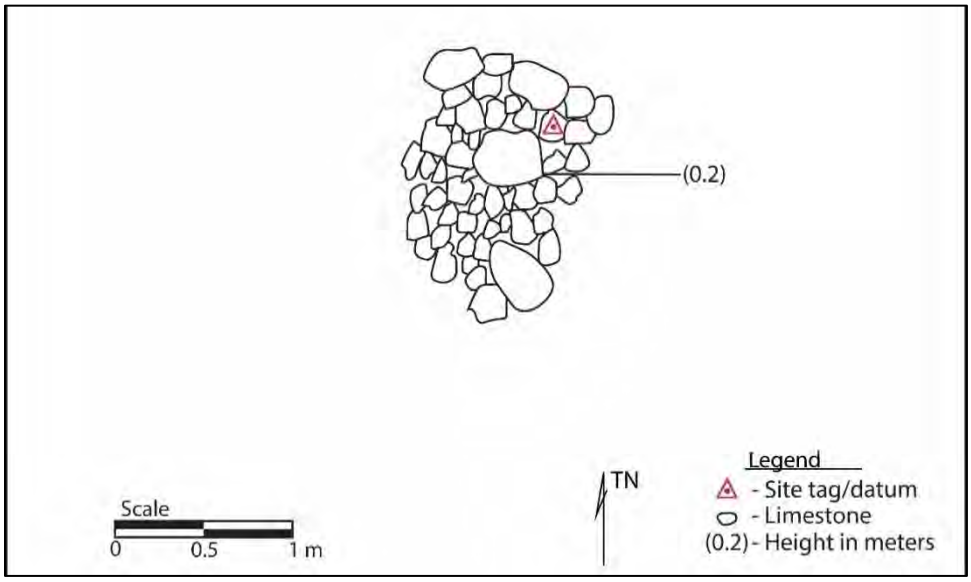

Figure 317. Plan-view map SIHP 50-80-12-05106, Feature 89 oval-shaped mound.

Figure 318. SIHP 50-80-12-05106, Feature 89 oval-shaped mound (view to north).

Feature 90 (Figure 319 and Figure 320) is an L-shaped linear mound that measures 3.5 m (N/S) × 2 m (E/W) with a maximum height of 0.5 m. The feature is constructed of large limestone boulders with small, medium, and large limestone cobbles piled. Soil is present along the east side of the mound. Feature 90 is interpreted as an agricultural mound in fair condition.

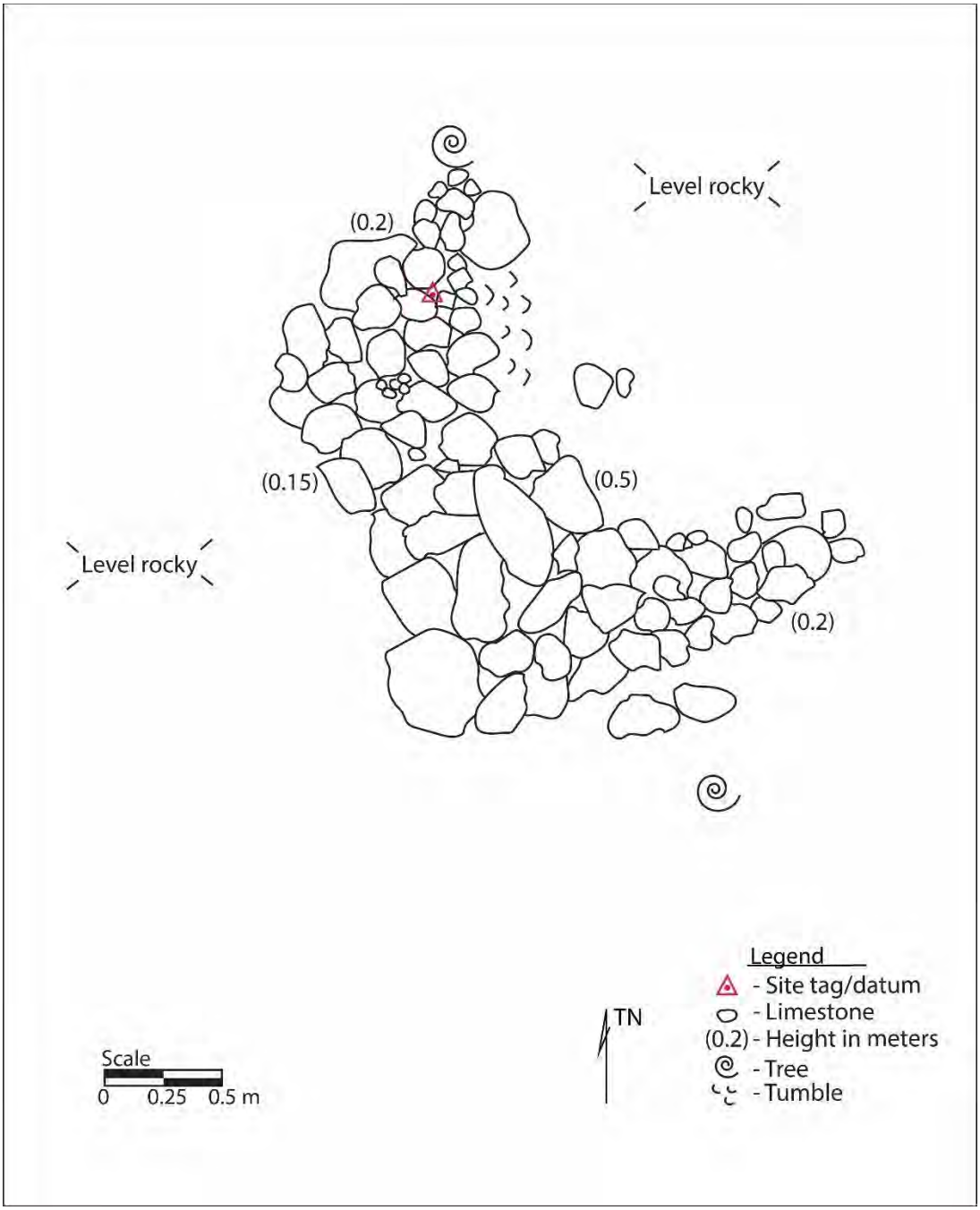

Figure 319. Plan-view map of SIHP 50-80-12-05106, Feature 90 linear mound.

Figure 320. SIHP 50-80-12-05106, Feature 90 linear mound (view southwest).

Feature 91 (Figure 321 and Figure 322) is a small, diamond-shaped mound 1.5 m (N/S) × 1.2 m (E/W) with a maximum height of 0.3 m. The structure is composed of small and medium limestone boulders with large limestone cobbles piled on top. Feature 91 is interpreted as an agricultural mound in fair condition.

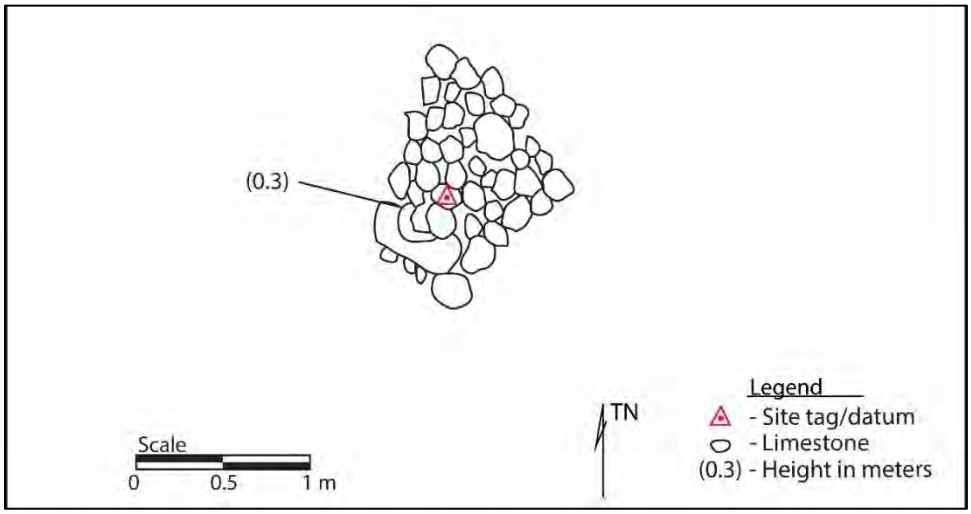

Figure 321. Plan-view map of SIHP 50-80-12-05106, Feature 91 diamond-shaped mound.

Figure 322. SIHP 50-80-12-05106, Feature 91 diamond-shaped mound (view to east).

Feature 92 (Figure 323 and Figure 324) is a small, oval-shaped mound that measures 2 m (N/S) × 1.5 m (E/W) with a maximum wall height of 0.4 m. This structure is made of small limestone boulders with small, medium, and large limestone cobbles piled on top. Feature 92 is interpreted as an agricultural mound in fair condition.

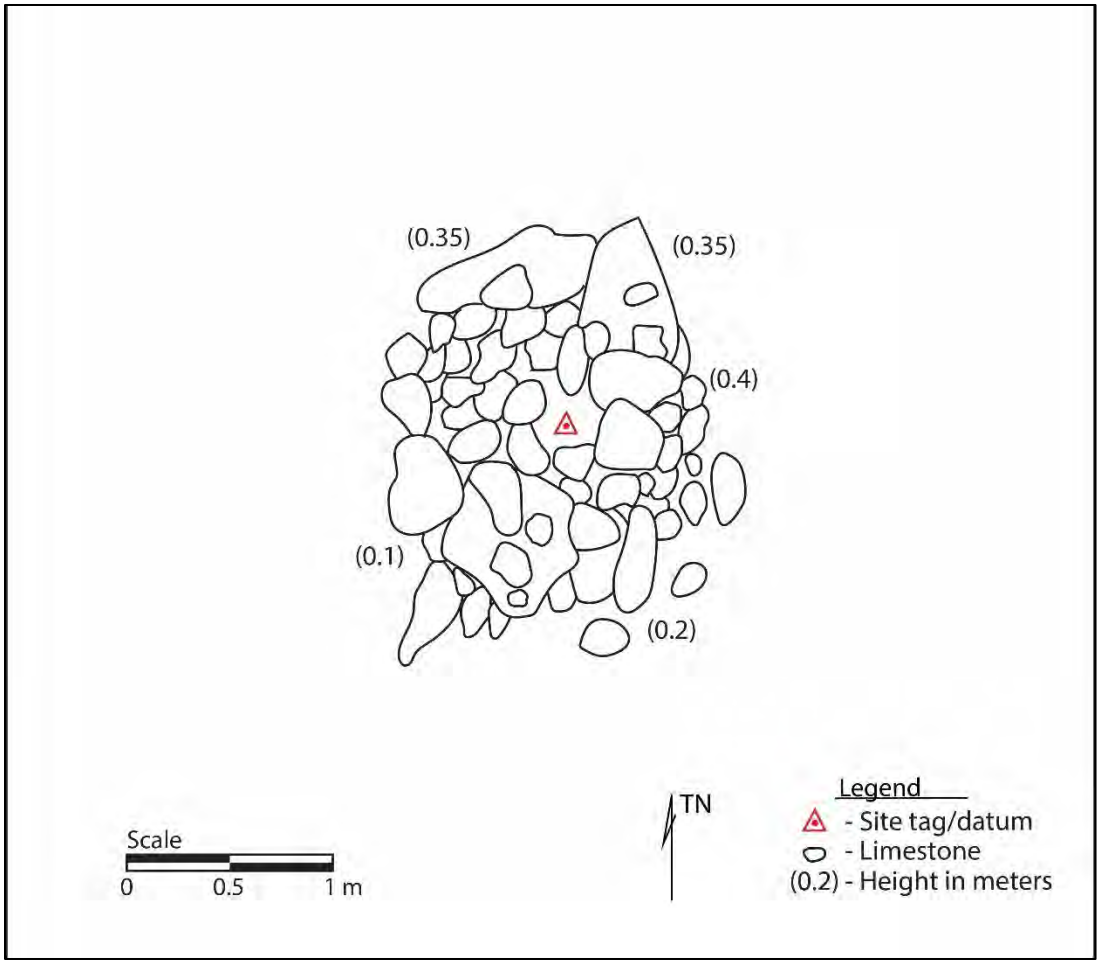

Figure 323. Plan-view map of SIHP 50-80-12-05106, Feature 92 oval-shaped mound.

Figure 324. SIHP 50-80-12-05106, Feature 92 oval-shaped mound (view to north/northeast).

Feature 93 (Figure 325 and Figure 326) is a rectangular platform attached to a low wall extending east of Feature 33. It is 7.5 m (NE/SW) × 4.7 m (E/W) with a height ranging from 0.25 to 0.6 m. Several internal depressions are in the southeast and northeast corners of the platform with the biggest depression in the northwest corner. The platform has an uneven surface of cobbles and small boulders. Given its connection to Feature 33, which extends from the Feature 34 enclosure (possible *makahiki* feature), Feature 93 is interpreted as a ceremonial feature.

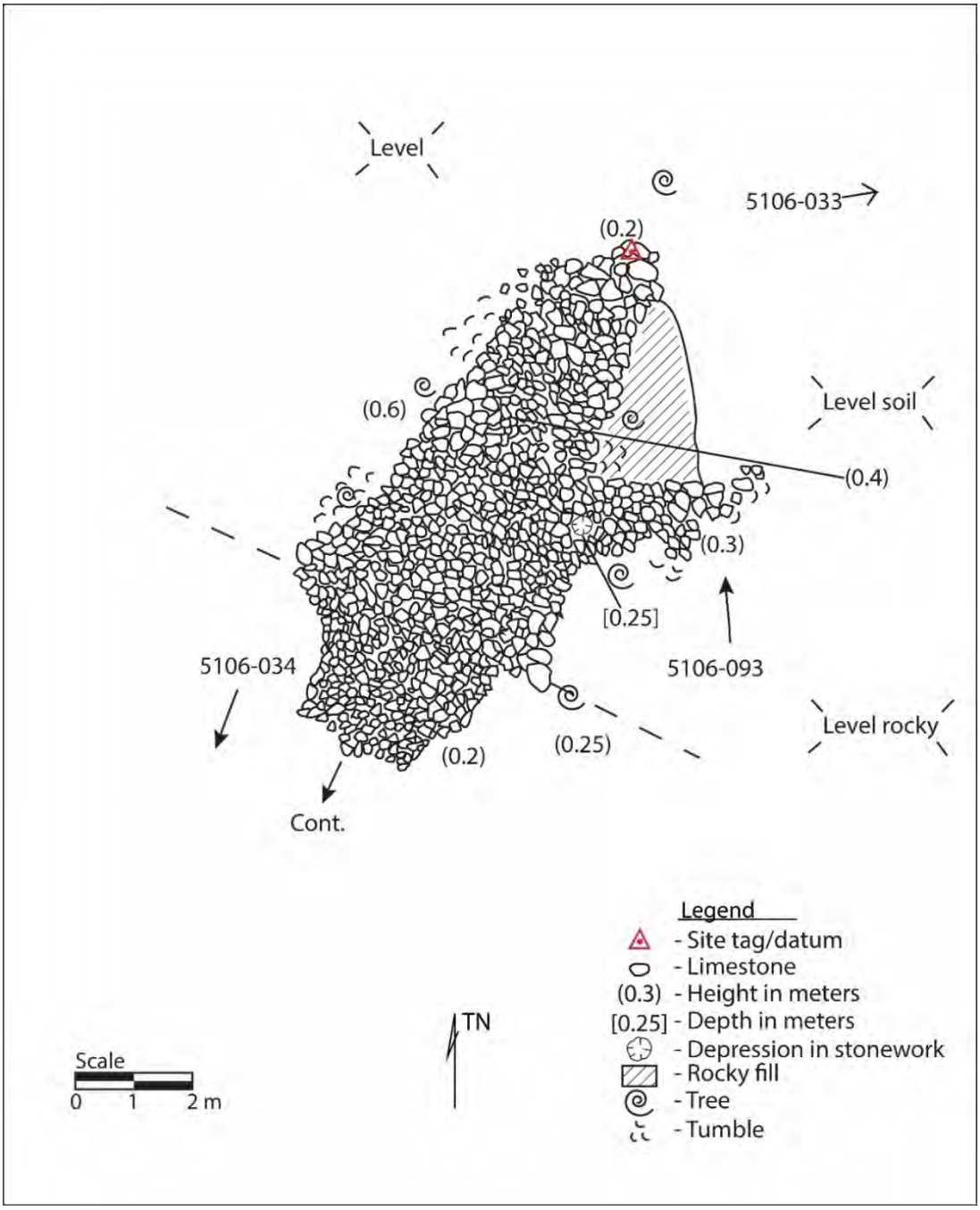

Figure 325. Plan-view map of SIHP 50-80-12-05106, Feature 93 remnant platform.

Figure 326. SIHP 50-80-12-05106, Feature 93 remnant platform (view to north/northwest).

Feature 94 (Figure 327 and Figure 328) is a triangular-shaped mound that measures roughly 2 m (N/S) × 2 m (E/W) with a maximum height of 0.35 m. There is a small depression at the center of the mound (5–7 cm in diameter) that descends 20 cm below the surface of the mound. The depression might indicate the mound once contained a post at the center. The feature is composed of piled small, medium, and large limestone cobbles and boulders 1 to 2 courses high. Feature 94 is interpreted as an agricultural mound in fair condition.

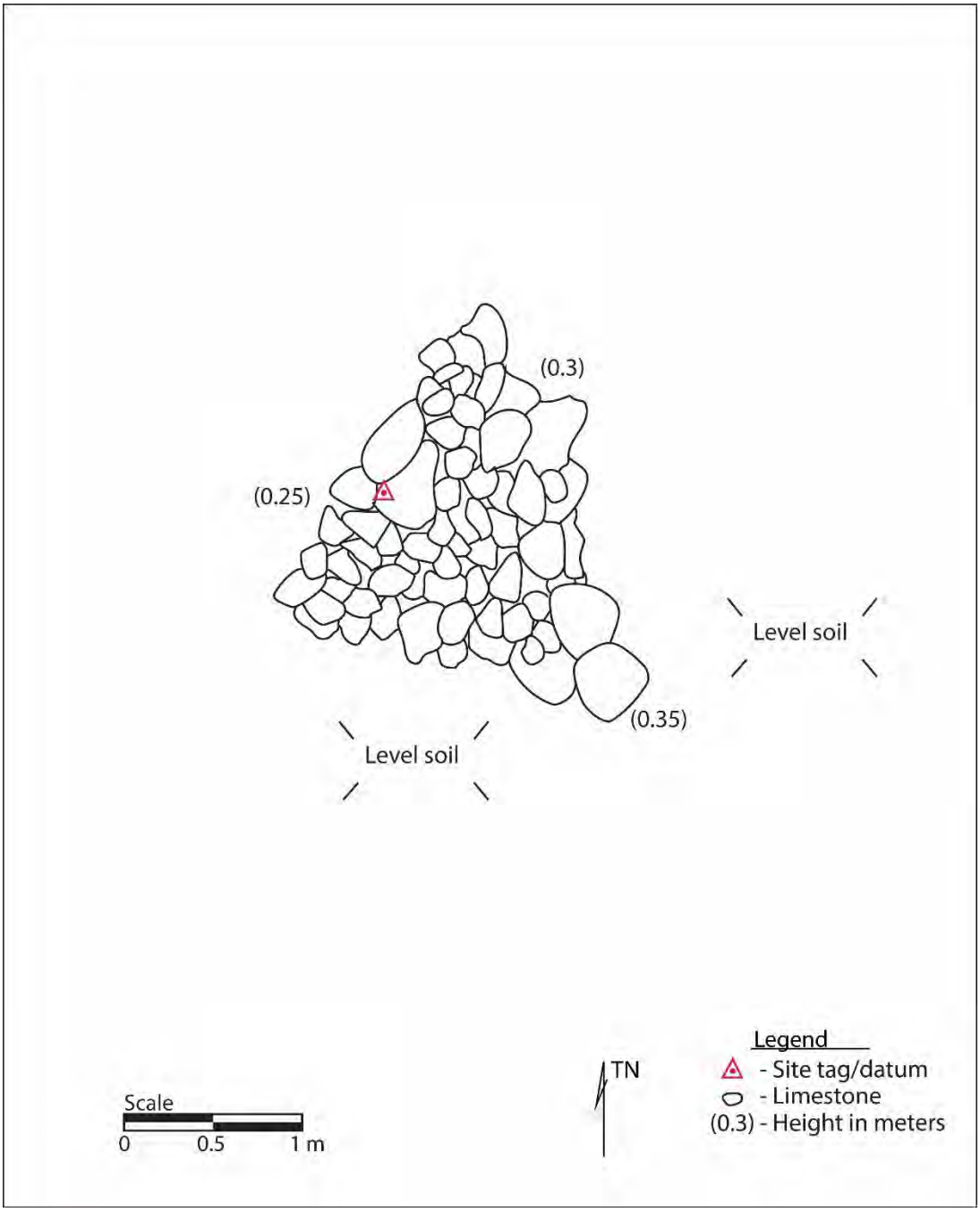

Figure 327. Plan-view map of SIHP 50-80-12-05106, Feature 94 triangular mound.

Figure 328. SIHP 50-80-12-05106, Feature 94 triangular mound (view to east).

Feature 95 (Figure 329 and Figure 330) is a small limestone mound that measures 1.4 m (N/S) × 0.9 m (E/W) with a maximum height of 0.2 m. The feature is composed of piled small, medium, and large limestone cobbles and boulders. Feature 95 is interpreted as an agricultural mound in fair condition.

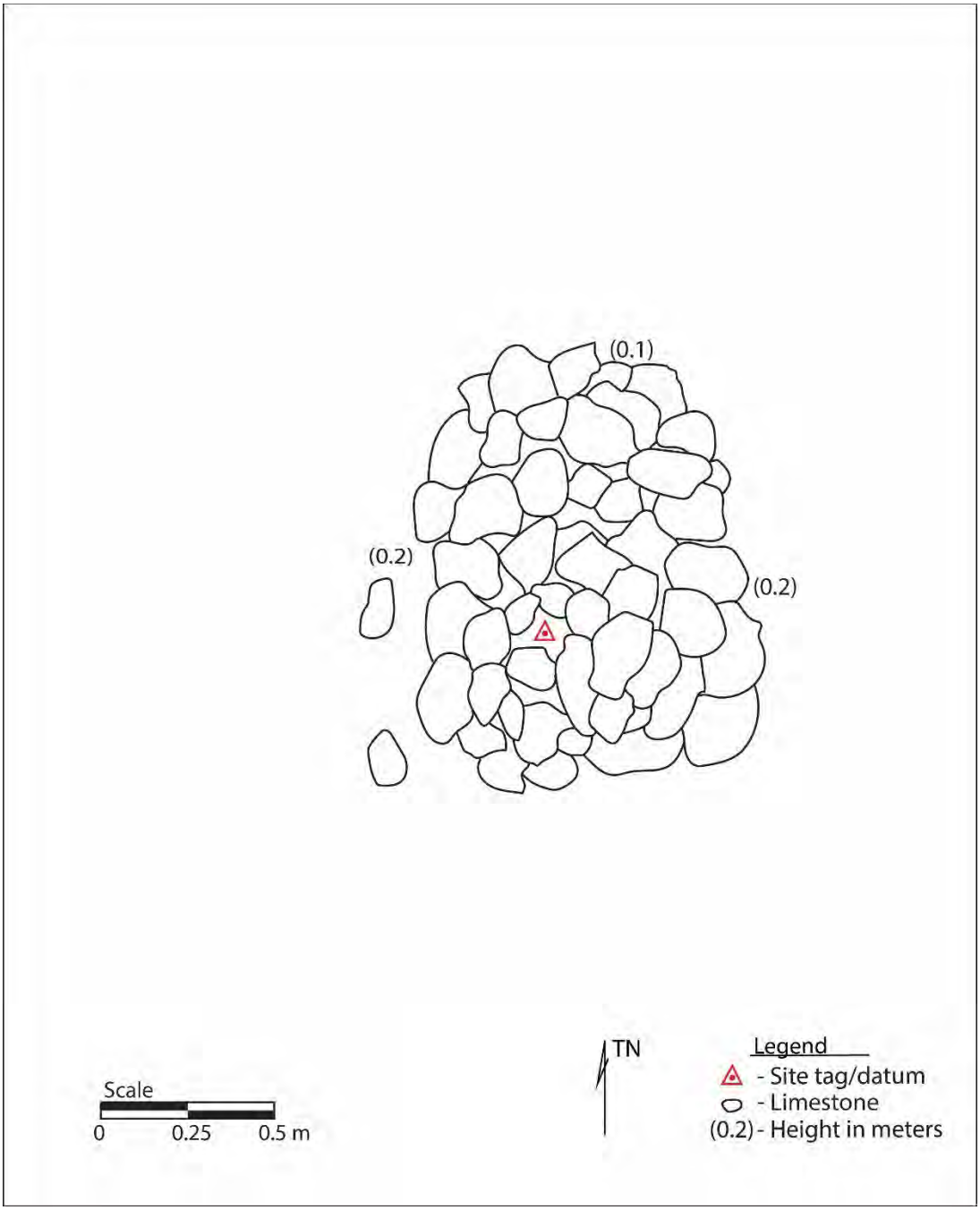

Figure 329. Plan-view map of SIHP 50-80-12-05106, Feature 95 mound.

Figure 330. SIHP 50-80-12-05106, Feature 95 mound (view to northwest).

Feature 96 (Figure 331 and Figure 332) is a small, trapezoidal-shaped mound that measures 2 m (N/S) × 0.8 m (E/W) with a maximum height of 0.3 m. The mound is composed of piled small limestone boulders with small, medium, and large limestone cobbles piled on top. Feature 96 is interpreted as an agricultural mound in fair condition.

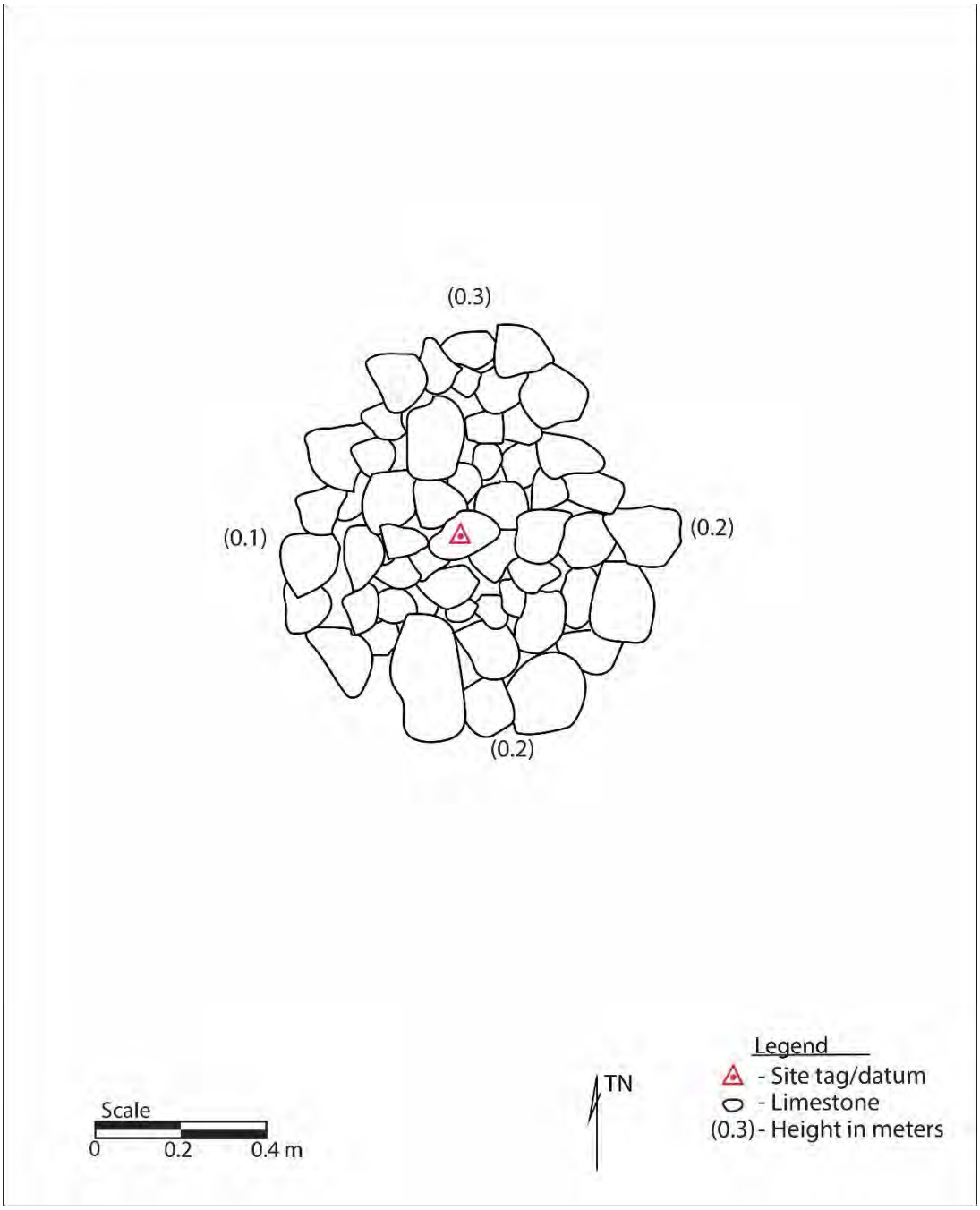

Figure 331. Plan-view map of SIHP 50-80-12-05106, Feature 96 trapezoidal mound.

Figure 332. SIHP 50-80-12-05106, Feature 96 trapezoidal mound (view to east).

Feature 97 (Figure 333) is a limestone pit located near the center of Parcel 40. It is 0.7 m long × 0.5 m wide × 1.7 m deep. The function of the unmodified pit is undetermined.

Figure 333. SIHP 50-80-12-05106, Feature 97 limestone pit (view to southeast).

Feature 98 (Figure 334 and see Figure 275, p. 242) is a small limestone mound located in the southwestern portion of Parcel 40, just 7 m north of Tripoli Road and 30 m east of Coral Sea Road. This mound is closely associated with Feature 66. Feature 98 is 1.75 m (N/S) × 1.25 m (E/W) with a maximum height of 0.25 m. The mound is rectangular in shape and 1 m west of Feature 99. This mound is composed of small limestone boulders and small, medium, and large subangular limestone cobbles. Feature 98 is interpreted as an agricultural mound in fair condition.

Figure 334. SIHP 50-80-12-05106, Feature 98 mound (view to north/northwest).

Feature 99 (Figure 335 and Figure 336) is a rough wall located in the southwesternmost extent of Parcel 40, about 60 m north of Tripoli Road and 25 m east of Coral Sea Road. The wall is roughly 7 m (NW/SE) × 2 m (NW/SW) with a maximum wall height of 0.3 m and a maximum wall width of 2 m. The rough wall was likely created by the U.S. military during land-clearing activities.

Figure 335. SIHP 50-80-12-05106, Feature 99 wall (view to west).

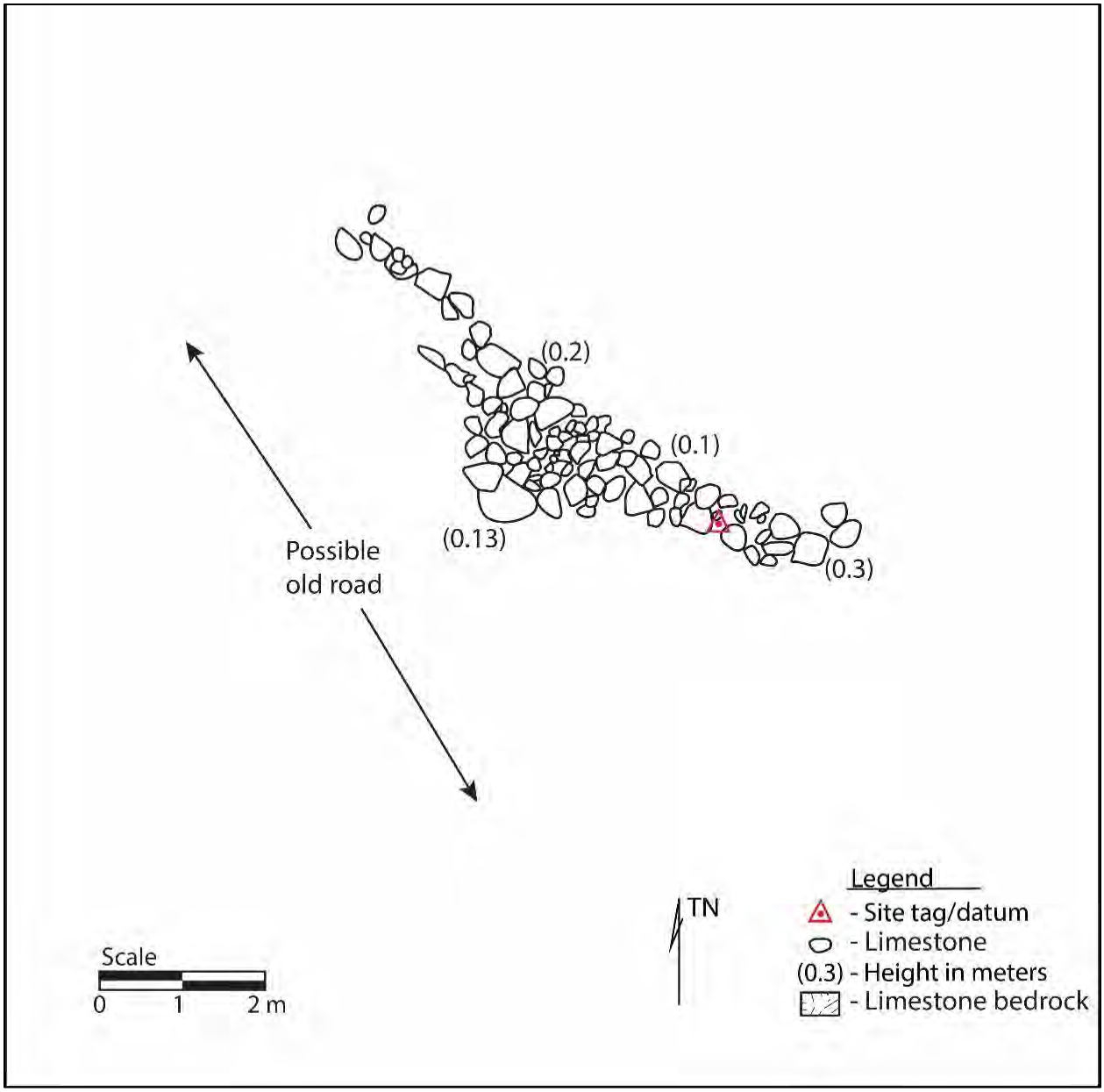

Figure 336. Plan-view map of SIHP 50-80-12-05106, Feature 99 wall.

SIHP No.: 50-80-12-05107
Site Type: Limestone pit complex
No. of Features: 7
Dimensions: 50 m L × 20 m W
Condition: Fair to Good
Possible Age: Undetermined
Possible Function: Undetermined
Significance: d
Recommended Treatment: Preservation
Previous Investigations: Archaeological survey (Tuggle and Tomonari-Tuggle 1997); intensive survey (Beardsley 2001)

SIHP 50-80-12-05107 is a complex of seven limestone pits clustered in the northwest corner of the undeveloped and forested portion of Parcel 40 (Table 9 and Figure 337). The site is immediately east of Coral Sea Road and south of the developed military magazine area (Temporary Site T-01; see Appendix B). The surrounding landform has been adversely impacted from military development and training activities, and various roads were created across the parcel that resulted in mechanically formed alignments or walls of soil, limestone, and wood debris.

As discussed in the previous SIHP 50-80-12-05106 description, Beardsley's (2001) investigation grouped all limestone pits (n=28) located in the undeveloped Parcel 40 area under SIHP 50-80-12-05107, originally assigned by Tuggle and Tomonari-Tuggle (1997) to a cluster of 18 limestone pits in the northwestern corner of the undeveloped Parcel 40 area.

During the current investigation, an attempt was made to group archaeological features and limestone pits by spatial association. Although only 7 of the 18 limestone pits originally identified by Tuggle and Tomonari-Tuggle (1997) were currently documented in SIHP 50-80-12-05107, the remaining 11 were likely subsumed under SIHP 50-80-12-05106 and correlations are mentioned above. None of the limestone pits that were thoroughly documented and tested by Beardsley (2001) can be clearly correlated with the seven pits identified during the current investigation. However, descriptions of four of the pits documented by Beardsley (Features A, F, G, and H) mention their proximity to the road and military magazines, which is a similar location as the current SIHP 50-80-12-05107 feature cluster. Two of the limestone pits (Feature 6 and 7) appear to be culturally modified.

Table 9. Summary of SIHP 50-80-12-05107 Modified and Unmodified Limestone Pits

Feature	Field No.	Type	Function
1	T-079	Limestone pit	Undetermined
2	T-108	Limestone pit	Undetermined
3	T-110	Limestone pit	Undetermined
4	T-111	Limestone pit	Undetermined
5	T-112	Limestone pit	Undetermined
6	T-113	Modified limestone pit	Agriculture
7	T-521	Modified limestone pit	Agriculture

Figure 337. SIHP 50-80-12-05107 feature locations overlaid on contours created from aerial LiDAR data, 2019.

Limestone pit descriptions area tabulated in Table 9. Photographs for all limestone pits are presented in Figure 338 through Figure 342. Features 1 through 5 are unmodified and Features 6 and 7 appear to be culturally modified.

Feature 6 contains three small limestone boulders aligned on the southwest exterior edge of the pit (Figure 343 and Figure 344). The alignment is 0.3 m wide × 0.9 m long.

Feature 7 contains a wall of limestone cobbles and small boulder slabs placed along the exterior edge of the pit (Figure 346 and Figure 345). The wall is piled 2–3 courses high, with the small boulders concentrated on the north side.

Figure 338. SIHP 50-80-12-05107, Feature 1 limestone pit (view to west).

Figure 339. SIHP 50-80-12-05107, Feature 2 limestone pit (view to north).

Figure 340. SIHP 50-80-12-05107, Feature 3 limestone pit (view to east).

Figure 341. SIHP 50-80-12-05107, Feature 4 limestone pit (view to east).

Figure 342. SIHP 50-80-12-05107, Feature 5 limestone pit (view to southwest).

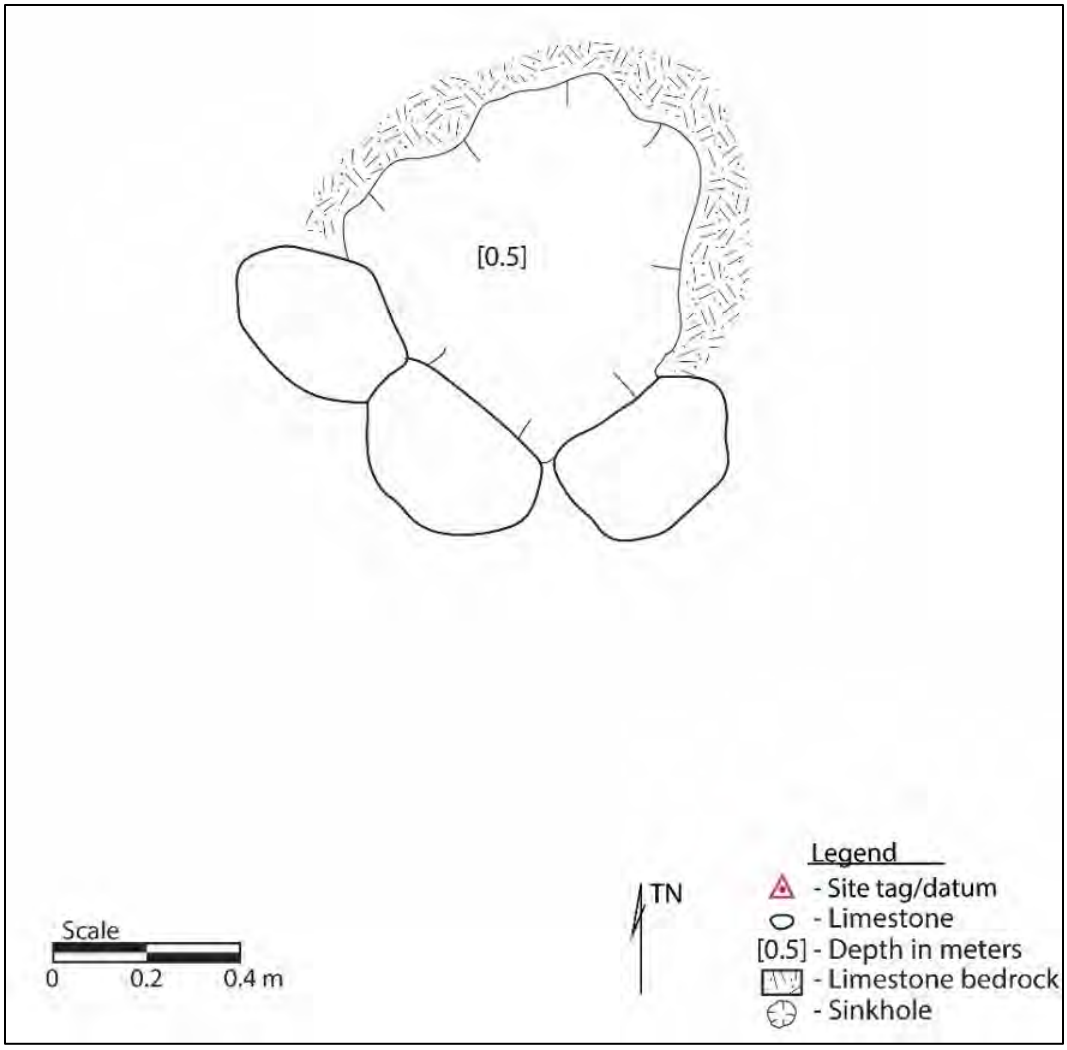

Figure 343. Plan-view of SIHP 50-80-12-05107, Feature 6 modified limestone pit.

Figure 344. SIHP 50-80-12-05107, Feature 6 modified limestone pit (view to west).

Figure 345. SIHP 50-80-12-05107, Feature 7 modified limestone pit (view to northeast).

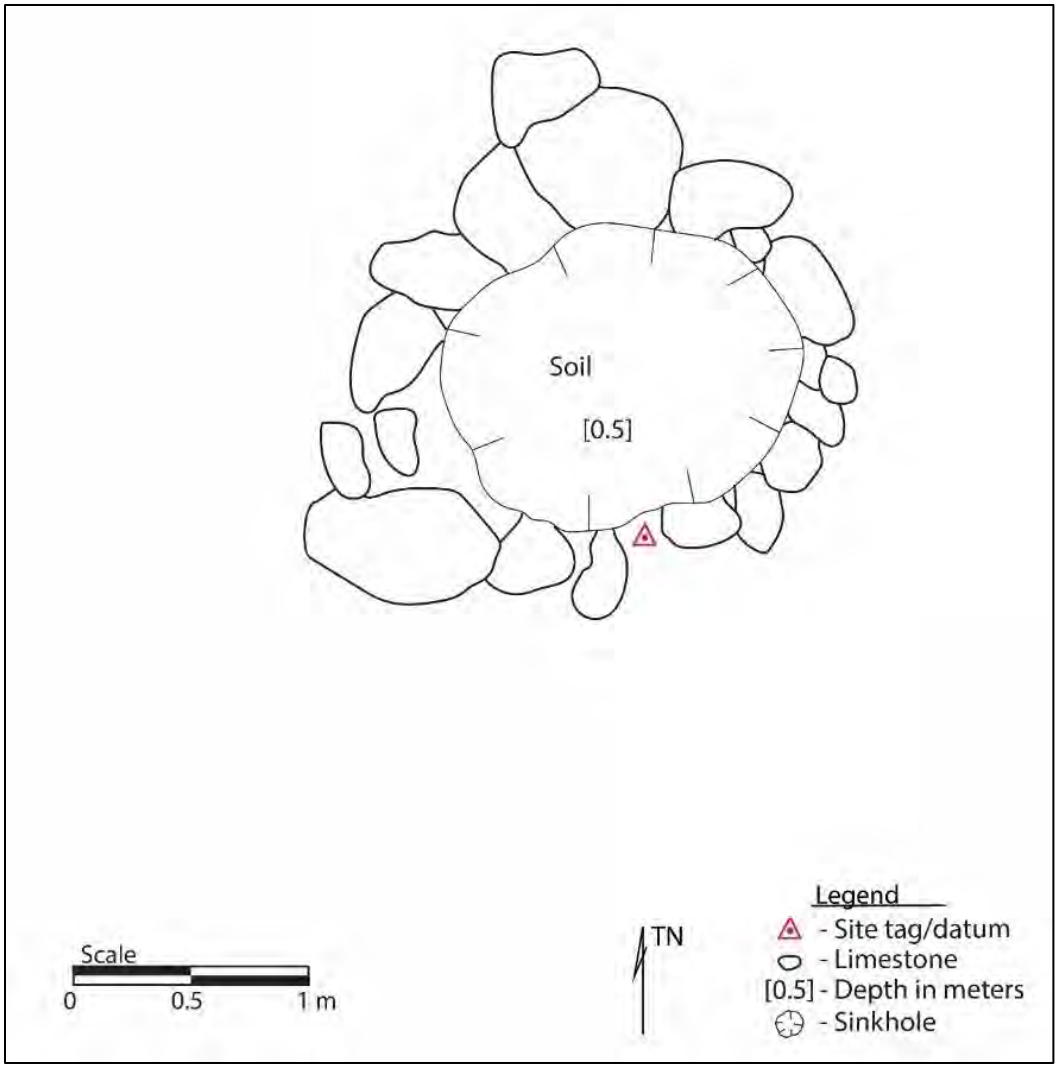

Figure 346. Plan-view of SIHP 50-80-12-05107, Feature 7 modified limestone pit.

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[TMK: (1) 9-1-013:038; (1) 9-1-013:040; AND (1) 9-1-016:027 (POR.)]

APPENDIX B:

SITE DESCRIPTIONS FOR NEWLY IDENTIFIED HISTORIC PROPERTIES

CULTURAL RESOURCES CONSULTANTS

Hawai'i Office:
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ARCHAEOLOGICAL INVENTORY SURVEY OF THE PROPOSED BARBERS POINT SOLAR PROJECT IN THE AHUPUA‘A OF HONOULIULI, DISTRICT OF ‘EWA, ISLAND OF O‘AHU

[TMK: (1) 9-1-013:038; (1) 9-1-013:040; AND 9-1-016:027 (POR.)]

APPENDIX B: SITE DESCRIPTIONS FOR NEWLY IDENTIFIED HISTORIC PROPERTIES

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September 2021

PREFACE

This report volume contains archaeological site descriptions, feature plan maps, and photographs for newly identified sites (T-01 through T-03, T-07 through T-12) documented in the Barbers Point Solar Project Area. A gap in temporary site numbers resulted from combining all limestone sink features in Parcel 38 (originally assigned T-03 through T-05) into a single site complex (T-03). Following additional review, the feature documented as T-06 was subsequently voided, as it was determined to be a modern feature (dating to the 1970s–80s).

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1.0 ARCHAEOLOGICAL SITE DESCRIPTIONS

SIHP No.: 50-80-12-XXXXX
TEMPORARY NO.: T-01
Site Type: U.S. Military Buildings
No. of Features: 7
Dimensions: 200 m L × 45 m W
Condition: Good
Possible Age: 1943
Possible Function: High Explosive Magazines, Building Foundation
Significance: a, d
Recommended Treatment: Preservation/No Further Work
Previous Investigation: Architectural History Report (Yoklavich 1997)

SIHP 50-80-12-XXXXX (T-01) consists of six concrete high explosive magazines (Features 1 through 6) located in Parcel 40 and a concrete building foundation (Feature 7) located east of the bunkers on the west side of Coral Sea Road (Figure 1 and Table 1). The six magazines were included in a historic building inventory survey of NAS Barbers Point and evaluated as an architectural resource eligible for the National Register (Yoklavich 1997:241). The magazines comprise concrete walls and floors and contain vented double steel doors on their east sides. The roofs of the magazines are filled with gravel and soil and have a maximum height of roughly 4.5 m. Their east-facing facades have a hexagon or semi-circular shape. The Feature 7 building foundation was not included in Yoklavich's 1997 report; however, it is shown on a 1945 NAS Barbers Point Station map as Building 183.

Feature 1 (Figure 2 and Figure 3) is the northeastern-most magazine located within the leased parcel of Kalaeloa Ranch on Long Island Street. The magazine doors were closed and not accessed during the survey. A modern ranch structure was erected on the northeast corner of Feature 1. Feature 1 measures 23 m (E/W) × 22 m (N/S). The roof supports a dense growth of *kiawe* (*Prosopis pallida*). Feature 1 is Building 176 of NAS Barbers Point. Feature 1 is in good condition.

Feature 2 (Figure 4 and Figure 5) is east of Feature 1 and lies within the pyrotechnic leased parcel on Long Island Street. The magazine doors were closed and blocked with concrete and were not accessed during the survey. Feature 2 is roughly 21 m × 21 m. Feature 2 is Building 177 of NAS Barber Point. Feature 2 is in good condition.

Feature 3 (Figure 6 and Figure 7) is east of Feature 2 and lies within the pyrotechnic leased parcel on Long Island Street. The magazine doors were open during the survey and the interior appeared vacant. Feature 3 measures 23 m (E/W) × 20 m (N/S). The magazine is Building 178 of NAS Barbers Point. Feature 3 is in good condition.

Feature 4 (Figure 8) is the most southeastern magazine, located on Casablanca Street. The magazine doors were open during the survey and the interior appeared vacant. The magazine roof and building edges support a thick growth of *kiawe* (*Prosopis pallida*) and two *noni* (*Morinda citrifolia*) trees. Feature 4 measures 24 m (E/W) × 23 m (N/S). The magazine is Building 179 of NAS Barbers Point. Feature 4 is in good condition.

Table 1. Summary of SIHP 50-80-12-XXXXX (T-001) Military Magazines and Building Foundation

Feature	Field No.	Building Number	Type	Function
1	016	176	Magazine	High explosive ammunition storage
2	062	177	Magazine	High explosive ammunition storage
3	109	178	Magazine	High explosive ammunition storage
4	485	179	Magazine	High explosive ammunition storage
5	486	180	Magazine	High explosive ammunition storage
6	489	181	Magazine	High explosive ammunition storage
7	610	183	Concrete curbing	Building foundation

Feature 5 (Figure 9 and Figure 10) is east of Feature 4 on Casablanca Street. The magazine doors were open during the survey and the interior appeared vacant. The magazine roof supports a dense growth of *kiawe* (*Prosopis pallida*) and *koa haole* (*Leucaena leucocephala*). Feature 5 measures 24 m × 24 m. The magazine is Building 180 of NAS Barbers Point. Feature 5 is in good condition.

Feature 6 (Figure 9 and Figure 10) is east of Feature 5 on Casablanca Street. The magazine doors were open during the survey and the interior was vacant. The magazine roof supports a dense growth of *kiawe* (*Prosopis pallida*) and *koa haole* (*Leucaena leucocephala*). Feature 6 measures 25 m (E/W) × 19 m (N/S) at maximum. The magazine is Building 181 of NAS Barbers Point. Feature 6 is in good condition.

Feature 7 is a rectangular concrete foundation associated with NAS Barbers Point's Building 183. The foundation comprises a 12 cm-wide by 0.2 to 0.4 m-high concrete curb that forms a rectangular enclosure measuring 8.5 m (N/S) by 6 m (E/W) and interior "room" in the north portion of the feature. A 0.2 m high concrete block is within the northern-interior portion of the feature. One vertical pipe is on the south side of the concrete block and three adjacent vertical pipes are along the eastern wall. The floor is soil covered. Feature 7 is in fair condition.

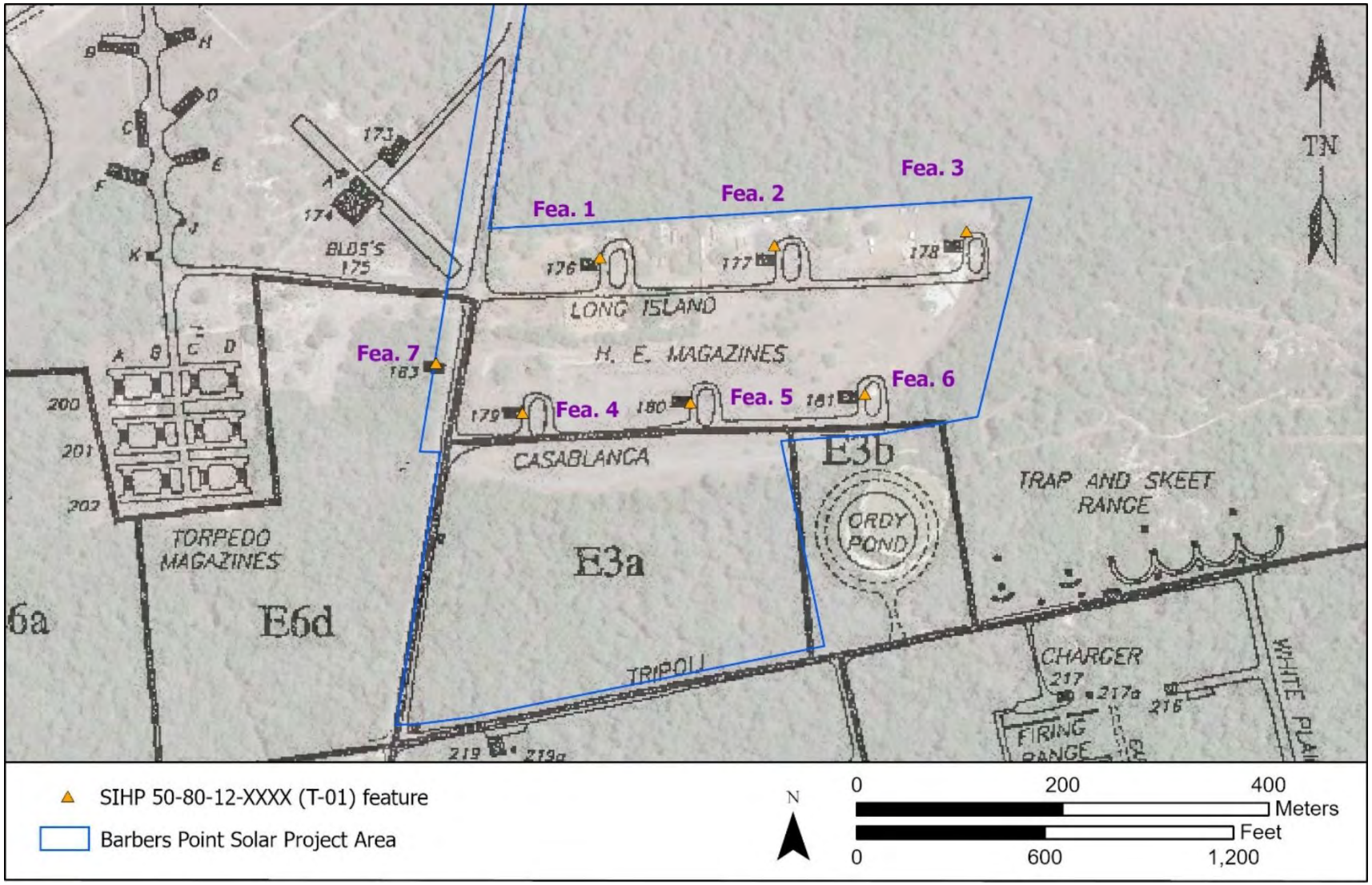

Figure 1. Plan-view map of SIHP 50-80-12-XXXXX (T-01), showing feature distribution overlaid on 1945 Station Map (in Tuggle and Tomonari-Tuggle 1997:Figure 25).

Figure 2. SIHP 50-80-12-XXXXX (T-01), east side of Feature 1 magazine (view to northwest).

Figure 3. SIHP 50-80-12-XXXXX (T-01), south side of Feature 1 magazine (view to north).

Figure 4. SIHP 50-80-12-XXXXX (T-01), east side of Feature 2 magazine (view to west).

Figure 5. SIHP 50-80-12-XXXXX (T-01), south side of Feature 2 magazine (view to north).

Figure 6. SIHP 50-80-12-XXXXX (T-01), east side of Feature 3 magazine (view to west).

Figure 7. SIHP 50-80-12-XXXXX (T-01), south side of Feature 3 magazine (view to north).

Figure 8. SIHP 50-80-12-XXXXX (T-01), east side of Feature 4 magazine (view to west).

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Figure 9. SIHP 50-80-12-XXXXX (T-01), east side of Feature 5 magazine (view to west).

Figure 10. SIHP 50-80-12-XXXXX (T-01), south side of Feature 5 magazine (view to north).

Figure 11. SIHP 50-80-12-XXXXX (T-01), east side of Feature 6 magazine (view to west).

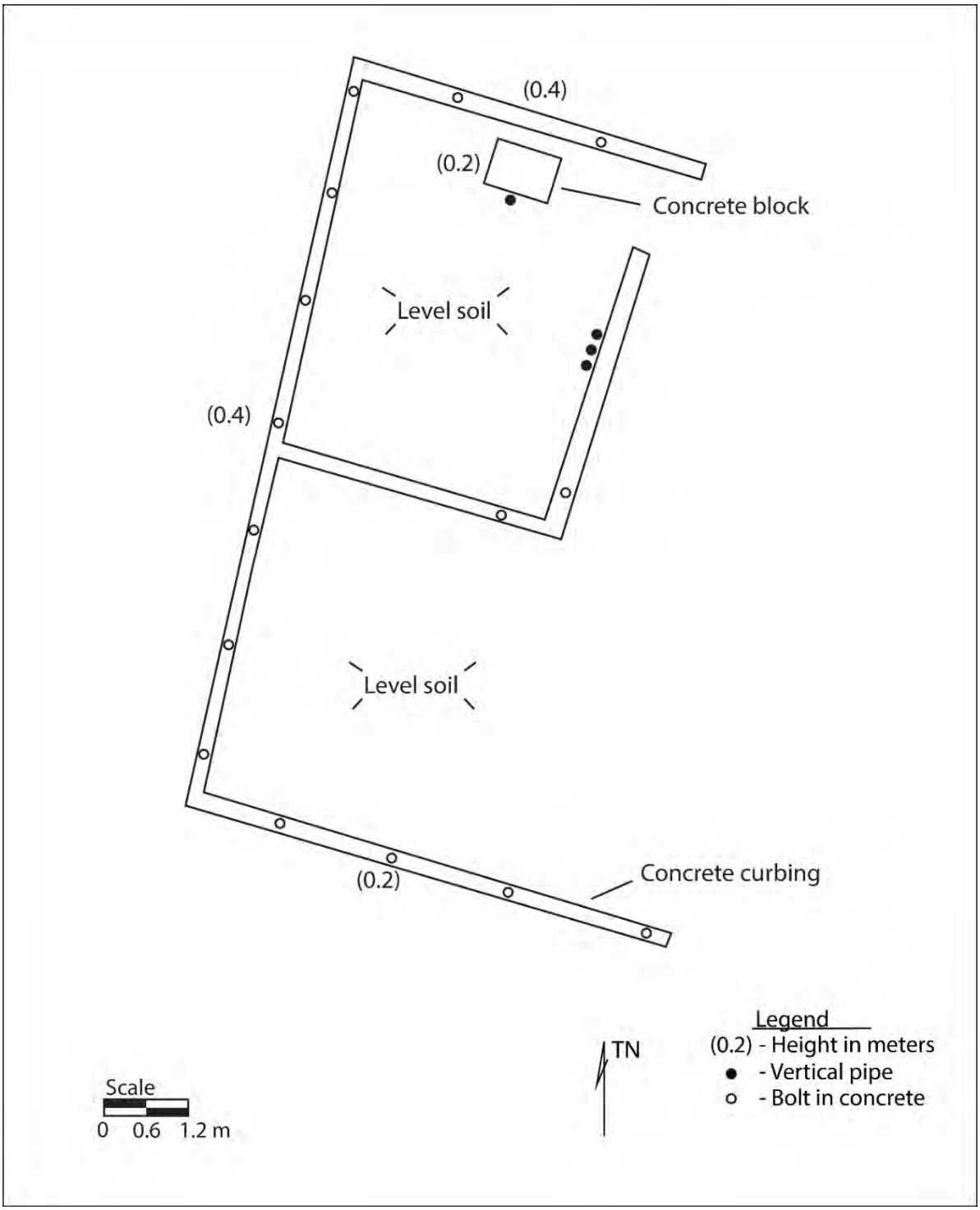


Figure 12. Plan map of SIHP 50-80-12-XXXXX (T-01), Feature 7 concrete foundation.

Figure 13. SIHP 50-80-12-XXXXX (T-01), Feature 7 concrete foundation (view to north).

SIHP No.: 50-80-12-XXXXX
TEMPORARY NO.: T-02
Site Type: Complex of U.S. military buildings, revetments, and associated infrastructure
No. of Features: 57
Dimensions: 700 m L × 430 m W
Condition: Poor to Good
Possible Age: 1942–1957
Function: U.S. Military Facility
Significance: a, c, d
Recommended Treatment: Preservation/No Further Work
Previous Investigation: Architectural History Report (Yoklavich 1997); National Register Nomination (Ewa Field Revetment District South; Resnick, Frye, and Salo 2018)

SIHP 50-80-12-XXXXX (T-02) consists of a complex of 57 U.S. military structures and a limestone quarry associated with development of Marine Corps Air Station Ewa (MCAS Ewa) following the Japanese attack on Oʻahu Island on December 7, 1941 (Figure 14 and Table 2). The revetments and associated structures were documented by Yoklavich (1997). Table 2 provides a summary of the 59 features documented in the project area and correlating building numbers and dates of construction provided by Yoklavich (1997).

The current survey documented a total of 42 revetments (Features 1–4, 6, 7, 9–16, 22–33, 38–46, 48–53, 57, and 58), a high-explosive magazine (Feature 5), stone-rubble berm (Feature 8), two Quonset huts (Features 20 and 34), four concrete structures (Features 19, 35, 37, and 56), a C-shaped wall built into one of the revetments (Feature 17), a fire hydrant barrier (Feature 21), a mound (Feature 18), a stone-masoned building remnant (Feature 36), a signpost and foundation (Feature 47), and the limestone quarry (Feature 59).
Each feature is described below by formal type.

Aircraft Revetments
A total of 42 revetments (Figure 15 through Figure 53) were documented within the current project area and designated Features 1–4, 6, 7, 9–16, 22–33, 38–46, 48–53, 57, and 58 (see Table 2). The revetments were constructed in 1942 in response to the December 7, 1941 Japanese attack and destruction of aircraft left unprotected on the adjacent MCAS Ewa airfield. The aircraft revetments are in fair to good condition, and many have been altered by graffiti. Excerpts from the Historic American Buildings Survey (HABS No. HI-279-A) provide a description of the revetment construction efforts:

> The revetments are built with a parabolic-shaped cast-in-place concrete beam over the one opening to each revetment. Each beam is 6 feet high and 12 inches thick. Although the title of the drawings says they are “44' Clear Span” they actually span about 53 feet. The 44-foot clear span measurement is based on the span between points at which there is a 7-foot vertical clearance. The maximum clear height of the front arch is 16'-9". The beam is further reinforced with five concrete fins, each six inches thick, which act as buttresses for the beam and as a further interconnection between the beam and the revetment shell. The reinforced concrete shell structure has an inside radius at the floor of 28 feet.
>
> After completion, the revetments were covered with about ten feet of sand. Many of the revetments are still completely covered by the sand, with grass and trees growing from the mounds. The top surface of some revetments are partially exposed due to erosion. The floors of the revetments are covered with asphalt paving.

Table 2. Summary of SIHP 50-80-12-XXXXX (T-02) Features

Feature	Field No.	Building No.	Type	Function	Date	Comments
1	246	1272	Revetment	Aircraft concealment	1942	graffiti
2	248	1273/48	Revetment	Aircraft concealment	1942	graffiti
3	259	1274	Revetment	Aircraft concealment	1942	graffiti, garbage, tires
4	260	1275	Revetment	Aircraft concealment	1942	wood, graffiti
5	264	1525	Bunker remnant	Ammunition storage	1944	-
6	266	1280	Revetment	Aircraft concealment	1942	-
7	267	1281	Revetment	Aircraft concealment	1942	-
8	269	-	Stone-soil Berm	Land clearing for revetments	1942	-
9	292	1278/53	Revetment	Aircraft concealment	1942	white truck; graffiti
10	293	1279/53	Revetment	Aircraft concealment	1942	trash, graffiti
11	298	1284/59	Revetment	Aircraft concealment	1942	thick vegetation; graffiti
12	299	1285/60	Revetment	Aircraft concealment	1942	thick vegetation; graffiti
13	320	1288/63	Revetment	Aircraft concealment	1942	tractor tow, diesel fuel truck, water truck, graffiti
14	321	1289/64	Revetment	Aircraft concealment	1942	diesel fuel truck, boat, F650 truck, graffiti
15	322	1290/65	Revetment	Aircraft concealment	1942	equipment storage
16	324	1285	Revetment	Aircraft concealment	1942	-
17	325	-	C-shaped Wall	Military training	1944-1957?	built into edge of revetment
18	350	-	Mound	Military development	1944-1957?	-
19	357	-	Concrete structure	Military Quonset hut foundation	1944	-
20	358	1506	Quonset hut	Military	1944	-
21	361	-	Metal barrier	Military fire hydrant	1944-1957?	-
22	376	1283/57	Revetment	Aircraft concealment	1942	wooden planks, ladder
23	377	1282	Revetment	Aircraft concealment	1942	living room chair
24	395	1253/28	Revetment	Aircraft concealment	1942	graffiti
25	396	1255/30	Revetment	Aircraft concealment	1942	graffiti
26	397	1248/23	Revetment	Aircraft concealment	1942	black sedan, trash
27	398	1249/24	Revetment	Aircraft concealment	1942	graffiti
28	399	1251/26	Revetment	Aircraft concealment	1942	graffiti
29	400	1250/25	Revetment	Aircraft concealment	1942	trash, graffiti
30	401	1257	Revetment	Aircraft concealment	1942	desk, corrugated metal, kiawe wood

Feature	Field No.	Building No.	Type	Function	Date	Comments
31	402	1259	Revetment	Aircraft concealment	1942	piled kiawe wood
32	408	1301	Revetment	Aircraft concealment	1942	-
33	411	1256/31	Revetment	Aircraft concealment	1942	storage for lease holder
34	412	1523	Quonset hut	Facility building	1944	no interior access; used by lease holder
35	413	87	Concrete structure	Air raid shelter	1944	-
36	414	-	Stone-mason building	Military structure	1944-1957?	-
37	415	-	Concrete footings	Military building foundation	1944-1957?	-
38	416	12/58/33	Revetment	Aircraft concealment	1942	trash, wooden pallets
39	417	1261	Revetment	Aircraft concealment	1942	wooden pallet, graffiti
40	418	1260	Revetment	Aircraft concealment	1942	Graffiti
41	419	1263	Revetment	Aircraft concealment	1942	Graffiti
42	420	1262	Revetment	Aircraft concealment	1942	Graffiti
43	421	1265	Revetment	Aircraft concealment	1942	Graffiti
44	422	1264	Revetment	Aircraft concealment	1942	Graffiti
45	423	1277	Revetment	Aircraft concealment	1942	Graffiti
46	424	1276	Revetment	Aircraft concealment	1942	graffiti
47	426	-	Concrete foundation	Facility signpost	1942-1957	-
48	428	1266	Revetment	Aircraft concealment	1942	graffiti
49	429	1267	Revetment	Aircraft concealment	1942	graffiti
50	430	1268	Revetment	Aircraft concealment	1942	graffiti
51	431	1269	Revetment	Aircraft concealment	1942	graffiti
52	432	1271	Revetment	Aircraft concealment	1942	graffiti
53	433	1270	Revetment	Aircraft concealment	1942	graffiti
56	454	-	Concrete box	Undetermined	Post 1941	-
57	525	1252	Revetment	Aircraft concealment	1942	-
58	526	1254	Revetment	Aircraft concealment	1942	-
59	527	-	Quarry	Revetment building material	1942	-

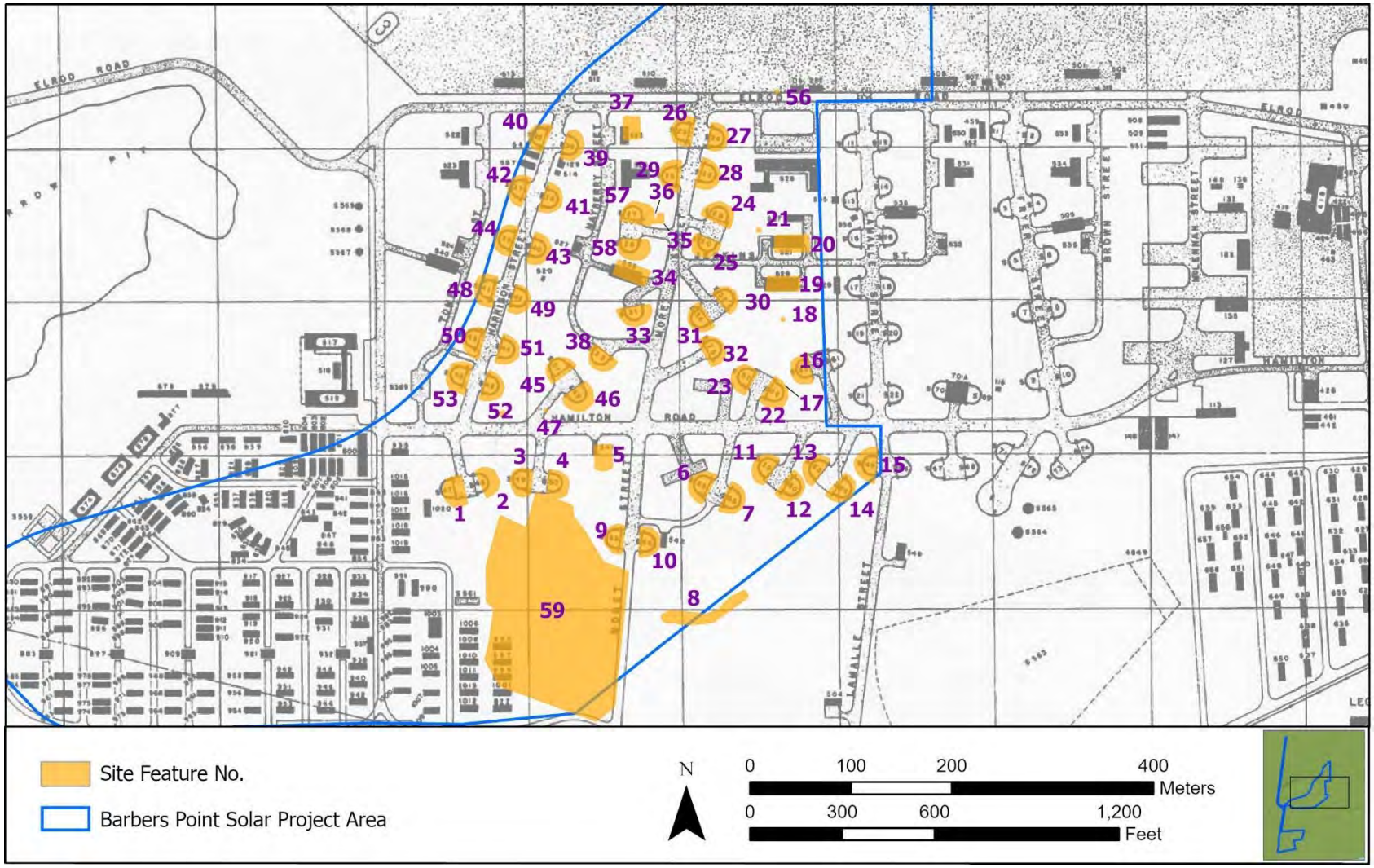


Figure 14. Plan view of SIHP 50-80-12-XXXXX (T-02) features overlaid on MCAS Ewa map (U.S. Navy 1948).

Figure 15. SIHP 50-80-12-XXXXX (T-02), Feature 1 revetment (view to west).

Figure 16. SIHP 50-80-12-XXXXX (T-02), Feature 2 revetment (view to east).

Figure 17. SIHP 50-80-12-XXXXX (T-02), Feature 3 revetment (view to west).

Figure 18. SIHP 50-80-12-XXXXX (T-02), Feature 4 revetment (view to east).

Figure 19. SIHP 50-80-12-XXXXX (T-02), Feature 6 revetment (view to west).

Figure 20. SIHP 50-80-12-XXXXX (T-02), Feature 7 revetment (view to east).

Figure 21. SIHP 50-80-12-XXXXX (T-02), Feature 9 revetment (view to west).

Figure 22. SIHP 50-80-12-XXXXX (T-02), Feature 10 revetment (view to east).

Figure 23. SIHP 50-80-12-XXXXX (T-02), Feature 11 revetment (view to northwest).

Figure 24. SIHP 50-80-12-XXXXX (T-02), Feature 12 revetment (view to southeast).

Figure 25. SIHP 50-80-12-XXXXX (T-02), Feature 13 revetment (view to northwest).

Figure 26. SIHP 50-80-12-XXXXX (T-02), Feature 14 revetment (view to southeast).

Figure 27. SIHP 50-80-12-XXXXX (T-02), Feature 15 revetment (view to west).

Figure 28. SIHP 50-80-12-XXXXX (T-02), Feature 22 revetment (view to east).

Figure 29. SIHP 50-80-12-XXXXX (T-02), Feature 23 revetment (view to west).

Figure 30. SIHP 50-80-12-XXXXX (T-02), Feature 24 revetment (view to north).

Figure 31. SIHP 50-80-12-XXXXX (T-02), Feature 25 revetment (view to south).

Figure 32. SIHP 50-80-12-XXXXX (T-02). Feature 26 revetment (view to northwest).

Figure 33. SIHP 50-80-12-XXXXX (T-02), Feature 27 revetment (view to east).

Figure 34. SIHP 50-80-12-XXXXX (T-02), Feature 28 revetment (view to east).

Figure 35. SIHP 50-80-12-XXXXX (T-02), Feature 29 revetment (view to west).

Figure 36. SIHP 50-80-12-XXXXX (T-02), Feature 30 revetment (view to northeast).

Figure 37. SIHP 50-80-12-XXXXX (T-02), Feature 31 revetment (view to southwest).

Figure 38. SIHP 50-80-12-XXXXX (T-02), Feature 32 revetment (view to east).

Figure 39. SIHP 50-80-12-XXXXX (T-02), Feature 33 revetment (view to south).

Figure 40. SIHP 50-80-12-XXXXX (T-02), Feature 38 revetment (view to southwest).

Figure 41. SIHP 50-80-12-XXXXX (T-02), Feature 39 revetment (view to east).

Figure 42. SIHP 50-80-12-XXXXX (T-02), Feature 40 revetment (view to west).

Figure 43. SIHP 50-80-12-XXXXX (T-02), Feature 41 revetment (view to east).

Figure 44. SIHP 50-80-12-XXXXX (T-02), Feature 42 revetment (view to west-northwest).

Figure 45. SIHP 50-80-12-XXXXX (T-02), Feature 43 revetment (view to east).

Figure 46. SIHP 50-80-12-XXXXX (T-02), Feature 44 revetment (view to west).

Figure 47. SIHP 50-80-12-XXXXX (T-02), Feature 45 revetment (view to northwest).

Figure 48. SIHP 50-80-12-XXXXX (T-02), Feature 46 revetment (view to southeast).

Figure 49. SIHP 50-80-12-XXXXX (T-02), Feature 49 revetment (view to east).

Figure 50. SIHP 50-80-12-XXXXX (T-02), Feature 50 revetment (view to west).

Figure 51. SIHP 50-80-12-XXXXX (T-02), Feature 51 revetment (view to east).

Figure 52. SIHP 50-80-12-XXXXX (T-02), Feature 52 revetment (view to east).

Figure 53. SIHP 50-80-12-XXXXX (T-02), Feature 53 revetment (view to west).

Air Raid Shelter

Feature 35 (Figure 54) is a portable air raid shelter located 2.0 m east of Feature 36 stone structure and east of Feature 57 revetment. Yoklavich (1997:220) provides the following description of the WWII feature, which is designated as Building 87:

> This parabolic-arch air raid shelter is built of pre-cast concrete sections, except the floor which is poured-in-place concrete. It is built of four sections, each about 5 feet in length, about 13 feet in height, and about 13 feet in width measured at the floor. There are four metal loops embedded in each section for lifting.

Feature 35 was evaluated as a "distinctive constructive type" specific to the time following the Japanese attack on December 7, 1941 and represents the only remaining temporary air raid shelter at former NAS Barbers Point (Yoklavich 1997:220). Except for the painted graffiti, the building is in good condition.

Figure 54. SIHP 50-80-12-XXXXX (T-02), Feature 35 air raid shelter with Feature 36 stone structure on left (view to north).

Concrete and Other Structures
Four concrete structures (Features 37, 47, 55, and 56) and one metal pipe structure (Feature 21) are included in the Site T-02 inventory. The condition of all the concrete structures is good, but they represent remnant components of former buildings or utilities.

Feature 37 (Figure 55) consists of 28 concrete footings once serving as a building foundation in the northwest corner of the revetment area. The footings are 0.3 m high by 0.3 in diameter and they are arranged in a rectangular shape that measures 22.0 m (N/S) x 18.0 m (E/W). The former building corresponds to Building 525 shown on a 1948 MCAS Ewa Station map (see Figure 14). Building 525 was not identified in the Yoklavich (1997) investigation (Figure 56).

Feature 47 (Figure 57) is a metal and concrete post located on a paved road leading to revetment Features 45 and 46. It contains a circular metal base 0.3 m in diameter × 2.2 m high, with 2.2 m high metal post on top. The feature is a former signpost.

Feature 56 (Figure 58) consists of a square concrete rim with a separate metal-sheet top on the edge of El Rod Road. The feature appears to have been displaced from its original location. It measures 0.6 m square and is 0.2 m thick. The metal plate fits the open space of the concrete-rimmed feature. The structure might represent a former electrical or other utility valve box.

Feature 21 (Figure 59) is a fire hydrant and surrounding metal-pipe triangular barrier located 20 m northwest of the Feature 20 Quonset hut. The triangle of the metal-pipe barrier is 2 m in diameter. The existing fire hydrant is labeled "487." A concrete drainage hole is on the northeast side of the hydrant.

Figure 55. SIHP 50-80-12-XXXXX (T-02), Feature 37 building foundation (view to southwest).

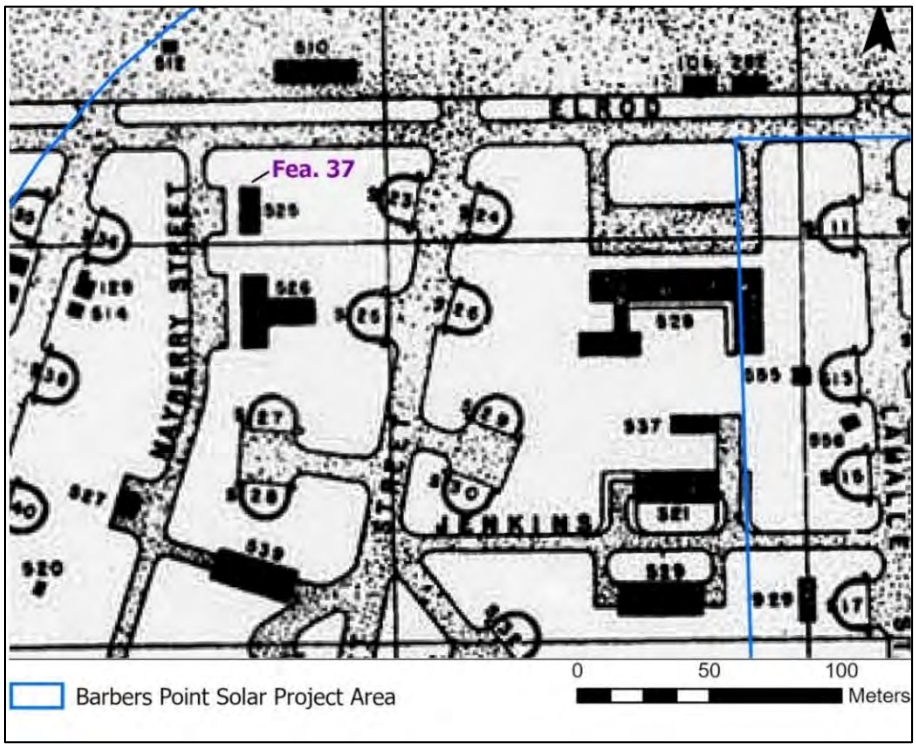


Figure 56. MCAS Ewa Station map (U.S. Navy 1948) showing SIHP 50-80-12-XXXXX (T-02), Feature 37 (Building 525).

Figure 57. SIHP 50-80-12-XXXXX (T-02), Feature 47 signpost (view to northeast).

Figure 58. SIHP 50-80-12-XXXXX (T-02), Feature 56 possible concrete utility box (view to southwest).

Figure 59. SIHP 50-80-12-XXXXX (T-02), Feature 21 fire hydrant (view to northwest).

Quonset Huts
Features 20 and 34 (Figure 60 through Figure 63) are complete Quonset huts and **Feature 19**, immediately south of Feature 20, is likely a Quonset hut concrete foundation. The two complete Quonset huts were built for storage and office space in 1944, a date that corresponds to construction at the MCAS Ewa base that transitioned to the Navy Construction Battalions or Seabees (Yoklavich 1997:220).

All three Quonset huts and foundation measured roughly 30 m long × 14 m wide and the complete Quonset huts (Features 20 and 34) are constructed of metal sheeting on top of a concrete slab. Feature 20 (Building 1506) was vacant during the current survey. Feature 34 (Building 1523) is currently used by the leaseholder, Mr. Franklin Souza, and was not entered during the survey. The two complete Quonset huts are in good structural condition. The Feature 19 concrete foundation is in good condition but represents a remnant component of a building no longer in place.

Pyrotechnics Magazine
Feature 5 or Building 1525 (Figure 64) is an "Armco Hut" pyrotechnics storage magazine built in 1944 (Yoklavich 1997:229). The magazine is in remnant (poor) condition and is currently characterized by a dilapidated metal building, collapsed roof, and front façade with vented double doors. The remaining portion of the structure measures 15 m (N/S) × 7.5 m (E/W) and 3.5 m high.

Stone Masonry Enclosure
Feature 36 (Figure 65) is a rectangular stone enclosure, located 2.0 m west of Feature 35 air raid shelter and immediately east of Feature 57 revetment. The structure likely formed a foundation and base wall for a small building. The wall is composed of a mixture of basalt and limestone rubble (large cobbles and small boulders) and cement mortar placed on top of a concrete slab. Stone rubble covers the floor of the enclosure. The enclosure measures 2 m (N/S) × 5 m (E/W) and a maximum of 0.2 m high. The wall is 0.3 m thick. Consultation with MCAS Ewa historian John Bond suggests that Feature 36 is a former latrine used by military personnel while working in the area. The structure is in fair condition and only contains the lower portion of the building walls.

Figure 60. SIHP 50-80-12-XXXXX (T-02), Feature 20 Quonset hut (view to east).

Figure 61. SIHP 50-80-12-XXXXX (T-02), Feature 20 building interior (view to east).

Figure 62. SIHP 50-80-12-XXXXX (T-02), Feature 34 Quonset hut (view to west-northwest).

Figure 63. SIHP 50-80-12-XXXXX (T-02), Feature 19 likely Quonset hut concrete foundation (view to southwest).

Figure 64. SIHP 50-80-12-XXXXX (T-02), Feature 5 pyrotechnics magazine (view to south).

Figure 65. SIHP 50-80-12-XXXXX (T-02), Feature 36 rectangular stone enclosure (view to north).

Limestone Structures

Feature 17 (Figure 66 and Figure 67) is a C-shaped wall composed of piled limestone cobbles and small to medium boulders. The feature is built into the east edge of the Feature 22 revetment. It measures 2 m (N/S) × 1 m (E/W) with a maximum height of 0.6 m. The feature is in good condition. Feature 17 postdates the revetment, and thus is interpreted as a military training feature.

Feature 18 (Figure 68 and Figure 69) is a limestone mound located in a heavily disturbed area evidenced by abundant bulldozer push piles, with aircraft revetments and Quonset huts on all sides. A concentration of limestone pits (T-03) is also in this area. The mound is 1.1 m in diameter and 0.2 m high. It is constructed of piled cobbles and small boulders. Feature 18 is in good condition. It is interpreted as a possible U.S. military land clearing feature.

Limestone Quarry

Feature 59 (Figure 70 and Figure 71) is a limestone quarry located at the center of Parcel 38. The quarry measures approximately 185 m (N/S) × 130 m (E/W) and descends to around 5 m (16 ft) at its deepest point. An access descends into the quarry from Moffet Street on the east side of the quarry. The aircraft revetments are retained by blocks of limestone likely derived from the quarry. The quarry is in good condition in the sense that it clearly looks like a quarried area.

Feature 8 (Figure 72 and Figure 73) is a large berm of limestone rubble and debris (including rusted metal items) that overlaps the southeastern boundary of the project area in Parcel 38. The berm is covered with a dense, high grass and measures approximately 43 m (NE/SW) long × 4 to 8 m wide with a maximum height of 1.5 m. The feature is in fair to good condition. The berm is likely the result of extensive land clearing on the southeast side of the project area.

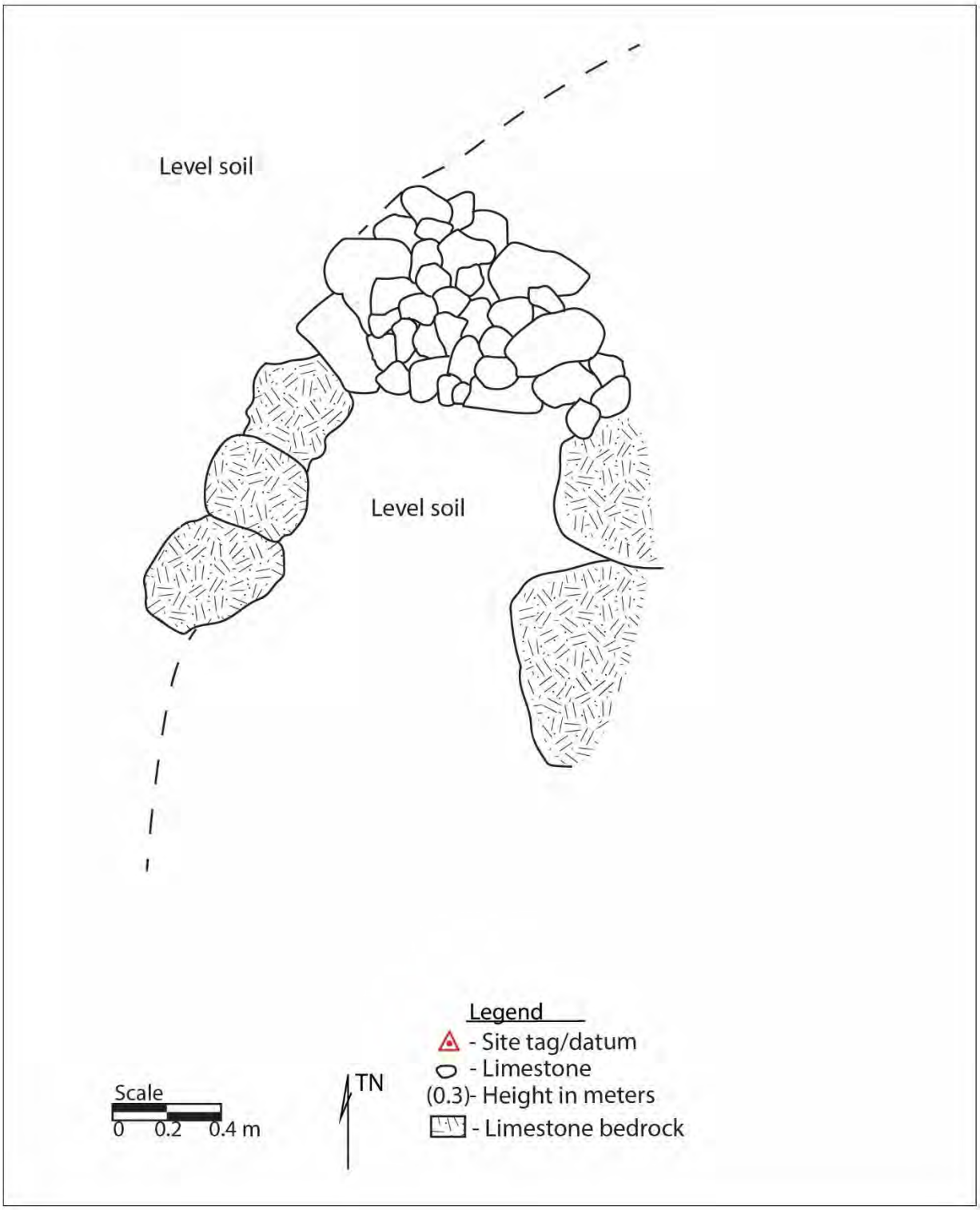


Figure 66. Plan-view map of SIHP 50-80-12-XXXXX (T-02), Feature 17 C-shaped wall.

Figure 67. SIHP 50-80-12-XXXXX (T-02), Feature 17 C-shaped wall (view to west).

Figure 68. SIHP 50-80-12-XXXXX (T-02), Feature 18 mound (view to northwest).

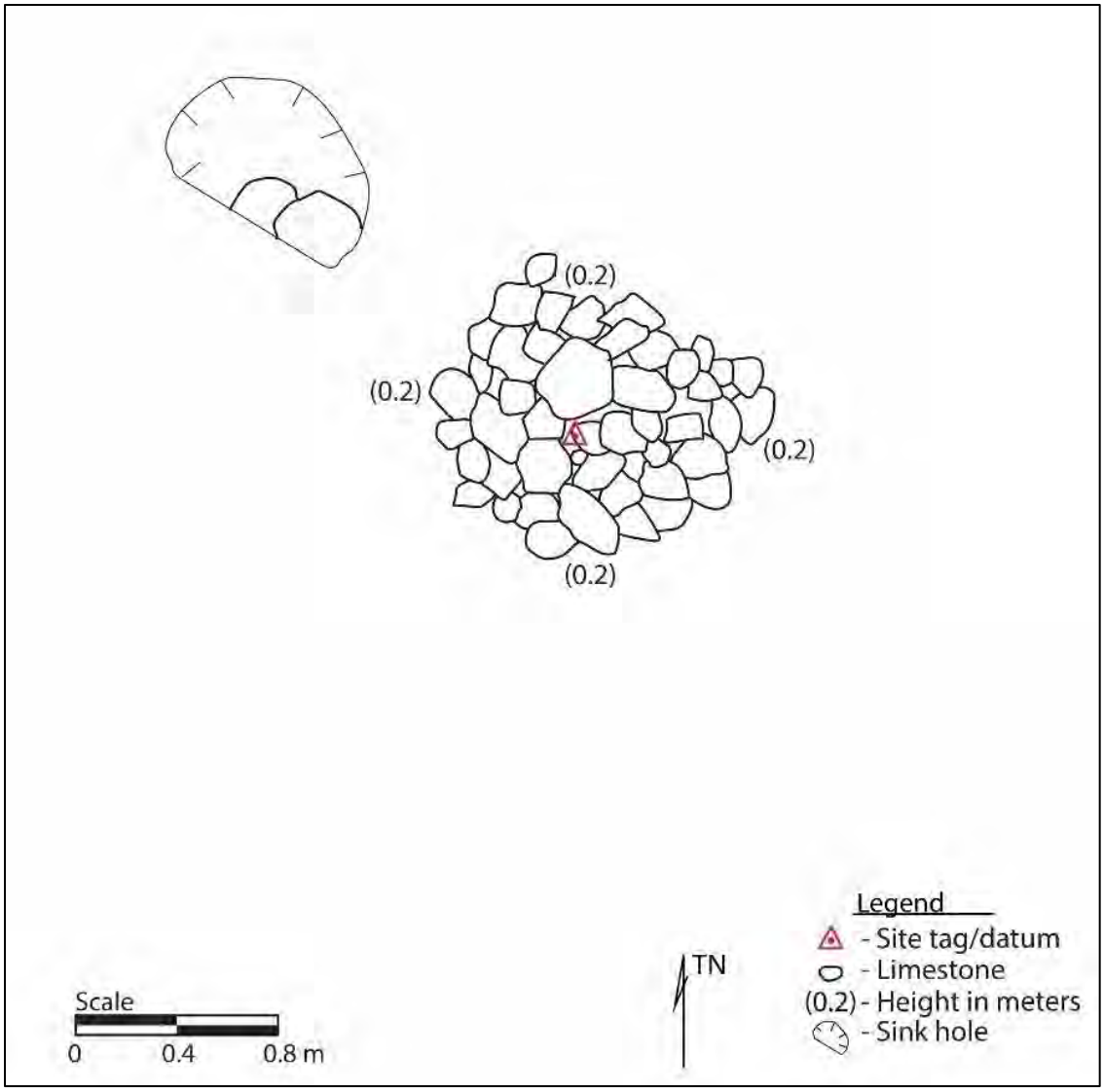


Figure 69. Plan-view map of SIHP 50-80-12-XXXXX (T-02), Feature 18 mound.

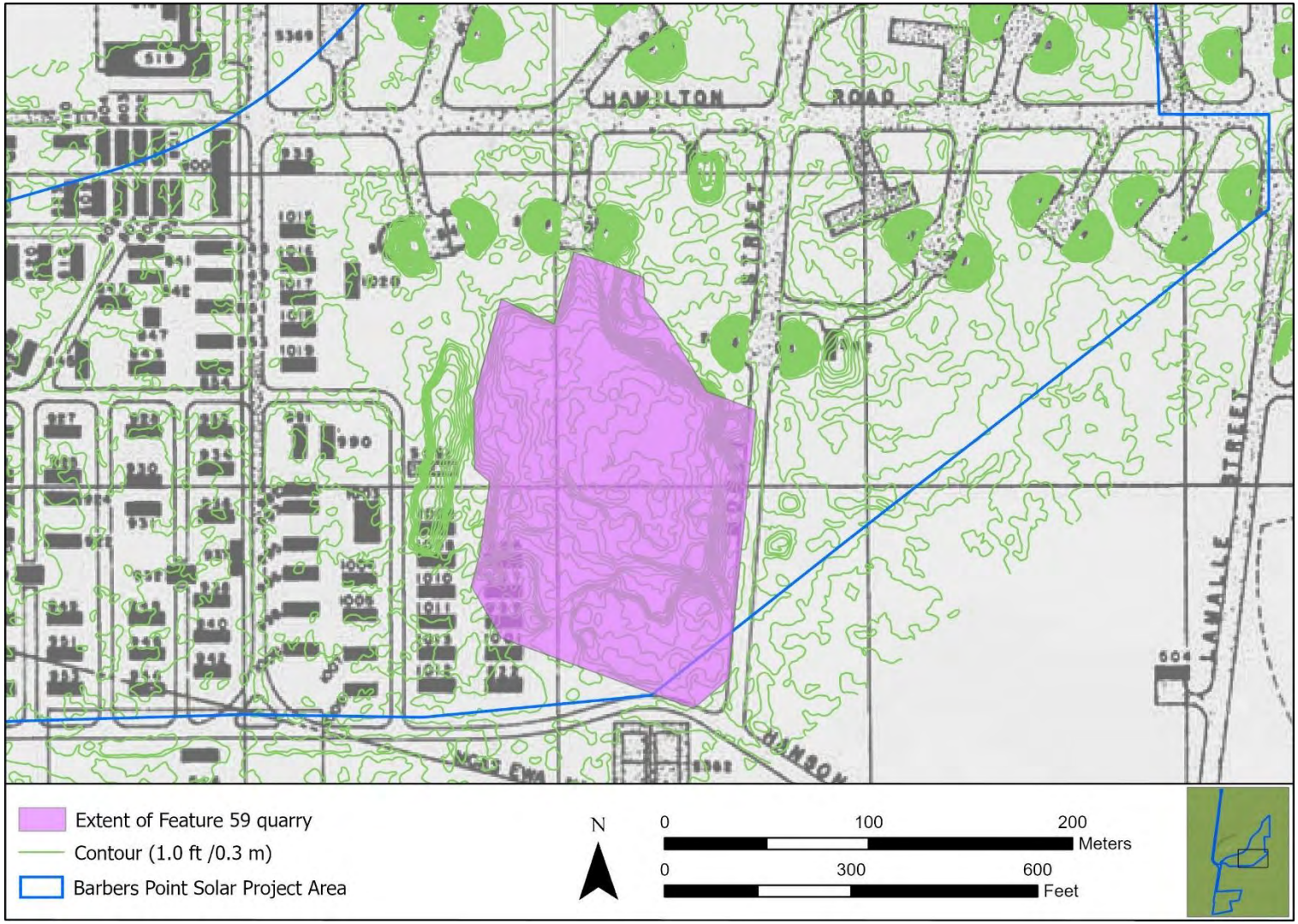


Figure 70. SIHP 50-80-12-XXXXX (T-02), Feature 59 quarry, overlaid on contours created from LiDAR data, 2019, and MCAS Ewa map (U.S. Navy 1948).

Figure 71. Overview of SIHP 50-80-12-XXXXX (T-02), Feature 59 quarry edge. Crewmember is next to quarried limestone block (view to southwest).

Figure 72. SIHP 50-80-12-XXXXX (T-02), Feature 8 berm, overlaid on contours created from LiDAR data, 2019, and MCAS Ewa map (U.S. Navy 1948).

Figure 73. SIHP 50-80-12-XXXXX (T-02), Feature 8 berm under grass (view to southwest).

SIHP No.: 50-80-12-XXXXX
TEMPORARY NO.: T-03
Site Type: Unmodified and Modified Limestone Pits and Mounds
No. of Features: 160
Dimensions: 210 m (NW/SE) × 970 m (NE/SW)
Condition: Fair to Poor
Possible Age: Undetermined/Pre-Contact–Early Post-Contact Era
Possible Function: Undetermined/Agricultural
Significance: d
Recommended Treatment: Preservation/Data Recovery (If Impacted)
Previous Investigation: Presence noted but not recorded during archaeological survey (Tuggle and Tomonari-Tuggle 1997)

SIHP 50-80-12-XXXXX consists of three modified limestone pits (Features 96, 116, and 153) and 157 unmodified limestone pits (Features 1–95, 97–115, 117–152, and 154–160). Feature 160 pit was below the current surface and was identified during excavation of T-05 (see Appendix C). The site features are distributed across Parcel 38 within and just south of the former U.S. Navy Seabee Camp (SIHP 50-80-12-05099) and the area containing revetments and related buildings and infrastructure (Site T-02).

The surrounding terrain, as well as many of the limestone pits, was adversely impacted by development of the WWII-era revetment complex and the U.S. Navy Seabee Camp, including the latter facility's demolition. This is evidenced by many of the limestone pits being mechanically filled with soil, limestone debris, residential refuse (e.g., beverage containers), vehicle parts, metal barrels and sheets, demolished utility pipes, and paint cans, among other military-related items. Although limestone pits were previously noted by Tuggle and Tomonari-Tuggle (1997) at SIHP -05099, none were documented during Tuggle and Tomonari-Tuggle's survey.

The modified and unmodified limestone pits range from 0.5 to 5 m wide to 0.6 to 8 m long and between 0.2 m and a maximum of 8 m in depth. A tabulated description (Table 3) and photographs (Figure 78 through Figure 242) are provided for all but one limestone pit (Feature 86), which was not photographed due to the presence of swarming bees from a hive inside the pit feature. During the current investigation, scaled plan maps were drafted for the modified pits.

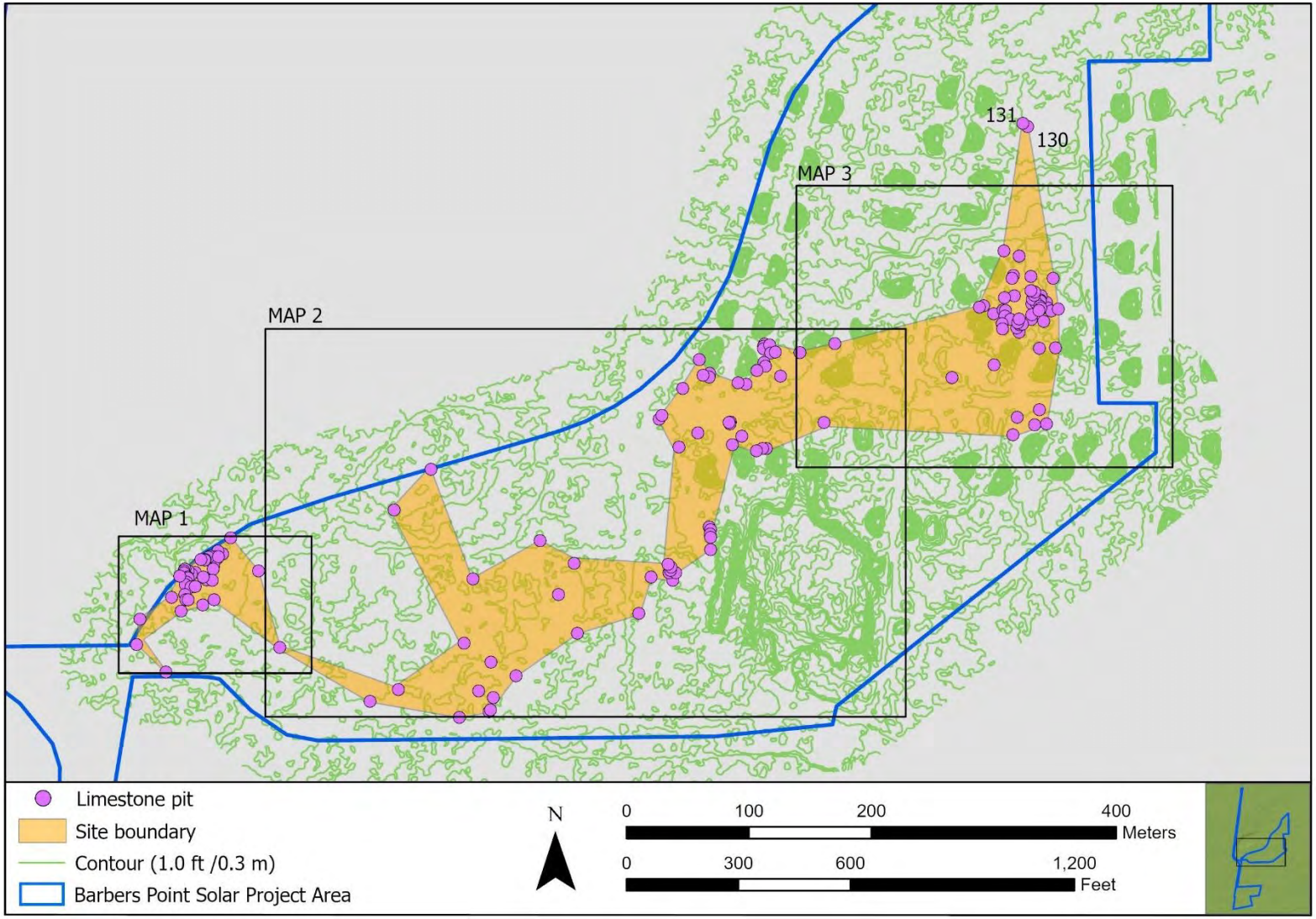


Figure 74. SIHP 50-80-12-XXXXX (T-03), showing overview of feature distribution and Map 1 through 3 insets (see following three figures).

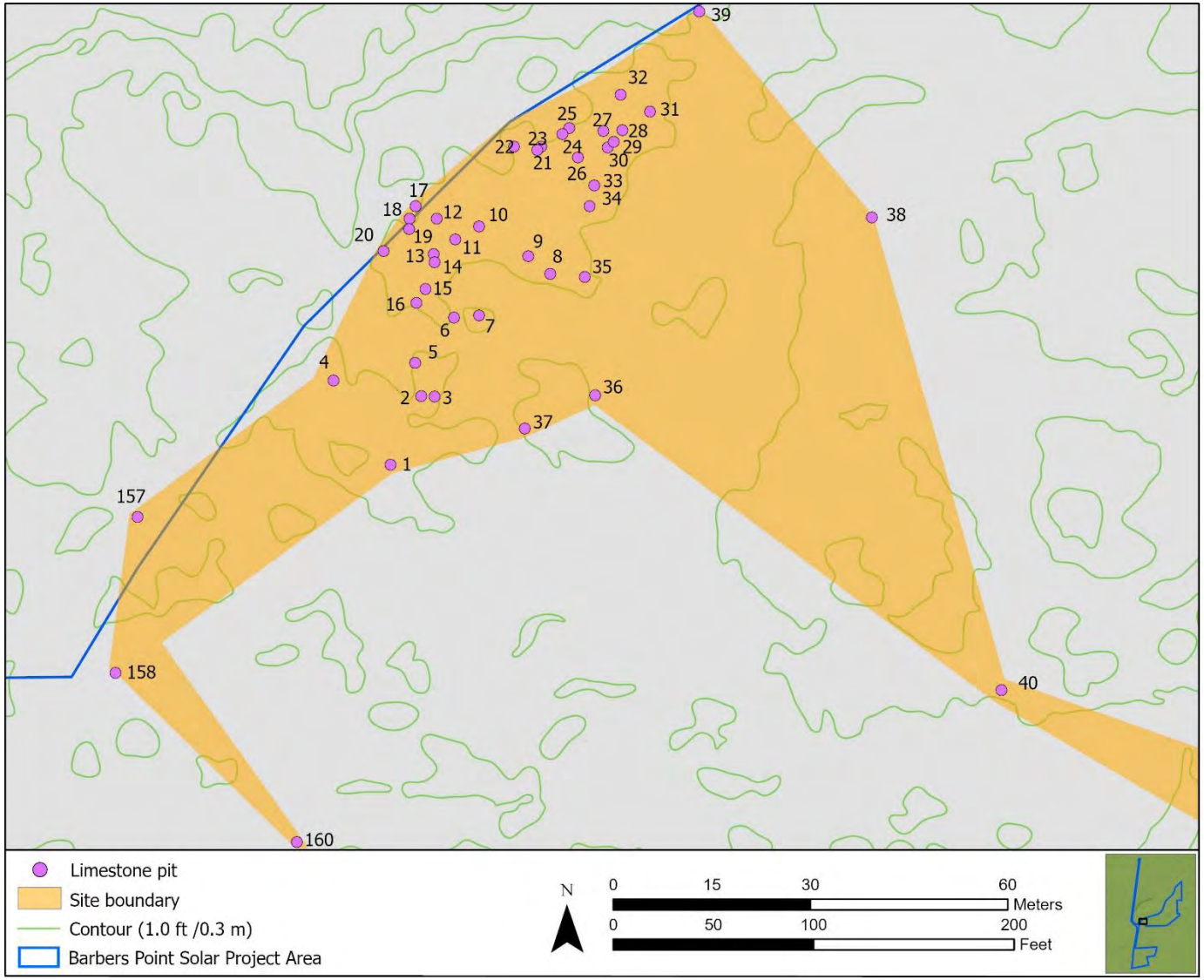


Figure 75. SIHP 50-80-12-XXXXX (T-03), Map 1, limestone pits overlaid on contour created from aerial LiDAR data, 2019.

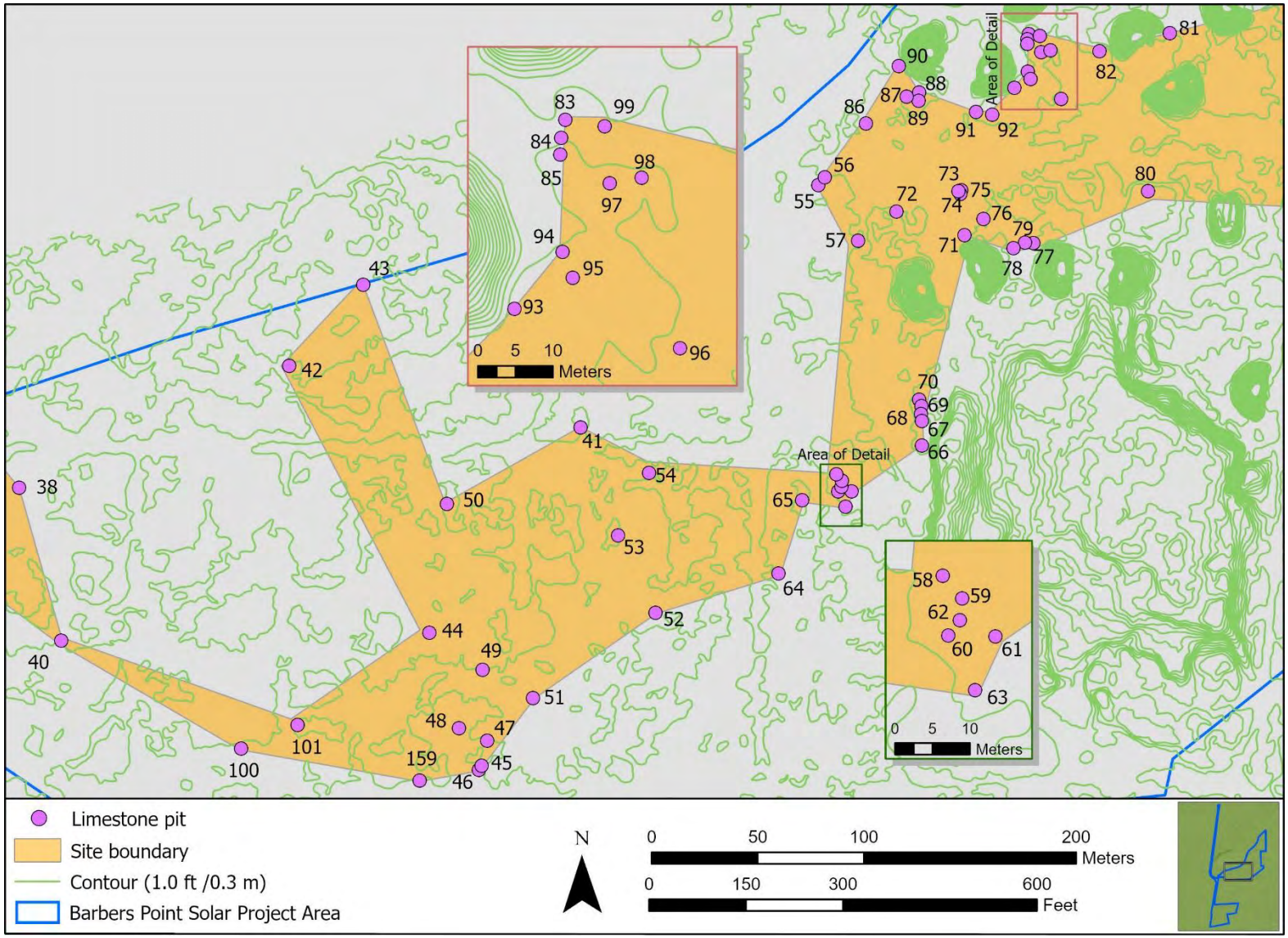


Figure 76. SIHP 50-80-12-XXXXX (T-03), Map 2, limestone pits overlaid on contour created from aerial LiDAR data, 2019.

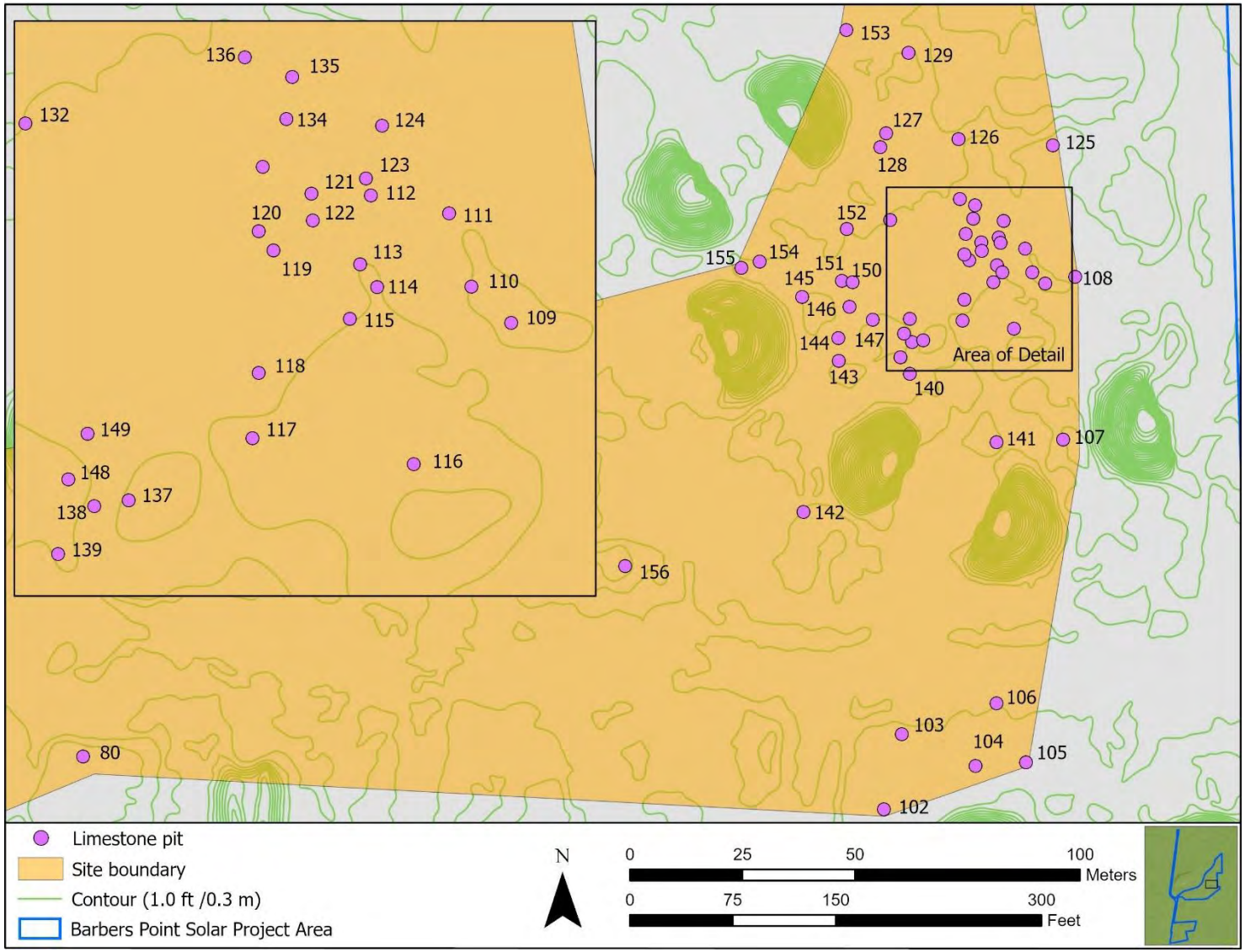


Figure 77. SIHP 50-80-12-XXXXX (T-03), Map 3, limestone pits overlaid on contour created from aerial LiDAR data, 2019.

Table 3. SIHP 50-80-12-XXXXX (T-03) Limestone Pit Descriptions

Feature No.	Field No.	Width	Length	Depth	Stone-filled	Soil-filled	Additional Contents
1	T-137	0.9	1.65	0.7	X	–	Concrete pipe
2	T-138	0.7	1.2	0.8	–	X	Barbed-wire fencing
3	T-139	1.2	1.4	0.6	X	–	Barbed wire
4	T-140	1.4	2.7	1.1	X	–	Bottles
5	T-142	1.1	2.5	1.3	X	–	Metal trash
6	T-144	1	1	2.1	X	–	Bottles
7	T-145	1.7	2.7	1.5	X	–	Bottles
8	T-146	1.2	1.7	4	X	–	Bottles/metal
9	T-147	1.1	2.1	3	X	X	Bottles
10	T-148	0.6	1.6	0.8	X	–	2 open metal cans
11	T-149	0.9	2.1	0.9	X	X	–
12	T-150	0.8	1.8	1	–	X	Bottles, metal
13	T-151	0.6	1.2	1.6	X	–	Metal and bottles
14	T-152	1.1	1.5	1.1	X	–	–
15	T-153	0.9	0.9	0.5	X	–	–
16	T-154	1.1	1.1	1.1	–	X	–
17	T-155	0.7	1.2	0.6	–	X	–
18	T-156	0.6	1.3	1	X	X	Bottles
19	T-157	1.2	2	1.7	X	X	–
20	T-158	1.6	1.9	1	X	–	Metal
21	T-159	1	1	1	X	X	Pipe across
22	T-160	2.5	4.5	0.8	X	–	Filled with concrete
23	T-161	0.7	1	1	X	X	–
24	T-162	1	1.3	1.3	X	X	Barbed wire
25	T-163	0.8	1.7	1.3	X	–	–
26	T-164	1.7	1.8	1.4	–	X	–
27	T-165	0.7	0.7	1.8	X	–	–
28	T-166	0.7	1	1.4	X	–	–
29	T-167	0.6	0.8	1.6	X	X	–
30	T-168	0.5	0.7	1.2	X	X	–
31	T-169	0.8	0.8	0.5	X	–	Paint cans
32	T-170	5	5.7	0.6	X	X	Cans
33	T-171	0.7	2	0.8	–	X	–
34	T-172	1.1	1.2	0.7	X	–	Wooden planks, branches, and metal
35	T-174	0.6	1	0.8	–	–	Cans and metal
36	T-176	1	2	2.5	X	X	–
37	T-177	0.7	1.4	0.5	X	–	Bees
38	T-178	1	1	1.4	X	–	–
39	T-180	1.3	1.6	0.4	X	–	Wood
40	T-182	0.7	0.8	0.4	X	X	–
41	T-185	0.8	0.8	0.8	–	X	Roots over opening
42	T-195	0.8	1.1	0.4	X	–	–
43	T-198	2	2.5	0.8	–	X	–
44	T-199	1.7	1.4	0.7	–	X	Wood covering opening
45	T-201	1.6	2.7	0.4	–	X	–
46	T-202	1.2	1.2	0.5	X	–	Concrete signpost
47	T-203	1.4	1.4	0.5	X	–	–
48	T-204	0.6	0.6	0.3	–	X	–

Feature No.	Field No.	Width	Length	Depth	Stone-filled	Soil-filled	Additional Contents
49	T-205	2	2.1	0.8	–	X	–
50	T-207	1	1	0.5	–	X	–
51	T-211	0.9	0.9	0.2	–	X	–
52	T-214	0.6	0.7	0.6	X	–	–
53	T-215	0.9	1.8	1.4	X	–	Bottle on top
54	T-216	1	2.3	1	X	X	–
55	T-225	0.9	0.9	0.2	X	X	–
56	T-226	0.9	0.9	0.4	X	X	–
57	T-228	1	1	0.2	X	–	–
58	T-229	1.4	2.1	0.4	X	X	–
59	T-230	0.9	2.3	0.4	X	X	Metal and *kiawe* branches
60	T-231	0.6	0.6	0.9	X	X	Plastic cone; possible speaker
61	T-232	1.7	1.3	0.3	X	X	–
62	T-233	1.1	1.1	0.8	X	X	–
63	T-234	0.7	1.8	0.9	X	X	Boulder at bottom
64	T-239	0.7	0.8	0.4	X	–	–
65	T-240	1	0.6	0.8	–	X	–
66	T-241	2	2.2	2	X	–	Metal pipes, wood, and tree trunk
67	T-242	1.2	1.4	0.9	–	X	–
68	T-243	0.9	1.5	1.2	–	X	–
69	T-244	2.4	3.3	0.4	X	X	Metal cable and sheet inside
70	T-245	2	2.1	0.8	X	X	Metal sheet
71	T-249	1	1	0.5	X	–	–
72	T-250	0.9	0.9	0.2	X	X	–
73	T-251	0.6	0.7	0.6	–	X	–
74	T-252	0.9	1.8	1.4	X	–	–
75	T-253	1	2.3	1	X	X	Banyan tree growing inside
76	T-254	0.9	0.9	0.2	X	X	–
77	T-255	0.9	0.9	0.4	–	X	–
78	T-256	1.0	1.0	0.2	X	X	Large boulder in opening
79	T-257	1.4	2.1	0.4	X	X	–
80	T-261	0.9	2.3	0.4	X	X	–
81	T-425	0.7	1.2	0.3	X	X	–
82	T-427	0.75	1.8	0.4	X	X	–
83	T-434	0.8	1.6	0.5	X	–	–
84	T-435	1.1	1.1	0.3	X	–	Asphalt
85	T-436	1.3	1.4	0.3	X	X	Asphalt
86	T-437	1.5	2.0	0.75	X	–	Bee's nest
87	T-438	1.4	1.8	0.6	X	X	–
88	T-439	2.4	1.3	2.3	X	X	Metal debris, gas tank
89	T-440	1.2	1.7	0.8	X	X	Metal debris
90	T-441	2.3	2.3	2.9	–	–	Metal material
91	T-442	1.8	2.6	2.9	–	X	–
92	T-443	1.3	1.2	0.4	X	X	–
93	T-444	0.7	1.0	0.9	X	X	–
94	T-445	0.7	0.9	0.8	X	–	–
95	T-446	0.4	1.4	2.9	X	–	–

Feature No.	Field No.	Width	Length	Depth	Stone-filled	Soil-filled	Additional Contents
96	T-447	1.2	1.4	2.6	–	X	Includes Features 96.2 and 96.3 mounds
97	T-448	2.3	2.4	0.8	X	X	–
98	T-449	1.2	1	0.5	X	X	–
99	T-450	0.6	0.9	1.1	X	X	–
100	T-600	0.9	1.0	0.2	X	X	Mechanically filled with soil and limestone
101	T-601	1.1	1.8	0.5	–	X	–
102	T-291	1.2	1.2	4	X	X	Bees
103	T-294	1.7	1.7	0.5	X	X	Overhang
104	T-296	0.9	2.1	1.2	X	X	–
105	T-297	1.2	0.7	0.2	X	X	–
106	T-323	1	1.7	0.5	X	–	–
107	T-326	2.4	5.1	1	X	X	Shallow overhang
108	T-328	1.1	1.1	0.9	–	X	–
109	T-330	0.9	0.9	0.7	–	X	–
110	T-331	1	0.7	0.9	–	X	–
111	T-332	2.2	4.5	1.3	X	–	Bridge between two openings
112	T-334	0.8	1.8	0.7	X	–	Dura-glass bottle
113.1	T-336A	1.3	1.3	1.7	X	X	Tire in floor; 3 openings, connected single cavern
113.2	T-336B	1.2	1.5	1	X	X	3 openings; connected by single cavern
113.3	T-336C	0.7	0.9	1.6	X	X	3 openings; connected by single cavern
114	T-337	1.2	0.7	0.6	X	X	–
115	T-338	0.9	0.7	0.7	X	X	Modern trash inside
116	T-339	4.0	8.0	0.8	–	X	Modified along outside edge (see description above)
117	T-341	1.6	1.6	3.3	X	X	Large banyan inside
118	T-342	2	2.1	0.8	–	X	0.75 m high overhang west side
119	T-344	1.1	1.1	0.5	–	X	–
120	T-345	1.8	0.9	0.6	–	X	–
121	T-346	1.1	1.1	0.6	X	X	–
122	T-347	0.8	3.4	0.3	–	–	–
123	T-348	0.8	0.75	1.2	–	–	–
124	T-349	1.9	1.9	1.7	X	X	–
125	T-351	0.8	0.6	0.6	X	–	Old post and net inside
126	T-352	0.8	0.9	0.4	–	X	–
127	T-353	1.3	2.2	1.4	X	–	Large *noni* tree inside
128	T-354	1.5	1.7	1.15	X	X	Large boulder inside
129	T-355	0.8	1.1	0.6	X	–	–
130	T-359	0.9	0.6	0.3	X	–	–
131	T-360	0.9	0.75	0.5	X	–	–
132	T-362	0.5	0.8	1.3	X	–	–
133	T-365	1.3	3	1.2	X	X	Good excavation potential
134	T-366	1	1.5	0.3	–	X	–
135	T-367	1.2	1.4	0.7	X	–	–

Feature No.	Field No.	Width	Length	Depth	Stone-filled	Soil-filled	Additional Contents
136	T-369	1.5	1.3	0.6	–	X	Coke bottle inside
137	T-370	0.8	1.1	1.25	–	X	–
138	T-371	1.7	2.1	0.6	–	X	Thick grass
139	T-372	0.6	0.9	1.3	X	–	–
140	T-373	0.8	0.7	1	X	X	Metal cans inside
141	T-375	3	2.3	0.75	X	X	Cables inside
142	T-380	1.8	2.15	1.2	X	–	Concrete block inside
143	T-382	0.7	1.3	2.5	X	X	–
144	T-385	1.4	1.6	0.3	X	X	–
145	T-386	2.2	1.2	4.3	X	X	Very deep pit
146	T-387	1.35	1.8	0.7	X	X	–
147	T-388	1.1	1.5	0.7	–	X	–
148	T-389	1.3	1.7	0.5	X	X	–
149	T-390	0.8	1.2	0.3	–	X	–
150	T-391	1.4	0.9	1.7	X	X	–
151	T-392	0.7	1	0.7	–	X	–
152	T-393	0.8	0.9	0.8	X	X	–
153	T-394	1.1	2.75	0.3	X	–	Wall on northeast edge (see description above)
154	T-404	2	2.7	0.8	X	–	–
155	T-405	1.5	1.15	0.9	X	–	Glass and metal inside
156	T-410	1.1	1.2	1.2	X	X	Glass bottles inside
157	T-620	1.6	2.0	1.1	–	X	–
158	T-621	1.4	1.6	1.6	–	X	–
159	T-197	1.8	1.8	1.5	X	–	Difficult to excavate
160	T-05	2.5	0.7	0.9	–	X	Identified in T-05 excavation

Modified Limestone Pits

Feature 96.1 (Figure 172 through Figure 175, p. 109–111) is a limestone pit with two adjacent mounds (Feature 96.2 and 92.3). **Feature 96.2** is a limestone mound that is immediately north of the Feature 96.1 pit and is constructed of piled limestone cobbles and small boulders. It measures 3 m (NE/SW) long × 2 m (NW/SE) wide and is 0.3 m high. **Feature 96.3** is a mound that is 1.5 m southeast of the Feature 96.1 pit and consists of a slightly rectangular mound of soil and limestone cobbles and boulders bordered by piled limestone cobbles and small boulders. It is 4 m (NW/SE) long × 2 m (NE/SW) wide and a maximum 0.8 m high. Separated by a 0.5 m gap, the Feature 96.3 mound continues roughly 2 m southeast. The mounds are likely related to military development of the nearby aircraft revetments and associated administrative buildings.

Feature 116 (Figure 197 through Figure 199, p. 122–123) is a large, modified limestone pit located in the southeastern corner of a dense pit concentration in the northeast corner of Site T-03. The feature is the largest limestone pit recorded in the project area, measuring 4 m (N/S) wide × 8 m (E/W) long and 0.8 m deep. The eastern end of the pit feature ascends 0.4 m below the rest of the sink floor, suggesting this portion may have been excavated for quarry material used during construction of the surrounding revetments. This eastern recessed area contains a 0.6 m high overhang extending 0.4 m into the south wall of the pit. The pit floor is relatively level and composed of soil and a few *koa haole* (*Leucaena leucocephala*) trees. A rough wall of cobbles and small boulders is aligned 3.5 m (E/W) along the north edge of the pit. The wall is

approximately 0.5 m wide and 0.7 m above the pit floor and 0.2 m on the back or north side. An alignment of six small limestone boulders located 1 m south of the pit's southern edge is 1.5 m (E/W) long × 0.3 m wide and 0.1 to 0.3 m high.

The function of Feature 116 is dubious because of its unusually large opening and possible quarried area on the eastern end. If the feature was modified during the pre-Contact or early post-Contact era, it probably functioned as an agricultural feature and is in fair condition.

Feature 153 (Figure 236 and Figure 237, p. 142) is a modified limestone pit 42 m northwest of the main pit concentration. The pit feature is 1.1 m (N/S) × 2.75 m (E/W) and 0.3 m deep. A rough concentration of piled limestone cobbles and small boulders is on the northeast side of the pit. The modification is 2.5 m long × 0.5 to 1 m wide and 0.2 m high. The feature possibly functioned as a pre-Contact or early post-Contact agricultural feature.

Figure 78. SIHP 50-80-12-XXXXX (T-03), Feature 1 pit (view to northwest).

Figure 79. SIHP 50-80-12-XXXXX (T-03), Feature 2 pit (view to southeast).

Figure 80. SIHP 50-80-12-XXXXX (T-03), Feature 3 pit (view to northeast).

Figure 81. SIHP 50-80-12-XXXXX (T-03), Feature 4 pit (view to west).

Figure 82. SIHP 50-80-12-XXXXX (T-03), Feature 5 pit (view to northwest).

Figure 83. SIHP 50-80-12-XXXXX (T-03), Feature 6 pit (view to northwest).

Figure 84. SIHP 50-80-12-XXXXX (T-03), Feature 7 pit (view to southeast).

Figure 85. SIHP 50-80-12-XXXXX (T-03), Feature 8 pit (view to northeast).

Figure 86. SIHP 50-80-12-XXXXX (T-03), Feature 9 pit (view to southeast).

Figure 87. SIHP 50-80-12-XXXXX (T-03), Feature 10 pit (view to northwest).

Figure 88. SIHP 50-80-12-XXXXX (T-03), Feature 11 pit (view to southwest).

Figure 89. SIHP 50-80-12-XXXXX (T-03), Feature 12 pit (view to north).

Figure 90. SIHP 50-80-12-XXXXX (T-03), Feature 13 pit (view to northwest).

Figure 91. SIHP 50-80-12-XXXXX (T-03), Feature 14 pit (view to northeast).

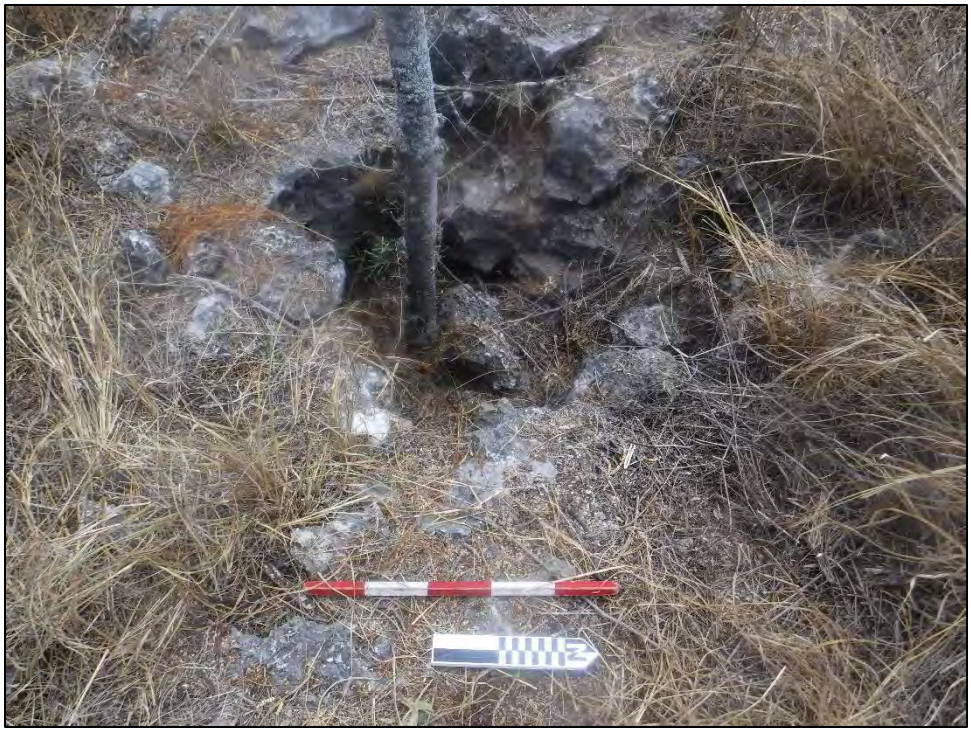


Figure 92. SIHP 50-80-12-XXXXX (T-03), Feature 15 pit (view to west).

Figure 93. SIHP 50-80-12-XXXXX (T-03), Feature 16 pit (view to northwest).

Figure 94. SIHP 50-80-12-XXXXX (T-03), Feature 17 pit (view to east).

Figure 95. SIHP 50-80-12-XXXXX (T-03), Feature 18 pit (view to northwest).

Figure 96. SIHP 50-80-12-XXXXX (T-03), Feature 19 pit (view to northwest).

Figure 97. SIHP 50-80-12-XXXXX (T-03), Feature 20 pit (view to southeast).

Figure 98. SIHP 50-80-12-XXXXX (T-03), Feature 21 pit (view to northwest).

Figure 99. SIHP 50-80-12-XXXXX (T-03), Feature 22 pit (view to southeast).

Figure 100. SIHP 50-80-12-XXXXX (T-03), Feature 23 pit (view to northwest).

Figure 101. SIHP 50-80-12-XXXXX (T-03), Feature 24 pit (view to northeast).

Figure 102. SIHP 50-80-12-XXXXX (T-03), Feature 25 pit (view to west).

Figure 103. SIHP 50-80-12-XXXXX (T-03), Feature 26 pit (view to northwest).

Figure 104. SIHP 50-80-12-XXXXX (T-03), Feature 27 pit (view to southeast).

Figure 105. SIHP 50-80-12-XXXXX (T-03), Feature 28 pit (view to southeast).

Figure 106. SIHP 50-80-12-XXXXX (T-03), Feature 29 pit (view to southwest).

Figure 107. SIHP 50-80-12-XXXXX (T-03), Feature 30 pit (view to north).

Figure 108. SIHP 50-80-12-XXXXX (T-03), Feature 31 pit (view to northeast).

Figure 109. SIHP 50-80-12-XXXXX (T-03), Feature 32 pit (view to northwest).

Figure 110. SIHP 50-80-12-XXXXX (T-03), Feature 33 pit (view to northeast).

Figure 111. SIHP 50-80-12-XXXXX (T-03), Feature 34 pit (view to east).

Figure 112. SIHP 50-80-12-XXXXX (T-03), Feature 35 pit (view to southeast).

Figure 113. SIHP 50-80-12-XXXXX (T-03), Feature 36 pit (view to northwest).

Figure 114. SIHP 50-80-12-XXXXX (T-03), Feature 37 pit (view to west).

Figure 115. SIHP 50-80-12-XXXXX (T-03), Feature 38 pit (view to west).

Figure 116. SIHP 50-80-12-XXXXX (T-03), Feature 39 pit (view to southwest).

Figure 117. SIHP 50-80-12-XXXXX (T-03), Feature 40 pit (view to northwest).

Figure 118. SIHP 50-80-12-XXXXX (T-03), Feature 41 pit (view to east).

Figure 119. SIHP 50-80-12-XXXXX (T-03), Feature 42 pit (view to northeast).

Figure 120. SIHP 50-80-12-XXXXX (T-03), Feature 43 pit (view to northwest).

Figure 121. SIHP 50-80-12-XXXXX (T-03), Feature 44 pit (view to southeast).

Figure 122. SIHP 50-80-12-XXXXX (T-03), Feature 45 pit (view to northwest).

Figure 123. SIHP 50-80-12-XXXXX (T-03), Feature 46 pit (view to northwest).

Figure 124. SIHP 50-80-12-XXXXX (T-03), Feature 47 pit (view to east).

Figure 125. SIHP 50-80-12-XXXXX (T-03), Feature 48 pit (view to north).

Figure 126. SIHP 50-80-12-XXXXX (T-03), Feature 49 pit (view to southwest).

Figure 127. SIHP 50-80-12-XXXXX (T-03), Feature 50 pit (view to southeast).

Figure 128. SIHP 50-80-12-XXXXX (T-03), Feature 51 pit (view to northeast).

Figure 129. SIHP 50-80-12-XXXXX (T-03), Feature 52 pit (view to south).

Figure 130. SIHP 50-80-12-XXXXX (T-03), Feature 53 pit (view to north).

Figure 131. SIHP 50-80-12-XXXXX (T-03), Feature 54 pit (view to southwest).

Figure 132. SIHP 50-80-12-XXXXX (T-03), Feature 55 pit (view to southeast).

Figure 133. SIHP 50-80-12-XXXXX (T-03), Feature 56 pit (view to northwest).

Figure 134. SIHP 50-80-12-XXXXX (T-03), Feature 57 pit (view to north).

Figure 135. SIHP 50-80-12-XXXXX (T-03), Feature 58 pit (view to south).

Figure 136. SIHP 50-80-12-XXXXX (T-03), Feature 59 pit (view to north).

Figure 137. SIHP 50-80-12-XXXXX (T-03), Feature 60 pit (view to southwest).

Figure 138. SIHP 50-80-12-XXXXX (T-03), Feature 61 pit (view to northwest).

Figure 139. SIHP 50-80-12-XXXXX (T-03), Feature 62 pit (view to northwest).

Figure 140. SIHP 50-80-12-XXXXX (T-03), Feature 63 pit (view to southeast).

Figure 141. SIHP 50-80-12-XXXXX (T-03), Feature 64 pit (view to northwest).

Figure 142. SIHP 50-80-12-XXXXX (T-03), Feature 65 pit (view to southeast).

Figure 143. SIHP 50-80-12-XXXXX (T-03), Feature 66 pit (view to south).

Figure 144. SIHP 50-80-12-XXXXX (T-03), Feature 67 pit (view to northeast).

Figure 145. SIHP 50-80-12-XXXXX (T-03), Feature 68 pit (view to east).

Figure 146. SIHP 50-80-12-XXXXX (T-03), Feature 69 pit (view to southeast).

Figure 147. SIHP 50-80-12-XXXXX (T-03), Feature 70 pit (view to northeast).

Figure 148. SIHP 50-80-12-XXXXX (T-03), Feature 71 pit (view to south).

Figure 149. SIHP 50-80-12-XXXXX (T-03), Feature 72 pit (view to east).

Figure 150. SIHP 50-80-12-XXXXX (T-03), Feature 73 pit (view to northeast).

Figure 151. SIHP 50-80-12-XXXXX (T-03), Feature 74 pit (view to north).

Figure 152. SIHP 50-80-12-XXXXX (T-03), Feature 75 pit (view to northeast).

Figure 153. SIHP 50-80-12-XXXXX (T-03), Feature 76 pit (view to southeast).

Figure 154. SIHP 50-80-12-XXXXX (T-03), Feature 77 pit (view to southwest).

Figure 155. SIHP 50-80-12-XXXXX (T-03), Feature 78 pit (view to northeast).

Figure 156. SIHP 50-80-12-XXXXX (T-03), Feature 79 pit (view to southeast).

Figure 157. SIHP 50-80-12-XXXXX (T-03), Feature 80 pit (view to northeast).

Figure 158. SIHP 50-80-12-XXXXX (T-03), Feature 81 pit (view to north).

Figure 159. SIHP 50-80-12-XXXXX (T-03), Feature 82 pit (view to southwest).

Figure 160. SIHP 50-80-12-XXXXX (T-03), Feature 83 pit (view to northwest).

Figure 161. SIHP 50-80-12-XXXXX (T-03), Feature 84 pit (view to northeast).

Figure 162. SIHP 50-80-12-XXXXX (T-03), Feature 85 pit (view to south).

Figure 163. SIHP 50-80-12-XXXXX (T-03), Feature 87 pit (view to southwest).

Figure 164. SIHP 50-80-12-XXXXX (T-03), Feature 88 pit (view to west).

Figure 165. SIHP 50-80-12-XXXXX (T-03), Feature 89 pit (view to west).

Figure 166. SIHP 50-80-12-XXXXX (T-03), Feature 90 pit (view to north).

Figure 167. SIHP 50-80-12-XXXXX (T-03), Feature 91 pit (view to southeast).

Figure 168. SIHP 50-80-12-XXXXX (T-03), Feature 92 pit (view to southwest).

Figure 169. SIHP 50-80-12-XXXXX (T-03), Feature 93 pit (view to southwest).

Figure 170. SIHP 50-80-12-XXXXX (T-03), Feature 94 pit (view to northeast).

Figure 171. SIHP 50-80-12-XXXXX (T-03), Feature 95 pit (view to northeast).

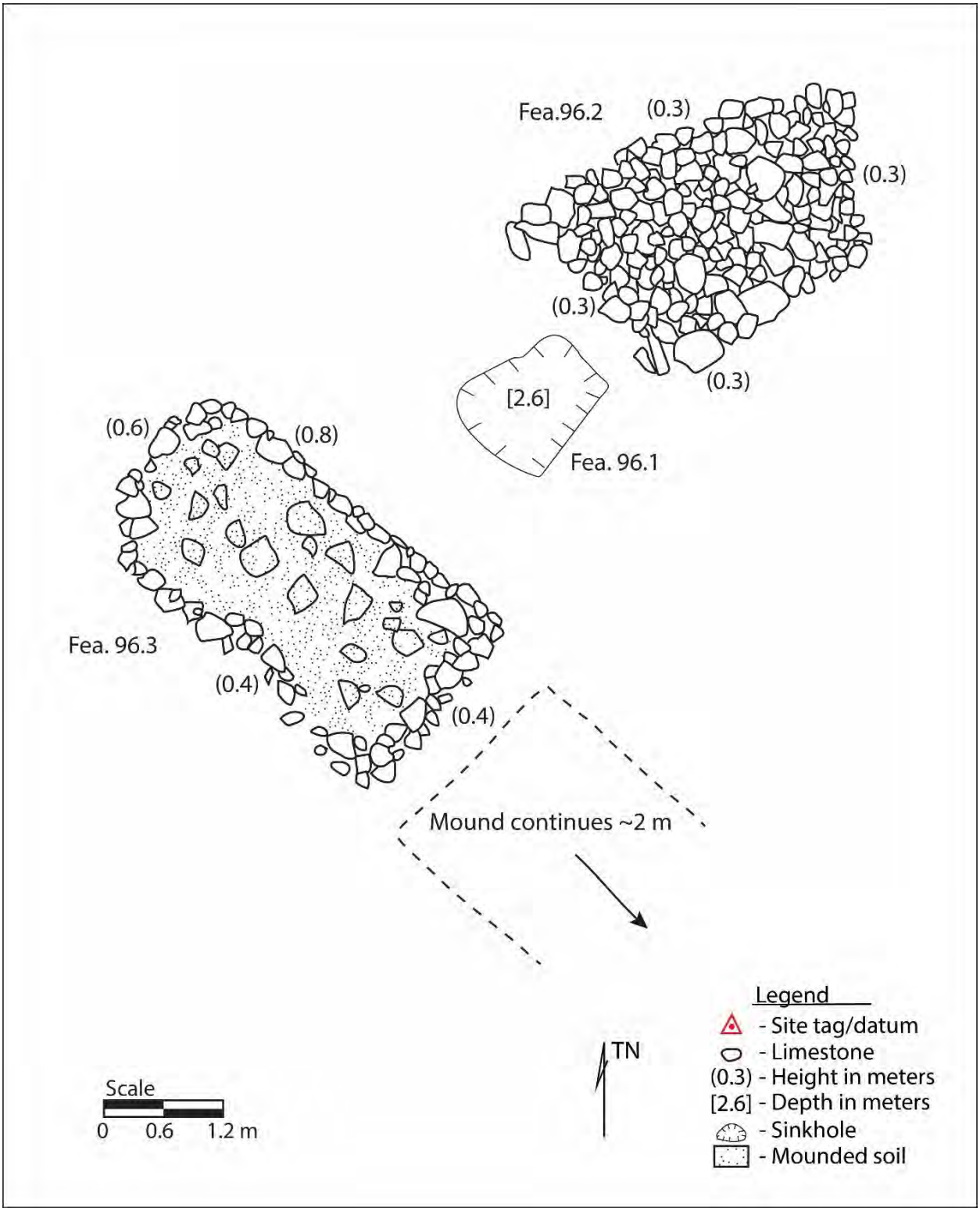


Figure 172. Plan-view map of SIHP 50-80-12-XXXXX (T-03), Features 96.1 through 96.3.

Figure 173. SIHP 50-80-12-XXXXX (T-03), Feature 96.1 pit (view to southeast).

Figure 174. SIHP 50-80-12-XXXXX (T-03), Feature 96.2 mound (view to west).

Figure 175. SIHP 50-80-12-XXXXX (T-03), Feature 96.3 mound (view to southwest).

Figure 176. SIHP 50-80-12-XXXXX (T-03), Feature 97 pit (view to southwest).

Figure 177. SIHP 50-80-12-XXXXX (T-03), Feature 98 pit (view to northeast).

Figure 178. SIHP 50-80-12-XXXXX (T-03), Feature 99 pit (view to southeast).

Figure 179. SIHP 50-80-12-XXXXX (T-03), Feature 100 pit (view to west).

Figure 180. SIHP 50-80-12-XXXXX (T-03), Feature 101 pit (view to southwest).

Figure 181. SIHP 50-80-12-XXXXX (T-03), Feature 102 pit (view to east).

Figure 182. SIHP 50-80-12-XXXXX (T-03), Feature 103 pit (view to west).

Figure 183. SIHP 50-80-12-XXXXX (T-03), Feature 104 pit (view to east).

Figure 184. SIHP 50-80-12-XXXXX (T-03), Feature 105 pit (view south).

Figure 185. SIHP 50-80-12-XXXXX (T-03), Feature 106 pit (view to east).

Figure 186. SIHP 50-80-12-XXXXX (T-03), Feature 107 pit (view to east).

Figure 187. SIHP 50-80-12-XXXXX (T-03), Feature 108 pit (view to east).

Figure 188. SIHP 50-80-12-XXXXX (T-03), Feature 109 pit (view to east).

Figure 189. SIHP 50-80-12-XXXXX (T-03), Feature 110 pit (view to southwest).

Figure 190. SIHP 50-80-12-XXXXX (T-03), Feature 111 pit (view northwest).

Figure 191. SIHP 50-80-12-XXXXX (T-03), Feature 112 pit (view to east).

Figure 192. SIHP 50-80-12-XXXXX (T-03), Feature 113.1 pit (view to north).

Figure 193. SIHP 50-80-12-XXXXX (T-03), Feature 113.2 pit (view to west).

Figure 194. SIHP 50-80-12-XXXXX (T-03), Feature 113.3 pit (view to west).

Figure 195. SIHP 50-80-12-XXXXX (T-03), Feature 114 pit (view to southeast).

Figure 196. SIHP 50-80-12-XXXXX (T-03), Feature 115 pit (view to north).

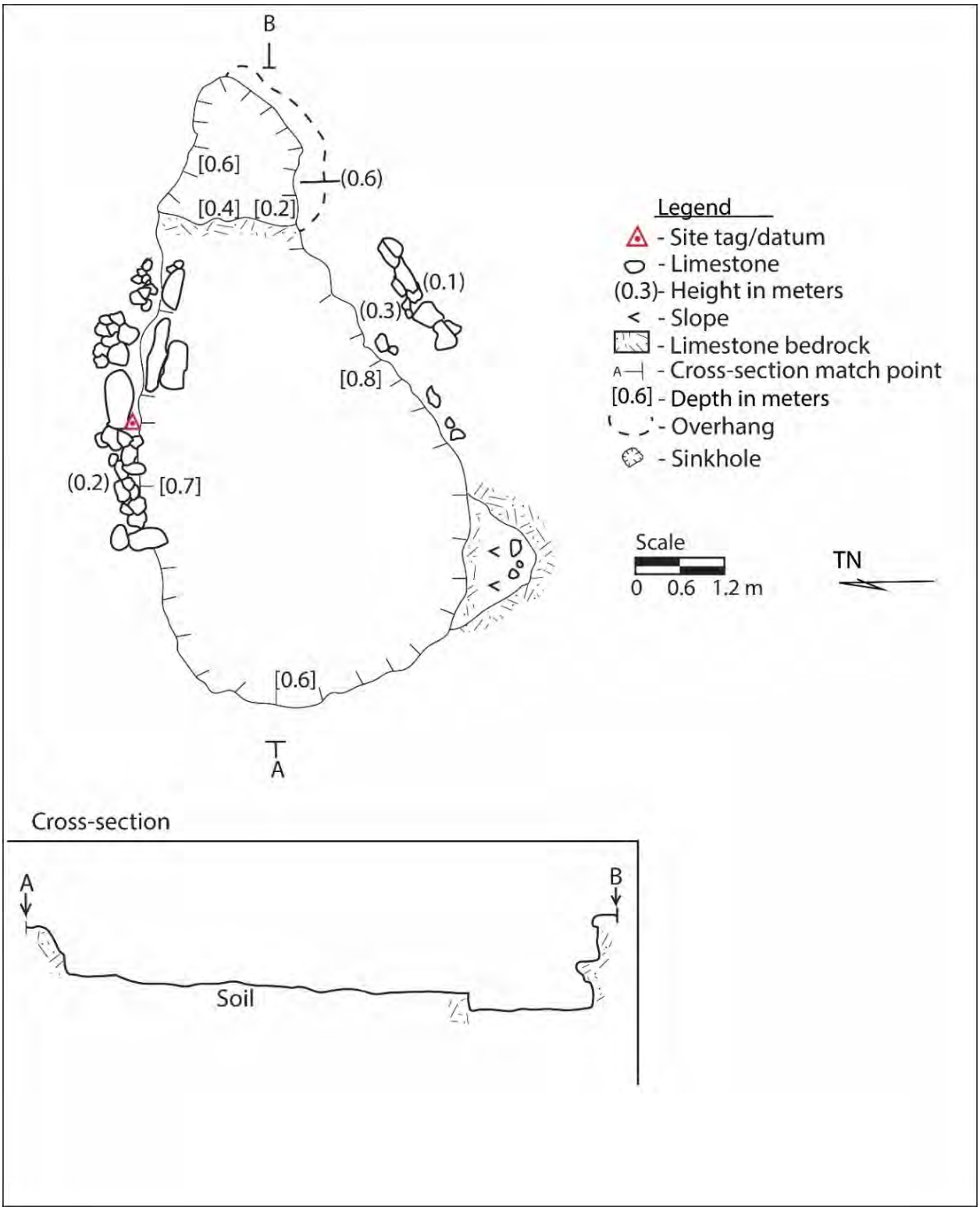


Figure 197. Plan-view map of SIHP 50-80-12-XXXXX (T-03), Feature 116 modified pit.

Figure 198. SIHP 50-80-12-XXXXX (T-03), Feature 116 modified pit (view to northeast).

Figure 199. SIHP 50-80-12-XXXXX (T-03), Feature 116 recessed eastern corner (view to east).

Figure 200. SIHP 50-80-12-XXXXX (T-03), Feature 117 pit (view to northeast).

Figure 201. SIHP 50-80-12-XXXXX (T-03), Feature 118 pit (view to north).

Figure 202. SIHP 50-80-12-XXXXX (T-03), Feature 119 pit (view to northeast).

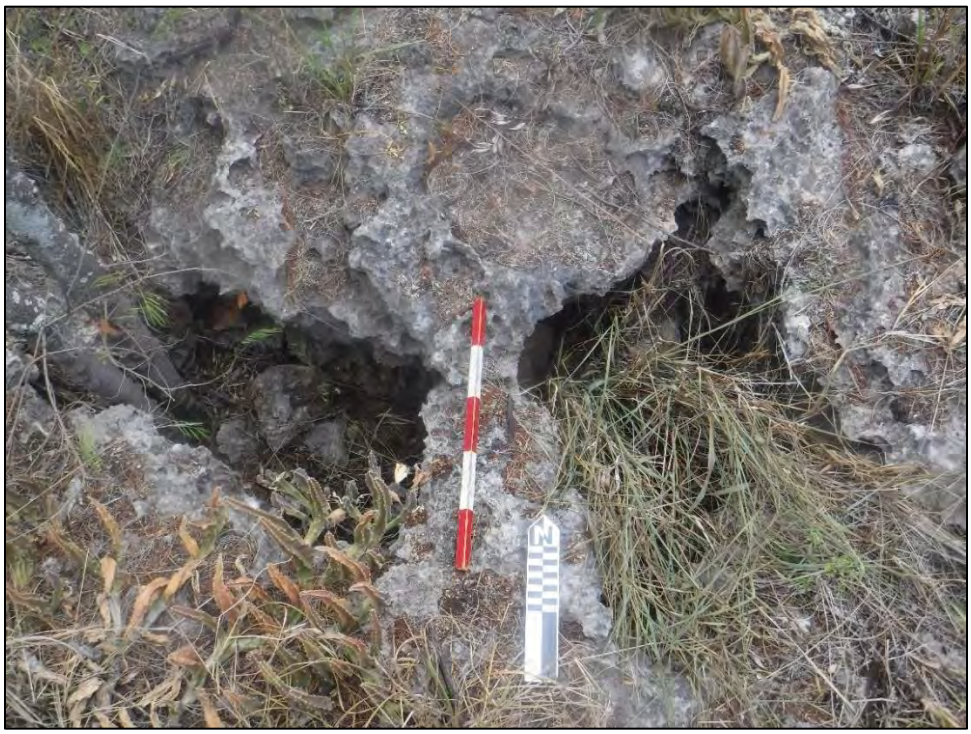


Figure 203. SIHP 50-80-12-XXXXX (T-03), Feature 120 pit (view to north).

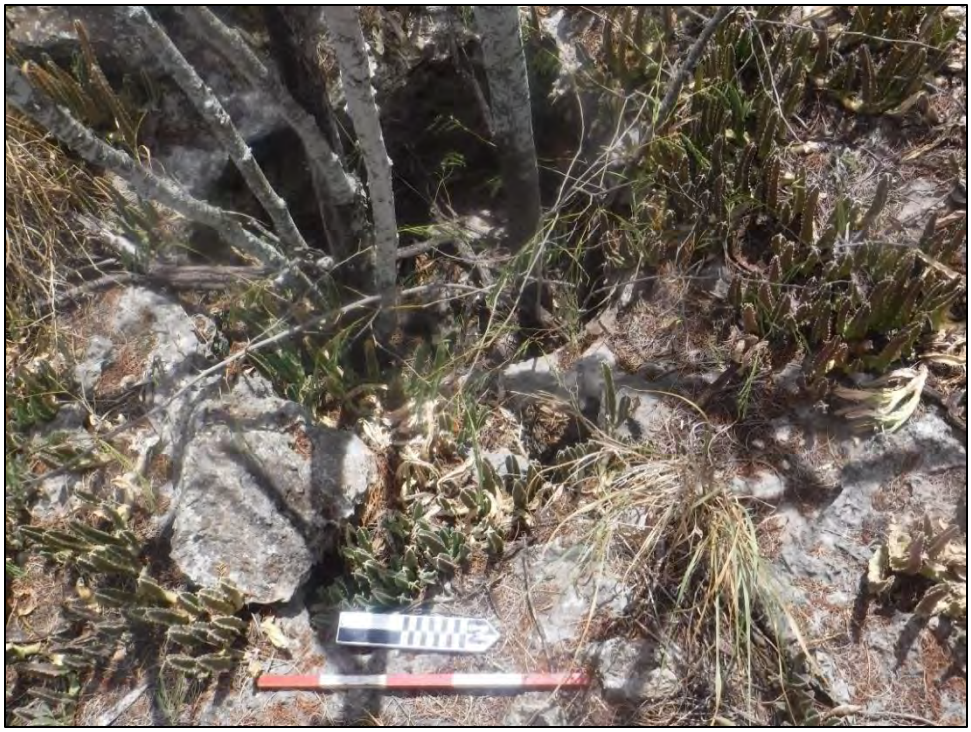


Figure 204. SIHP 50-80-12-XXXXX (T-03), Feature 121 pit (view to west).

Figure 205. SIHP 50-80-12-XXXXX (T-03), Feature 122 pit (view to southwest).

Figure 206. SIHP 50-80-12-XXXXX (T-03), Feature 123 pit (view to west).

Figure 207. SIHP 50-80-12-XXXXX (T-03), Feature 124 pit (view to east).

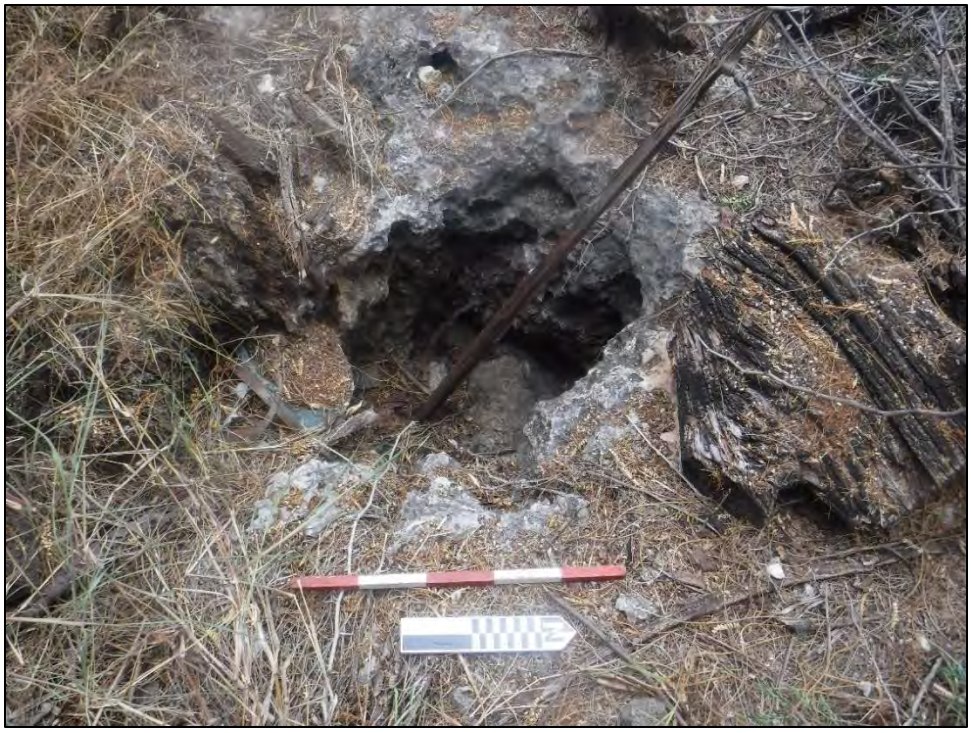


Figure 208. SIHP 50-80-12-XXXXX (T-03), Feature 125 pit (view to west).

Figure 209. SIHP 50-80-12-XXXXX (T-03), Feature 126 pit (view to north).

Figure 210. SIHP 50-80-12-XXXXX (T-03), Feature 127 pit (view to south).

Figure 211. SIHP 50-80-12-XXXXX (T-03), Feature 128 pit (view to southwest).

Figure 212. SIHP 50-80-12-XXXXX (T-03), Feature 129 pit (view to northwest).

Figure 213. SIHP 50-80-12-XXXXX (T-03), Feature 130 pit (view to north).

Figure 214. SIHP 50-80-12-XXXXX (T-03), Feature 131 pit (view to north).

Figure 215. SIHP 50-80-12-XXXXX (T-03), Feature 132 pit (view to south).

Figure 216. SIHP 50-80-12-XXXXX (T-03), Feature 133 pit (view to northeast).

Figure 217. SIHP 50-80-12-XXXXX (T-03), Feature 134 pit (view to east).

Figure 218. SIHP 50-80-12-XXXXX (T-03), Feature 135 pit (view to northwest).

Figure 219. SIHP 50-80-12-XXXXX (T-03), Feature 136 pit (view to northwest).

Figure 220. SIHP 50-80-12-XXXXX (T-03), Feature 137 pit (view to north).

Figure 221. SIHP 50-80-12-XXXXX (T-03), Feature 138 pit (view to southeast).

Figure 222. SIHP 50-80-12-XXXXX (T-03), Feature 139 pit (view to south).

Figure 223. SIHP 50-80-12-XXXXX (T-03), Feature 140 pit (view to southeast).

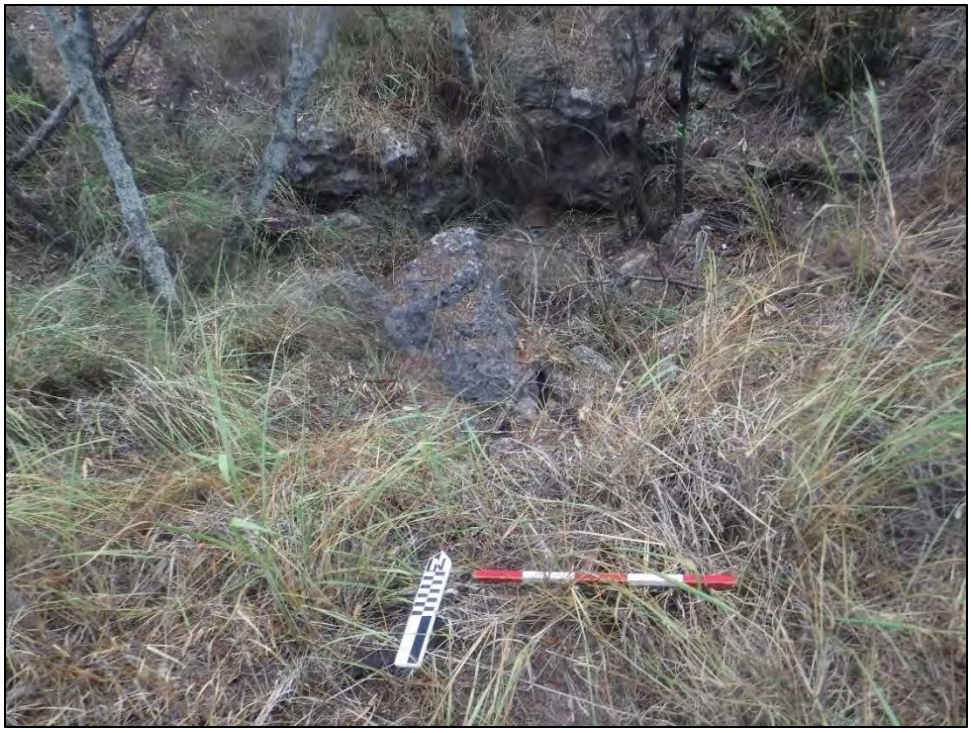


Figure 224. SIHP 50-80-12-XXXXX (T-03), Feature 141 pit (view to north).

Figure 225. SIHP 50-80-12-XXXXX (T-03), Feature 142 pit (view to north).

Figure 226. SIHP 50-80-12-XXXXX (T-03), Feature 143 pit (view to southwest).

Figure 227. SIHP 50-80-12-XXXXX (T-03), Feature 144 pit (view to south).

Figure 228. SIHP 50-80-12-XXXXX (T-03), Feature 145 pit (view to northeast).

Figure 229. SIHP 50-80-12-XXXXX (T-03), Feature 146 pit (view to north).

Figure 230. SIHP 50-80-12-XXXXX (T-03), Feature 147 pit (view to southeast).

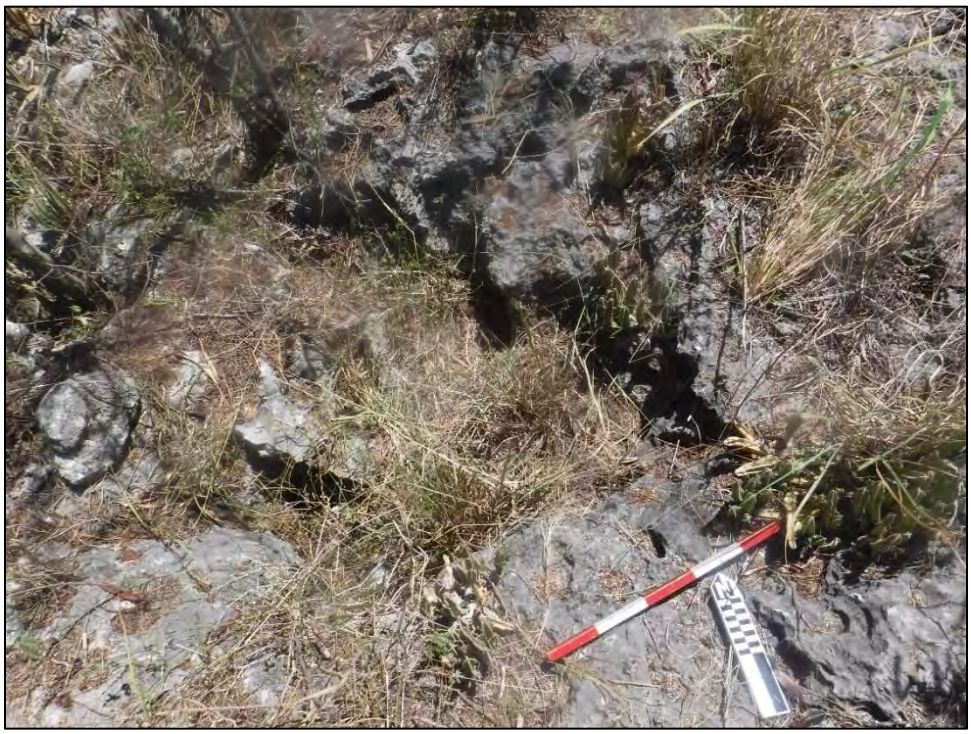


Figure 231. SIHP 50-80-12-XXXXX (T-03), Feature 148 pit (view to northeast).

Figure 232. SIHP 50-80-12-XXXXX (T-03), Feature 149 pit (view to southeast).

Figure 233. SIHP 50-80-12-XXXXX (T-03), Feature 150 pit (view to south).

Figure 234. SIHP 50-80-12-XXXXX (T-03), Feature 151 pit (view to south).

Figure 235. SIHP 50-80-12-XXXXX (T-03), Feature 152 pit (view to north).

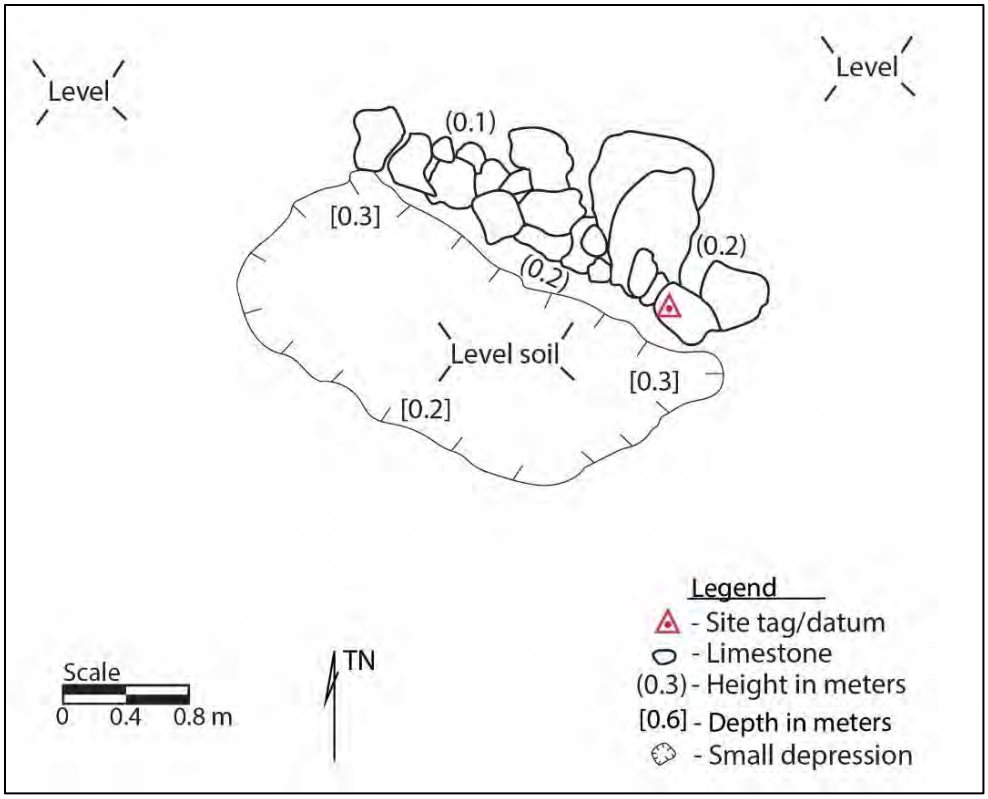


Figure 236. Plan-view map of SIHP 50-80-12-XXXXX (T-03), Feature 153 pit.

Figure 237. SIHP 50-80-12-XXXXX (T-03), Feature 153 pit (view to south).

Figure 238. SIHP 50-80-12-XXXXX (T-03), Feature 154 pit (view to southwest).

Figure 239. SIHP 50-80-12-XXXXX (T-03), Feature 155 pit (view to northeast).

Figure 240. SIHP 50-80-12-XXXXX (T-03), Feature 156 pit (view to west-northwest).

Figure 241. SIHP 50-80-12-XXXXX (T-03), Feature 157 pit (view to east).

Figure 242. SIHP 50-80-12-XXXXX (T-03), Feature 158 pit (view to north).

Figure 243. SIHP 50-80-12-XXXXX (T-03), Feature 159 pit (view to north).

SIHP No.: 50-80-12-XXXXX
TEMPORARY NO.: T-07
Site Type: L-shaped Wall
No. of Features: 1
Dimensions: 4 m L × 4 m W × 0.5 m H
Condition: Fair to good
Possible Age: Pre-Contact/Early Post-Contact
Possible Function: Permanent Habitation
Significance: d
Recommended Treatment: Preservation
Previous Investigation: Not previously recorded

SIHP 50-80-12-XXXXX (T-07) consists of an L-shaped stone wall located in the center of Parcel 38, about 40 m south of Hamilton Street. The site is within the SIHP 50-80-12-XXXXX (Site T-02) revetments area and is 12 to 14 m north of two revetments (Site T-02, Features 2 and 3). The site is also within SIHP 50-80-12-XXXXX (T-03), a complex of limestone pits including Feature 77 pit, 2.5 m southeast of T-07 (Figure 244). This feature is worth noting here because the interior is spacious enough to have been used as a habitation or storage feature, but it lacks archaeological evidence confirming a traditional Hawaiian function. The T-03, Feature 77 pit is described with a plan map in the Site T-03 description.

The Site T-07 L-shaped wall (Figure 245 through Figure 247) is open on the southeast side. The N/S and E/W axes of the L-shape are 4 m long, 0.5 to 0.9 m wide, and have a maximum height of 0.5 m. The wall is stacked with limestone cobbles and small boulder slabs and faced along the interior wall from 5 to 7 courses. The site has been disturbed by fallen and uprooted *kiawe* (*Prosopis juliflora*) and was also possibly disturbed by construction of the military facility. It is plausible that the site walls extended beyond its current configuration to include the adjacent SIHP 50-80-12-XXXXX (T-03) Feature 37 limestone pit.

SIHP 50-80-12-XXXXX (T-07) likely functioned as a permanent habitation feature used during the pre-Contact or early post-Contact era. This interpretation is based on the stability and formality of the stacked wall and internal space enclosing roughly 20 square meters.

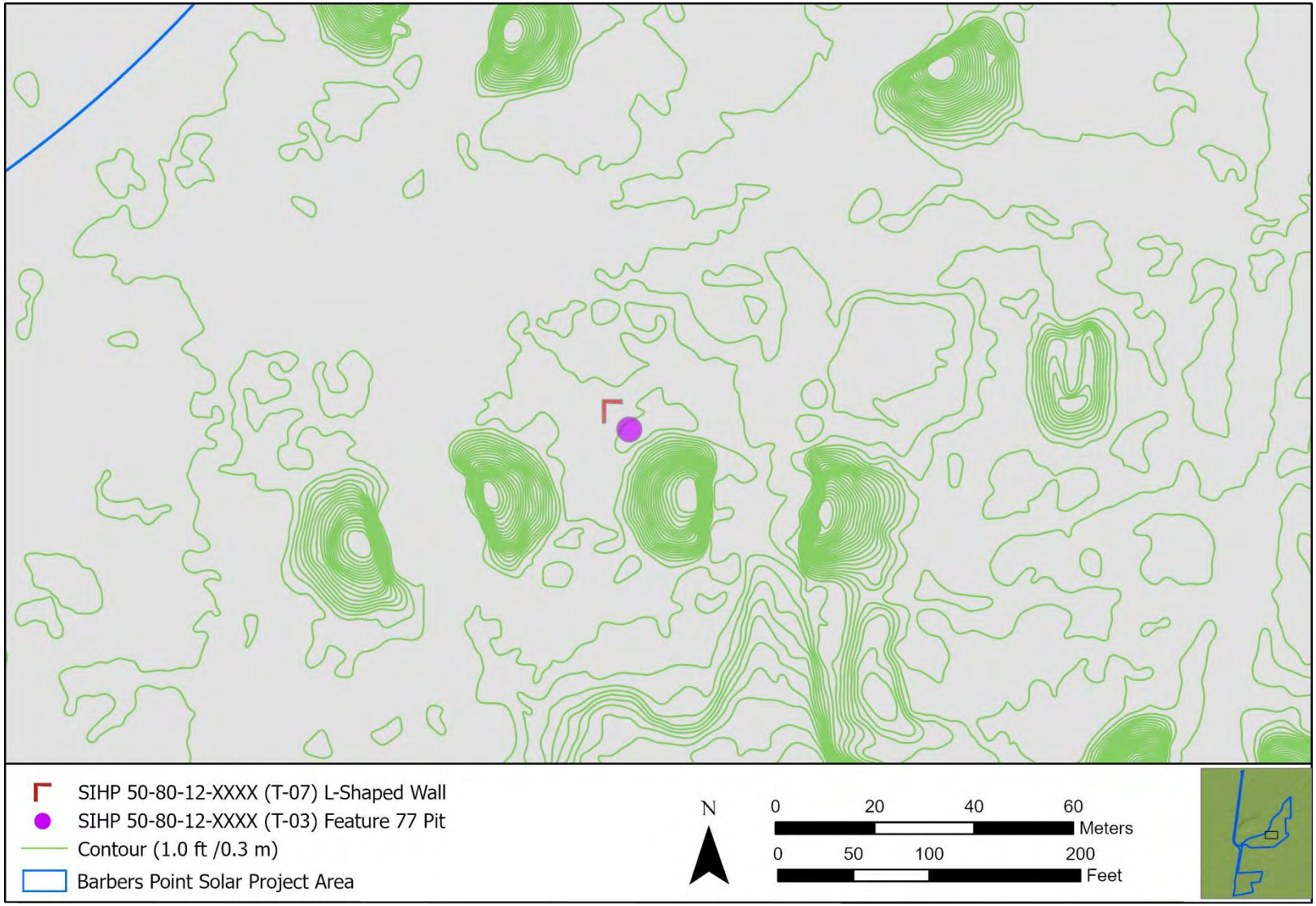


Figure 244. SIHP 50-80-12-XXXXX (T-07) L-shaped wall and 50-80-12-XXXXX (T-03), Feature 77 limestone pit overlaid on contours created from aerial LiDAR data, 2019.

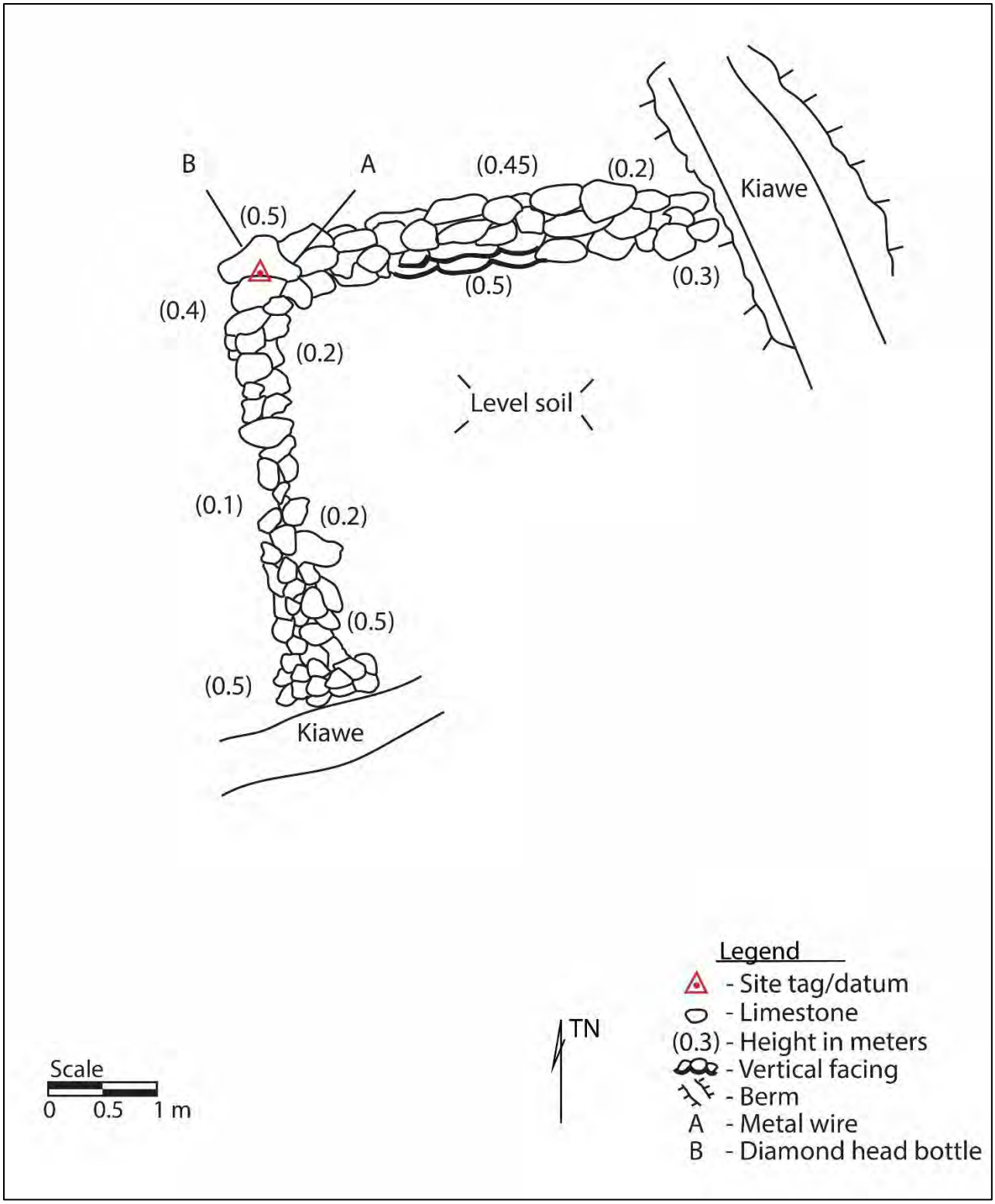


Figure 245. Plan-view map of SIHP 50-80-12-XXXXX (T-07) L-shaped wall.

Figure 246. SIHP 50-80-12-XXXXX (T-07) L-shaped wall (view to north).

Figure 247. SIHP 50-80-12-XXXXX (T-07) vertical facing on L-shaped wall (view to west).

SIHP No.: 50-80-12-XXXXX
TEMPORARY NO.: T-08
Site Type: WWII runway infrastructure
No. of Features: 4
Dimensions: 1,200 m (NE/SW) × 300 m (NW/SE)
Condition: Fair
Possible Age: 1942 through 1945; WWII era
Possible Function: MCAS Ewa infrastructure
Significance: a, d
Recommended Treatment: No Further Work
Previous Investigation: Architectural History Report (Yoklavich 1997), National Register Nomination Forms and field investigation for Ewa Mooring Mast Field (Truluck 2014), and Ewa Plain Battlefield District (Frye and Resnick 2013)

SIHP 50-80-12-XXXXX (T-08; Figure 248) consists of four features (Features 1 through 4) associated with the former MCAS Ewa airfield. The features include east–west trending parking aprons (Feature 1) constructed between 1942 and 1945 (Features 1.1 and1.2, respectively), two plane tie-down plates (Feature 2.1 and 2.2), a rectangular concrete basin (Feature 3), and an excavated ditch (Feature 4). The site is located between Roosevelt Avenue on the northeast and El Rod Road on the south side. The site features are in fair to good condition and portions of the runway and aprons have been impacted by decades of vegetation growth that have broken through the asphalt surfaces.

The Site T-08 features are south of the former MCAS Ewa airfield that was determined eligible by the U.S. Navy to be listed as a site (SIHP 50-80-12-5127) on the National Register of Historic Places (NRHP) for its direct association with the December 7, 1941 Japanese attack on Oʻahu (Truluck 2014). In 2016, the site was listed on the NRHP as a district and named the Ewa Plain Battlefield Historic District (Frye and Resnick 2013). The district was then designated SIHP 50-80-12-8025 in the Hawaiʻi Register of Historic Places. These four Site T-08 features are outside the boundary of the historic district and were not included as contributing elements of the district.

Feature 1 refers to two parking aprons of the MCAS Ewa airfield built between 1942 (northern apron) and 1944 (southern apron; see Figure 248. These construction dates are suggested based on a chronology of historic aerial photographs (NRHP nomination form, Truluck 2014:Map 7). However, the Kalaeloa Renewable Energy Park Environmental Assessment (Commander, Navy Region Hawaii 2012) suggests the more northern runway, referred to as Runway 8, was built in 1944. Figure 249 and Figure 250 provide current photographs of the asphalt surface of the more northern 1942 apron visible within the project area. The feature is in fair to poor condition.

Feature 2 consists of two ringed metal plates once serving as plane tie-downs on the Feature 1's southern 1944 apron. The tie-downs are spaced 10 m apart and are set in a 0.5 m square concrete slab placed flush with the apron surface (see Figure 251 and Figure 252). The feature components are in good condition.

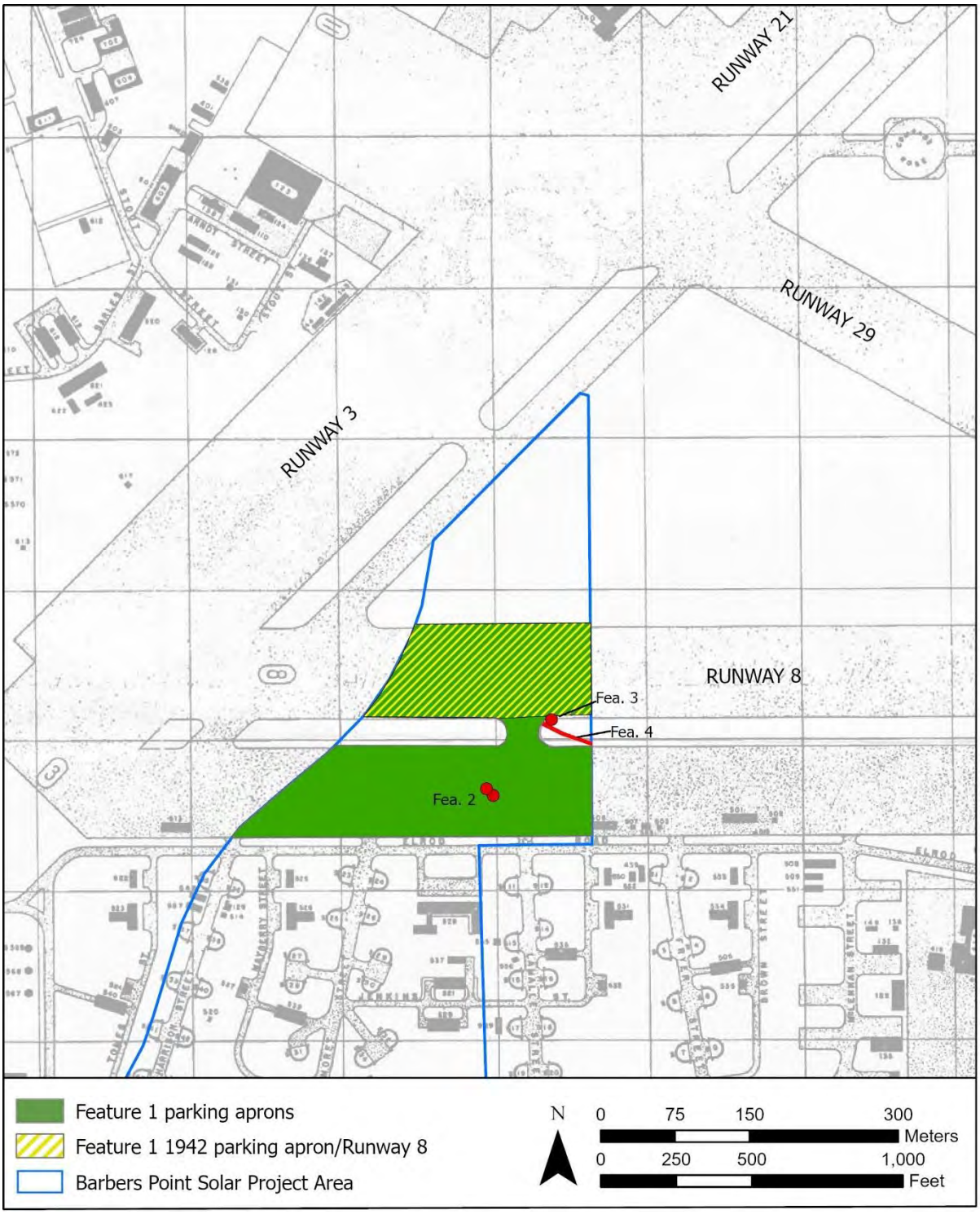


Figure 248. Plan-view map of Site T-08 WWII runway infrastructure overlaid on MCAS Ewa map (U.S. Navy 1948).

Figure 249. Site 50-80-12-XXXXX (T-08), Feature 1, showing portion of 1942 apron in project area (view to northwest).

Figure 250. Site 50-80-12-XXXXX (T-08), Feature 1, showing portion of 1942 apron on eastern boundary of project area with the Kalaeloa Renewable Energy Park (KREP) facility in background (view to east).

Feature 3 is a concrete rectangular basin constructed below the ground surface on the south side of the Feature 1's northern 1942 parking apron (Figure 253 and Figure 254). The box measures 1.5 m square and is 0.4 m deep. It contains a concrete and cement brick and mortar interior wall with a two-tiered concrete edge along its surface. Feature 3 is a possible utility box likely associated with surrounding MCAS Ewa airfield. The feature is in good condition.

Feature 4 consists of a linear ditch bound on the northeast and southwest sides by two parallel limestone rubble and soil berms. The ditch feature was constructed in a graded surface and aligned southwest, from the edge of the Feature 1's northern 1942 apron to the project boundary marked by the adjacent Kalaeloa Renewable Energy Park facility fence. The ditch measures 36 m long (NW/SE) × 0.8 m wide and is 0.4 m deep. The berms bounding the ditch range between 0.5 and 1 m wide and rise a maximum 0.2 m high. The ditch is in fair to good condition and possibly functioned to channel water from the adjacent airfield surface.

Figure 251. Site 50-80-12-XXXXX (T-08), northwestern Feature 2 plane tie-downs (view to southwest).

Figure 252. Site 50-80-12-XXXXX (T-08), southeastern Feature 2 plane tie-downs (view to southwest).

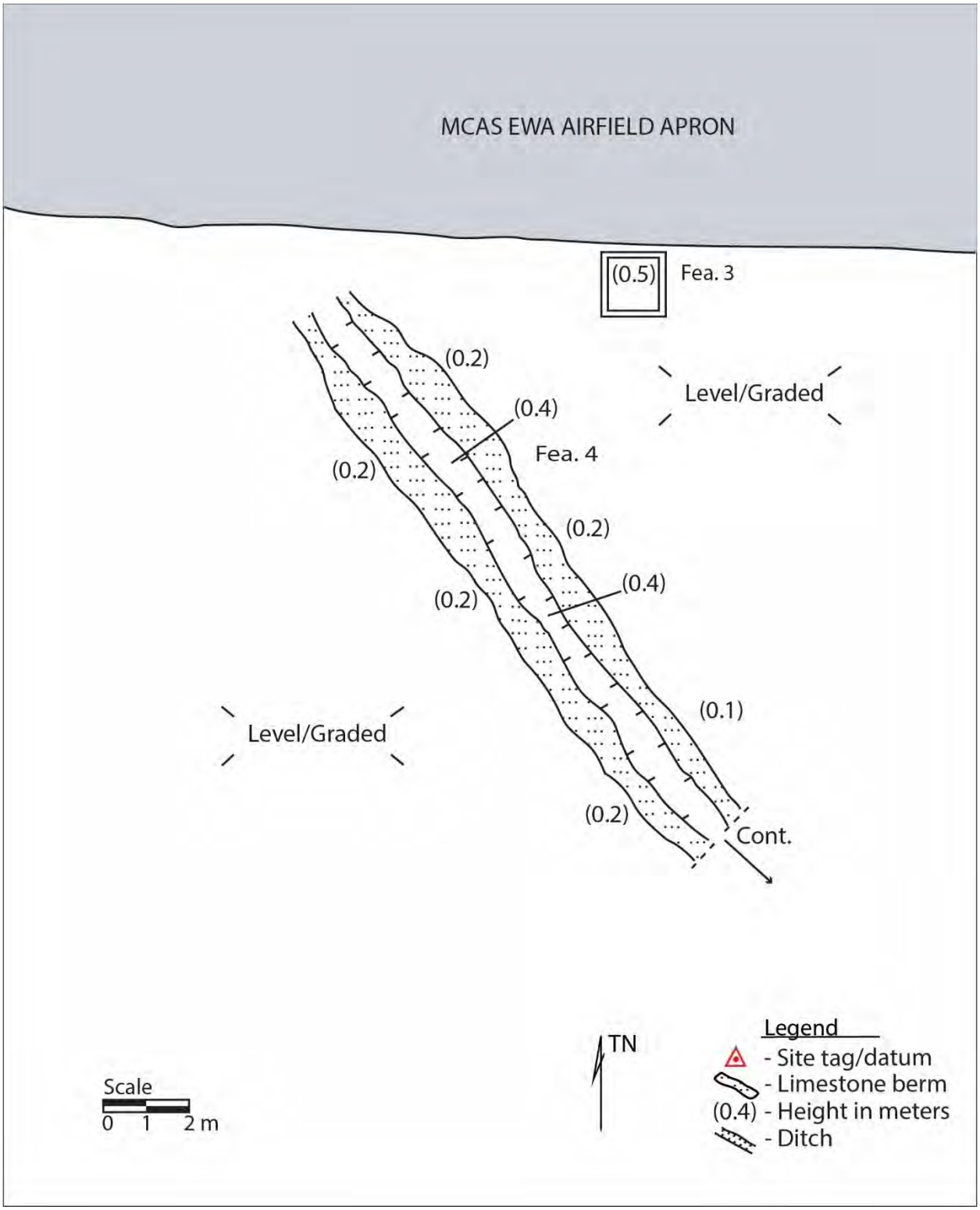


Figure 253. Plan-view map of SIHP 50-80-12-XXXXX (T-08), Feature 3 concrete box and Feature 4 ditch.

Figure 254. SIHP 50-80-12-XXXXX (T-08), Feature 3 concrete box (view to north).

Figure 255. SIHP 50-80-12-XXXXX (T-08), Feature 4 ditch (view to southeast).

SIHP No.: 50-80-12-XXXXX
TEMPORARY NO.: T-09
Site Type: Complex of concrete structures and associated poles and wiring
No. of Features: 5
Dimensions: 216 m (N/S) × 5 m (E/W)
Condition: Good
Possible Age: WWII (1942)
Possible Function: U.S. military building foundation (1) and above-ground covers (4), one of which has above-ground wiring and poles.
Significance: a, c, d
Recommended Treatment: Preservation/No Further Work
Previous Investigation: Mason Architects (2018)

SIHP 50-80-12-XXXXX (T-09) consists of six concrete structures (Features 1 through 5) located on the west side of Coral Sea Road. This includes four above-ground concrete structures, one of which has wooden poles and electrical wiring near it, as well as a concrete foundation, Feature 1. Based on their location and shape, Features 2 and 4 are covers that likely provide entry to below-grade octagonal concrete chambers. These chambers appear to have been documented by Mason Architects in 2018 but were not assigned SIHP numbers. They were built in 1942. Mason Architects assessed them as significant and determined that they were eligible for listing on the NHRP under criterion A and C for providing protected routes for communication lines during WWII (Mason Architects 2018:A-4). They were assessed as having good integrity overall, with "somewhat diminished integrity of setting and materials due to deterioration and loss" (Mason Architects 2018:A-4). Features 3 and 5 are above-ground covers that likely provide access to subsurface utilities.

Feature 1 (Figure 256 and Figure 257) is a partly buried concrete slab with only its western edge visible. The slab is 3.2 m (N/S) x 1.8 m (E/W) by 0.4 m high on the west side. A small hole is at the center of the slab. A black mesh is piled on the north corner. The surface feature is in good condition.

Feature 2 is located 5.9 m east of Feature 1. The concrete structure is octagonal and a portion of it is no longer present. It measures 1.07 m in diameter and contains a metal cover with a diameter of 85 cm that is 10 cm below the concrete rim. The metal cover is painted yellow and has two threaded handles that are welded onto it. Two holes are also visible on the eastern portion of the cover near one of the threaded handles. Based on its location and previous information provided by Mason Architects (2018), Feature 2 provides access to a below-grade octagonal concrete chamber, which was not assessed during the current investigation. The surface feature is in good condition.

Feature 3 is a round concrete structure located 6.5 m west of Coral Sea Road. The structure is 80 cm in diameter and contains a concrete cover that measures 50 cm in diameter and is set into the concrete rim. The cover has a metal handle and is made of concrete that incorporates subangular basalt pebbles. Feature 3 is located approximately 4 m southwest of Feature 4 and likely provides access to an underground utility, which was not assessed during the current investigation. The surface feature is in good condition.

Feature 4 is an octagonal concrete structure that measures 1.01 m in diameter and is 12 cm high. It has a concrete lid that is painted yellow with the number "95" painted in its center with white spray paint. The concrete is made with subangular basalt pebbles and is 2.6 m west of the

asphalt edge of Coral Sea Road. Two metal handles are inset in the concrete lid and the inset measures 18 cm long by 5 cm wide by 2 cm deep. The handles are intact and functional. Two wooden poles with crossbeams, wiring, and three steel poles are adjacent to the concrete structure. The central steel pole has a diameter of 6 cm and bears a manufacturer's mark of "Jones & Laughlin 4" on it. It has a curved shape approximately half-way up the pole. The steel poles on either side of it are straight and have a diameter of 5.5 cm. They have no visible markings on them. The two wooden poles are graduated with a maximum diameter of 28 cm at the base. They measure approximately 7 m high. They are braced with square bolts and washers with two 4" by 4" cross-beams connecting them, and bolts are present where a third cross beam is no longer present. Cabling extends from the top of the poles north along Coral Sea Road for 123 m before terminating at a single graduated wooden pole. Based on its location and previous information provided by Mason Architects (2018), Feature 4 includes access to a below-grade octagonal concrete chamber and supporting above-ground communications wiring. The below-grade chamber was not assessed during the current investigation. The surface feature is in good condition.

Feature 5 is a concrete structure that measures 1.6 m in diameter and 0.3 m high. An interior concrete lid is 84 cm in diameter and has inset areas where handles were once located in the concrete surface. The structure and cover are made of concrete with subangular basalt pebbles and rebar, which is visible in the cover. The structure is 4.1 m west of the asphalt edge of Coral Sea Road. Feature 5 likely provides access to underground utilities, which were not assessed during the current investigation. The surface feature is in good condition.

Feature 6 is a concrete structure located 7.0 m east of Coral Sea Road. The structure consists of a concrete slab with a 0.2 m-high and 0.15 m wide curbing on the feature's south, east, and north side. Overall, the structure is 4.9 m (N/S) by 3.8 m (E/W). A dirt road is aligned E/W on the south side of the feature. The feature lies southwest of a fenced-in structure that was interpreted by Mason Architects (2018) as a vehicle ramp. Although no mention of Feature 6 is made in Mason Architect's 2018 report, it is likely associated and might have functioned as a structure foundation.

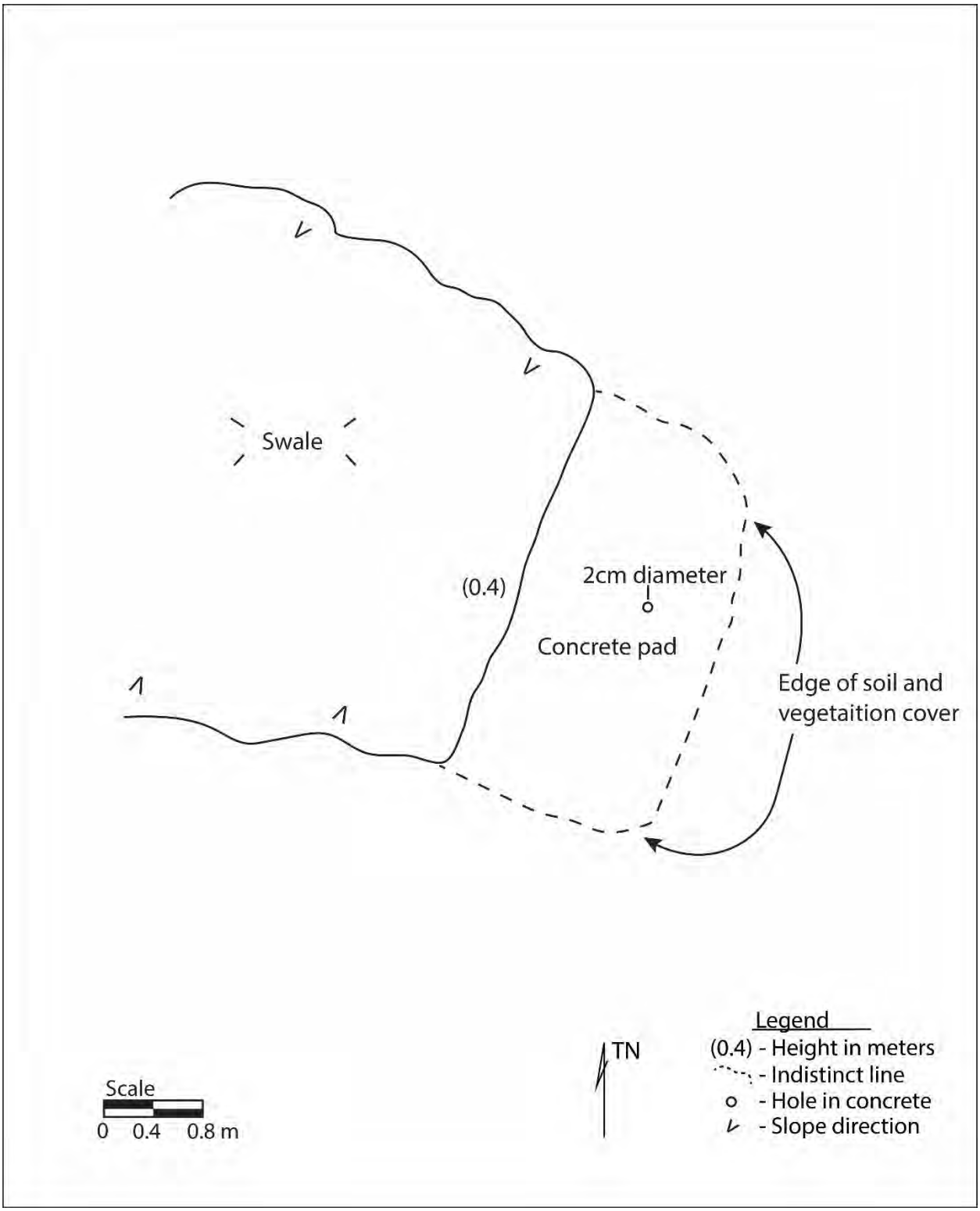


Figure 256. Plan view map of SIHP 50-80-12-XXXXX (T-09), Feature 1, concrete structure.

Figure 257. SIHP 50-80-12-XXXXX (T-09) Feature 1 concrete slab (view to east).

Figure 258. SIHP 50-80-12-XXXXX (T-09) Feature 2 concrete structure (view to west).

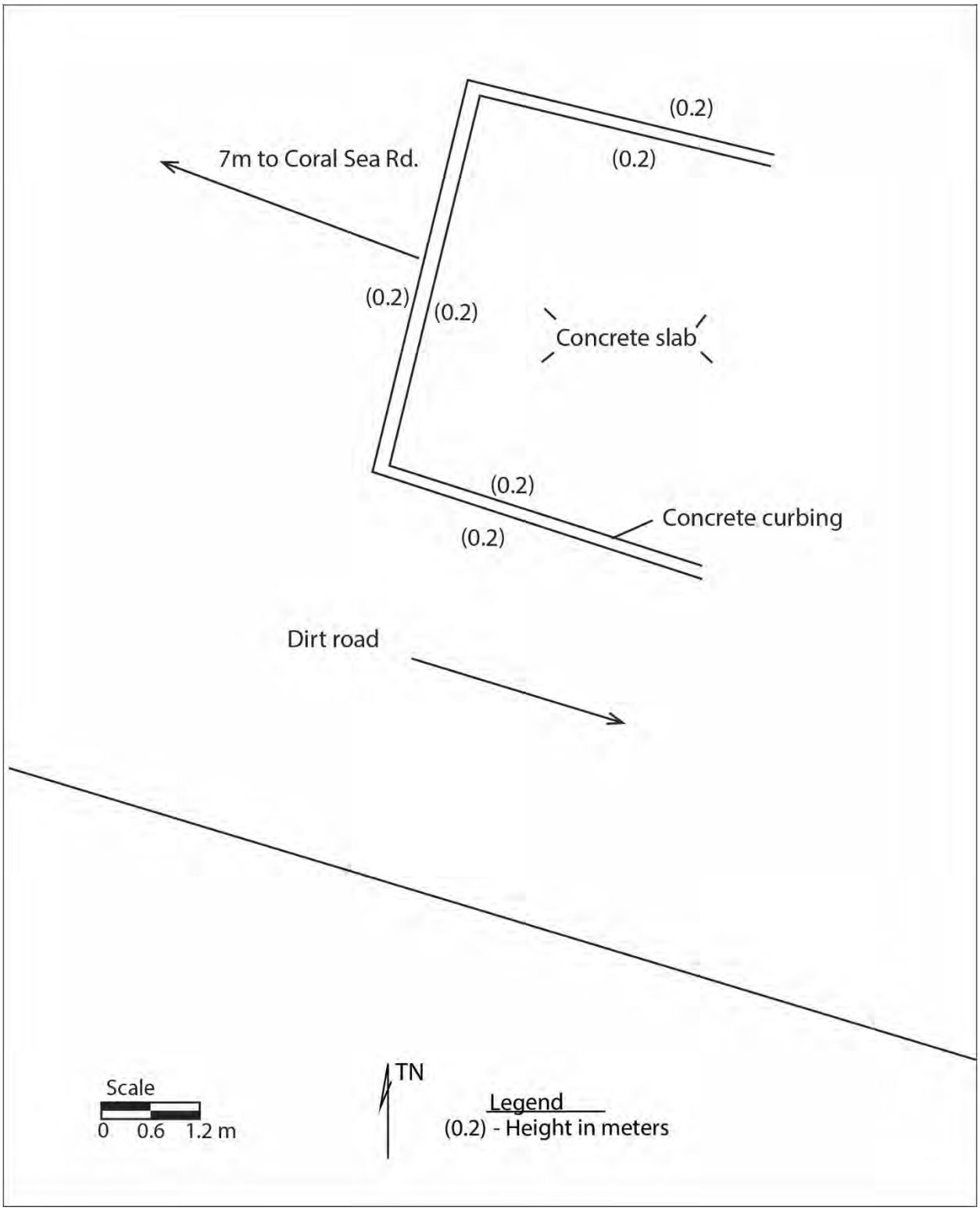
Figure 259. SIHP 50-80-12-XXXXX (T-09) Feature 3 concrete structure (view to southwest).

Figure 260. SIHP 50-80-12-XXXXX (T-09) Feature 4 concrete structure with pipes and poles (view to east).

Figure 261. SIHP 50-80-12-XXXXX (T-09) Feature 4 concrete structure with adjacent wooden poles and wiring (view to southeast).

Figure 262. SIHP 50-80-12-XXXXX (T-09) Feature 5 concrete structure (view to west).

Figure 263. SIHP 50-80-12-XXXXX (T-09) Feature 6 concrete building foundation (view to northeast).


(0.2)
(0.2)
7m to Coral Sea Rd.
(0.2)
(0.2)
Concrete slab
(0.2)
Concrete curbing
(0.2)
Dirt road
Scale
0 0.6 1.2 m
TN
Legend
(0.2) - Height in meters

SIHP No.: 50-80-12-XXXXX
TEMPORARY NO.: T-10
Site Type: Possible limestone pit
No. of Features: 1
Dimensions: 1.0 m (E/W) x 1.4 m (N/S)
Condition: Poor
Possible Age: Undetermined
Possible Function: Undetermined
Significance: d
Recommended Treatment: Data Recovery
Previous Investigation: None

SIHP 50-80-12-XXXXX (T-10; Figure 264) consists of a possible limestone pit located on the north side of a utility pole and 1.0 m south of a utility box, on the west side of Coral Sea Road.

The possible pit is defined by a circular depression measuring 1.0 m (E/W) x 1.4 m x 0.4 m deep. A PVC-lined utility pipe is in the south side of the feature. The possible natural pit might have been used for installation of the adjacent utility pole. The possible feature has fair to poor excavation potential.

Figure 264. SIHP 50-80-12-XXXXX (T-10) possible limestone pit (view to east).

SIHP No.: 50-80-12-XXXXX
TEMPORARY NO.: T-11
Site Type: Possible limestone pit
No. of Features: 1
Dimensions:
Condition: Poor
Possible Age: Undetermined
Possible Function: Undetermined
Significance: d
Recommended Treatment: Data Recovery
Previous Investigation: None

SIHP 50-80-12-XXXXX (T-11; Figure 265) consists of a possible limestone pit located on the north side of a utility pole and 1.0 m south of a utility box, on the west side of Coral Sea Road.

The possible pit is defined by a circular grass-covered depression measuring 0.7 m in diameter and 0.15 m deep. The possible feature has fair excavation potential.

Figure 265. SIHP 50-80-12-XXXXX (T-11) possible limestone pit (view to south).

SIHP No.: 50-80-12-XXXXX
TEMPORARY NO.: T-12
Site Type: Habitation cultural deposit
No. of Features: 1
Dimensions: 2.0 m (N/S) × 1.0 m (E/W)
Condition: Fair; truncated by land disturbances
Possible Age: Pre-Contact/early post-Contact era
Possible Function: Habitation
Significance: d
Recommended Treatment: Data Recovery
Previous Investigation: None

T-12 consists of a remnant cultural layer located between 80 and 110 cm below surface in the central portion of Test Trench 4 (Figure 266). The cultural layer consists of a charcoal-stained, gravelly silt loam that yielded charcoal, *kukui* (*Aleurites moluccana*; candlenut tree) endocarp, faunal bone (small mammal, fish), sea urchin (Echinoidea spp.), crab (Carpiliidae spp.), and marine mollusks (Isognomonidae spp., Lucinidae spp., Mytiliidae spp., Pteriidae spp., Cypraeidae spp., Patellidae spp., Thaididae spp., Trochidae spp., and Turbinidae spp.).

The remnant cultural layer was the upper portion of a natural (in situ) stratigraphy that lies below disturbed soils and fill episodes associated with underground utilities and construction of the adjacent Coral Sea Road. The cultural layer is likely associated with a traditional Hawaiian habitation site that existed at this location prior to historic and modern development of the area.

Figure 266. Location of SIHP 50-80-12-XXXX (T-12) cultural layer in Trench 4 (Google 2019 imagery).

Pacific Legacy

Historic Preservation

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ARCHAEOLOGICAL INVENTORY SURVEY OF THE PROPOSED BARBERS POINT SOLAR PROJECT IN THE AHUPUA'A OF HONOULIULI, DISTRICT OF 'EWA, ISLAND OF O'AHU

[TMK: (1) 9-1-013:038; (1) 9-1-013:040; AND (1) 9-1-016:027 (POR.)]

APPENDIX C:

DESCRIPTIONS OF TEST TRENCHES

CULTURAL RESOURCES CONSULTANTS

Hawai'i Office:
Kailua, O'ahu

California Offices:
Bay Area
Sierra/Central Valley

Pacific Legacy: Exploring the past, informing the present, enriching the future.

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DRAFT

ARCHAEOLOGICAL INVENTORY SURVEY OF THE PROPOSED BARBERS POINT SOLAR PROJECT IN THE AHUPUA‘A OF HONOULIULI, DISTRICT OF ‘EWA, ISLAND OF O‘AHU

[TMK: (1) 9-1-013:038; (1) 9-1-013:040 AND (1) 9-1-016:027 (POR.)]

APPENDIX C: DESCRIPTIONS OF TEST TRENCHES

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September 2021

PREFACE

This report volume contains descriptions of test trenches excavated along the proposed underground generator-tie line route.

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TRENCH 1

Trench 1 was located 2.65 m west of Coral Sea Road within an area of dense grass and young *koa haole* (*Leucaena*) trees (Figure 1, Figure 2, and Figure 3). It is the northernmost of the nine test trenches. Three stratigraphic layers were observed (**Error! Reference source not found.**). Layer I was a loose sandy loam containing abundant fine to small roots. Layers II and III were crushed coral fill. Layer II was highly compacted, while Layer III was loose and contained thin layers of densely matted fine roots within the upper portion and at the interface with Layer II. Trench 1 terminated at 64 cm below surface (cmbs) at the top of a buried concrete utility jacket. No cultural material was observed.

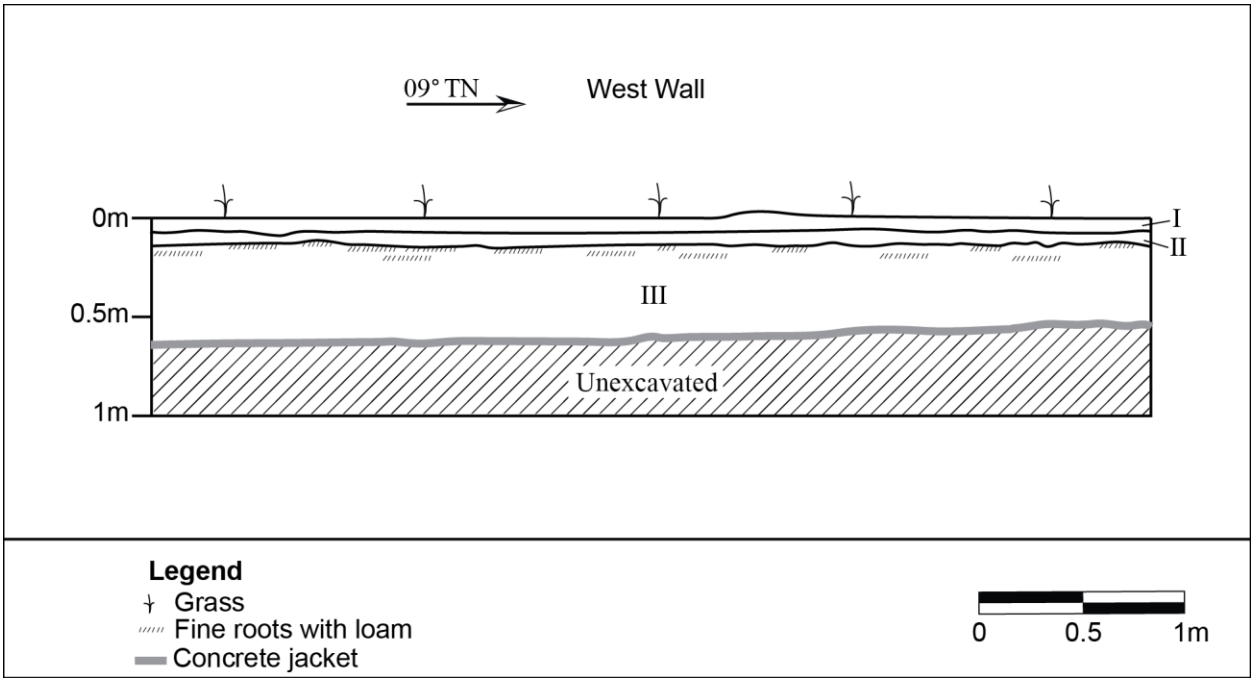

Figure 1. Profile of Trench 1 west wall.

Table 1. Soil Descriptions, Trench 1

Layer	Depth (cmbs)	Description
Layer I	0–9	Grayish brown (10YR 5/2) sandy loam; structureless; loose; non-plastic; abrupt, smooth lower boundary. Topsoil containing abundant fine to small roots.
Layer II	8–15	White (2.5Y 8/1) coral gravel; structureless; loose; non-plastic; very abrupt, smooth lower boundary. Compacted crushed coral fill.
Layer III	13–64	Pinkish white (5YR 8/2) extremely gravelly/cobbly sand; structureless; loose; non-plastic; very abrupt, smooth lower boundary. Crushed coral fill atop a concrete utility jacket. Contained very thin mats of roots with attached loam at the interface with Layer II and within the upper portion.

Figure 2. Trench 1 west wall profile, oblique view (view to southwest).

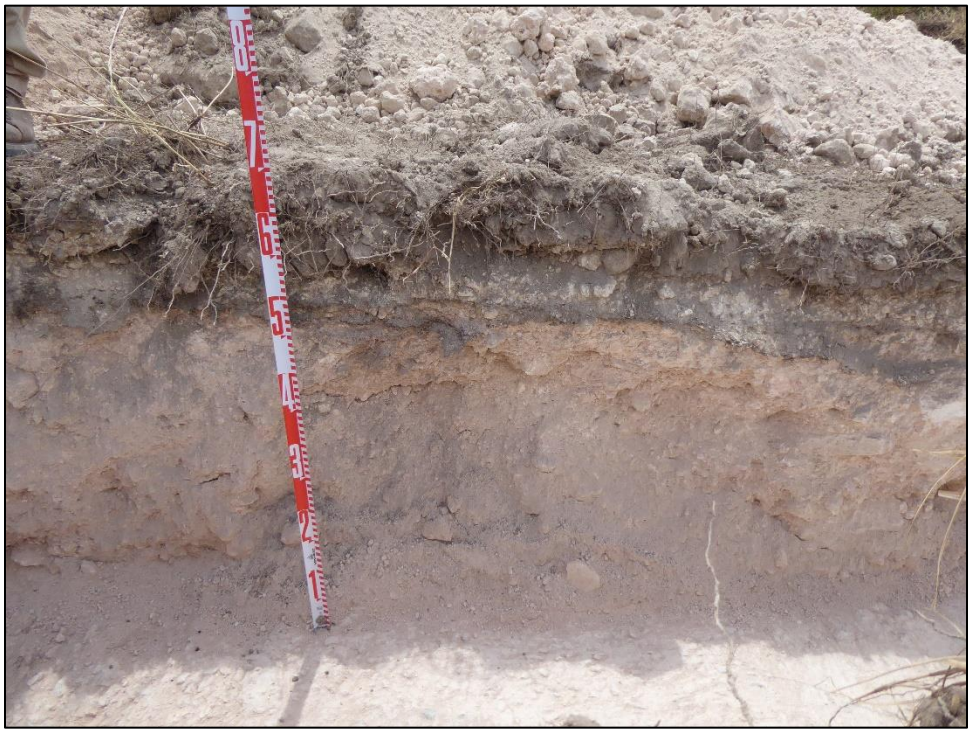

Figure 3. Trench 1, close-up of a portion of the west wall profile (view to west).

TRENCH 2

Trench 2 was located 3 m west of Coral Sea Road within the open shoulder of the road (Figure 4, Figure 5, and Figure 6). Four stratigraphic layers were observed (Table 2). Layer I was a loose gravelly sandy loam topsoil with fine roots. Layers II and III were consistent with Trench 1, comprising a thin layer of white, compacted crushed coral (Layer II) and a thicker layer of slightly darker, loose crushed coral (Layer III) atop a buried concrete utility jacket (Figure 7 and Figure 8). The upper surface of the concrete jacket was roughly textured, with small crevasses and depressions infiltrated by fine roots with accumulating loam soil, Layer IV. Trench 1 terminated at 44 cmbs at the top of the buried concrete utility jacket. No cultural material was observed.

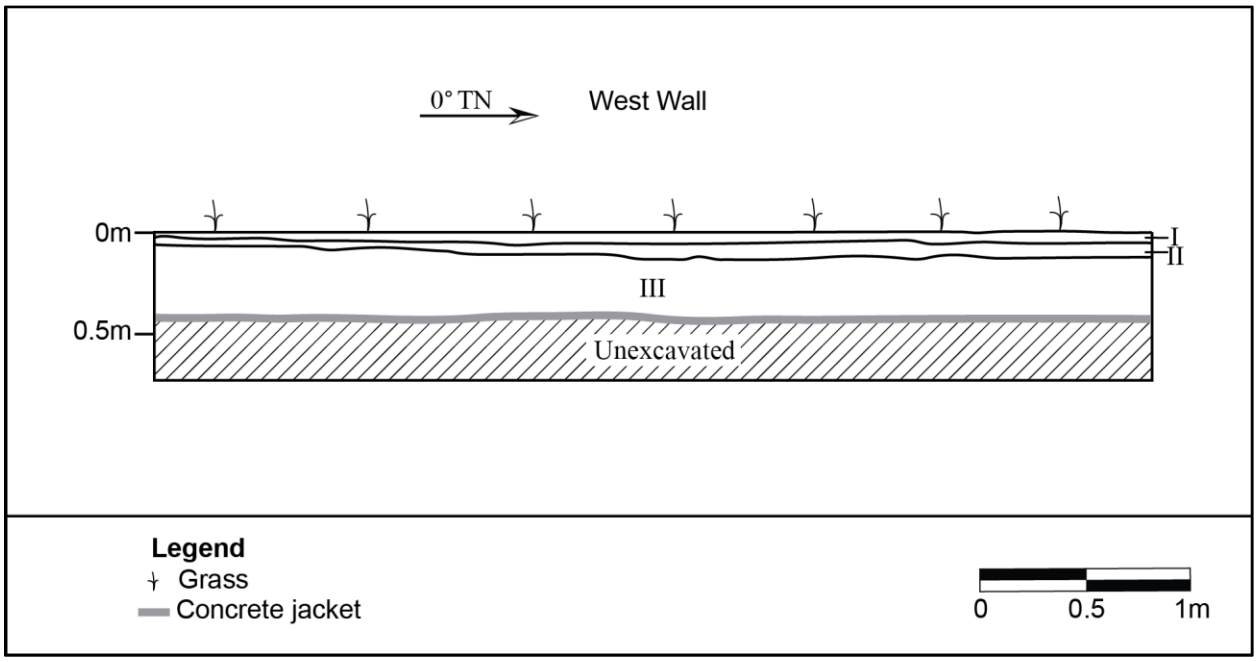

Figure 4. Profile of Trench 2 west wall.

Table 2. Soil Descriptions, Trench 2

Layer	Depth (cmbs)	Description
Layer I	0–5	Gray (10YR 5/1) gravelly sandy loam; structureless; loose; non-plastic; abrupt, smooth lower boundary. Topsoil containing fine roots.
Layer II	3–12	White (10YR 8/1) coral gravel; structureless; loose; non-plastic; very abrupt, smooth lower boundary. Compacted crushed coral fill.
Layer III	7–44	Light brownish gray (10YR 6/2) extremely gravelly/stony sand; structureless; loose; non-plastic; very abrupt, smooth lower boundary. Crushed coral fill atop a concrete utility jacket.
Layer IV	44	Brown (10YR 4/3) silt loam; weak, very fine, granular structure; non-plastic; very abrupt, broken lower boundary. Natural soil associated with root action within the crevasses and slight depressions of the concrete utility jacket.

Figure 5. Trench 2 west wall profile, oblique view (view to north).

Figure 6. Trench 2, close-up of trench floor, showing the concrete utility jacket with accumulating soil (Layer IV) (view to east).

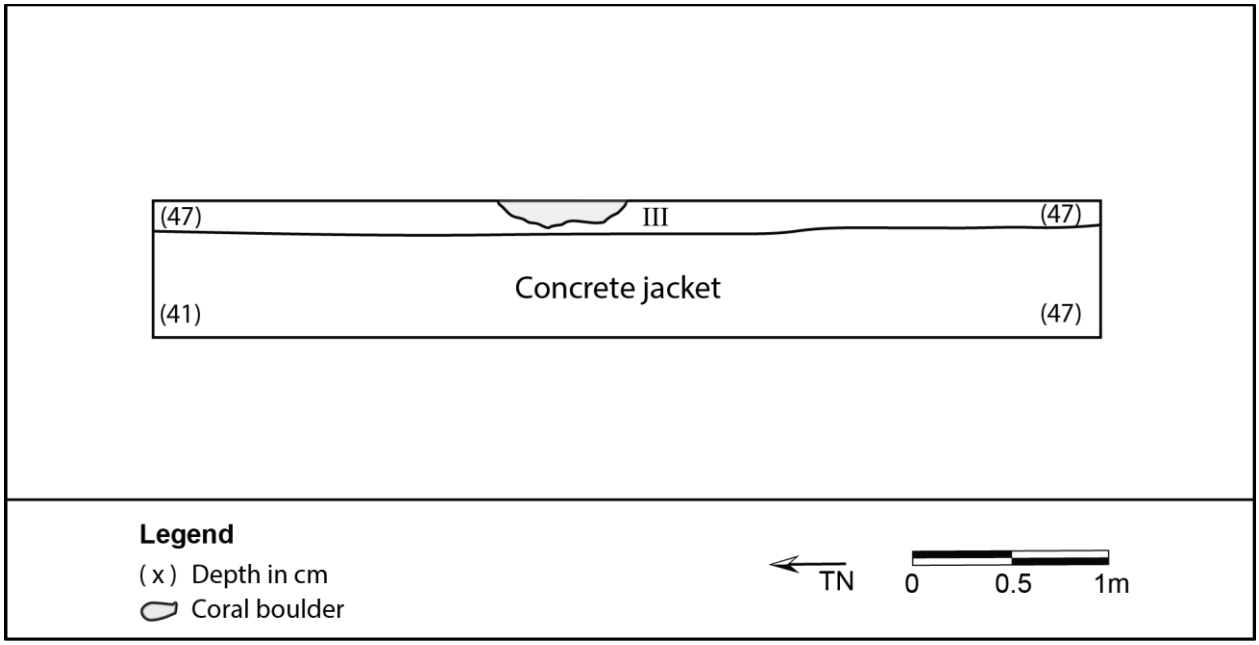

Figure 7. Plan view of concrete utility jacket within trench floor.

Figure 8. Trench 2, concrete utility jacket oriented north-south within the trench floor (view to north).

TRENCH 3

Trench 3 was located 2.1 m west of Coral Sea Road within the open shoulder of the road (Figure 9, Figure 10, and Figure 11). Four stratigraphic layers were observed (Table 3). Layers I, II, and III were consistent with the Trench 2 stratigraphy, comprised of a gravelly sandy loam topsoil and two layers of crushed coral. At the base of Layer III, the concrete utility jacket was again encountered, extending somewhat diagonally across the trench floor in a roughly northwest-southeast orientation. In order to explore the stratigraphy outside the utility corridor, the north end of the trench was expanded 40 cm to the east, for a maximum width of 1.1 m (Figure 12 and Figure 13). Below the Layer III crushed coral within the east wall was a deposit of very fine, natural silt loam containing a tabular coral boulder and fine roots. Trench 3 terminated at 80 cmbs along the east profile wall, at 70 cmbs atop the concrete utility jacket footing at the north end of the trench, and at 45 cmbs atop the concrete jacket in the remainder of the trench. A 1932 Bireley's glass soda bottle was collected from Layer III.

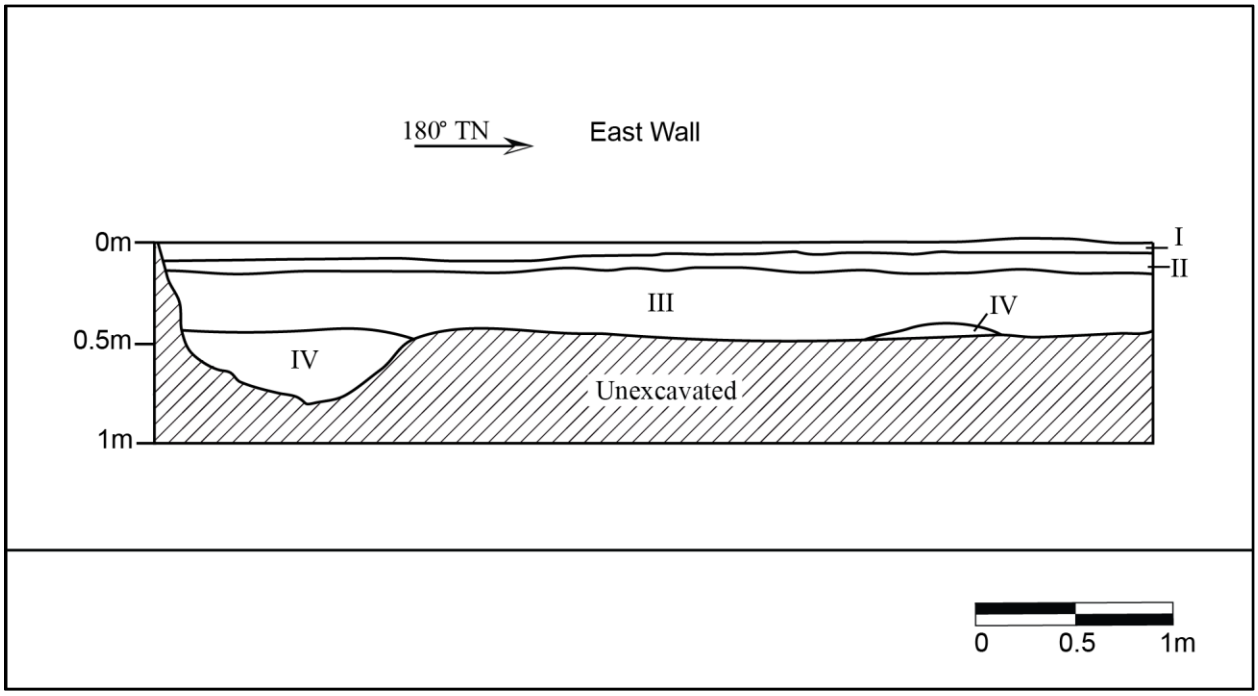

Figure 9. Profile of Trench 3 east wall.

Table 3. Soil Descriptions, Trench 3

Layer	Depth (cmbs)	Description
Layer I	0–9	Gray (10YR 5/1). Gravelly sandy loam; structureless; loose; non-plastic; abrupt, smooth lower boundary. Topsoil containing fine roots.
Layer II	5–15	White (10YR 8/1). Coral gravel; structureless; loose; non-plastic; very abrupt, smooth lower boundary. Compacted crushed coral fill.
Layer III	13–49	Light brownish gray (10YR 6/2). Extremely gravelly/stony sand; structureless; loose; non-plastic; very abrupt, smooth lower boundary. Crushed coral fill atop a concrete utility jacket. Contained many fine roots and an intact glass soda bottle.
Layer IV	41–80	Very pale brown (10YR 7/4). Silt loam; weak, very fine, granular structure; loose; non-plastic; lower boundary not reached. Very fine, homogenous natural soil. Contained few fine roots and a tabular coral boulder.

Figure 10. Trench 3, east wall profile, oblique view (view to southeast).

Figure 11. Trench 3, close-up of the expanded north end of the east wall profile (view to east).

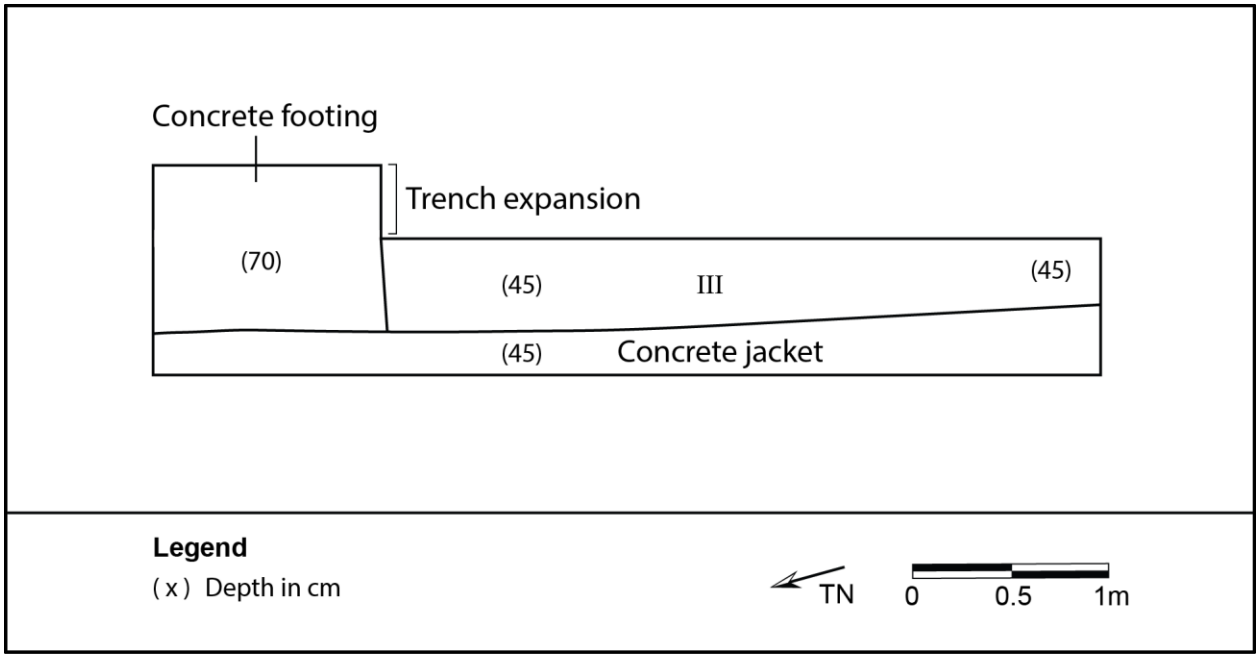

Figure 12. Plan view of concrete utility jacket within trench floor.

Figure 13. Trench 3, showing a concrete utility jacket oriented northwest-southeast within the trench floor (view to north).

TRENCH 4

Trench 4 was located 2.5 m west of Coral Sea Road within the open shoulder of the road (Figure 14 and Figure 15). Five stratigraphic layers were observed (Table 4). Layers I, II, and III were consistent with Trench 1–3 stratigraphy, with a sandy loam topsoil and two layers of crushed coral fill. Layer IV was a charcoal-stained, gravelly silt loam cultural layer encountered within the northwest portion of Trench 4 (Figure 16 and Figure 17). The cultural layer, interpreted as a component of Site T-12, was minimally 20 cm thick, extending from 83 cmbs to at least 103 cmbs. Layer IV possibly extended beyond the bounds of the trench to the northeast, northwest, and southwest. A 60.5-liter sample of Layer IV from 80–103 cmbs was screened in the field and all observed cultural material was collected. Cultural material included a volcanic glass scraper (Artifact 1), charcoal, *kukui* (*Aleurites moluccana*; candlenut tree) endocarp, faunal bone (small mammal, fish), sea urchin (Echinoidea spp.), crab (Carpiliidae spp.), and marine mollusks (Isognomonidae spp., Lucinidae spp., Mytiliidae spp., Pteriidae spp., Cypraeidae spp., Patellidae spp., Thaididae spp., Trochidae spp., and Turbinidae spp.). Layer V was similar to Layer IV within Trench 3, consisting of a very fine, light yellowish brown natural silt loam. It contained fine roots and no other inclusions. Layer V was minimally 65 cm thick, extending from 95 cmbs to at least 159 cmbs within the southeast portion of the trench. Due to unstable sidewalls, excavation ceased at this level; the coral shelf was not reached at this depth. In order to stabilize the sidewalls and to preserve the Site T-12 cultural layer (Layer IV) for possible future data recovery, the northeast portion of the trench was not excavated below 103 cmbs.

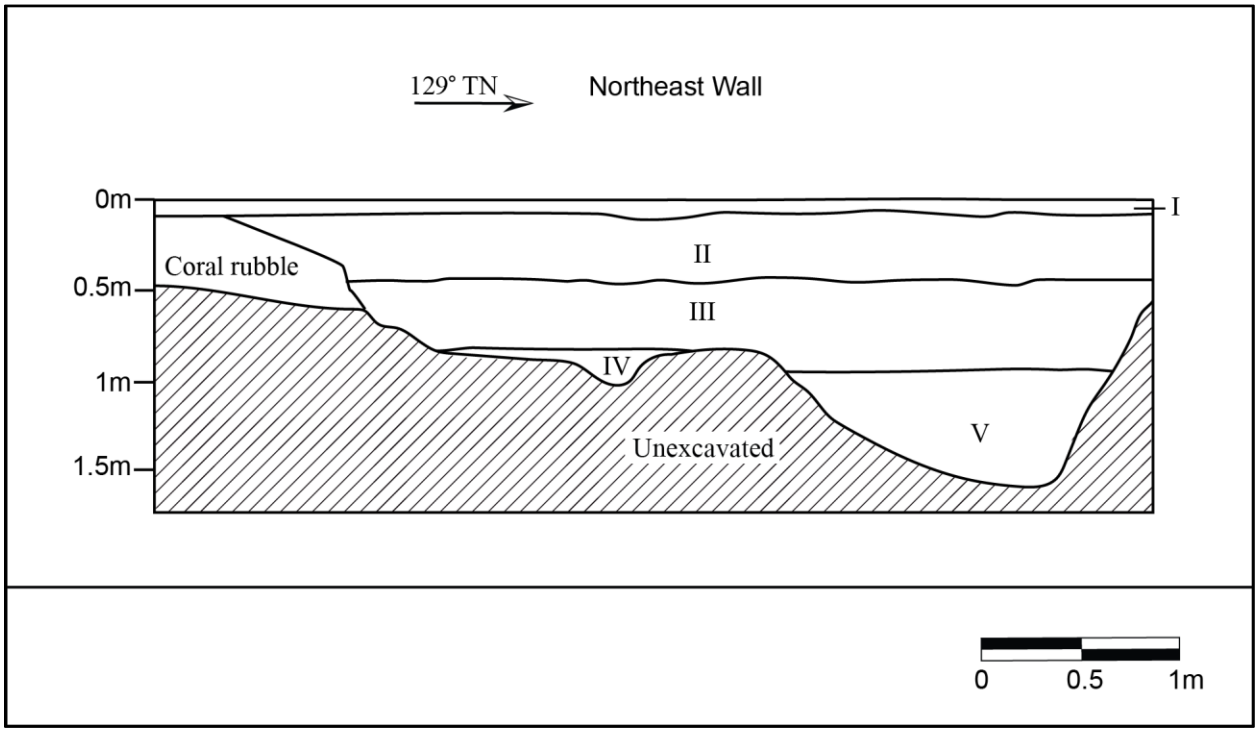

Figure 14. Profile of Trench 4 northeast wall.

Table 4. Soil Descriptions, Trench 4

Layer	Depth (cmbs)	Description
Layer I	0–9	Light brownish gray (10YR 6/4) sandy loam; structureless; loose; non-plastic; abrupt, smooth lower boundary. Topsoil containing abundant fine to small roots.
Layer II	6–45	Pinkish white (7.5YR 8/2) coral gravel; structureless; loose; non-plastic; very abrupt, smooth lower boundary. Crushed coral fill.
Layer III	45–95	Light gray (10YR 7/1) extremely gravelly/stony sand; structureless; loose; non-plastic; very abrupt, smooth lower boundary. Crushed coral fill with matrix of loamy sand.
Layer IV	83–103	Grayish brown (10YR 5/2) gravelly silt loam; weak, very fine, granular structure; loose; non-plastic; lower boundary not reached. Site T-12, charcoal-stained cultural layer. Contained charcoal, *kukui* endocarp, faunal (fish, small mammal) bone, and marine mollusks.
Layer V	95–159	Light yellowish brown (10YR 6/4) silt loam; weak, very fine, granular structure; loose; non-plastic; lower boundary not reached. Very fine, homogenous natural soil. Contained few fine roots. No cultural material was observed.

Figure 15. Trench 4 east wall profile, oblique view (view to southeast).

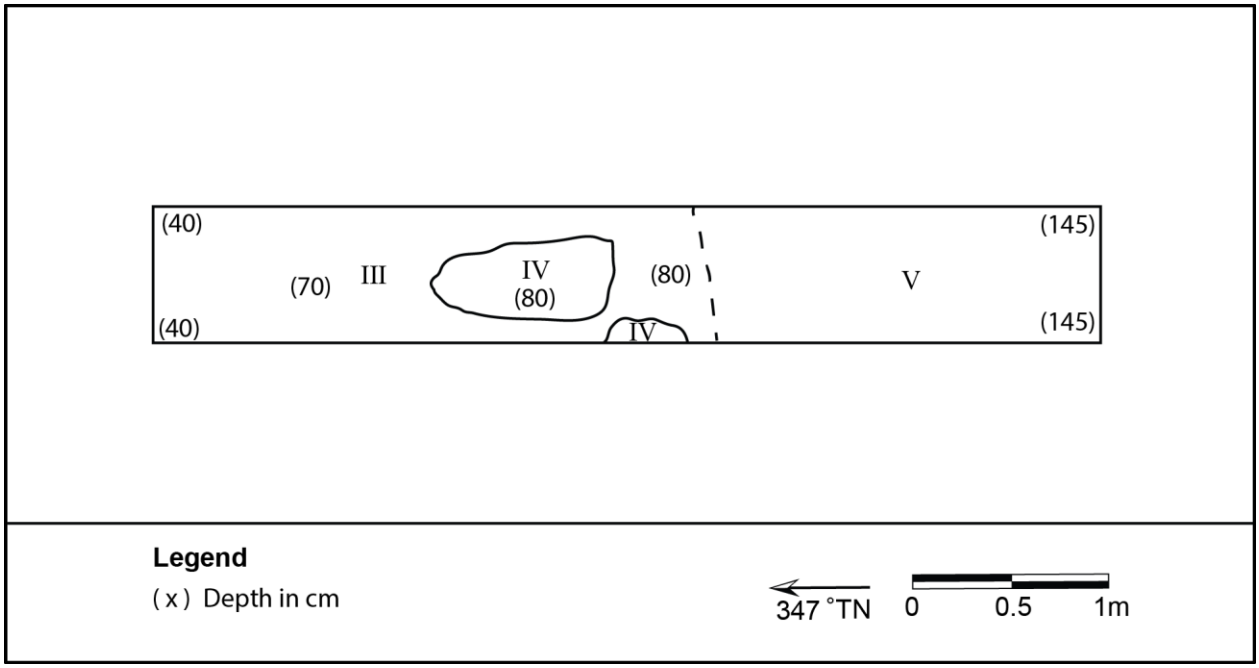

Figure 16. Plan view of Trench 4, showing Layer IV (Site T-12 cultural layer) within the trench floor at 80 cmbs.

Figure 17. Trench 4, close-up of Site T-12 charcoal-stained cultural layer, Layer IV (view to southwest).

TRENCH 5

Trench 5 was located 2.4 m south of the previous San Juacinto Street and approximately 125 m east of Coral Sea Road (Figure 18, Figure 19, and Figure 20). The trench environment consisted of a dense ground cover of grass and young *koa haole* trees along with large modern trash items (e.g., old mattresses, car tires). Four stratigraphic layers were observed (Table 5). Layer I was the current topsoil of gravelly sandy loam, containing leaf matter, grasses, and roots. Layer II consisted of a crushed coral fill. Layer III was a relatively thick deposit of natural, very fine, yellowish brown silt loam. The deposit infilled a deep depression within the coral shelf in the east half of the trench. In the west half of the trench, a slightly darker yellowish brown silt loam deposit, Layer IV, infilled a natural pit feature (Figure 21 and Figure 22). The unmodified pit feature, a component of Site T-03 (Feature 160), appeared to be hourglass-shaped, with a large coral shelf bulkhead on the east side. The aperture of the pit feature measured 60 cm wide; however, the interior widened significantly, with the coral shelf forming overhangs. At the base of excavation, the pit feature measured minimally 1.19 m wide and extended in all directions. A shovel test probe through Layer IV within the pit feature extended to 1.45 m below surface but did not reach the pit feature floor. Excavation was halted at this depth due to soil compaction and limited maneuverability. The coral shelf bulkhead within the central portion of the trench was partially removed by the excavator in order to verify that it was not coral boulder fill. One soil sample each of Layers III and IV was collected.

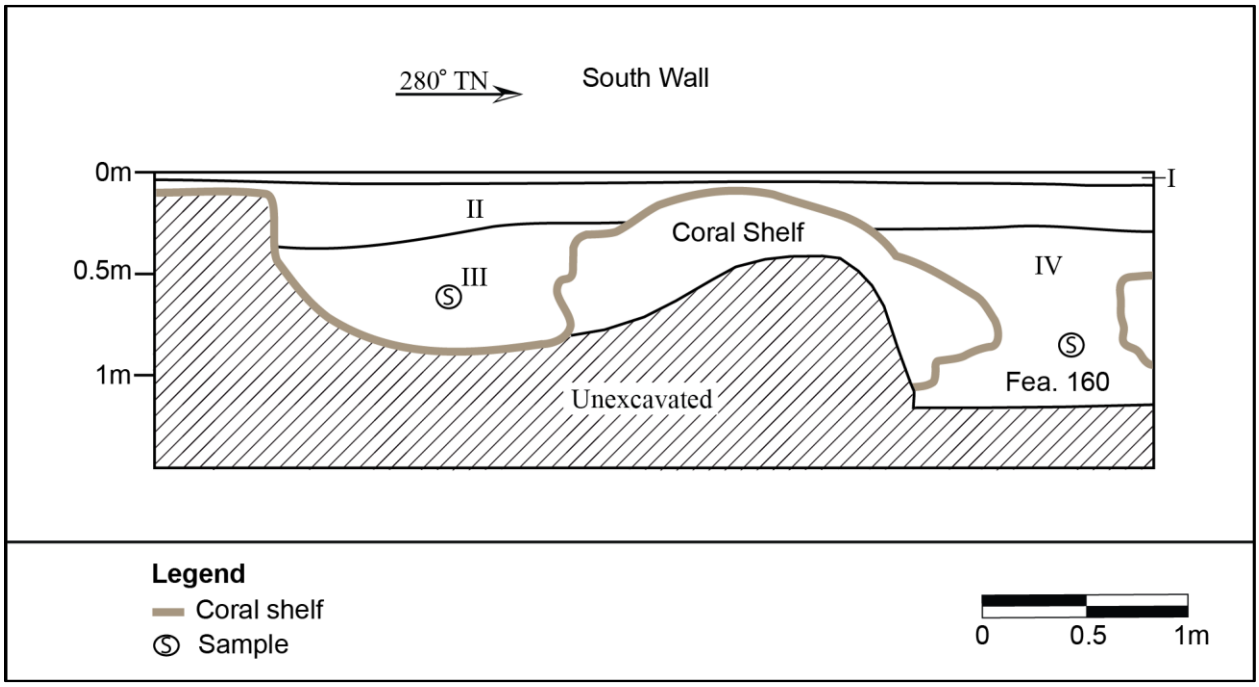

Figure 18. Profile of Trench 5 south wall.

Table 5. Soil Descriptions, Trench 5

Layer	Depth (cmbs)	Description
Layer I	0–5	Light brownish gray (10YR 6/2) gravelly sandy loam; structureless; loose; non-plastic; abrupt, smooth lower boundary. Topsoil containing organics and abundant fine to medium roots.
Layer II	5–38	White (10YR 8/1) extremely gravelly loamy sand; structureless; loose; non-plastic; abrupt, smooth lower boundary. Crushed coral fill.
Layer III	25–90	Yellowish brown (10YR 5/4) silt loam; weak, very fine, granular structure; non-plastic; very abrupt, broken/irregular lower boundary. Natural soil within a large depression in the coral shelf. Contained many fine to medium roots. No cultural material observed.
Layer IV	27–145	Dark yellowish brown (10YR 4/4) silt loam; weak, very fine, granular structure; loose; non-plastic; lower boundary not reached. Natural soil within a sinkhole feature (Site T-03 Feature 160). Contained many fine to medium roots. No cultural material observed.
Site T-03 Feature 160	~52–unknown	Natural sinkhole formation within coral shelf. Infilled with fine silt loam (Layer IV). No cultural material observed.

Figure 19. Trench 5 south wall profile, oblique view (view to southeast).

Figure 20. Trench 5, close-up of east portion of the south wall profile (view to south).

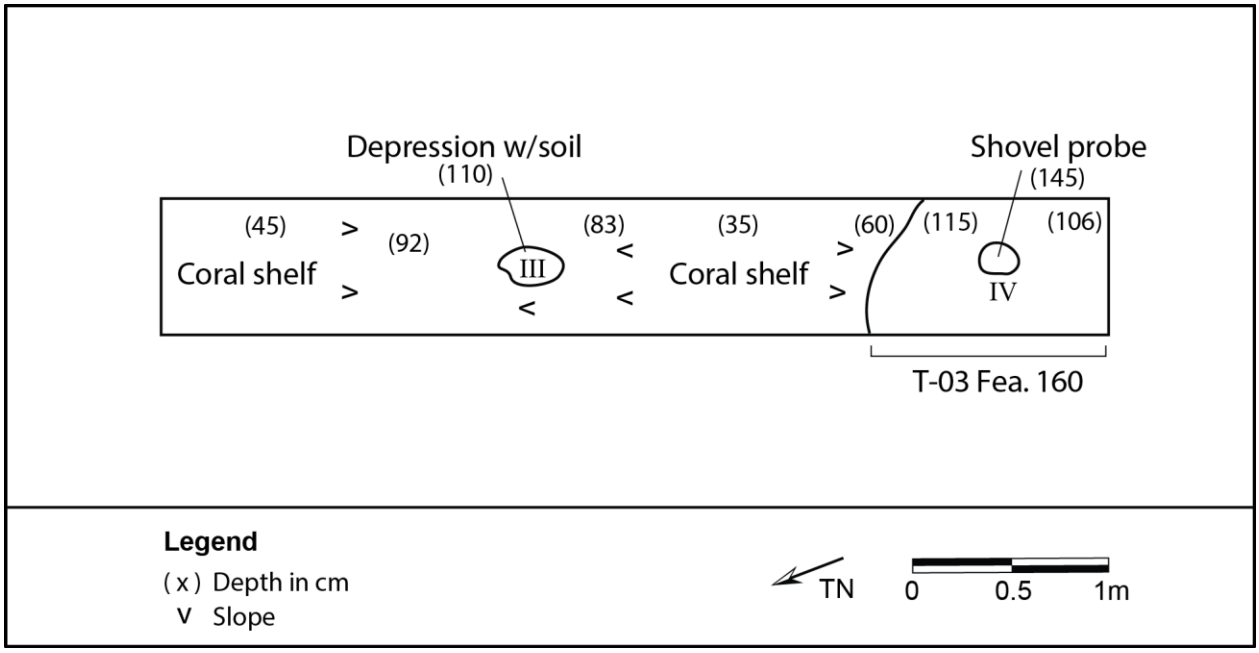

Figure 21. Plan view of Trench 5 at the base of excavation.

Figure 22. Trench 5, close-up of west portion of the south wall profile, showing an infilled sinkhole (Site T-03, Feature 160) (view to south).

TRENCH 6

Trench 6 was located approximately 7 m west of Coral Sea Road within the open shoulder of the road (Figure 23, Figure 24, and Figure 25). Three stratigraphic layers were observed (Table 6). Layer I was a gravelly silt loam topsoil with sparse grass and many fine roots. Layer II consisted of very fine, natural silt loam atop the coral shelf. It contained abundant platy coral inclusions in the central and north portions of the trench. Layer III consisted of very thin, isolated pockets of dark brown loam with dense mats of fine roots located within the surface depressions of the coral shelf. Trench 6 terminated on top of the coral shelf at 23 cmbs. No cultural material was observed.

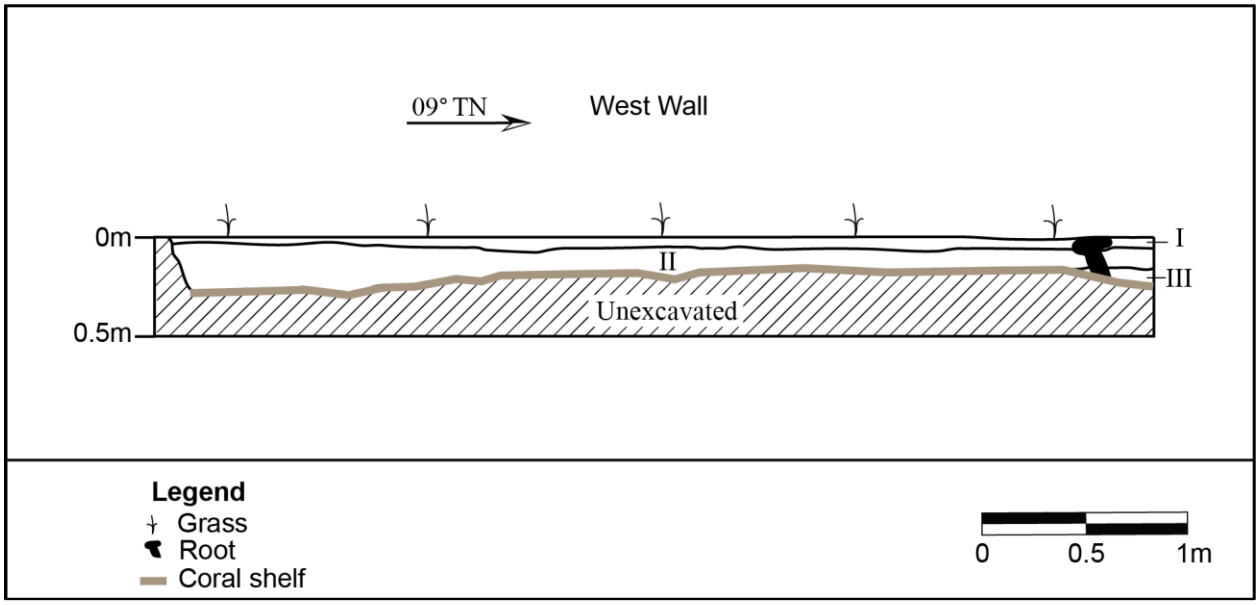

Figure 23. Profile of Trench 6 west wall.

Table 6. Soil Descriptions, Trench 6

Layer	Depth (cmbs)	Description
Layer I	0–6	Light brownish gray (10YR 6/2) gravelly sandy loam; structureless; loose; non-plastic; abrupt, wavy lower boundary. Topsoil containing many fine to medium roots.
Layer II	4–29	Brown (10YR 5/3) extremely stony silt loam; weak, very fine, granular structure; loose; non-plastic; very abrupt, wavy lower boundary. Natural silt loam atop the coral shelf. Contained platy coral inclusions within the central and north portions of the trench. No cultural material observed.
Layer III	15–23	Dark brown (7.5YR 3/3) loam; weak, fine, granular structure; very friable; non-plastic; very abrupt, broken lower boundary. Natural soil within depressions in the coral shelf. Contained dense mats of fine roots. No cultural material observed.

Figure 24. Trench 6 west wall profile, oblique view (view to northwest).

Figure 25. Trench 6, close-up of a portion of the west wall profile (view to west).

TRENCH 7

Trench 7 was located on the west side of Coral Sea Road within the open shoulder of the road (Figure 26, Figure 27, and Figure 28). The three stratigraphic layers observed in Trench 6 were also observed in Trench 7, consisting of gravelly silt loam topsoil (Layer I), very fine natural silt loam (Layer II), and small patches of loam within surface depressions of the coral shelf (Layer III) (Table 7, Figure 29, and Figure 30). Layer II contained more coral cobbles/stones than silt loam matrix within Trench 7. Trench 7 terminated on top of the coral shelf at 45 cmbs. No cultural material was observed.

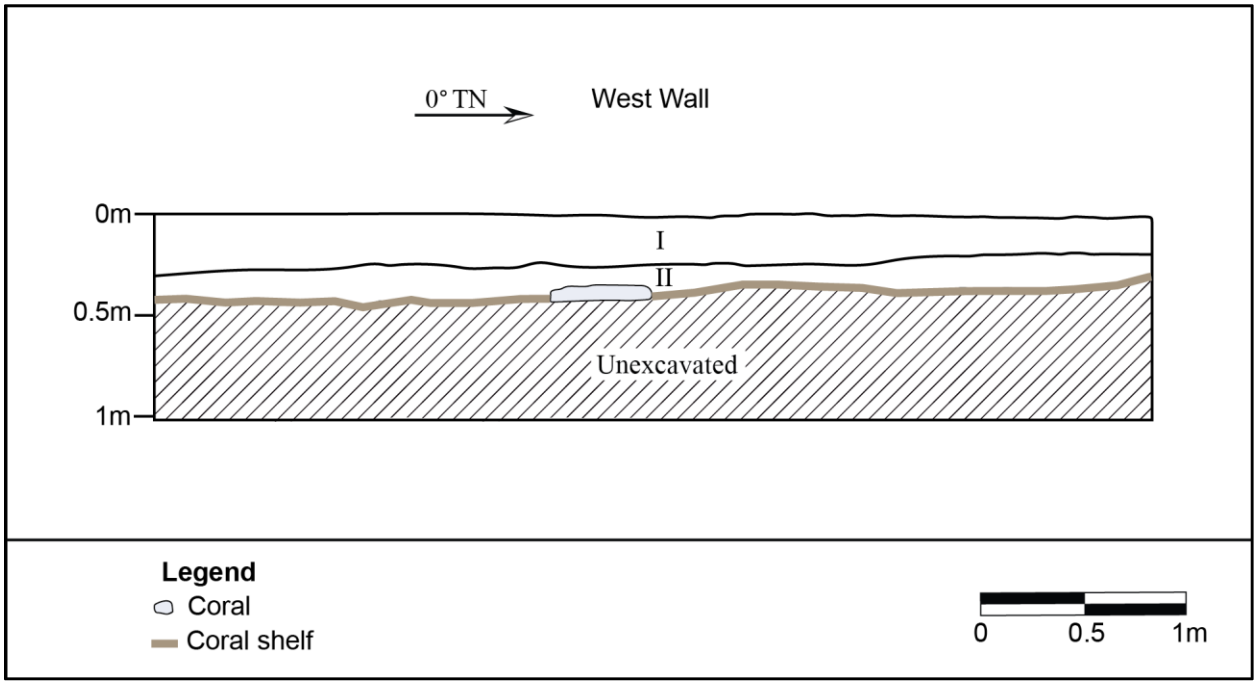

Figure 26. Profile of Trench 7 west wall.

Table 7. Soil Descriptions, Trench 7

Layer	Depth (cmbs)	Description
Layer I	0–30	Light brownish gray (10YR 6/2) gravelly sandy loam; structureless; loose; non-plastic; abrupt, smooth lower boundary. Topsoil containing many fine roots.
Layer II	19–45	Brown (10YR 5/3) extremely stony silt loam; structureless; loose; non-plastic; very abrupt, wavy lower boundary. Natural, very fine silt loam atop the coral shelf. Contained abundant platy and tabular coral blocks and many fine roots. No cultural material observed.
Layer III	35–45	Brown (7.5YR 3/3) loam; weak, fine, granular structure; very friable; non-plastic; very abrupt, broken lower boundary. Natural soil within depressions in the coral shelf. Contained dense mats of fine roots. No cultural material observed.

Figure 27. Trench 7 west wall profile, oblique view (view to southwest).

Figure 28. Trench 7, close-up of a portion of the west wall profile (view to west).

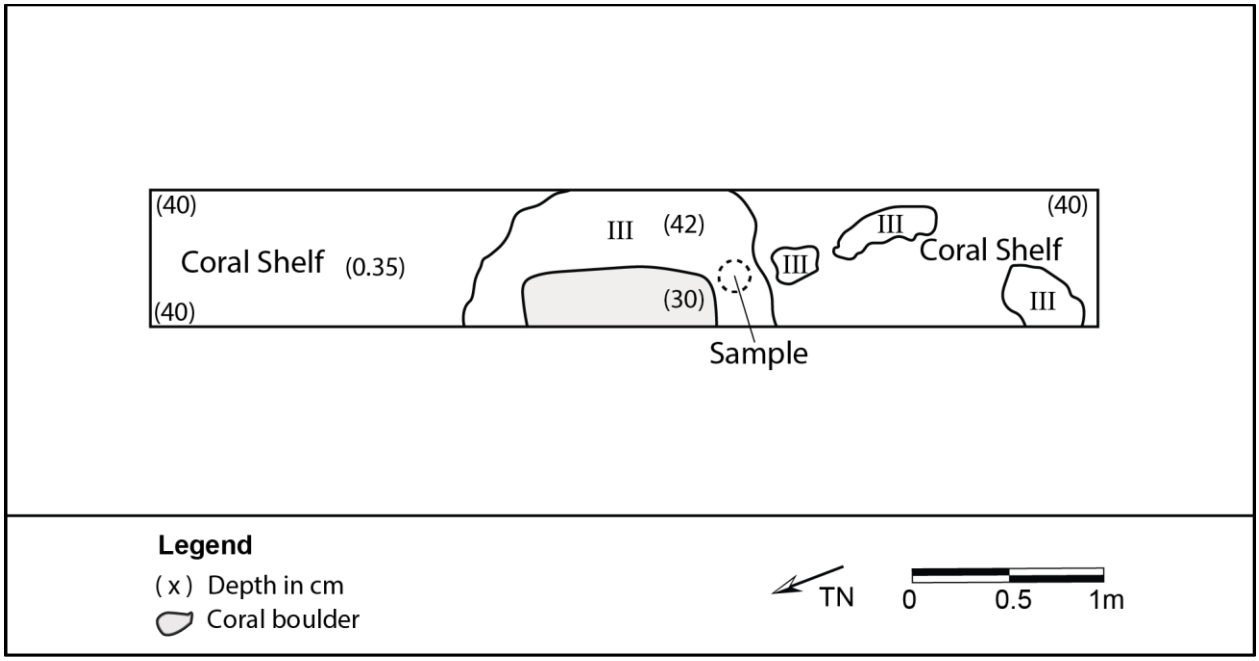

Figure 29. Plan view of Trench 7 at the level of the coral shelf.

Figure 30. Trench 7, close-up of Layer III loam with fine roots atop the coral shelf (view to north).

TRENCH 8

Trench 8 was located on the west side of Coral Sea Road within the open shoulder of the road and on the east edge of a thicket of young *koa haole* trees (Figure 31, Figure 32, and Figure 33). Two stratigraphic layers were observed (Table 8). Layer I was a gravelly sandy loam topsoil with many fine roots. Layer II consisted of a very fine silt loam atop the coral shelf. It contained several tabular coral blocks and many fine roots. Trench 8 terminated on top of the coral shelf at 48 cmbs. No cultural material was observed.

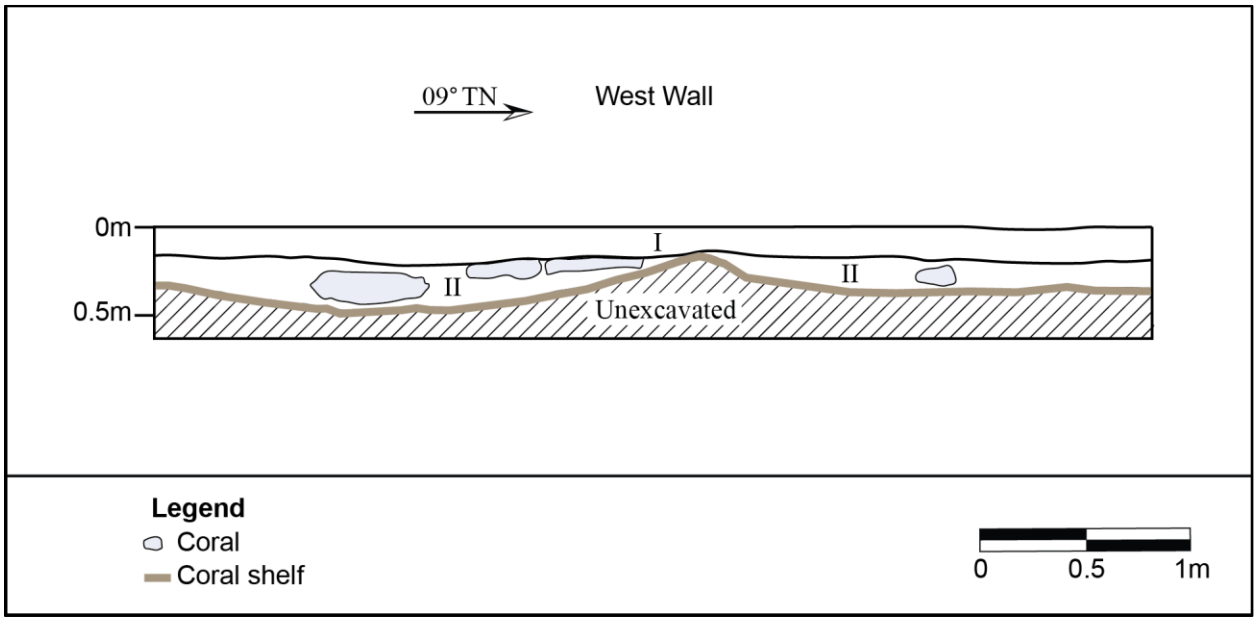

Figure 31. Profile of Trench 8 west wall.

Table 8. Soil Descriptions, Trench 8

Layer	Depth (cmbs)	Description
Layer I	0–20	Light brownish gray (10YR 6/2) gravelly sandy loam; structureless; loose; non-plastic; abrupt, smooth lower boundary. Topsoil containing many fine roots.
Layer II	15–48	Light gray (10YR 7/2) stony silt loam; weak, very fine, granular structure; loose; non-plastic; very abrupt, wavy lower boundary. Natural, very fine silt loam atop the coral shelf. Contained several tabular coral blocks and many fine roots. No cultural material observed.

Figure 32. Trench 8 south wall profile, oblique view (view to southwest).

Figure 33. Trench 8, close-up of a portion of the west wall profile (view to west).

TRENCH 9

Trench 9 was located on the west side of Coral Sea Road within the open shoulder of the road and on the east edge of a *kiawe* (mesquite; *Prosopis pallida*) thicket (Figure 34, Figure 35, and Figure 36). Three stratigraphic layers were observed (Table 9). Layer I was a gravelly sandy loam topsoil containing abundant fine to small roots. Layers II and III comprised natural deposits of silt loam, differing slightly in color (yellowish brown and light yellowish brown) and the inclusion of several tabular coral blocks within Layer III. Within the north end of the trench, a modern trench bisected Trench 9 at a northeast-southwest angle. The trench cut was straight-edged and extended from the upper boundary of Layer II to the base of excavation at 122 cmbs. The trench matrix appeared to incorporate Layers II and III backdirt. The coral shelf within Trench 9 sloped down to the north. Its depth below the modern trench was unable to be determined due to difficulty hand-excavating through the coral cobbles. No cultural material was observed.

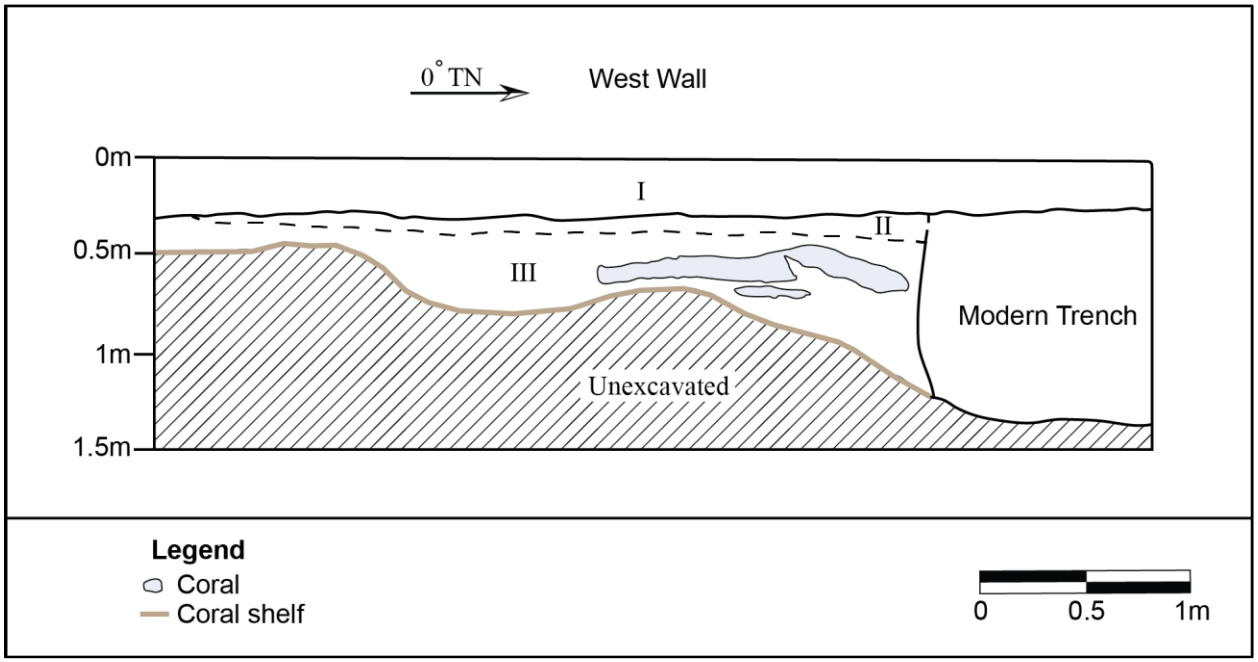

Figure 34. Profile of Trench 9 west wall.

Table 9. Soil Descriptions, Trench 9

Layer	Depth (cmbs)	Description
Layer I	0–31	Light brownish gray (10YR 6/2) extremely gravelly sandy loam; structureless; loose; non-plastic; abrupt, smooth lower boundary. Topsoil containing many fine to small roots.
Modern Trench	25–135	Brown (10YR 4/3) and light brownish gray (10YR 6/2) extremely gravelly loamy sand; structureless; loose; non-plastic; lower boundary not reached. Backfilled modern trench with abundant coral gravels and cobbles.
Layer II	29–41	Yellowish brown (10YR 5/4) stony silt loam; weak, very fine, granular structure; loose; non-plastic; clear, smooth lower boundary. Natural, very fine silt loam. No cultural material observed.
Layer III	33–122	Light yellowish brown (10YR 6/4) stony silt loam; weak, very fine, granular structure; loose; non-plastic; very abrupt, wavy lower boundary. Natural, very fine silt loam atop the coral shelf. Contained several tabular coral blocks and many fine to small roots. No cultural material observed.

Figure 35. Trench 9 west wall profile, oblique view (view to northwest).

Figure 36. Trench 9, close-up of north portion of the west wall profile, showing the modern trench truncating Layers II and III (view to west).

APPENDIX B. VEGETATION MANAGEMENT PLAN

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Honolulu, HI 96813
808.523.5866
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July 30, 2021

Acting Fire Chief Lionel Camara, Jr.
Honolulu Fire Department
1046 Young Street
Honolulu, HI 96814

Subject: Fire Code Compliance for Ground Mounted Solar Farms
Barbers Point Solar LLC, Kapolei, Oahu, Hawaii
TMK (1) 9-1-013:038,039,040

Dear Acting Fire Chief Camara,

We are kindly requesting a review and confirmation of the proposed approach to fire code compliance for the proposed ground-mounted solar project listed in this letter. This request intends to identify the specific code requirements and describe how the proposed project will comply with the code.

In 2015 and late 2020, G70 worked closely with HFD to set up a common understanding of the NFPA 1 requirements for several ground-mounted solar facilities on Oahu. Two (2) of those projects were subsequently permitted and constructed based on those initial meeting's contents. See ***Attachment A – 2015 HFD Memorandum*** and ***Attachment B – 2020 07 28_HFD Minutes***.

G70 is now working with Barbers Point Solar, LLC to design a ground-mounted solar farm in Barbers Point along Coral Sea Road. The project's design responds to a Power Purchase Agreement with Hawaiian Electric Company and intends to provide utility scale renewable power generation in support of the State's fossil fuel reduction effort. The current schedule has the project working through entitlements and conceptual site planning to 30% project design. The Project consists of construction and operation of a 15-megawatt (MW) solar photovoltaic system coupled with a 15 MW, 4-hour (60 MWh) PV-Coupled ESS as well as related interconnection and ancillary support infrastructure. The major infrastructures of the Project will include the following: single-axis tracking solar photovoltaic system; direct current electrical collector lines; power conversion systems including PV-coupled ESS units and step-up transformers; alternating current (AC) electrical collector lines; Project collector substation; a generation-tie line (combination overhead and underground); communication equipment; access roads and fencing; and temporary laydown areas.

Project Name	TMK	MW-AC	Acres	Permit Status
Barbers Point Solar	(1)9-1-013:038, 039,040	15 MW, 60 MWh (BESS)	163	Draft EA to be filed end of Q3 2021 and on track to file Final EA Q2 2022. HCDA CUP/DP on track to be obtained Q3 2022.

In a previous request, G70 asked for the use of the 2018 NFPA 1 Fire Code in lieu of the 2012 NFPA 1 version. The basis for the previous request rested on the use of a Vegetation Management Plan not outlined in prior versions of the Code. As of January 2021, it is G70's understanding Honolulu County has adopted the 2018 version of the NPFA 1 as such adopting the use of Vegetation Management Plan.

In an effort to design the project in alignment with HFD's understanding of the Code, we respectfully request HFD review the following excerpt of the 2018 NFPA 1 Fire Code and confirm HFD's enforcement position. Also, if HFD plans to amend the code in regards to Solar Farms, G70 is willing to review and discuss any additional comments or questions not currently quoted here.

The NFPA 2018 section 11.12.3 states, "ground-mounted photovoltaic systems shall be installed in accordance with 11.12.3.1 through 11.12.3.3." Shown below are specific code sections, along with the non-mandatory Annex A material from the NFPA 2018 Fire Code Handbook. The project's design intend to comply with all of these requirements, including submitting a *Vegetation Management Plan* for review (see Attachment C - VMP) and approval by the HFD Plan Review Division.

The following is an excerpt from the 2018 NFPA 1 Fire Code.

11.12.3.1* **Clearances**. A clear area of 10 ft (3048 mm) around ground-mounted photovoltaic installations shall be provided.

A.11.12.3.1 The zoning regulations of the jurisdiction setback requirements between buildings or property lines, and accessory structures may apply.

11.12.3.2* **Vegetation Management Plan**. A vegetation management plan or other non-combustible base acceptable to the AHJ shall be approved and maintained under and around the installation where required by the AHJ.

A.11.12.3.2 Though dirt with minor growth is not considered noncombustible, the AHJ might approve dirt bases as long as any growth is maintained under and around the installation to reduce the risk of ignition from the electrical system. This could be a serious consideration for large ground-mounted photovoltaic systems. Not only should the base be considered under the systems, but also around the systems to the point that the risk of fire from growth or other ignition sources will be reduced.

11.12.3.3* **Security Barriers**. Fencing, skirting, or other suitable security barriers shall be installed when required by the AHJ.

A.11.12.3.3 Security barriers are intended to protect individuals and animals from contact with energized conductors or other components.

In addition to confirming the use and understanding of the 2018 NFPA 1 Fire Code, a previous G70 meeting with HFD also discussed the topic of Code compliance with Chapter 18, Fire Department Access and Water Supply, which is documented in ***Attachment B – 2020 07 28_HFD Minutes.*** G70 and HFD agreed that fire department access and water supply is **not** a requirement for the following reasons.

- The solar farms are unmanned utility facilities and there will not be any use or occupancy that the fire code would apply to. Specifically, there will not be any occupied buildings in the proposed projects. Therefore, provision of fire access and water supply is not required by code.
- Locks will be utilized to secure the perimeter fencing/gates with access provided to HFD.
- The developer will prepare and coordinate an Emergency Response Plan with HFD that establishes appropriate HFD response at the proposed sites and implements regular training for HFD first responders for site-specific response.
- Notes will be provided on the proposed drawings that reference NFPA 1 Sections 18.2.2.1, 18.2.2.2, and 18.2.2.3 related to access boxes, access to developments, and access maintenance.

The Battery Energy Storage System (BESS) for the project consists of self-contained enclosures distributed across the site. Each system rests on open-air gravel pads. The battery enclosures design and manufacturing include safeguards to mitigate and monitor the systems to contain and suppress fires with no active fire response necessary from HFD.

Thank you for your attention to this matter; please feel free to call me directly at (808) 441-2127 if you have questions or need additional information.

Sincerely,

Group 70 International Inc., a Hawaii Corporation, dba G70

Paul T. Matsuda, PE, LEED AP
Principal

Attachments:
A. 2015 HFD Memorandum
B. 2020 07 28_HFD Minutes
C. Vegetation Management Plan

cc: Hawaii Wildlife Management Team
Julia Mancinelli, Innergex

ATTACHMENT A
2015 HFD MEMORANDUM

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

September 28, 2015

Mr. Paul Matsuda, P.E.
Group 70 International
925 Bethel Street, 5th Floor
Honolulu, Hawaii 96813-4398

Dear Mr. Matsuda:

Subject: SunEdison Solar Farms
Fire Code Compliance for Ground-Mounted Solar Farms

In response to your memorandum dated September 2, 2015, regarding the above-mentioned subject, the Honolulu Fire Department approves the proposed approach to fire code compliance as outlined in your memorandum. Please note that this approval may be modified upon evaluating the proposed procedures or other factors that may impact fire safety.

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

SOCRATES D. BRATAKOS
Assistant Chief

SDB/SY:bh

RECEIVED

OCT - 1 2015

GROUP 70 INTL

MEMORANDUM

Group 70 International, Inc. ● Architecture • Planning & Environment • Civil Engineering • Interior Design • Technolog
925 Bethel Street, Fifth Floor ● Honolulu, Hawai'i 96813-4398 ● PH: (808) 523-5866 ● FAX: (808) 523-5874

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Tom Young, MBA, AIA
Paul T. Matsuda, PE, LEED AP
Ma Ry Kim, RIBA, ARB

OF COUNSEL
Ralph E. Portmore, FAICP

TO:	Honolulu Fire Department City and County of Honolulu 636 South Street Honolulu, HI 96813		
ATTENTION:	Fire Chief Manuel P. Neves		
DATE:	September 2, 2015		
PROJECT:	SunEdison Solar Farms	**PROJECT NO:**	See Table 1
EMAIL:		**NO. OF PAGES:**	4
SUBJECT:	Fire Code Compliance for Ground-mount Solar Farms		

PROJECT OVERVIEW:

SunEdison has been working closely with HECO, landowners, and City and State agencies for the past few years on entitlements and permitting for several large, utility scale projects on Oahu. These projects are being developed in conjunction with HECO and originated through a competitive bid which was solicited and awarded to several different companies. In total, SunEdison is working on four large solar farm projects at various locations on Oahu. Three of these projects were previously submitted for building permit approval and the fourth will be submitted by the end of 2015. The projects are listed below.

Table 1 – SunEdison Solar Farm Projects

Project Name	TMK	MW	Acres	Building Permit Application No.	DPP File No.
Mililani I and II	9-4-005: 090,091,092,096 &079	35	354.6	A2015-06-0495	2015/CP-028
Waipio*	9-5-003:004	47	309	A2015-06-1383	2015/CP-137
Waiawa	9-4-006: 034, 035,036,037 & 9-4-004: 024, 025,026	50	211	A2015-07-1063	2015/CP-090
Kawailoa	6-1-006:001 & 6-1-005:001	68	384.1	n/a	n/a

* Waipio Solar Farm was a First Wind project before First Wind was acquired by SunEdison.

The projects are all ground mounted, photovoltaic energy projects. Each project uses different types and models of solar rack systems and electrical equipment. However, in terms of layout and application of fire code, the solar farms are similar.

PURPOSE OF MEMORANDUM
We are requesting review and confirmation of the proposed approach to fire code compliance as outlined in this memorandum so that the design and response to comments for code compliance can be consistently applied to each project.

PERMIT REVIEW COMMENTS
HFD review comments were received for the three open building permits. It is our understanding that although NFPA 2006 is the adopted code, the projects are being reviewed using NFPA 2012, referenced below. The current NFPA 2012 contains specific requirements for ground mounted solar farms which are not part of the 2006 code.

Comments are generally consistent between the reviews and are summarized below with reference to the applicable NFPA 2012 section:

1. Fire Safety Notes – Notes related to code requirements for PV Solar Farms including Retention of Plans shall be included on plans
2. Access to PV Solar Farm required by NFPA 18.2.2
3. PV Solar Farms must comply with NFPA 11.12.3
    a. Clearance around PV Solar Farm required by NFPA 11.12.3.1
    b. Noncombustible Base around and under PV Solar Farm required by NFPA 11.12.3.2
    c. Security Barriers required by 11.12.3.3
4. Clarify and clearly state on plans whether the Control Building is classified as a structure or a building.
5. Indicate battery type and battery electrolyte amount on plans.

Item #1 – Fire Safety Notes

The following notes are consolidated from the three separate reviews and will be added to each permit set.

Fire Safety Notes

- 16.1.1 Structures undergoing construction, alteration, or demolition operations, including those in underground locations, shall comply with NFPA 241, Standard for Safeguarding Construction, Alteration, and Demolition Operations, and this chapter. 2006 NFPA 1.
- 11.12.1 New photovoltaic systems shall be installed in accordance with NFPA 1 2012 Section 11.10, Section 11.12 and NFPA 70.
- 11.12.3 Ground-Mounted Photovoltaic System Installations. Ground-mounted photovoltaic systems shall be installed in accordance with 11.12.3.1 through 11.12.3.3.
- 11.12.3.1 Clearances. A clear area of 10ft around ground-mounted photovoltaic installations shall be provided.
- 11.12.3.2 Noncombustible Base. A gravel base or other non-combustible base acceptable to the AHJ shall be installed and maintained under and around the installation.
  Though dirt with minor growth is not considered noncombustible, the AHJ might approve dirt bases as long as any growth is maintained under and around the installation to reduce the risk of ignition from the electrical system. This could be a serious consideration for large ground-mounted photovoltaic systems. Not only should the base be considered under the systems, but also around the systems to the point that the risk of fire from growth or other ignition sources will be reduced.
- 11.12.3.3 Security Barriers. Fencing, skirting, or other suitable security barriers shall be installed when required by the AHJ.
- Sec. 18-5.2 Retention of Plans - One set of approved plans, specifications, and computations shall be retained by the building official for a period of not less than 90 days from date of completion of the

work covered therein, and one set of approved plans shall be returned to the applicant, and said set shall be kept on the site of the building or work at all times during which the work authorized thereby is in progress. (sec. 18-5.2 R.O. 1978 (1983 Ed.); Am. Ord. 93-59)

- 18.2.2.1 Access Boxes. The AHJ shall have the authority to require an access box(es) to be installed in an accessible location where access to or within a structure or area is difficult because of security.
- 18.2.2.2 Access to Gates Subdivisions or Developments. The AHJ shall have the authority to require fire department access be provided to gates subdivisions or developments through the use of an approved device system.
- 18.2.2.3 Access Maintenance. The owner or occupant of a structure or area, with required fire department access as specified in 18.2.2.1 or 18.2.2.2, shall notify the AHJ when access is modified in a manner that could prevent fire department access.

ITEM #2 – Access

Access notes will be added to the Building permit plans and access and security will be coordinated with HFD. The solar farm perimeter is secured, access is limited, and lock boxes will be in place to limit access to SunEdison personnel, security and HFD.

ITEM # 3 – NFPA 11.12.3 – Ground-mounted PV Solar Farms

NFPA 2012 code requires ground-mounted photovoltaic systems shall be installed in accordance with 11.12.3.1 through 11.12.3.3. Specific code sections with Annex A supplemental information are listed below with proposed compliance.

11.12.3.1 Clearances. A clear area of 10 ft (3048 mm) around ground-mounted photovoltaic installations shall be provided.*
A.11.12.3.1 The zoning regulations of the jurisdiction setback requirements between buildings or property lines, and accessory structures may apply.

- All sites will have a minimum 10′ clear space between the edge of the solar array and the perimeter fence and a 10′ area outside the fence that vegetation will be maintained to a height between 6″ and 18″ that will serve as a fire break.

11.12.3.2 Noncombustible Base. A gravel base or other non-combustible base acceptable to the AHJ shall be installed and maintained under and around the installation.*
A.11.12.3.2 Though dirt with minor growth is not considered noncombustible, the AHJ might approve dirt bases as long as any growth is maintained under and around the installation to reduce the risk of ignition from the electrical system. This could be a serious consideration for large ground-mounted photovoltaic systems. Not only should the base be considered under the systems, but also around the systems to the point that the risk of fire from growth or other ignition sources will be reduced.

- SunEdison will reduce fire risk under and around the installation by implementing the following:

A. All trees and shrubs will be removed from the site and a dirt base will be maintained around the installation with vegetation maintained to a height between 6″- 18″. This would be well below the lower edge of the equipment, which is approximately 36″. Section *A.11.12.3.2* acknowledges that "dirt with minor growth" could be approved as a "consideration for large ground-mounted systems." Vegetation will be maintained by rotational mowing and/or grazing sheep or other livestock.

Continual vegetation management is required for normal operations to ensure the solar arrays are operating at maximum capacity.

B. The DC conductors from the combiner boxes to the inverters will be buried. All transitions to above ground equipment will be done inside PVC conduit. Inverters and other large electrical equipment including the substation will be mounted on concrete or gravel surfaces.
C. To assist in the vegetation abatement at all sites except Waiawa, SunEdison intends to also use the property for the pasturage of sheep. A condition of the Special Use Permits, issued by the State Land Use Commission (LUC) on March 25, 2015 for Waipio and June 29, 2015 for Kawailoa, requires that these projects make the site, including areas under PV panels, available for compatible agricultural use. Through studies and testimony submitted to the LUC, the SUP decision noted that sheep grazing around and under the panels limits vegetation growth and provides food in the form of lamb meat. The sheep will serve a dual purpose in that they will help to reduce vegetation growth as well as satisfy the requirements of the Special Use Permit. Sheep grazing is not a new idea to the solar industry and is a practice that has been used at a number of solar farms in Europe and the United States.
D. It is a standard O&M practice for SunEdison to consistently maintain all the vegetation surrounding equipment, solar or wind, to ensure the power facility functions in safe and efficient manner. In addition to the sheep grazing on the site, mechanical mowing will be accomplished by tow behind mowing equipment, and weed whackers. Mowing will bring the vegetation down to 4-6inches and will be cut typically once per month or as needed to keep growth below the maximum average height. Continual vegetation management is required for normal operations to ensure the solar arrays are operating at maximum capacity and to reduce the risk of any ignition by the electrical system.

11.12.3.3 Security Barriers. Fencing, skirting, or other suitable security barriers shall be installed when required by the AHJ.*
A.11.12.3.3 Security barriers are intended to protect individuals and animals from contact with energized conductors or other components.

- As required by section 11.12.3.3 of the NFPA 1, the project will have a fence along the perimeter of the site. Additionally, the high voltage substation and switchyards will be surrounded by a 8′ security fence.

ITEM #4 – Control Enclosures

Control Enclosures – There are no buildings on any of the solar farm projects. There are enclosures and cabinets to protect inverters and other electrical equipment. These structures are not buildings and shall be labeled accordingly.

ITEM #5 – Battery
Battery type and battery electrolyte amount will be shown on applicable substation sheets.

VERY TRULY YOURS,

Paul T. Matsuda, P.E. CC: **File**

P:\2013\213018-01 DHHL Kau Water Assessment Study\100 Administration\104 Correspondence\Meetings\2013 11 15 - DHHL Kau meeting with KAWDC.doc

ATTACHMENT B
FIRE CODE COMPLIANCE FOR GROUND MOUNT SOLAR FARMS

2020 07 28_MINUTES

CONFERENCE REPORT

111 S. King Street
Suite 170
Honolulu, HI 96813
808.523.5866
www.g70.design

TO:	Mr. Ricardo Zapata Honolulu Fire Department 1046 Young Street Honolulu, HI 96814		
FROM:	G70		
DATE:	July 28, 2020; 1:15-2:45pm	**LOCATION:**	HFD conference table
PROJECT:	Clearway Energy Group Solar Farms	**PROJECT NO:**	220020-01 MIL 220021-01 WAIA
SUBJECT:	Fire Code Compliance for Ground Mount Solar Farms	**NO. OF PAGES:**	2
THOSE PRESENT:	Ricardo Zapata (HFD) Michael Bungcayao (G70)		

DRAFT

DISCUSSION:

I. **Background –** G70 worked with HFD in 2015 to establish how NFPA 1 requirements for ground mount solar facilities would be applied on five solar farms on Oahu. A memorandum was submitted to HFD to document this process and HFD issued a letter that approved the approach outlined in the memorandum. A copy of the memorandum and letter were shared with HFD.

II. **Constructed Condition –** Mililani II was designed and constructed to conform with the approach outlined in the 2015 memorandum. The attached images were shared to present the constructed condition of Mililani II.

   a. **Overall Solar Farm –** Overall view of project from southern tip; looking north
   b. **Solar Block –** Zoomed in view of southern tip of project; looking north-northeast
      i. **G70 n**oted the gravel access, clear space around the perimeter of the facility and maintained vegetative growth.
   c. **Solar Block Zoom –** Zoomed in view of southern tip of project; looking west
   d. **Rack –** Backside of PV panels mounted on a rack.
      i. G70 noted the wiring is elevated above grade with minimum clear distance provided from vegetation.
   e. **Equipment Pad –** Typical, pad-mounted equipment enclosure
      i. G70 noted these are water-tight and elevated above surrounding grade. Gravel pads and additional clear width is provided around all equipment pads.
   f. **Substation and Switchyard –** looking southeast
      i. G70 noted the clear area around the substation/switchyard fencing, relatively small concrete foundations and gravel surface across the entire pad areas.
      ii. HFD noted the secondary containment visible in the project switchyard and G70 indicated that although dry transformers are proposed, secondary containment will be provided where required by code.
   g. **Proposed Mililani I Project Area** – Same as image #1 with the proposed Mililani I project area highlighted.

III. **NFPA 1 Section 11.12.3** – Ground-Mounted Photovoltaic System Installations

   a. G70 recognizes that although the 2012 edition of NFPA 1 is adopted, HFD is moving towards adoption of the 2018 edition.
      i. Changes in the 2018 edition in section 11.12.3 Ground-Mounted Photovoltaic System Installations is limited to a clarification that a vegetation management plan acceptable to the AHJ can be utilized if the project area is vegetated. This is in-line with the 2015

discussion with HFD that soil is the non-combustible base and vegetation is allowed on the soil if growth under and around the installation is maintained to reduce the risk of ignition from the electrical system.

b. Section 11.12.3.1 requires a 10' clear area around ground-mounted photovoltaic installations. The proposed projects will provide a minimum 20' clear space around the installation to meet/exceed the code requirement and to serve as a fire break.
c. Section 11.12.3.2 requires a vegetation management plan or noncombustible base acceptable to HFD be utilized. The proposed projects will have a vegetation management plan prepared that require maintenance of the vegetation beneath racks to maintain a height between 6"-18" tall to provide clear space from racks/panels and maintenance of the clear area around the installation to serve as a fire break.
d. Section 11.12.3.3 requires fencing or other suitable security barrier when required by HFD. The proposed projects will provide a perimeter fence around the facility and additional fencing around the substation, switchyard and battery storage areas.

IV. Mililani I and Waiawa Solar Farms – Site plans were shared and discussed for both proposed solar farms.

a. NFPA 1 Section 11.12.3 conformance – G70 noted conformance with the NFPA 1 requirements for Ground-mounted photovoltaic system installations.

b. Access

i. There are no occupied buildings proposed in the proposed projects and provision of fire water and access is not required by code.
ii. Although not designed specifically for HFD fire access, access routes into the site will be improved during construction to facilitate delivery of materials using large containers and low-boys (for substation equipment).
iii. The proposed equipment is specified/designed to contain a fire such that the fire will burn-out on its own and does not require active HFD response.
iv. The project owner (Clearway Energy Group; CEG) will prepare and coordinate an emergency response plan with HFD in the future. CEG also intends to implement regular training for HFD first responders for site-specific response at the proposed solar farms.
v. Lock boxes will be in place to limit access to CEG personnel, security and HFD.
vi. Notes will be provided on the proposed drawings that reference NFPA 1 Sections 18.2.2.1, 18.2.2.2 and 18.2.2.3 related to access boxes, access to developments and access maintenance.

c. **Batteries -** Battery storage areas will be provided in the proposed projects. Battery storage will be coordinated with HFD in a separate, follow-up meeting.

Image 1 - Overall Solar Farm (Mililani II)

Image 2 - Solar Block

Image 3 - Solar Block Zoom

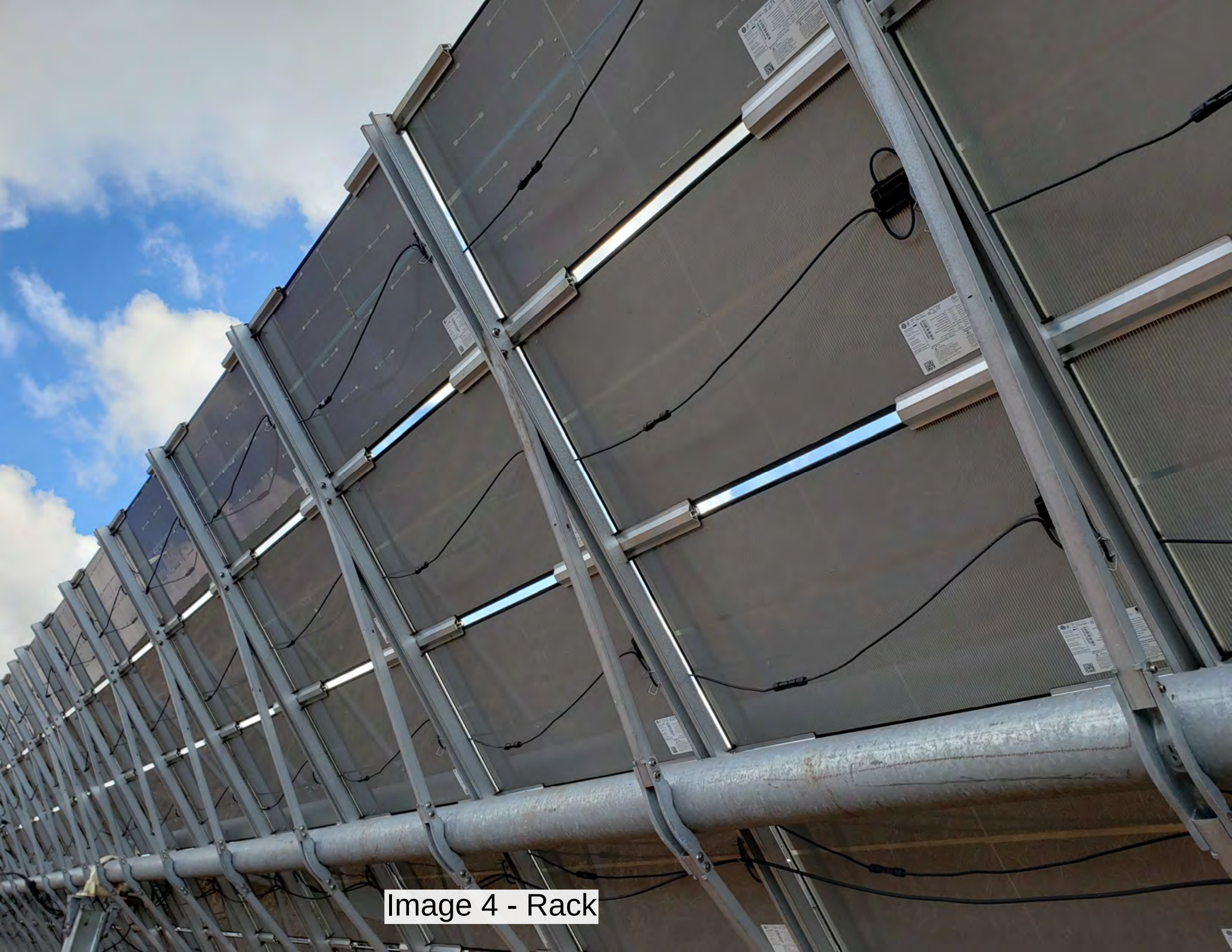

Image 4 - Rack

Image 5 - Equipment Pad

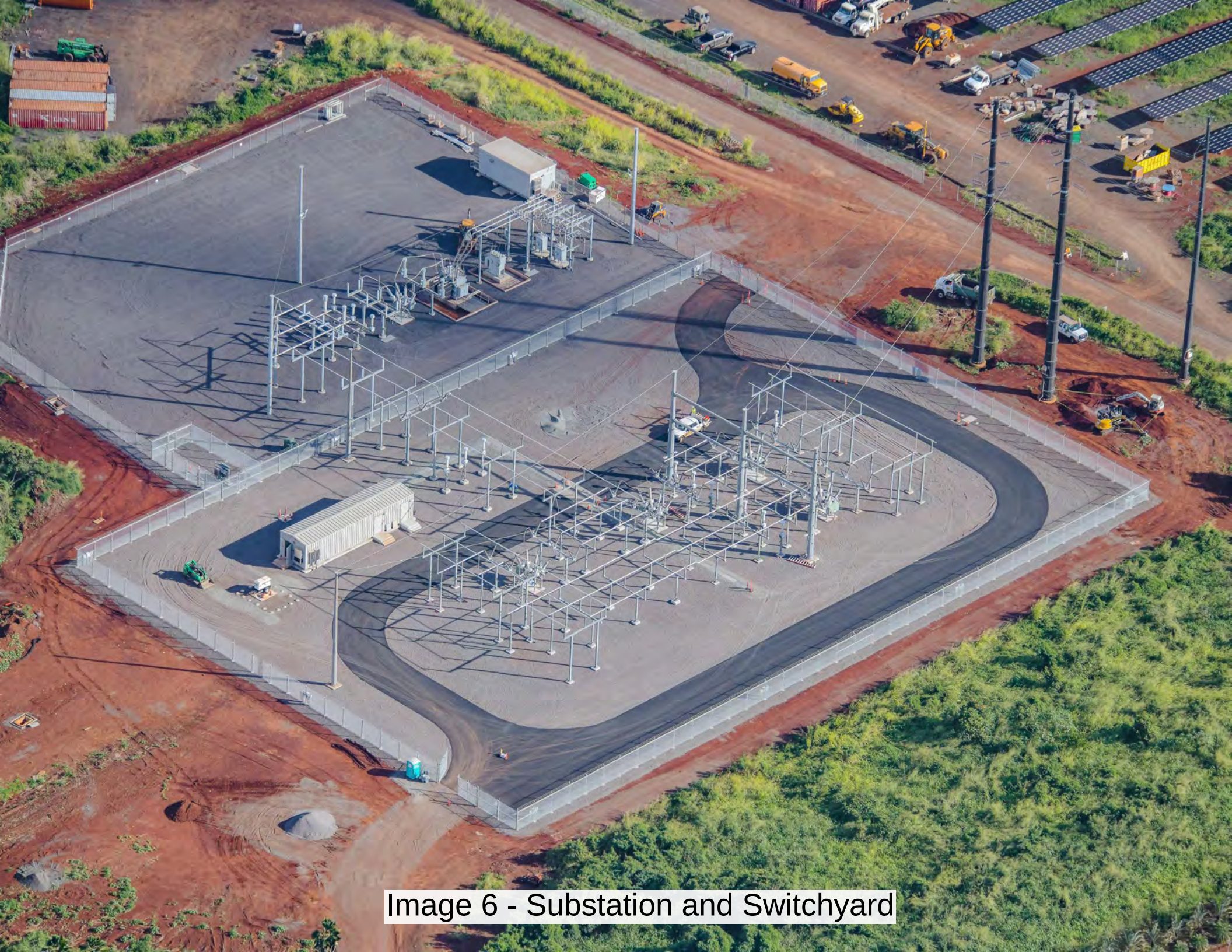

Image 6 - Substation and Switchyard

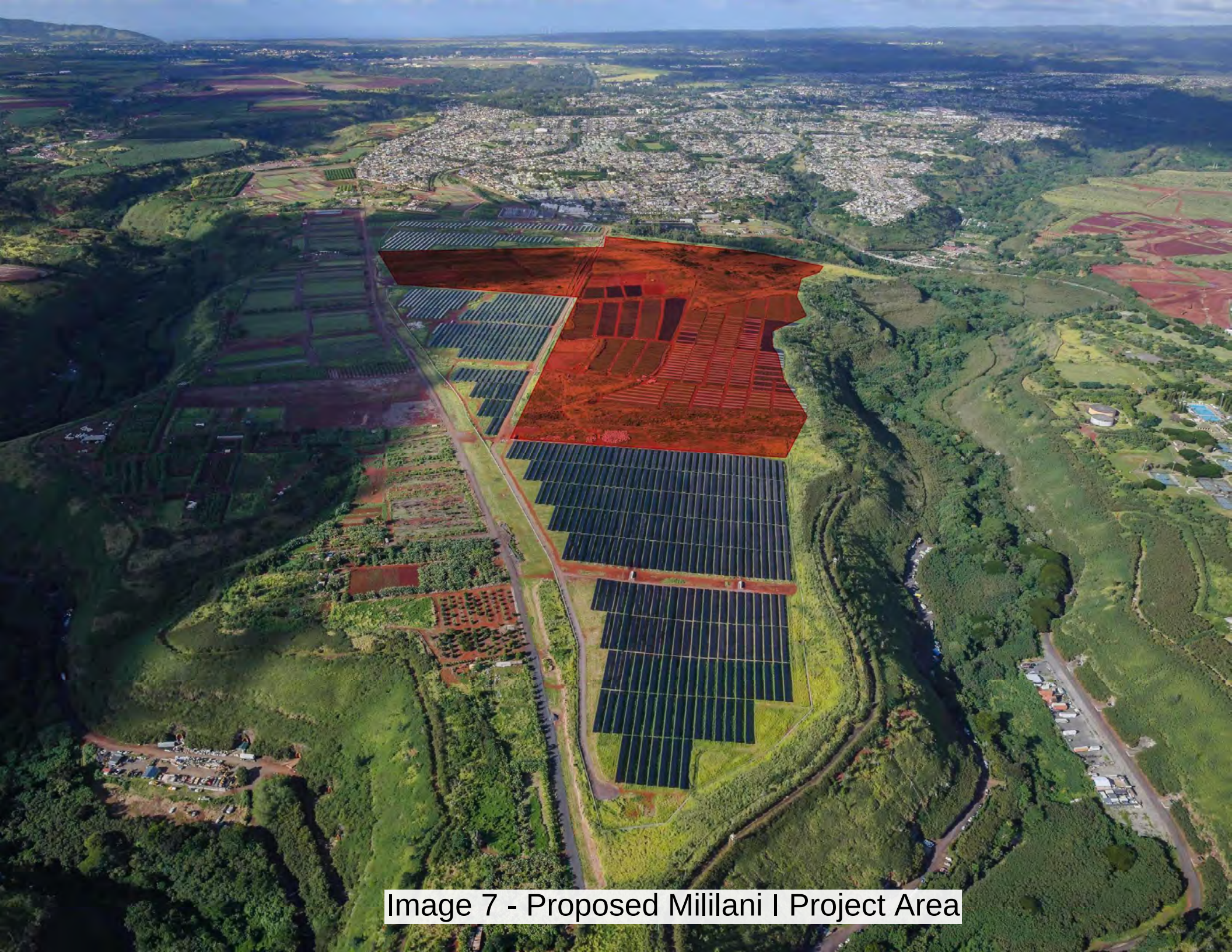

Image 7 - Proposed Mililani I Project Area

ATTACHMENT C
BARBERS POINT SOLAR PROJECT VEGETATION MANAGEMENT PLAN

BARBERS POINT SOLAR PROJECT

VEGETATION MANAGEMENT PLAN

Effective Date: July 2021
Expiry Date:

Original signed by:

APPROVED BY:

Environment Manager

APPROVED BY:

Operations Manager

Revision History

Revised by	Revision Date	Summary of Revision
O.Robson	12-July-2021	Draft version for review

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1. OBJECTIVE

This operating Vegetation Management Plan describes the vegetation management program at the Barbers Point Solar Project.

The objective of the vegetation management program is to:

- Manage the site vegetation which can grow under and around the modules, fall on power lines and damage infrastructure.
- Establish and maintain fire and fuel breaks.
- Reduce the amount of vegetation to decrease wildfire hazards.
- Meet requirements established with the Maui Fire Department and NFPA 1 (2018) requirements.

2. PROCEDURE

2.1 Vegetation Survey

A physical vegetation survey assessment of the Barbers Point Solar Project, including generation transmission (gen-tie) right-of-way, will be completed at least twice a year to monitor for vegetation clearances and monitor for wildfire hazards. The survey will be conducted by the Site Operations Manager (SOM) and will follow guidance standards as indicated in Section 2.3.

The survey will be used to assess the frequency of upcoming vegetation maintenance and identify areas that may need additional attention and will be used to create a Vegetation Maintenance Work Plan. The work plan will be a living document that will be updated in order to meet the objectives of this document.

Observations will include:

- Location
- Species
- Estimated growth rate
- Abundance
- Clearance / Setbacks
- Risk of fire hazard

2.2 Vegetation Maintenance Work Plan

Barbers Point Solar will create and implement vegetation maintenance work plan based on the ground survey. The work plan shall include the method to be used for vegetation control and should be flexible to adjust to any changing site conditions as they arise. The work plan shall take into consideration the anticipated growth of vegetation, combustion risk, and all other environmental factors that may have an impact on the reliability of the Barbers Point Solar Project. Any adjustments to the work plan shall be documented as they occur. Barbers Point Solar will track the planned vegetation management work to ensure that it is completed according to the work specification.

Barbers Point Solar will also monitor the site vegetation on a monthly basis coinciding with each scheduled monthly maintenance cycle to ensure vegetation clearances and growth falls within the expected rates. Scheduled vegetation maintenance may be updated based on the observations.

Barbers Point Solar intends to generally subcontract the vegetation maintenance activities, however self-performance may be incorporated as required.

2.3 Vegetation Setbacks and Maintenance Requirements

Re-vegetation:

- Any un-stabilized areas within the arrays and fire breaks will be revegetated with grass species that are currently found throughout the site. A seed mix will be designed to assist with quick establishment to reduce dust and sediment and erosion issues while adding native species that do well in dry environments.

Fire Breaks:

- All fire breaks, defined as a gap in combustible materials or maintained vegetation below 6 inches in height or cut to the appropriate height as recommended following the vegetation survey.
- All fire breaks will be 30 feet around any array block as shown in grey in Figure 2 below. This fire break can include a 10-foot buffer on the outside of the fence line.
- Removal of all wood debris, slashing, trees and shrubs.
- Branches and limbs overhanging the fire break will be trimmed to 8 feet above the ground.
- Danger trees and dying growth outside the perimeter fence will be assessed to minimize fuel loading falling within the fire break.
- Site access roads, with an approximate 20-foot width, will provide additional fire breaks.
- Vegetation will be cleared to a maximum of 10 feet on the outside of the fence line as required to maintain the fire break.

Solar Arrays:

- Vegetation will be maintained to a height of 18-inches and provide a minimum of 24-inch clear distance to any exposed electrical cables. Exposed electrical wires should be running under the solar panels at the midpoint or higher than the center of the panel.
- A 50-foot separation distance free of equipment will be provided between array blocks.

PV Coupled Battery Energy Storage System (PV-Coupled-ESS) Units:

- Vegetation will be removed within 10-foot perimeter of the PV-Coupled ESS Units (combines battery energy storage and step-up transformer) pads. Gravel or similar noncombustible base shall be present.

Project Collector Substation:

- Vegetation will be removed from inside the project collector substation fence line. Gravel or similar noncombustible base shall be used.
- The Main Power Transformer will be located within the project collector substation and will have its own concrete containment base.

Generation-Transmission (gen-tie) line:

- Vegetation may not exceed 8-feet in height under the gen-tie line right-of-way.
- Danger trees will be removed.

Retention Basins:

- Keep retention areas free of emergent vegetation to avoid attracting listed waterbirds.
- Maintain vegetation along the perimeter of the retention areas as low as possible to discourage listed waterbirds from nesting.

2.4 Vegetation Control

The Vegetation Maintenance Work Plan will be followed during operation of the Project to ensure that vegetation does not grow in a manner that blocks or reduces solar radiation reaching the solar panels and reduce the risk of starting a fire. Vegetation control will employ Best Management Practices (BMPs) and techniques that are most appropriate for the local environment based on factors such as compatibility with grazing and existing land operations and preventing runoff – thus reducing the need to use chemical herbicides. BMPs may include physical vegetation control such as mowing and shredding or introduction of a non-invasive species that is low growing.

In rare circumstances where it is necessary to use herbicides, an effort will be made to minimize use and only apply bio-degradable, EPA-registered, organic solutions that are non-toxic to wildlife. Sustainable, long-term management practices and the promotion of healthy biodiversity within local ecosystems is a priority. Any herbicides used for vegetation management the site will be selected and used in a manner that fully complies with all applicable laws and regulations.

Although non-native weedy species are common in the Project Area, implement invasive species minimization measures to avoid the unintentional introduction or transport of new invasive species to the area. This includes utilizing on-site gravel, rock, and/or soil when practicable, purchasing raw materials (e.g., gravel, rock, soil) from a local supplier when practicable; utilizing certified, weed-free seed mixes; and washing and/or visually inspecting (as appropriate) construction materials or equipment arriving from outside Maui for excessive debris, plant materials, and invasive or harmful non-native species. Consult with Maui Invasive Species Committee (MISC) if needed. Personnel will follow the most recent Rapid ʻŌhiʻa Death decontamination protocols from USFWS and DOFAW as required.

Avoid trimming or removing woody vegetation (trees or shrubs) taller than 15 feet between June 1 and September 15, when juvenile bats are not yet capable of flying and may be roosting in the trees, resulting in the potential to be impacted. If some trimming or removing woody vegetation taller than 15 feet is necessary

between June 1 and September 15, consultation with USFWS and DOFAW is required to ensure impacts to the Hawaiian hoary bat are avoided.

Regularly monitor the Barbers Point Solar Project for tree tobacco, particularly after ground-disturbing activities, and remove all tree tobacco plants under 3 feet in height as soon as possible in accordance with USFWS recommendation measures to avoid and minimize potential project impacts to the endangered Blackburn's sphinx moth (USFWS 2020). If tree tobacco is over 3 feet in height, thoroughly search the plant for eggs, larvae, and signs of larval feeding and adhere to the USFWS treatment and removal process steps.

Mechanical means of vegetation control will include options as noted below.

- Mowing (preferred method, where terrain permits) using mower decks similar to the Van Wamel Series RF Rotary mower with swingarm capable of reaching under arrays and trimming around posts.
- Handheld brushing and line trimmers (limited access areas).
- Slashing (preferred method for low growing established plant community areas).
- Pruning (where a tree or higher growing vegetation is to be retained).
- Hazard tree removal

Grazing livestock on solar farms is becoming a popular method of weed abatement and controlling grass. Sheep can be effective and are already being utilized on other utility-scale projects in Hawaii and may be considered at the Barbers Point Solar Project, however it would not be considered the primary means.

2.5 Training

Each person will be provided a comprehensive Barbers Point Solar Project Orientation before commencing any work at site. The material at a minimum will cover topics such as a general overview of the project, hazard analysis, emergency response, archaeological and cultural, wildlife training and vegetation management (as outlined in this document).

The included wildlife education and observation program will help to identify state or federally-listed threatened, endangered, or otherwise rare plants or animals that may be found on-site (including Hawaiian hoary bat, seabirds, waterbirds, and Blackburn's sphinx moth) and to take appropriate steps if listed wildlife (including downed listed wildlife) are found, especially during vegetation management activities.

2.6 Contacts

If any questions or concerns arise with regards to the Vegetation Management Plan, the following personal may be contacted:

POSITION	NAME	EMAIL	PHONE
Barbers Point Solar Operations Manager	TBD	TBD	TBD
Innergex Environmental Manager	TBD	TBD	TBD

3 SITE LOCATIONS- COORDINATES

The Barbers Point Solar Project is located in east Kalaeloa (east of the Kalaeloa Airport) in the ‘Ewa District, on the island of Oahu. The Project will be located within a 163-acre Study Area and is bordered by Tripoli Road to the south, Coral Sea Road to the west, the Barbers Point Golf Course to the east, and vacant land and Roosevelt Ave/Geiger Road on the north. The Project will be primarily located on tax map keys (TMK) 9-1-013:038 and 9-1-013:040, which are owned by Department of Hawaiian Home Lands (DHHL). Project electrical collector and transmission lines will also be located within rights-of-way owned by Hawai‘i Department of Transportation (HDOT) (Coral Sea Road and Roosevelt Avenue), as well as within a portion of TMK 9-1-016:027 (owned by Kapolei Infrastructure, LLC). See Figure 1.

The site’s main coordinates are as follows:

20°57'12.34"N 156°39'0.65"W

The solar PV system would include a series of panels arranged into arrays consisting of evenly-spaced rows. The panels would be mounted on a racking system installed on posts. The Project’s solar arrays will include three areas: Area 1 in the northern portion of TMK 9-1-013:038 (north of intersection of Bismarck Sea Road and Tripoli Road), Area 2 in the southern portion of TMK 9-1-013:038 (north of San Juancinto Road), and Area 3 located on TMK 9-1-013:040 (borders the intersection of Coral Sea Road and Tripoli Road).

The photovoltaic coupled battery energy storage system (PV-Coupled ESS) and collector lines will be distributed across the Project area. The PV-Coupled ESS includes a self-contained standalone unit that incorporate several layers of protection to avoid failures, to contain potential hazardous substances, and to prevent fires. A Project collector substation will be constructed on TMK 9-1-013:038 where a 1.5 mile generation-tie line (combination of overhead and underground line) will extend north along Coral Sea Road and transition to the existing Hawaii Electric overhead transmission line.

Access to Areas 1 and 2 on TMK 9-1-013:038 will be provided by a new driveway off Coral Sea Road. This driveway will be located within an existing HDOT ROW associated with Roadway Lot 13083. Access to the DHHL parcel 9-1-013:40 is currently via an existing driveway on Coral Sea Road. Access within the Project’s two solar array parcels will be provided through a network of existing and new onsite access roads.

Figure 1: Location

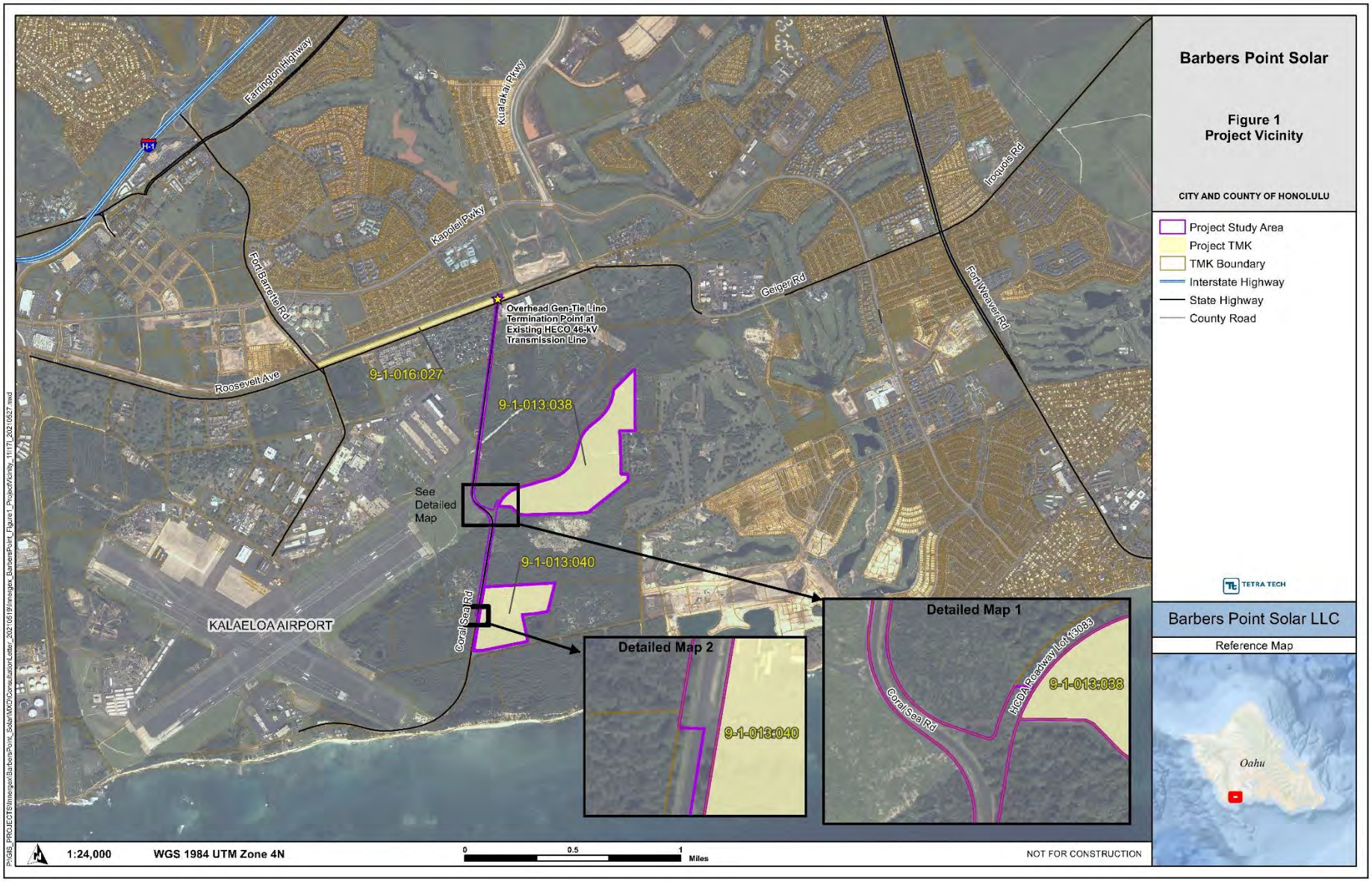
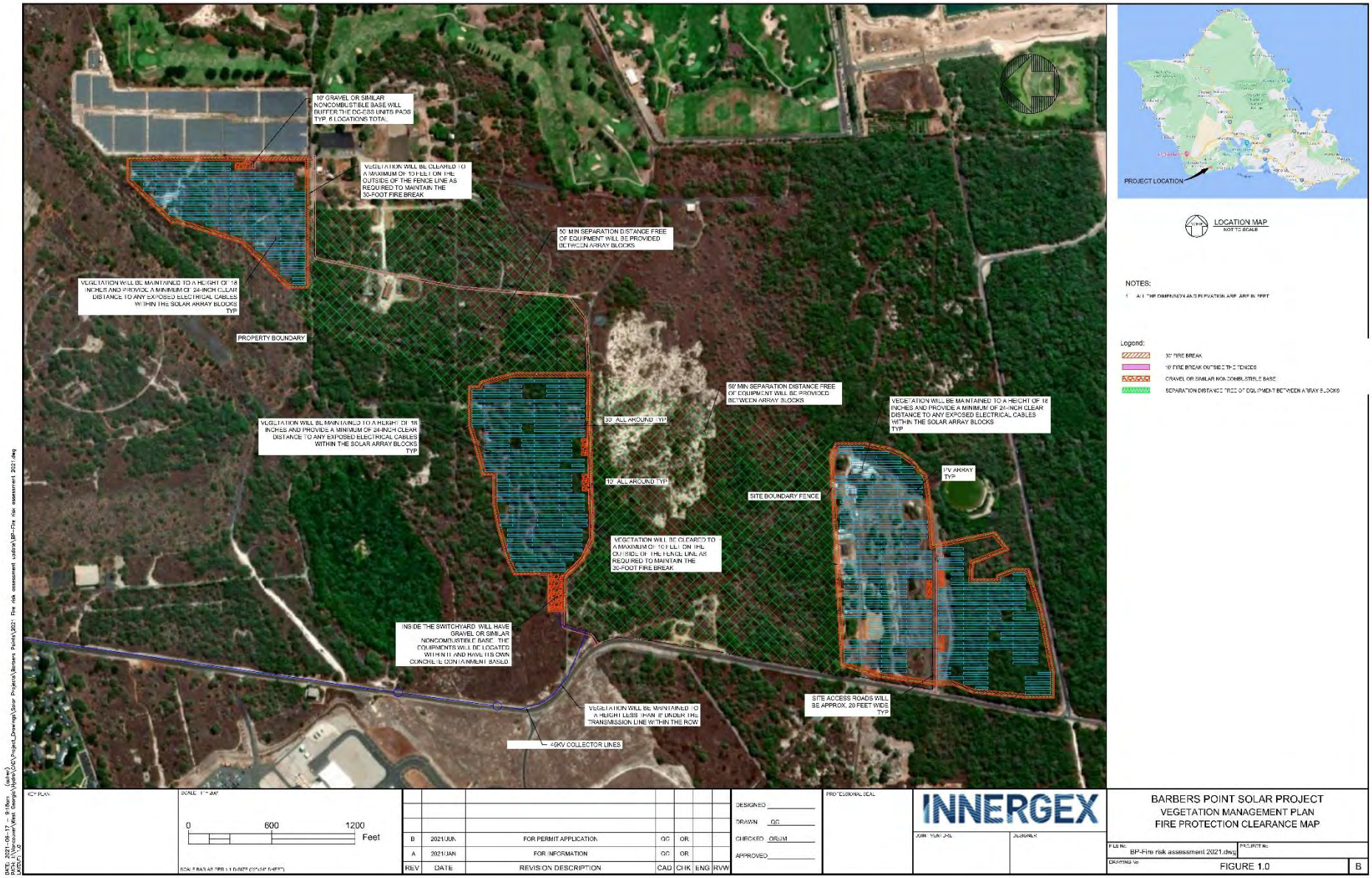


Figure 2: Fire Protection Clearance Map



APPENDIX C. BIOLOGICAL RESOURCES SURVEY REPORT AND SUPPLEMENTAL ‘AKOKO SURVEY

Barbers Point Solar Project

Revised Biological Resources Survey Report

Prepared for:

Barbers Point Solar, LLC

Revised July 2021

TETRA TECH

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Appendix B. List of Plant Species Observed During Surveys of the Barbers Point Solar Study Area

Appendix C. Pueo Survey Data Sheets

1.0 Introduction

Barbers Point Solar, LLC is proposing to build and operate the Barbers Point Solar Project (Project) located in east Kalaeloa, ‘Ewa District, on the Island of O‘ahu. The Project will consist of a 15-megawatt (MW) solar photovoltaic system coupled with a 15 MW, 4-hour (60MWh) photovoltaic-coupled battery energy storage system (PV-Coupled ESS) located within an approximately 163-acre (66-hectare) Study Area (Figure 1). The Project will be primarily located on tax map keys (TMK) 9-1-013:038 and 9-1-013:040, which are owned by Department of Hawaiian Home Lands (DHHL). Project electrical transmission lines will also be located within rights-of-way owned by Hawai‘i Department of Transportation (HDOT) (Coral Sea Road and Roosevelt Avenue, and Roadway Lot 13083-B) as well as within a portion of TMK 9-1-016:027 (owned by Kapolei Infrastructure, LLC).

Tetra Tech, Inc. (Tetra Tech) was contracted by Barbers Point Solar, LLC to conduct biological surveys for the Project. The purpose of the surveys was to characterize the existing plant and animal habitat and determine whether state or federally-listed endangered or threatened species (pursuant to the federal Endangered Species Act or Hawai‘i Revised Statutes [HRS] Chapter 195D), or otherwise rare plants or animals have the potential to occur and could be impacted by construction or operation of the Project. This report summarizes the results of the various biological surveys conducted by Tetra Tech in June 2020, August 2020, October 2020, November 2020, April 2021, and May 2021. The April 2021 survey consisted of a supplemental wet season survey for the endangered ‘akoko (*Euphorbia skottsbergii* var. *skottsbergii;* formerly *Chamaesyce skottsbergii* var. *skottsbergii*) within portions of the Study Area and areas adjacent to the Study Area; the complete results of the wet season ‘akoko survey are provided in a separate report (Tetra Tech 2021).

Project Description

The Project consists of construction and operation of a 15-megawatt (MW) solar photovoltaic system coupled with a 15 MW, 4-hour (60 MWh) PV-Coupled ESS as well as related interconnection and ancillary support infrastructure. The major infrastructures of the Project will include the following:

1. Solar photovoltaic system;
2. Direct current electrical collector lines;
3. Power conversion systems including PV-Coupled ESS units and step-up transformers;
4. Alternating current (AC) electrical collector lines;
5. Project collector substation;
6. A generation-tie line (combination overhead and underground);
7. Communication equipment;
8. Access roads and fencing; and
9. Temporary laydown areas.

The 46-kilovolt generation-tie line would extend approximately 1.1 miles (1.7 km) from the Project collector substation to connect into the Hawaiian Electric Company grid.

It is anticipated that Project construction and commissioning would require approximately 12-15 months. Based on the Projects Power Purchase Agreement (PPA) with Hawaiian Electric Company, Inc., the Project is expected to operate for approximately 25 years. At that point in time, the Project may be repowered under a renegotiated PPA or other contract (with subsequent permits/approvals) or decommissioned. Decommissioning will involve removal of all equipment associated with the Project and returning the area to substantially the same condition as existed prior to Project development. Decommissioning will include the recycling of materials demolished or removed from the site to the extent feasible.

2.0 Description of Study Area

As shown in Figure 1, the Study Area encompasses approximately 163 acres (66 hectares) on the ‘Ewa Plain in east Kalaeloa (Barbers Point) on O‘ahu. It extends from Tripoli Road on the south to Roosevelt Avenue on the north. The Study Area includes four main sub-areas referred to as Area 1, Area 1x, Area 2 (all located on TMK 9-1-013:038), and Area 3 (located on TMK 9-1-013:040), as well as linear areas for access roads, collector lines, and a generation-tie line (Figure 1). The Project will primarily be located on two TMKs (9-1-013:038 and :040), which are owned by DHHL. Project electrical transmission lines (overhead and underground generation tie-line and AC electrical collector lines) will also be located within rights-of-way owned by HDOT (primarily Coral Sea Road from Casablanca Street to Roosevelt Avenue) and as well as within a portion of TMK 9-1-016:027 (owned by Kapolei Infrastructure, LLC).

The Study Area is located within the former Naval Air Station Barbers Point (NASBP), which was established in 1942 and closed in 1999, and was utilized for military purposes. Currently, the majority of the Study Areas is vacant, but portions of the Study Area are leased to tenants for commercial and agricultural purposes. There are large cleared areas, concrete and asphalt paved areas, as well as debris, bunkers, aircraft revetments and associated structures, and abandoned vehicles and equipment in the Study Area.

Notable land uses in the vicinity include: Honouliuli Wastewater Treatment Plant to the north, Kalaeloa Airport (or John Rodgers Field) to the west, Kalaeloa Heritage Park to the west, Kalaeloa Renewable Energy Park to the east, Barbers Point Golf Course to the east, Barbers Point Stables to the east, Ordy Pond to the east, and the Navy’s former Northern Trap and Skeet Range and Southern Trap and Skeet Range to the north and east of Area 3.

Barbers Point Solar

Figure 1
Study Area and Vicinity

CITY AND COUNTY OF HONOLULU

Study Area
TMK Boundary
Road

TETRA TECH

Barbers Point Solar LLC

Reference Map

1:14,000 WGS 1984 UTM Zone 4N

0 0.25 0.5 Miles

NOT FOR CONSTRUCTION

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2.1 Climate

The climate in the Study Area is characterized as arid and sunny. According to the Online Rainfall Atlas of Hawai‘i (Giambelluca et al. 2013), the area receives a mean annual rainfall of approximately 21 inches (530 millimeters [mm]). Rainfall is typically highest in November-January and lowest in June-July (Giambelluca et al. 2013). Monthly rainfall totals for the two closest National Weather Service (NWS) rainfall gages during the survey periods are shown in Table 1. The Kalaeloa Airport (HJR) station is the closest station to the Study Area, roughly 0.8 miles (1.9 km) to the west. Because the HJR station was not functional for most of 2020, data from the ‘Ewa Beach Pacific Tsunami Warning Center (PTWC) station (roughly 3.8 miles [6.1 km] to the southeast) is also provided. The year-to-date total for the PTWC station from January–June 2020 was above average (140 percent of normal), suggesting conditions were slightly wetter than normal during the June 2020 biological surveys. The year-to-date total for the HJR station from January–May 2021 was below average (73 percent of normal), suggesting conditions were slightly dry during the 2021 surveys (NWS 2021).

Table 1. Monthly Rainfall Totals Collected at the HJR and PTWC Stations between January 2020 and May 2021

Year/Month	Rainfall (Inches)	
	HJR Station	PTWC Station
January 2020	N/A	1.60
February 2020	N/A	1.09
March 2020	N/A	4.56
April 2020	N/A	3.45
May 2020	N/A	0.29
June 2020	N/A	0.11
July 2020	N/A	0.76
August 2020	N/A	0.00
September 2020	N/A	0.24
October 2020	3.10	2.42
November 2020	0.35	0.28
December 2020	0.10	0.63
January 2021	1.10	2.33
February 2021	1.22	1.99
March 2021	3.12	5.75
April 2021	0.43	0.80
May 2021	0.22	0.08

Source: NRCS 2021.

Note: Months when biological surveys were conducted are highlighted in in grey.

2.2 Topography, Geology, and Soils

The topography of the Study Area is gently sloping in a south-westerly direction with elevations ranging between about 50 feet (15 m) above mean sea level (amsl) near Roosevelt Avenue on the north to about 10 feet (3 m) above amsl at the southwestern extent of the Study Area. Within the Study Area the topography is uneven due to numerous coral reef limestone outcroppings and sinkholes (also referred to as limestone pits) scattered throughout the area. Sinkholes are openings in the surface created by rainwater corroding the coral ground surface (Ziegler 2002).

Soil cover across the Kalaeloa area consists of a thin layer of friable, red material present in cracks and crevices on coral outcrop. The Natural Resources Conservation Service (NRCS) identifies three soil types in the Study Area (NRCS 2019). Approximately 87 percent of the Study Area is identified as coral outcrop (Figure 2). The northern portion of the Study Area (Area 1) is defined as fill land, mixed. A small portion of the Study Area near Roosevelt Avenue is classified as Mamala stony silty clay loam, 0 to 12 percent slopes (Figure 2).

2.3 Hydrology

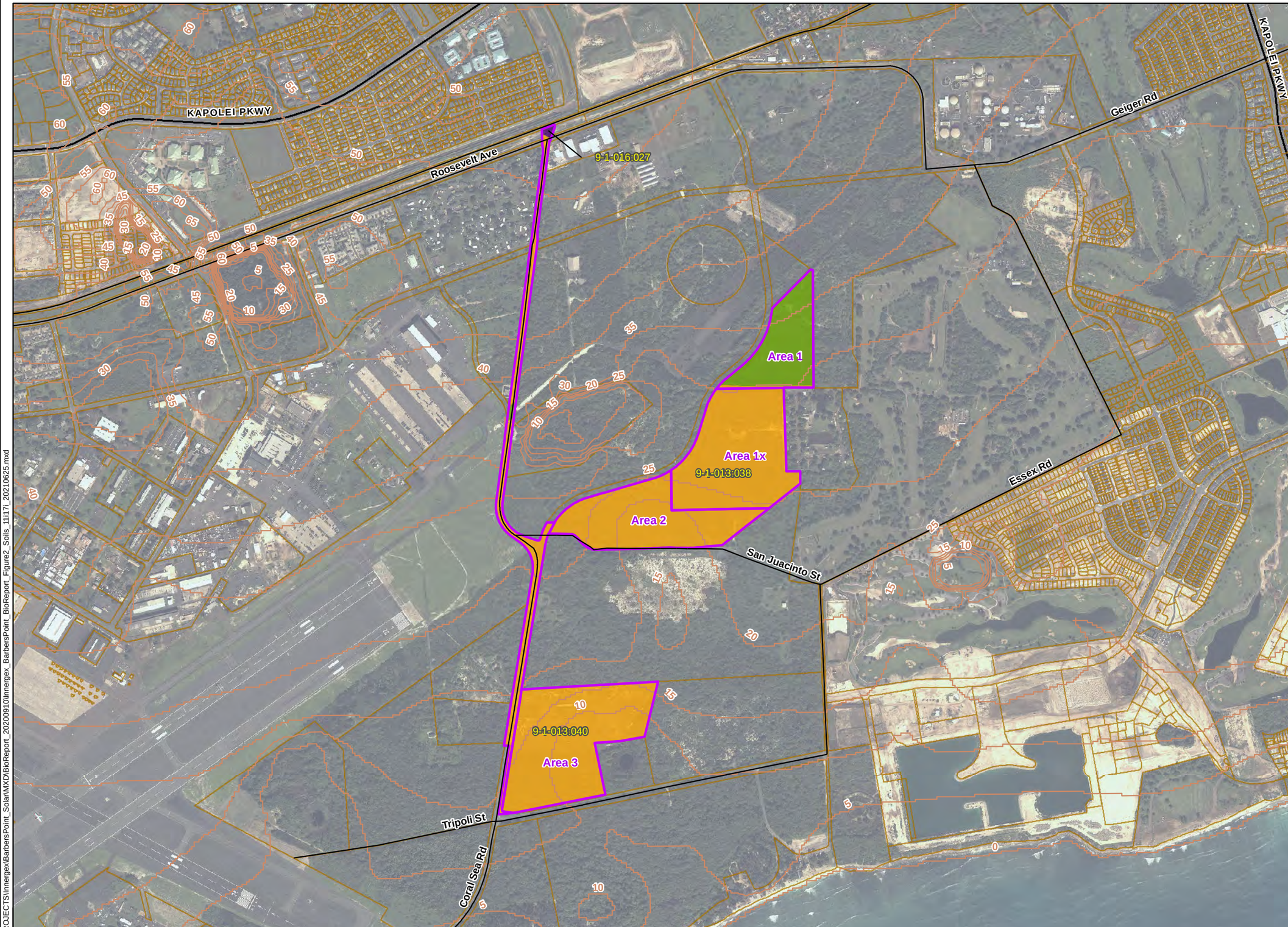
The Study Area is within the Kalo‘i watershed (CWRM 2008). No perennial streams or wetlands are present in the Study Area according to the U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) data (NWI 2019), the U.S. Geological Survey (USGS) topographic and National Hydrography Dataset (NHD) (2020), and the State of Hawai‘i Division of Aquatic Resources (DAR) dataset (DAR 2008) (Figure 3). Although not located in the Study Area, Ordy Pond is located less than 130 feet (40 m) from Area 3 on TMK 9-1-013:041 (Figure 3). This pond is identified as a Freshwater Forested/Shrub Wetland (PFO3Cx) by NWI (2019) and a perennial land/pond by NHD (2020).

Anchialine pools have been recorded throughout the ‘Ewa Plains. Anchialine pools are enclosed waterbodies that have no surface connection to the ocean but display tidal fluctuations and salinity ranges that indicate subsurface connections to the groundwater table and the ocean (Holthuis 1973). Anchialine pools occur in highly porous substrates and can occur at the bottom of sinkholes (Brock and Kam 1997).

Barbers Point Solar

Figure 2
Topography and Soils

CITY AND COUNTY OF HONOLULU



Study Area
TMK Boundary
Road
5-ft Contour

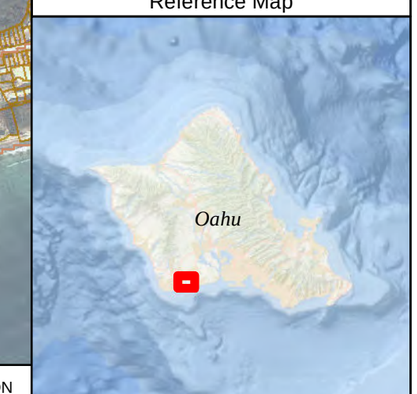
Map Unit Name

Coral outcrop
Fill land, mixed
Mamala stony silty clay loam, 0 to 12 percent slopes

TETRA TECH

Barbers Point Solar LLC

Reference Map



1:14,000 WGS 1984 UTM Zone 4N

0 0.25 0.5 Miles

NOT FOR CONSTRUCTION

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Barbers Point Solar

Figure 3
Water Resources

CITY AND COUNTY OF HONOLULU

Study Area
TMK Boundary
Road

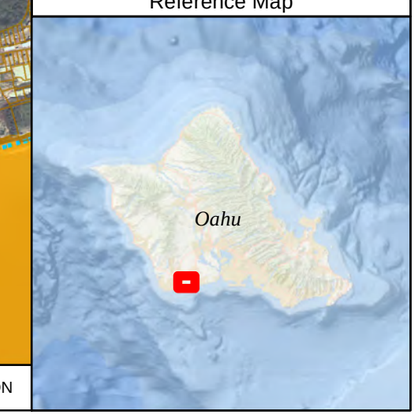
Water Resources

Stream (DAR)
Artificial Path (NHD)
Canal Ditch (NHD)
Coastline (NHD)
Perennial Stream (NHD)
Waterbody (NHD)
Estuarine and Marine Deepwater (NWI)
Estuarine and Marine Wetland (NWI)
Freshwater Emergent Wetland (NWI)
Freshwater Forested/Shrub Wetland (NWI)
Freshwater Pond (NWI)

TETRA TECH

Barbers Point Solar LLC

Reference Map



1:14,000 WGS 1984 UTM Zone 4N

0 0.25 0.5 Miles

NOT FOR CONSTRUCTION

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3.0 Methods

Prior to the field surveys, Tetra Tech conducted a review of relevant publicly available literature and data with respect to biological resources in and near the Study Area. This review included environmental assessments and environmental impact statements, NWI data, the USGS 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 Study Area to identify occurrences of state or federally-listed species, rare species, or habitats that could harbor these species.

Field surveys of the Study Area included the following:

- General plant and wildlife survey conducted on June 3, 9, and 11, 2020;
- Pueo surveys conducted on June 11, August 17, October 8, and November 16, 2020;
- Wet season survey for the endangered ʻakoko (*Euphorbia skottsbergii* var. *skottsbergii*) conducted on April 10, 12, and 15, 2021;[1] and
- General plant and wildlife survey of the Coral Sea Road Right-of-Way conducted on May 5, 2021.

Details of the field survey methodologies are provided below.

Following the June 2020 biological survey, Tetra Tech had meetings with the USFWS and Hawaiʻi Division of Forestry and Wildlife (DOFAW) to discuss the survey results and measures to avoid and minimize impacts to state and federally-listed species.

3.1 Plants

Tetra Tech conducted pedestrian botanical surveys within the Study Area on the following dates: June 3, 9, and 11, 2020; April 10, 12, and 15, 2021; and May 5, 2021. All plant species, dominant vegetation types, as well as any listed or rare plant species were recorded. During the surveys, biologists examined areas more likely to support native plants (e.g., areas with exposed limestone substrate, rocky outcrops, and shady areas) more intensively. If found, Tetra Tech also mapped any state or federally-listed plants or planted listed in the International Union for Conservation of Nature's Red List (IUCN 2021). Plant identifications were made primarily in the field; plants that could not be positively identified were photo-documented for comparison with the recent taxonomic literature.

Plants recorded during the surveys are indicative of the season and environmental conditions at the time of the survey. The presence and location of plants can be influenced by seasonal and temporal

[1] This survey was conducted within a portion of the Study Area as well as adjacent areas. The complete results of the wet season ʻakoko survey are provided in a separate report (Tetra Tech 2021).

changes; therefore, it is possible additional species may occur within the Study Area but were not present during this survey.

The taxonomy and nomenclature of the flowering plants are in accordance with Wagner et al. (1999, 2012), Wagner and Herbst (2003), and Imada (2012, 2019) for native and naturalized flowering plants, Palmer (2003) and Smith et al. (2011) for ferns. and Staples and Herbst (2005) for ornamental plants. 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 and identification of birds, mammals, and large invertebrate species encountered while searching the Study Area. Tetra Tech recorded all wildlife seen or heard while walking and driving within the Study Area coupled with observation of scat, tracks, and other animal sign. Habitats or plants that could support listed species were also identified, if present (e.g., water features as potential habitat for listed Hawaiian waterbirds). Observations of invertebrates encountered were recorded incidentally to wildlife surveys. Invertebrates were identified through visual observations; no invertebrates were collected in the field.

Scientific nomenclature for birds follows Birds of the World (Billerman et al. 2020). Scientific names for mammals follows Tomich (1986). Scientific nomenclature follows Nishida (2002) for invertebrates.

3.2.1 Pueo

Surveys specifically to detect the pueo or Hawaiian short-eared owl (*Asio flammeus sandwichensis*) were conducted on four dates: on the morning of June 11, 2020 (prior to the start of the plant and wildlife survey), and on the evenings of August 17, October 8, and November 16, 2020. Pueo are not federally-listed, but are listed as endangered by the State of Hawaiʻi for the Island of Oʻahu. The survey methods followed the Pueo Project Survey Protocol (Price and Cotin 2018), but were adjusted to stay within the boundaries of the Study Area. The morning survey was conducted from civil twilight to approximately 60 minutes after sunrise and the evening surveys were conducted approximately 60 minutes before sunset until civil twilight. According to researchers, most pueo detections have occurred in the evenings on Oʻahu (M. Price/ UH Mānoa, pers. comm., September 2019).

Two survey locations were chosen to provide the best vantage points of suitable habitat in the Study Area. A biologist was present at each survey point for the duration of each of the four surveys. The ground and sky within the viewshed of each survey point were scanned with binoculars and the naked eye throughout the survey period.

The following general information was collected during each pueo survey: date, observer, GPS coordinates, start time, and end time. Environmental information was recorded, including: cloud cover, wind speed, temperature, precipitation, extent of surveyed area (maximum length of viewshed surveyed in cardinal directions), and habitat classification. Any native or migrant birds recorded incidental to the pueo surveys were also noted. For any pueo observations, the following information

was collected: detection start time, detection end time, detection type, owl behavior classification, owl vocalization description, distance from observer, direction from observer, habitat where owl observed, and courtship behavior description. All pueo surveys were conducted in good weather with light winds, few clouds, and no precipitation.

3.2.2 Hawaiian Hoary Bat

Specific surveys for the endangered Hawaiian hoary bat or ʻōpeʻapeʻa (*Lasiurus cinereus semotus*), through the use of acoustic bat detectors or nighttime observation, were not conducted. Rather, as the USFWS and DOFAW recognize all woody vegetation greater than 15 feet (4.5 m) tall as potential bat roosting habitat (DOFAW 2015, USFWS 2019a), Tetra Tech noted the presence or absence of such vegetation within the Study Area.

4.0 Results and Discussion

In general, the Study Area is heavily altered land that was previously used as a military base, and is now fallow or used for agricultural, transportation, or commercial purposes. There are large cleared or concrete and asphalt paved areas in the Study Area, as well as debris, and abandoned vehicles and equipment. Large concrete aircraft revetments, paved parking areas, and paved runways and former roads are present in Area 1x and Area 2 (see Photos 1 through 4 in Appendix A). Tenants currently operate agricultural or commercial activities in portions of the Study Area including a ranch (Area 3), an explosives and pyrotechnics company (Area 3), and a painting company (Area 1x).

Past and current disturbances, in addition to the introduction of invasive plants and animals, have modified and degraded the native biological resources in the Study Area. The area is dominated by non-native plant and wildlife species, and suitable habitat for native species is limited. Of the native species observed, most are common across Oʻahu and other Hawaiian Islands.

Two listed species were observed in the Study Area during the surveys: the state and federally-endangered aeʻo or Hawaiian stilt (*Himantopus mexicanus knudseni*)[2] and the state-listed pueo. In addition, endangered alae keʻokeʻo or Hawaiian coots (*Fulica alai*) were seen in the immediate vicinity of the Study Area at Ordy Pond and the endangered ʻakoko (*Euphorbia skottsbergii* var. *skottsbergii*) was observed outside of the Study Area in the critical habitat unit within TMK 9-1-013:039 (the Navy's former Northern Trap and Skeet Shooting Range). Several other state or federally-listed species not observed in the Study Area during the survey may occur in or traverse the Study Area. State and federally-listed species are discussed in further detail below. Representative photographs of the Study Area are presented in Appendix A.

[2] USFWS (2021) recently proposed to reclassify the Hawaiian stilt from an endangered species to a threatened species.

4.1 Plants

No federal or state listed threatened, endangered, proposed listed, or candidate plant species were observed in the Study Area during the surveys. A total of 138 plant species were recorded within the Study Area during the biological surveys (Appendix B). Twelve of the observed plant species are native to the Hawaiian Islands (Table 2). Although none of the native plants are listed by USFWS or DOFAW, the endemic wiliwili (*Erythrina sandwicensis*) tree is listed as Vulnerable in the International Union for Conservation of Nature's Red List (IUCN 2021). None of the other native plants observed are considered rare throughout the Hawaiian Islands (Wagner et al. 1999). The remaining 126 plant species observed within the Study Area are non-native to the Hawaiian Islands. A list of plants observed during the survey is presented in Appendix B.

Table 2. Native Plant Species Recorded in the Study Area During the Surveys

Common/Hawaiian Name	Scientific Name	Status
ʻānunu	*Sicyos pachycarpus*	E
hoary abutilon	*Abutilon incanum*	I
ʻiliahiʻaloʻe	*Santalum ellipticum*	E
ʻilieʻe	*Plumbago zeylanica*	I
ʻilima	*Sida fallax*	I
kaunaʻoa pehu	*Cassytha filiformis*	I
kīpūkai, seaside heliotrope	*Heliotropium curassavicum*	I
pāʻū-o-Hiʻiaka	*Jacquemontia sandwicensis*	E
pololei	*Ophioglossum polyphyllum*	I
pōpolo	*Solanum americanum*	I
wiliwili	*Erythrina sandwicensis*	E
ʻuhaloa	*Waltheria indica*	I
Status: E = Endemic (native only to the Hawaiian Islands); I = Indigenous (native to the Hawaiian Islands and elsewhere). Species highlighted in grey were observed immediately outside of the Study Area.		

Five main vegetation types occur in the Study Area: Kiawe/Buffelgrass Forest, Koa Haole Scrub, Ruderal Vegetation, Non-Native Grassland, and Mixed Non-Native Forest. All of these vegetation types are dominated by non-native species.

The primary vegetation type within the Study Area is Kiawe (*Prosopis pallida*)/Buffelgrass (*Cenchrus ciliaris*) Forest. It is characterized by large kiawe trees, roughly 15 to 30 feet (5–9 m) tall (see Photo 5-7 in Appendix A). The kiawe canopy ranges from open to dense thickets. In general, dense mats of buffelgrass occur in the understory. In areas with denser canopy cover, Guinea grass (*Megathyrsus maximus*), Chinese violet (*Asystasia gangetica*), and Zulu giant (*Stapelia gigantea*) are common. The non-native koa haole (*Leucaena leucocephala*) and ʻopiuma (*Pithecellobium dulce*) trees are also widely scattered in this vegetation type. Sisal (*Agave sisalana*) also occurs in dense patches. Three native

species—‘ilima (*Sida fallax*), hoary abutilon (*Abutilon incanum*), and ‘uhaloa (*Waltheria indica*)—are also common in understory areas with moderate shade. The native kauna‘oa pehu (*Cassytha filiformis*) grows down from the canopy of kiawe trees in some areas, and the native ‘ilie‘e (*Plumbago zeylanica*) is also present. Notably, the invasive vine rubber vine (*Cryptostegia grandifolia*) is present in the dense kiawe thicket within the southern portion of Area 3.

The Koa Haole Scrub vegetation type is scattered in Area 1x, Area 2, and along the outer edges of the Coral Sea Road right-of-way. It is characterized by open to dense stands of non-native koa haole trees, ranging from 4 to 10 feet (1–2.5 m) in height (see Photos 8-9 in Appendix A). Buffelgrass and Guinea grass are the most abundant plants in the understory, although the native ‘uhaloa and ‘ilima, along with non-native *Sida acuta,* Chinese violet, and Zulu giant are also common in the understory. ‘Opiuma and kiawe trees are sparsely scattered throughout this vegetation type.

The Ruderal Vegetation type occurs on fallow land, along the edges of roads, in mowed or cleared areas, surrounding existing facilities, or in previously disturbed areas. It is dominated by a mix of non-native, low-growing plants (see Photos 10-11 in Appendix A). Abundant and common grasses found in the Ruderal Vegetation type include buffelgrass, sourgrass, lovegrass (*Eragrostis* spp.), fingergrass (*Chloris* spp.), Bermuda grass (*Cynodon dactylon*), and St. Augustine grass (*Stenotaphrum secundatum*). Common shrubs and herbaceous species include Australian saltbush (*Atriplex semibaccata*), *Sida ciliaris,* false mallow (*Malvastrum coromandelianum*), *Trianthema portulacastrum, Boerhavia coccinea*, creeping indigo (*Indigofera spicata*), graceful spurge (*Euphorbia hypericifolia*), hairy spurge (*Euphorbia hirta*), and prostrate spurge (*Euphorbia prostrata*). The native ‘uhaloa also occurs in this vegetation type.

A Non-Native Grassland is present in the central portion of Area 3 (see Photos 12-13 in Appendix A). It is dominated by buffelgrass, with patches of other non-native species including *Sida ciliaris*, Australian saltbush, and khaki weed (*Alternanthera pungens*).

Mixed Non-Native Forest occurs in limited area, notably Areas 1 and 2. In Area 1, which was previously paved, abundant vegetation has established from beneath or on top of the asphalt substrate. Rather than having one or two dominant species, it is characterized by a mix of non-native trees and shrubs, along with native ‘uhaloa and ‘ilima, which all had similar levels of abundance. The canopy in this area ranged from 10 to 20 feet (3–6 m) high and was a mix of kiawe, ‘opiuma, and Indian sandalwood (*Santalum album*), along with sandalwood trees that appear to be hybrids (*Santalum album x Santalum ellipticum*). A single native ‘iliahi‘alo‘e (*Santalum ellipticum*) individual was also observed less than 10 feet (3 m) outside the Study Area (see Photo 16). Buffelgrass, koa haole, Zulu giant, and *Sida ciliaris* were common in the understory. Ficus (*Ficus* spp.) is a dominant component in Area 2.

Tetra Tech documented 11 native wiliwili (*Erythrina sandwicensis*) trees in the Study Area during the biological surveys (Figure 4). This includes one adult tree in Area 3, three adult trees in Area 2, and 7 trees in Area 1x (four adults and three juveniles). These trees were generally associated with areas of limestone substrate and sinkholes. Wiliwili tree height ranges from 8 to 25 feet (2.5–7 m) tall (see Photo 17 in Appendix A). No saplings were seen. Three dead wiliwili trees were also observed in the Study Area.

Barbers Point Solar

Figure 4
Wiliwili Trees Mapped in the Study Area

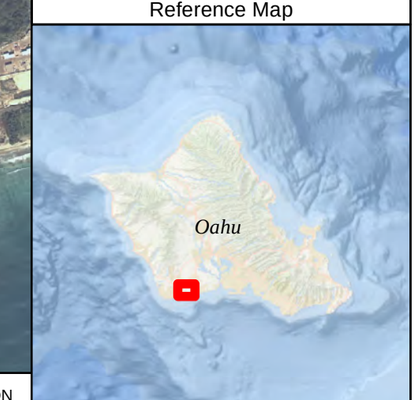
CITY AND COUNTY OF HONOLULU

Study Area
Road
Wiliwili Tree
(Erythrina sandwicensis)

TETRA TECH

Barbers Point Solar LLC

Reference Map



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Listed Species and Critical Habitat

As stated above, no state and federally-listed plant species were recorded in the Study Area during the biological surveys. In addition, no designated critical habitat occurs in the Study Area. However, the endangered ‘akoko (*Euphorbia skottsbergii* var. *skottsbergii*) and critical habitat for listed plants occurs adjacent to the Study Area.

In 2012, O‘ahu Lowland Dry – Unit 11 was designated as critical habitat by USFWS on TMKs 9-1-013:039 and 9-1-013:042, which are outside the Study Area north and east of Area 3 (Figure 5). This critical habitat unit is occupied by the endangered ‘akoko. It is also unoccupied critical habitat for the following 16 listed species: *Achyranthes splendens* var. *rotundata*, *Bidens amplectens*, *Bonamia menziesii*, *Euphorbia celastroides* var. *kaenana*, *Euphorbia haeleelenana*, *Gouania meyenii*, *Gouania vitifolia*, *Hibiscus brackenridgei*, *Isodendrion pyrifolium*, *Melanthera tenuifolia*, *Neraudia angulata*, *Nototrichium humile*, *Schiedea hookeri*, *Schiedea kealiae*, and *Spermolepis hawaiiensis*. None of these 16 listed plant species are known to occur in the area (USFWS 2012).

Although O‘ahu Lowland Dry – Unit 11 has been considered the largest population for ‘akoko (Department of Navy and Isla Botanica 2012; USFWS 2019b), various population numbers have been reported for this area in the last 20 years. Surveys in 2008 documented nearly 1,230 ‘akoko plants in TMK 9-1-013:039 (Whistler 2008, Department of Navy and Isla Botanica 2012). During 2012 surveys of TMK 9-1-013:039, fewer plants were documented, with a total of 823 ‘akoko plants recorded. The majority of these individuals were seen within the Navy’s ‘akoko restoration site located near the eastern boundary of TMK 9-1-013:039 (Department of Navy and Isla Botanica 2012).

Tetra Tech and LeGrande Biological Surveys Inc. recorded a total of 36 ‘akoko individuals within a portion of TMK 9-1-013:039 (outside of the Study Area) during surveys in April 2021 (Tetra Tech 2021). The ‘akoko plants occur at 3 locations in the northern central portion of the parcel within the former “2003 clean-up action area.” All of the ‘akoko individuals recorded during this survey are more than 328 feet (100 meters) from the Project’s limits of disturbance, which is USFWS’ recommended buffer for federally listed shrubs (USFWS 2018).[3] It is unknown how many additional ‘akoko plants occur within the remainder of TMK 9-1-013:039.

[3] This survey was conducted within a portion of the Study Area as well as adjacent areas. The complete results of the wet season ‘akoko survey are provided in a separate report (Tetra Tech 2021).

Barbers Point Solar

Figure 5
Critical Habitat

CITY AND COUNTY OF HONOLULU

Study Area
TMK Boundary
Road

Critical Habitat
Oahu Lowland Dry - Unit 11

TETRA TECH

Barbers Point Solar LLC

Reference Map

1:14,000 WGS 1984 UTM Zone 4N

0 0.25 0.5 Miles

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4.2 Wildlife

4.2.1 Birds

Thirty-three bird species were recorded within the Study Area during the surveys (Table 3). Warbling white-eye (*Zosterops japonicus*), common myna (*Acridotheres tristis*), and red-vented bulbul (*Pycnonotus cafer*) were the most common bird species recorded during the survey. Most of the bird species recorded are non-native to the Hawaiian Islands and are commonly found in rural or agricultural areas. One native migratory bird species—the Pacific golden-plover or kōlea (*Pluvialis fulva*)—was seen in the Study Area is protected by the Migratory Bird Treaty Act (MBTA).

As stated in Section 4.0, two listed bird species were recorded within the Study Area. The state and federally-listed Hawaiian stilt was observed flying over the Study Area and the state-listed pueo was also seen in the Study Area. Hawaiian coots and Hawaiian stilts were also seen and heard immediately adjacent to the Study Area at Ordy Pond. Federally and state-listed bird species are described in more detail below.

Table 3. Birds Detected in the Study Area and Immediate Vicinity

Common Name	Scientific Name	Status	MBTA	ESA	State Listed Endangered
African silverbill	*Euodice cantans*	NN			
Barn owl	*Tyto alba*	NN	X		
Cattle egret	*Bubulcus ibis*	NN	X		
Chestnut munia	*Lonchura atricapilla*	NN			
Common myna	*Acridotheres tristis*	NN			
Common waxbill	*Estrilda astrild*	NN			
Eurasian skylark	*Alauda arvensis*	NN	X		
Gray francolin	*Francolinus pondicerianus*	NN			
‘Alae ke‘oke‘o, Hawaiian coot[1]	*Fulica alai*	E		X	
Mallard – koloa-like duck, Hawaiian duck hybrid[1]	*Anas platyrhynchos x A. wyvilliana*	NN			
Pueo, Hawaiian short-eared owl	*Asio flammeus sandwichensis*	E			X
Ae‘o, Hawaiian stilt	*Himantopus mexicanus knudseni*	E		X	
House finch	*Haemorhous mexicanus*	NN	X		
House sparrow	*Passer domesticus*	NN			
Indian peafowl	*Pavo cristatus*	NN			
Mourning dove	*Zenaida macroura*	NN	X		
Northern cardinal	*Cardinalis cardinalis*	NN	X		
Northern mockingbird	*Mimus polyglottos*	NN	X		

Common Name	Scientific Name	Status	MBTA	ESA	State Listed Endangered
Pacific-golden plover	*Pluvialis fulva*	M	X		
Red avadavat	*Amandava amandava*	NN			
Red-crested cardinal	*Paroaria coronata*	NN			
Red junglefowl	*Gallus gallus*	NN			
Red-vented bulbul	*Pycnonotus cafer*	NN			
Red-whiskered bulbul	*Pycnonotus jocosus*	NN			
Rock pigeon	*Columba livia*	NN			
Rose-ringed parakeet	*Psittacula krameri*	NN			
Saffron finch	*Sicalis flaveola*	NN			
Scaly-breasted munia	*Lonchura punctulata*	NN			
Spotted dove	*Streptopelia chinensis*	NN			
Warbling white-eye	*Zosterops japonicus*	NN			
White-rumped shama	*Copsychus malabaricus*	NN			
Yellow-fronted canary	*Crithagra mozambica*	NN			
Zebra dove	*Geopelia striata*	NN			

Status: E = Endemic, M = Migrant, NN = non-native established species, MBTA = Migratory Bird Treaty Act, ESA = Endangered Species Act.
1. Indicates bird seen or heard outside the Study Area, but within the immediate vicinity.

Pueo

The pueo or Hawaiian short-eared owl is a bird of prey listed as endangered by the State of Hawaiʻi on the island of Oʻahu, but is not a federally listed species. It is a culturally significant endemic subspecies of the widespread short-eared owl (*Asio flammeus*) and is believed to have colonized the Hawaiian Islands after the arrival of Polynesians (Price and Cotín 2018). Pueo are found on all of the main Hawaiian Islands, at elevations ranging from sea level to 8,000 feet (2,438 m). On Oʻahu, pueo occupy a variety of habitats, including agricultural lands, grasslands, wetlands, shrublands, and native forests. It is suggested their habitat use may be influenced by food availability (Price and Cotín 2018).

A single pueo was observed in the Study Area on the morning of June 11, 2020 (see Figure 6 and Photos 12 and 18 in Appendix A). The pueo was observed flying into the Non-native Grassland in Area 3. No pueo were detected on the subsequent three evening surveys. Pueo Survey Data Sheets are included in Appendix C. Given the pueo sighting and habitat present, pueo could forage, roost, or nest in and around the Study Area.

Listed Hawaiian Waterbirds

Listed waterbird species that occur on Oʻahu include the Hawaiian stilt, Hawaiian coot, and ʻalea ʻula or Hawaiian common gallinule (*Gallinula galeata sandvicensis*). Listed Hawaiian waterbirds are found primarily in and around fresh and brackish-water marshes and natural or man-made ponds. Hawaiian stilts may also be found in fields, and where ephemeral or persistent standing water may occur (Kawasaki et al. 2019). No suitable habitat for listed waterbirds occurs in the Study Area; however, Tetra Tech detected the Hawaiian stilt flying over the Study Area, and Hawaiian coots and Hawaiian stilts were seen immediately outside the Study Area at Ordy Pond, which is less than 130 feet (40 m) from Area 3. Stilts and coots have been reported to regularly occur at and nest at nearby Ordy Pond (C. Carnes/ NAVFAC Hawaii, pers. comm., March 2021). It is likely these two listed waterbird species could traverse the Study Area while moving to and from Ordy Pond.

At some solar facilities in the continental U.S., water dependent birds (e.g., grebes, loons, rails, coots, shorebirds, and waterfowl) have been documented as colliding with photovoltaic arrays (Kosciuch et al. 2020). It has been hypothesized that some waterbirds may 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 has been termed the "lake effect." However, no studies have found a causal link for the source of waterbird mortalities observed in the continental U.S. More research is needed to investigate whether water-dependent birds are attracted to solar panel arrays, and if proximity to water sources or other factors relate to avian mortality at the facilities (Walston et al. 2016, Kosciuch et al. 2020).

Listed waterbird species that occur in Hawaiʻi have not been documented to collide with photovoltaic arrays. Hawaiʻi currently has over 1,000 MW of installed solar (HECO 2020, KIUC 2021) and utility-scale solar has existed in Hawaiʻi since 2008; yet there are no public records indicating endangered birds are colliding with solar panel arrays in Hawaiʻi. Waterbird activity and abundance varies regionally and may result in variation in avian mortality risk across different landscapes. There have been no reports to date of the "lake effect" from operating solar facilities in Hawaiʻi or information to indicate listed birds are colliding with solar panel arrays in Hawaiʻi.

Listed Seabirds

The endangered ʻuaʻu or Hawaiian petrel (*Pterodroma sandwichensis*), endangered ʻakeʻake or band-rumped storm petrel (*Oceanodroma castro*), and threatened aʻo Newell's shearwater (*Puffinus newelli*) (collectively referred to as seabirds) have not been documented in the Study Area, and suitable nesting habitat does not occur in the area. However, suitable nesting habitat may exist in upper elevations of the Waiʻanae Mountains and the Northern Koʻolau Mountains (Young et al. 2019), 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 strike strikes.

White Terns

Although manu-o-Kū or white terns (*Gygis alba*) were not observed during this survey, the species was observed flying in the area by AECOS in June 2013 (AECOS 2017). The white tern is not federally listed, but is listed as threatened on the Island of Oʻahu by the State of Hawaiʻi.

4.2.2 Mammals

Several non-native terrestrial mammalian species were detected during the survey. Cats (*Felis catus*), small Indian mongoose (*Herpestes javanicus*), horses (*Equus ferus caballus*), goats (*Capra aegagrus hircus*), a single cow (*Bos taurus*), dogs (*Canis lupus familiaris*), and sheep (*Ovis aries*) were all observed within the Study Area. According to a resident in the area, feral pigs (*Sus scrofa*) have also been seen within the Study Area (J. Bond, pers. comm., January 2021). Although not observed, other introduced mammals, such as house mice (*Mus musculus*) and rats (*Rattus* spp.), are likely to occur within the Study Area.

The state and federally-endangered Hawaiian hoary bat may transit, forage, or roost in the Study Area. This species will forage in open and semi-cluttered landscapes in a wide range of habitats and vegetation types (Bonaccorso et al. 2015). Many of the trees within the Study Area (e.g., kiawe, ironwood, ficus) are over 15 feet (4.5 m) tall and have the potential to function as bat roost trees, per USFWS and DOFAW, and can provide edge habitat that bats could use for foraging. However, detections at nearby bat detector stations have documented low bat activity compared to other detector sites on Oʻahu (WEST 2020) (Table 4).

Table 4. Hawaiian Hoary Bat Activity Rates at Nearby Bat Detectors from WEST (2020)

Site Name and ID	Distance and Bearing from Study Area	Detections	Nights with Detections	Detector Nights	Mean Detections Per Detector Night	Proportion of Detector Nights with Detections
Kroc Center (Site-036)	1.4 mi NNWest	3	3	650	0.0046	0.0046
West Loch Golf (Site-098)	2.4 mi NNEast	8	8	632	0.0127	0.0127
Iroquois Pt (Site-070)	4.0 mi East	6	5	519	0.0166	0.0096
Barbers Point (Site-112)	3.1 mi West	0	0	520	0.0000	0.0000
Barbers Point (Site-034)	3.1 mi NWest	2	2	604	0.0033	0.0033

Barbers Point Solar

Figure 6
Listed Bird Species Recorded in the Study Area and Vicinity

CITY AND COUNTY OF HONOLULU

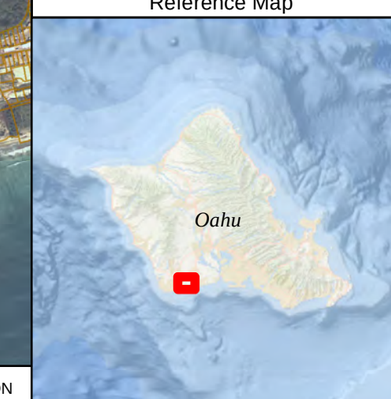
Study Area
Road
TMK Boundary
Pond
Pueo Survey Point

Waterbird Observations (Tetra Tech)
- Hawaiian Coot
- Pueo
- Hawaiian Stilt

TETRA TECH

Barbers Point Solar LLC

Reference Map



1:14,000 WGS 1984 UTM Zone 4N

0 0.25 0.5 Miles

NOT FOR CONSTRUCTION

P:\GIS_PROJECTS\Innergex\BarbersPoint_Solar\MXD\BioReport_20200910\Innergex_BarbersPoint_BioReport_Figure6_BirdSpecies_11i17i_20210625.mxd

4.2.3 Invertebrates

Twenty-four invertebrate species were observed during the surveys and are listed in Table 5. Of these, only the two dragonflies—globe skimmer (*Pantala flavescens*) and green darner (*Anax junis*)—are native to the Hawaiian Islands. These two dragonflies are common in Hawaiʻi.

Table 5. Invertebrates Recorded in the Study Area During the Surveys

Common Name	Scientific Name	Status
Ash-grey ladybeetle	*Olla v. nigrum*	NN
Cabbage white butterfly	*Pieris rapae*	NN
Clouded sulfur	*Colias philodice*	NN
Dog dung fly	*Musca sorbens*	NN
Fiery skipper	*Hylephila phyleus*	NN
Giant African land snail	*Achatina fulica*	NN
Globe skimmer	*Pantala flavescens*	I
Graceful twig ant	*Pseudomyrmex gracilis*	NN
Grasshopper	*Acrididae sp.*	NN
Gray bird grasshopper	*Schistocerca nitens*	NN
Green darner	*Anax junis*	I
Gulf fritillary	*Agraulis vanillae*	NN
Hawaiian garden spider	*Argiope appensa*	NN
Ladybird beetle	*Coccinellidae* sp.	NN
Large orange sulphur	*Phoebis agarithe*	NN
Narrow winged katydid	*Elimaea punctifera*	NN
Mantis	*Mantodea sp.*	NN
Paper wasp	*Polistes sp.*	NN
Rosy wolf snail	*Euglandina rosea*	NN
Tiger mosquito	*Aedes albopictus*	NN
Tropical fire ant	*Solenopsis geminata*	NN
Western honeybee	*Apis mellifera*	NN
Yellow garden spider	*Argiope aurantia*	NN
Status: E = Endemic, I = Indigenous, NN = non-native species.		

4.3 Sinkholes

Over 200 limestone sinkholes are present in the Study Area. Sinkholes occur in all sections of the Study Area, except Area 1. Tetra Tech did not observe any water in the sinkholes during the survey (see Photo 19 in Appendix A). Additionally, Pacific Legacy documented and conducted detailed investigations of the

sinkholes in the Study Area for archaeological and cultural purposes and reported no observation of water or evidence of water. Therefore, no anchialine pools were observed in the Study Area.

5.0 Conclusions and Recommendations

As described in Section 4, the majority of the plants and animals observed in the Study Area are introduced species that are non-native to the Hawaiian Islands. However, the state and federally-listed Hawaiian stilt and the state-listed pueo were detected within the Study Area. Several other listed wildlife species have the potential to occur in or transit through the Study Area. Furthermore, the endangered ʻakoko occurs adjacent to the Study Area in TMK 9-1-013:039 (the Navy's former Northern Trap and Skeet Shooting Range). Recommended measures to avoid and minimize impacts to state and federally-listed species that could occur in the Study Area, as well as other native species, are outlined below.

5.1 Plants

Overall, the vegetation in the Study Area is disturbed from previous and current land-use activities. The majority of the plant species recorded in the Study Area (over 91 percent) are not native to the Hawaiian Islands. The vegetation types and species identified are not considered unique. However, the endangered ʻakoko has been recorded adjacent to the Study Area and critical habitat for listed species is designated in the immediate vicinity. All of the ʻakoko individuals recorded during the recent survey adjacent to the Study Area are more than 328 feet (100 meters) from the Project's limits of disturbance, which is USFWS' recommended buffer for federally listed shrubs (USFWS 2018).

Tetra Tech recommends the following measures to avoid and minimize potential impacts to native plants:

- Design the Project to maintain a 328-foot (100-m) buffer from the remaining ʻakoko individuals in TMK 9-1-013:039 in accordance with USFWS recommendations (USFWS 2018).
- Establish an environmental education and observation program to educate all construction and operational personnel about the nearby endangered ʻakoko and critical habitat. Staff should be trained to identify the species and to take appropriate steps if ʻakoko are found.
- If the Project's limits of disturbance change, a comprehensive ʻakoko survey may be needed in areas with suitable ʻakoko habitat (if present) during the wet season following sufficient rains.
- If landscaping is installed along the perimeter of the Project for visual screening or due to Hawaii Community Development Authority requirements, use non-invasive plants, and consider incorporating native plant species to the maximum extent practicable. Potential native species that may be appropriate for landscaping at the site include ʻilieʻe, ʻilima, ʻiliahiʻaloʻe, wiliwili, Oʻahu sedge (*Carex wahuensis*), pili grass (*Heteropogon contortus*), ʻaweoweo (*Chenopodium*

oahuense), ‘akia (*Wikstroemia uva-ursi*), pōhinahina (*Vitex rotundifolia*), and ‘ulei (*Osteomeles anthylidifolia*).

- Although non-native weedy species are common in the Study Area, implement invasive species minimization measures to avoid the unintentional introduction or transport of new invasive species to the area. This includes utilizing on-site gravel, rock, soil when practicable, purchasing raw materials (e.g., gravel, rock, soil) from a local supplier when practicable; utilizing certified, weed-free seed mixes; and washing and/or visually inspecting (as appropriate) construction materials or equipment arriving from outside O‘ahu for excessive debris, plant materials, and invasive or harmful non-native species. Consult with O‘ahu Invasive Species Committee if needed.
- Coordinate with the Hawai‘i Department of Transportation on their efforts to control the invasive rubbervine (*Cryptostegia grandiflora*) along Coral Sea Road and Tripoli Road.
- Develop an Emergency Response Plan and Vegetation Management Plan to reduce potential fire risk to/from the Project.

5.2 Wildlife

The majority of the animal species recorded in the Study Area are not native to the Hawaiian Islands, with the exception of the state-listed pueo, state and federally-listed Hawaiian stilt, migrant Pacific golden-plover, and the two native dragonflies. Tetra Tech recommends the following general measures to avoid and minimize potential impacts to native wildlife:

- Establish an environmental education and observation program for all construction and operational personnel. Staff should be trained to identify listed wildlife that may be found on-site (including pueo, Hawaiian waterbirds, seabirds, and Hawaiian hoary bats) and to take appropriate steps if listed wildlife species (including downed listed wildlife) are found.
- If downed listed species are observed at the Project, notify USFWS and DOFAW using the standard protocol for responding to dead or injured birds and bats (USFWS 2020).

5.2.1 Pueo

As described in Section 4.2.1, a single pueo was observed in the Study Area during Tetra Tech’s surveys. Pueo have been reported to use the surrounding areas (Price and Cotín 2018, Pueo Project 2019). Given the pueo sighting and habitat present, it is possible that pueo could fly through, hunt, roost, or nest within the Study Area. Should this species occur within the Study Area, it could be impacted by construction activities. In addition to the general measures listed above, Tetra Tech recommends the following avoidance and minimization measures for pueo:

- Prior to clearing vegetation or ground-disturbing activities with heavy machinery within areas of suitable nesting habitat within the Project Area, pre-construction ground nesting surveys should be conducted by a qualified biologist to confirm pueo are not nesting in the area.

- If a pueo is observed in the Project area at any time (prior to construction, during construction, or during operation), all activities in the immediate vicinity should stop immediately. The location of the bird should be reported to a designated representative, and a qualified biologist should check the area for the presence of a pueo nest.
- If a ground nest or a pueo nesting on the ground is observed at any time (prior to construction, during construction, or during operation), an approximately 100-foot (30 m) buffer should be established around the nest and marked in the field by a qualified biologist. DOFAW should be notified immediately. If the nest is confirmed as a pueo nest, no work should occur in the buffer until pueo nesting is complete.

5.2.2 Listed Hawaiian Waterbirds

The Study Area does not provide suitable nesting or foraging habitat for the three listed Hawaiian waterbirds on O‘ahu; however, suitable habitat is available at the nearby Ordy Pond. Listed waterbirds may fly through the Study Area in transit to and from other areas or forage in the Study Area in the event of temporary flooding. If these species land within the Study Area, they could be impacted by construction and operation activities. Tetra Tech recommends the following avoidance measures:

- Avoiding creating areas with standing water. Design stormwater retention areas to drain within 48 hours of end of a storm event and keep retention areas free of emergent vegetation, to avoid attracting listed waterbirds.
- If listed waterbirds are found in the Study Area during active construction, cease all activities within 100 feet (30 m) of the bird(s), and do not approach the bird(s). Have a biological monitor that is familiar with the species’ biology conduct Hawaiian waterbird nest surveys where appropriate habitat occurs. Repeat surveys again within 3 days of project initiation and after any subsequent delay of work of 3 or more days (during which birds may attempt nesting). If a nest of a listed waterbird is not discovered, work may continue after the listed waterbird leaves the area of its own accord. If a nest of a listed waterbird is discovered, contact USFWS and DOFAW, and establish a 100- foot (30 m) buffer around all active nests and/or broods until the chicks/ducklings have fledged. Do not conduct potentially disruptive activities or habitat alteration within this buffer.

5.2.3 Listed Seabirds

The Study Area does not provide suitable nesting or foraging habitat for the listed Hawaiian seabirds. However, seabirds may fly over the Study Area at night in transit between the ocean and upland breeding sites during the breeding, nesting and fledging seasons and may be attracted to construction lights at night. Tetra Tech recommends the following measures to avoid and minimize potential impacts to listed seabirds:

- Restrict construction activity to daylight hours during the seabird peak fallout period (September 15–December 15) and avoid the use of nighttime lighting that could attract seabirds.
- If nighttime construction cannot be avoided, construction lighting should be shielded and directed downward and fit with non-white lights if construction safety is not compromised, to minimize the attractiveness of construction lights to seabirds.
- If nighttime construction is required during the seabird peak fallout period, a biological monitor should be present in the construction area from approximately 0.5-hour before sunset to 0.5-hour after sunrise to watch for the presence of seabirds. If the biological monitor observes a seabird, and the seabird 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.
- If a grounded seabird is found, contact DOFAW and USFWS.
- For operational on-site lighting, use fixtures that will be shielded and directed downward to prevent upward radiation, and fitted with non-white light bulbs to the extent possible. The lighting should also be triggered by a motion detector, unless otherwise directed by Hawaiian Electric Company or code compliance. Lighting should be situated so that light does not shine on and reflect off the solar panels.

5.2.4 Hawaiian Hoary Bat

The USFWS (2019a) provides the following avoidance and minimization measures for the Hawaiian hoary bat:

- Avoid trimming or removing woody vegetation (trees or shrubs) taller than 15 feet (4.5 m) between June 1 and September 15, when juvenile bats are not yet capable of flying and may be roosting in the trees, resulting in the potential to be impacted.
- To prevent entanglement, do not use barbed wire for fencing.

Tetra Tech recommends that if some trimming or removing woody vegetation taller than 15 feet (4.5m) is necessary between June 1 and September 15, consult with USFWS and DOFAW to ensure impacts to the Hawaiian hoary bat are avoided.

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APPENDIX A

REPRESENTATIVE PHOTOGRAPHS OF THE BARBERS POINT SOLAR STUDY AREA

Barbers Point Solar

Figure A-1
Photo Location Map

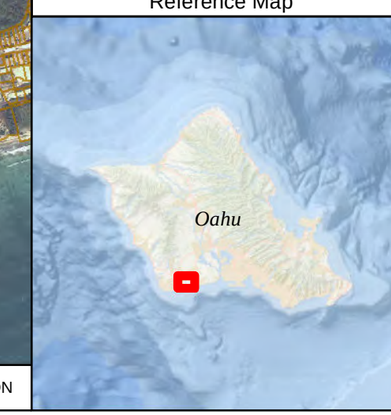
CITY AND COUNTY OF HONOLULU

Study Area
Photo Point
TMK Boundary
Road

TETRA TECH

Barbers Point Solar LLC

Reference Map



1:14,000 WGS 1984 UTM Zone 4N

0 0.25 0.5 Miles

NOT FOR CONSTRUCTION

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Photo 1. Cleared area within the Study Area along Coral Sea Road. Location: 21.314828, -158.055356. June 3, 2020.

Photo 2. Aircraft revetments are common within Area 1x. Location: 21.320097, -158.04865. June 9, 2020.

Photo 3. Ranch within Area 3 of the Study Area. Location: 21.309835, -158.055595. June 11, 2020.

Photo 4. Numerous paved roads are present in Areas 1x and 2. Location: 21.316434, -158.050331. April 12, 2021.

Photo 5. Kiawe (*Prosopis pallida*)/Buffelgrass (*Cenchrus ciliaris*) Forest common in the Study Area. Location: 21.323763, -158.045227. June 9, 2020.

Photo 6. Typical area with Chinese violet (*Asystasia gangetica*) within the Study Area. Location: 21.315487, -158.051798. April 10, 2021.

Photo 7. Kiawe (*Prosopis pallida*) thicket common in Area 3. Location: 21.306915, -158.055272. June 11, 2020.

Photo 8. Koa Haole Scrub vegetation type within Area 1x. Location: 21.317236, -158.048224. June 3, 2020.

Photo 9. Koa Haole Scrub between Area 2 and the Coral Sea Road right-of-way. Location: 21.315649, -158.054927. May 5, 2021.

Photo 10. Typical vegetation along Coral Sea Road right-of-way showing low-growing mowed grasses and herbaceous species. Location: 21.316619, -158.056685. May 5, 2021.

Photo 11. Mowed grasses along the western portion of the Coral Sea right-of-way. Location: 21.328694, -158.055069. May 5, 2021.

Photo 12. Non-native Grassland in Area 3. Location: 21.308449, -158.054901. June 11, 2020.

Photo 13. Looking north to the Non-native native Grassland in Area 3. Location: 21.307763, -158.053362. June 11, 2020.

Photo 14. Area 1 showing asphalt substrate with vegetation. Location: 21.322543, -158.04559. June 9, 2020.

Photo 15. Representative habitat within Area 1 showing *Santalum album x Santalum ellipticum* hybrid in right foreground. Location: 21.321707, -158.045449. June 9, 2020.

Photo 16. A single native iliahiʻaloʻe (*Santalum ellipticum*) plant found less than 10 feet (3 m) outside the Study Area. Location: 21.321303, -158.047563. June 9, 2020.

Photo 17. Native wiliwili (*Erythrina sandwicensis*) trees observed within Area 2 of the Study Area. Location: 21.316021, -158.054202. June 3, 2020.

Photo 18. Survey point where a single pueo (*Asio flammeus sandwichensis*) was detected within Area 3 of the Study Area at 5:27am. Location: 21.307716, -158.054952. June 11, 2020.

Photo 19. Sinkhole observed within Area 1x of the Study Area. Numerous sinkholes of various sizes occur throughout the entire Study Area. Location: 21.316323, -158.049555. June 3, 2020.

APPENDIX B

LIST OF PLANT SPECIES OBSERVED DURING SURVEYS OF THE BARBERS POINT SOLAR STUDY AREA

Table B-1 provides a list of plant species observed in the Study Area by Tetra Tech on June 3, 9, 11, 2020; April 10, 12, and 15, 2021; and May 5, 2021. The plant names are arranged alphabetically by family and then by species into three groups: Ferns/Lycophytes, Monocots, and Dicots. The taxonomy and nomenclature of the ferns and lycophytes follow Palmer (2003), with recent name changes in accordance with Smith et al. (2011). Flowering plants are in accordance with Wagner et al. (1999, 2012), Wagner and Herbst (2003), Imada (2012, 2019), and Staples and Herbst (2005). If no common or Hawaiian name is known, only the scientific name is provided.

Status

- E = endemic = native only to the Hawaiian Islands
- I = indigenous = native to the Hawaiian Islands and elsewhere
- P = Polynesian = introduced by Polynesians
- X = introduced/ non-native = all those plants brought to the Hawaiian Islands by humans, intentionally or accidentally, after Western contact (Cook's arrival in the islands in 1778)

Table B-1. List of Plant Species Observed During Surveys for the Barbers Point Solar Project

Scientific Name and Authorship	Hawaiian/Common Name	Status
FERNS/LYCOPHYTES		
Ophioglossaceae		
Ophioglossum polyphyllum A. Braun	pololei	I
MONOCOTS		
Agavaceae		
Agave sisalana Perrine	sisal	X
Cordyline fruticosa (L.) A.Chev.	ti, kī	P
Sansevieria trifasciata Prain	mother-in-law's tongue	X
Aloeaceae		
Aloe vera (L.) Burm.f.	aloe vera	X
Arecaceae		
Phoenix sp.	date palm	X
Veitchia merrillii (Beccari) H.E. Moore	manila palm	X
Commelinaceae		
Commelina diffusa Burm.f.	honohono	X
Poaceae		
Axonopus compressus (Sw.) P.Beauv.	carpetgrass	X
Axonopus fissifolius (Raddi) Kuhlm.	narrow-leaved carpetgrass	X
Bothriochloa pertusa (L.) A. Camus	pitted beardgrass	X
Cenchrus ciliaris L.	buffelgrass	X

Scientific Name and Authorship	Hawaiian/Common Name	Status
Cenchrus echinatus L.	common sandbur	X
Chloris barbata Sw.	swollen fingergrass	X
Chloris radiata (L.) Sw.	radiate fingergrass	X
Cynodon dactylon (L.) Pers.	Bermuda grass	X
Digitaria insularis (L.) Mez ex Ekman	sourgrass	X
Eleusine indica (L.) Gaertn.	wire grass	X
Eragrostis amabilis (L.) Wight & Arn.	lovegrass	X
Eragrostis pectinacea (Michx.) Nees var. *pectinacea*	Carolina lovegrass	X
Megathyrsus maximus (Jacq.) B.K.Simon & S.W.L. Jacobs	Guinea grass	X
Melinis repens (Willd.) Zizka	Natal redtop	X
Setaria parviflora (Poir.) Kerguélen	yellow foxtail	X
Setaria verticillata (L.) P.Beauv.	bristly foxtail	X
Sporobolus indicus (L.) R.Br.	West Indian dropseed, smutgrass	X
Sporobolus sp.	–	X
Stenotaphrum secundatum (Walter) Kuntze	St. Augustine grass	X
DICOTS		
Acanthaceae		
Asystasia gangetica (L.) T.Anderson	Chinese violet	X
Aizoaceae		
Trianthema portulacastrum L.	–	X
Amaranthaceae		
Achyranthes aspera L. var. *aspera*	–	X
Alternanthera pungens Kunth	khaki weed	X
Amaranthus spinosus L.	spiny amaranth	X
Amaranthus viridus L.	slender amaranth	X
Atriplex semibaccata R.Br.	Australian saltbush	X
Atriplex suberecta I.Verd.	saltbush	X
Dysphania carinata (R.Br.) Mosyakin & Clemants	goosefoot	X
Salsola tragus L.	tumbleweed	X
Anacardiaceae		
Schinus terebinthifolius	Christmas berry	X
Annonaceae		
Annona muricata L.	soursop	X
Apocynaceae		
Thevetia peruviana (Pers.) K.Schum.	be-still tree, yellow oleander	X

Scientific Name and Authorship	Hawaiian/Common Name	Status
Asclepiadaceae		
Cryptostegia grandiflora Roxb. ex R.Br.	rubber vine	X
Stapelia gigantea (N.E. Brown)	Zulu giant	X
Asteraceae		
Bidens alba (L.) DC. var. *radiata* (Sch.Bip.) Ballard ex Melchert	Spanish needle	X
Bidens pilosa L.	Spanish needle	X
Calyptocarpus vialis Less.	–	X
Flaveria trinervia (Spreng.) C.Mohr	–	X
Parthenium hysterophorus L.	false ragweed	X
Pluchea carolinensis (Jacq.) G. Don	sourbush	X
Pluchea Xfosbergii Cooperr. & Galang	marsh fleabane	X
Sonchus oleraceus L.	sow thistle	X
Synedrella nodiflora (L.) Gaertn.	nodeweed	X
Taraxacum officinale W.W.Weber ex F.H.Wigg.	common dandelion	X
Thymophylla tenuiloba (DC.) Small	Dahlberg daisy, lemon drop	X
Tridax procumbens L.	coat buttons	X
Verbesina encelioides (Cav.) Benth. & Hook.	golden crown-beard	X
Bignoniaceae		
Spathodea campanulata P.Beauv.	African tulip tree	X
Boraginaceae		
Cordia sebestena L.	geiger tree	X
Heliotropium curassavicum L.	kīpūkai, seaside heliotrope	I
Heliotropium procumbens Mill. var. *depressum* (Cham.) Fosberg	–	X
Brassicaceae		
Lepidium sp.	–	X
Cactaceae		
Acanthocereus tetragonus (L.) Hummelinck	barbed wire cereus	X
Hylocereus undatus (Haw.) Britton & Rose	night-blooming cereus, dragon fruit	X
Opuntia ficus-indica (L.) Mill.	prickly-pear, panini	X
Caricaceae		
Carica papaya L.	papaya	X
Casuarinaceae		
Casuarina equisetifolia L.	ironwood	X

Scientific Name and Authorship	Hawaiian/Common Name	Status
Convolvulaceae		
Ipomoea cairica (L.) Sweet	ivy-leaved morning glory	X?
Ipomoea obscura (L.) Ker Gawl.	morning glory	X
Jacquemontia sandwicensis A. Gray	pāʻū-o-Hiʻiaka	E
Merremia aegyptia (L.) Urb.	hairy merremia	X
Cucurbitaceae		
Cucumis dipsaceus Ehrenb. ex Spach	wild cucumber	X
Momordica charantia L.	balsam pear, bitter melon	X
Sicyos pachycarpus Hook. & Arn.	kūpala	E
Euphorbiaceae		
Euphorbia graminea Jacq.	spurge	X
Euphorbia hirta L.	hairy spurge	X
Euphorbia hypericifolia L.	graceful spurge	X
Euphorbia hyssopifolia L.	spurge	X
Euphorbia tirucalli L.	pencil tree	X
Euphorbia prostrata Aiton	prostrate spurge	X
Jatropha gossypiifolia L.	cotton-leaved jatropha	X
Ricinus communis L.	castor bean	X
Synadenium grantii Hook.f.	African milkbush	X
Fabaceae		
Acacia farnesiana (L.) Wild.	klu	X
Albizia lebbeck (L.) Benth.	siris tree	X
Crotalaria pallida Aiton	smooth rattlepod	X
Desmanthus pernambucanus (L.) Thell.	slender mimosa	X
Erythrina sandwicensis O.Deg.	wiliwili	E
Indigofera spicata Jacq.	creeping indigo	X
Indigofera suffruticosa Mill.	indigo	X
Leucaena leucocephala (Lam.) de Wit	koa haole	X
Macroptilium atropurpureum (DC.) Urb.	–	X
Macroptilium lathyroides (L.) Urb.	wild bean	X
Mimosa pudica L. var. *unijuga* (Duchass. & Walp.) Griseb.	sensitive plant	X
Neonotonia wightii (Wight & Arn.) Lackey	perennial soybean	X
Pithecellobium dulce (Roxb.) Benth	ʻopiuma	X
Prosopis pallida Kunth	kiawe	X
Samanea saman (Jacq.) Merr.	monkeypod	X

Scientific Name and Authorship	Hawaiian/Common Name	Status
Senna surattensis (Burm.f.) H.S.Irwin & Barneby	scrambled eggs	X
Tamarindus indica L.	tamarind	X
Gentianaceae		
Centaurium erythraea Raf. subsp. *erythraea*	bitter herb	X
Lamiaceae		
Leonotis nepetifolia (L.) R.Br.	lion's ear	X
Vitex trifolia L.	blue vitex	X
Lauraceae		
Cassytha filiformis L.	kaunaʻoa pehu	I
Malvaceae		
Abutilon grandifolium (Willd.) Sweet	hairy abutilon	X
Abutilon incanum (Link.) Sweet	hoary abutilon	I
Hibiscus rosa-sinensis L.	red hibiscus	X
Malva parviflora L.	cheese weed	X
Malvastrum coromandelianum (L.) Garcke	false mallow	X
Sida acuta Burm.f.	–	X
Sida ciliaris L.	–	X
Sida fallax L.	ʻilima	I
Sida rhombifolia L.	–	X
Sida spinosa L.	prickly sida	X
Moraceae		
Ficus microcarpa L.f.	Chinese banyan	X
Ficus platypoda (A.Cunn. ex Miq.) A.Cunn. ex Miq.	Australian rock fig	X
Ficus sp.		X
Moringaceae		
Moringa oleifera Lamarck	drumstick tree	X
Nyctaginaceae		
Boerhavia coccinea Mill.	–	X
Bougainvillea sp.	bougainvillea	X
Oxalidaceae		
Oxalis corniculata L.	wood sorrel	P?
Passifloraceae		
Passiflora foetida L.	love in a mist	X
Passiflora suberosa L.	huehue haole	X

Scientific Name and Authorship	Hawaiian/Common Name	Status
Phytolaccaceae		
Rivina humilis L.	coral berry	X
Plumbaginaceae		
Plumbago zeylanica L.	‘ilie‘e	I
Polygonaceae		
Antigonon leptopus Hook. & Arn.	Mexican creeper	X
Portulacaceae		
Portulaca oleracea L.	pigweed	X
Portulaca pilosa L.	hairy pigweed	X
Rubiaceae		
Morinda citrifolia L.	noni	P
Rutaceae		
Murraya paniculata (L.) Jack	mock orange	X
Santalaceae		
Nicotiana glauca Graham	tree tobacco	X
Santalum album L.	Indian sandalwood	X
Santalum ellipticum Gaudich.*	‘iliahi‘alo‘e	E
Santalum album x Santalum ellipticum hybrids	sandalwood hybrids	X
Solanaceae		
Solanum americanum Mill.	pōpolo	I
Solanum seaforthianum Andrews	vining solanum	X
Sterculiaceae		
Waltheria indica L.	‘uhaloa	I
Verbenaceae		
Citharexylum sp.	–	X
Stachytarpheta jamaicensis (L.) Vahl	Jamaican vervain	X
* = Species observed immediately outside of the Study Area.		

APPENDIX C

PUEO SURVEY DATA SHEETS

Pueo Project Survey Datasheet 2017

Site : Barber's Point GPS point: #1 GPS coordinates: (D.dddddd, -D.dddddd) 21.315291 N 158.055767 W

Date: 11/16/20 Visit # (1, 2 or 3): 4 Survey Start Time: 4:36 Survey Stop Time: 6:19 Observers: J. Duffey

Temperature: 78 Cloud cover (Clear, PC, MC, Cloudy): PC Rain: None Wind (0-7): 1-2 from NE

Detection start time	Detection end time	Number	Initial distance	Initial direction	Sounds	Behavior	Habitat
—	—	—	—	—	—	—	—

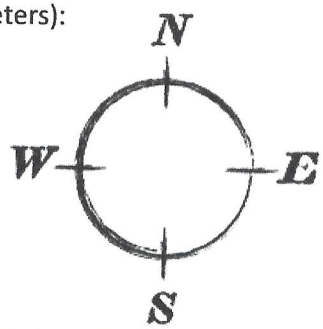
% Habitat w/in 400 m or surveyed area (must be 100%):

Developed	Wetland	Agricultural Crops	Agricultural Dirt	Grasslshort Grazed	Grasslshort Golf	Grasslshort Mowed
						50%
Grassland Fallow	**Grasslands Tall >75cm**	**Shrublands**	**Non Native Forest**	**Native Forest**	**Other**	**Total**
	10%	40%				100%

Surveyed area (max visible meters):

N: 600 S: 300
NE: 300 SW: 1000+
E: 250 W: 1000+
SE: 350 NW 1000+

To Kiawe canopy



Observations: No owls detected

Pueo Project Survey Datasheet 2017

Site: Barber's Point GPS point: #2 GPS coordinates: (D.dddddd, -D.dddddd) 21.307716N 158.054952W

Date: 11-16-20 Visit # (1, 2 or 3): 4 Survey Start Time: 4:25p Survey Stop Time: 6:30p Observers: Phil Taylor

Temperature: 80°F Cloud cover (Clear, PC, MC, Cloudy): PC Rain: Ø Wind (0-7): 3

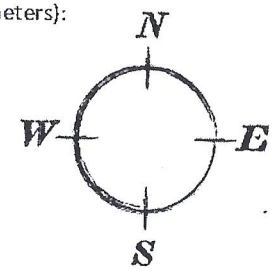
Detection start time	Detection end time	Number	Initial distance	Initial direction	Sounds	Behavior	Habitat
—	—	—	—	—	—	—	—

% Habitat w/in 400 m or surveyed area (must be 100%):

Developed	Wetland	Agricultural Crops	Agricultural Dirt	Grasslshort Grazed	Grasslshort Golf	Grasslshort Mowed
Grassland Fallow	Grasslands Tall >75cm	Shrublands	Non Native Forest	Native Forest	Other Short grass gravel	Total
		20	20		60	100

Surveyed area (max visible meters):

N: 100 S: 10
NE: 400 SW: 20
E: 20 W: 100
SE: 10 NW 100



Observations: Bird species list - Zebra dove, house finch, Spotted dove, Japanese white-eye, northern cardinal, red-vented bulbul, Pacific golden-plover, chestnut munia, gray francolin, red-crested cardinal, Hawaiian stilts (flyover-2), Common waxbill,

Barbers Point Solar Project

‘Akoko (*Euphorbia skottsbergii* var. *skottsbergii*) Survey Report

Prepared for:

Barbers Point Solar, LLC

July 2021

TETRA TECH

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Appendix A. Representative Photographs of the 'Akoko Survey Area

1.0 Introduction

Barbers Point Solar, LLC is proposing to build and operate the Barbers Point Solar Project (Project) located in 'Ewa District, on the Island of O'ahu. The Project will consist of a 15-megawatt (MW) solar photovoltaic system coupled with a 15 MW, 4-hour (60MWh) photovoltaic-coupled battery energy storage system located within approximately 66-hectares (163-acres) in east Kalaeloa (Barbers Point). The Project will be primarily located on tax map keys (TMK) 9-1-013:038 and 9-1-013:040, which are owned by Department of Hawaiian Home Lands (DHHL). Project electrical transmission lines will also be located within rights-of-way owned by Hawai'i Department of Transportation (HDOT) (Coral Sea Road, Roosevelt Avenue, and Roadway Lot 13083-B) as well as within a portion of TMK 9-1-016:027 (owned by Kapolei Infrastructure, LLC).

Tetra Tech conducted a biological survey within an approximately 68-hectares (168-acres) Project Study Area (i.e. "2020 Project Study Area") on June 3, 9, and 11, 2020. The purpose of the 2020 biological survey was to characterize the habitat and verify whether state or federally-listed threatened, endangered, or otherwise rare plants or animals have the potential to occur in the Project Study Area and could be impacted by construction or operation of the Project. Although no listed plant species were observed in the 2020 Project Study Area during the June 2020 survey, review of previous surveys in the Project's vicinity indicated that the endangered 'akoko (*Euphorbia skottsbergii* var. *skottsbergii;* formerly *Chamaesyce skottsbergii* var. *skottsbergii*) was documented adjacent to the Project Study Area in 2012. Because the 2020 biological survey was conducted during the dry season, and this species of 'akoko can be difficult to identify during dry periods due to seasonal leaf loss and dormancy, a supplemental wet season 'akoko survey was recommended by the U.S. Fish and Wildlife Service (USFWS) and Hawai'i Division of Forestry and Wildlife (DOFAW) for portions of the Project Study Area.

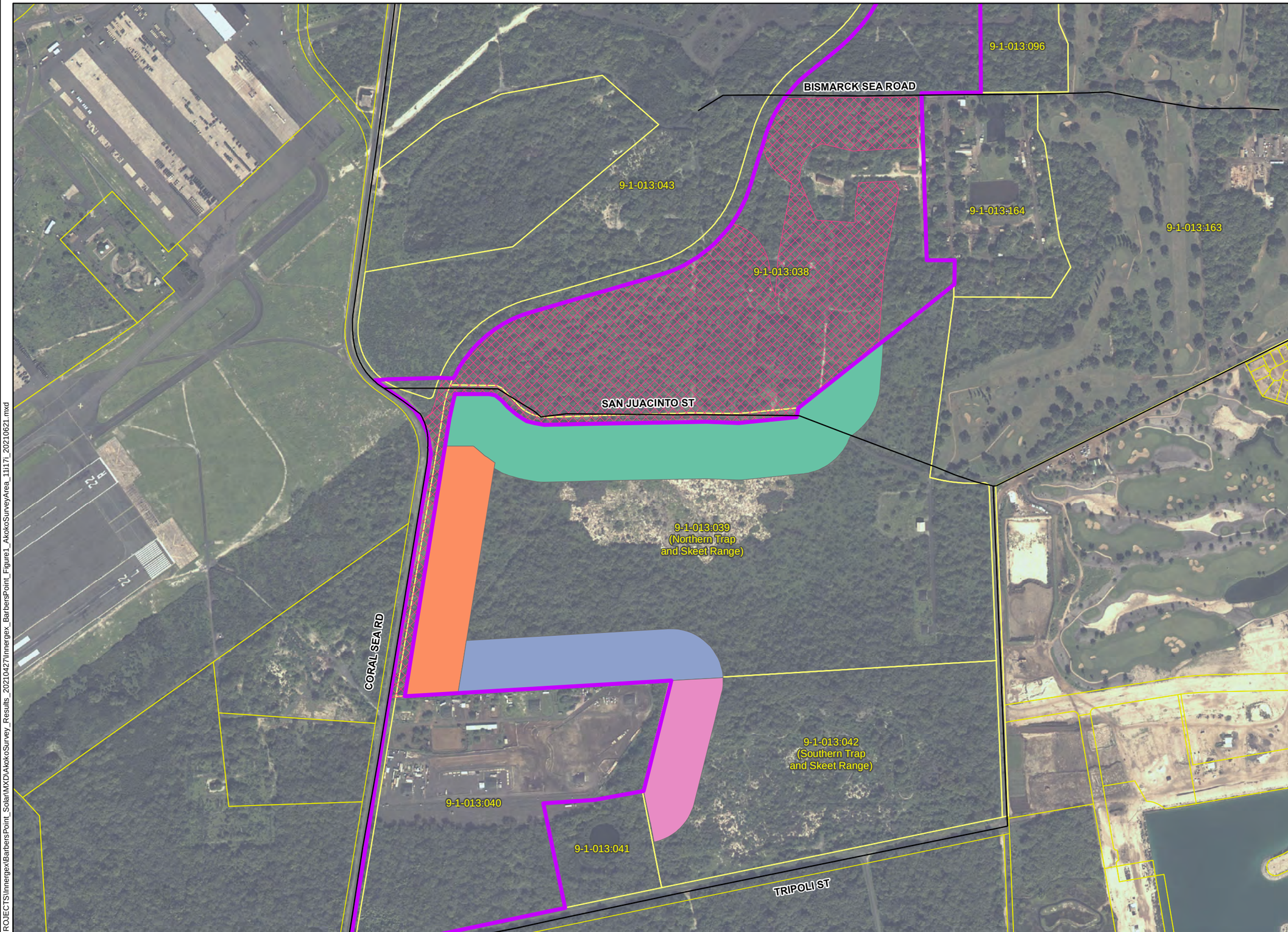
Furthermore, the USFWS recommended a supplemental 'akoko survey for adjacent areas outside of and adjacent to the Project Study Area to assess potential indirect impacts to the species as a result of the Project. USFWS recommended surveying portions of the Northern Trap and Skeet Range (NTSR) and Southern Trap and Skeet Range (STSR) that are within 100 meters (328 feet) of any proposed Project activity (Lindsy Asman/USFWS, pers. comm., March 2021). The 100-meter distance is based on USFWS' recommended 100-meter buffer for federally listed shrubs (USFWS 2018).

This report summarizes the results of the wet season 'akoko survey conducted in the 'Akoko Survey Area (Figure 1) by Tetra Tech and LeGrande Biological Surveys Inc. between April 8 - 15, 2021. The 'Akoko Survey Area includes portions of the 2020 Project Study Area, as well as portions of the NTSR and STSR adjacent to the Project components (see Figure 1 and Section 2).

Barbers Point Solar

Figure 1
‘Akoko Survey Area

CITY AND COUNTY OF HONOLULU

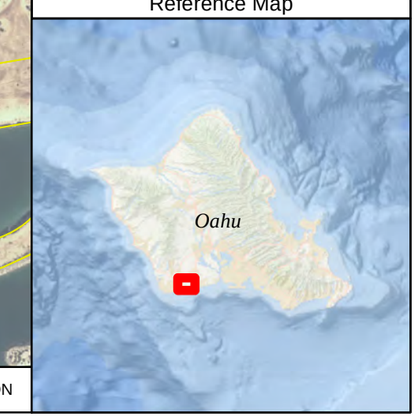


- 2020 Project Study Area
- Akoko Survey Area 1
- Akoko Survey Area 2
- Akoko Survey Area 3
- Akoko Survey Area 4
- Project Resurvey Area
- TMK Boundary
- Roads

TETRA TECH

Barbers Point Solar LLC

Reference Map



1:7,000 WGS 1984 UTM Zone 4N

0 0.25 0.5 Miles

NOT FOR CONSTRUCTION

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Project Description

The major infrastructures of the Project will include the following: a solar photovoltaic system, a network of electrical collector lines, battery energy storage system and step-up transformers, a collector substation and transformer, a generation-tie line (combination of overhead and underground), internal access roads, and temporary laydown (i.e., staging) areas for construction. Details of the Project design are provided in the biological survey report (Tetra Tech 2021).

2.0 Description of 'Akoko Survey Area

As shown in Figure 1, the 'Akoko Survey Area encompasses approximately 49.8 hectares (123.1 acres) on the 'Ewa Plain in east Kalaeloa (Barbers Point). It includes five areas which are listed in Table 1 and described in detail below. The 'Akoko Survey Area is located within the former Naval Air Station Barbers Point, which closed in 1999, and was utilized for military purposes. It includes portions of the NTSR and STSR which were utilized as trap and skeet ranges prior to base closure. The NTSR 'akoko population is considered to be the largest and last known existing wild population of the species (Department of Navy and Isle Botanica 2012). USFWS designated portions of the 'Akoko Survey Area as critical habitat for 'akoko (O'ahu Lowland Dry – Unit 11) in 2012 (see Figure 2). Notable land uses in the vicinity of the 'Akoko Survey Area include: Barbers Point Stables, Barbers Point Golf Course, Ordy Pond, Kalaeloa Airport, Honouliuli Wastewater Treatment Plant, Kalaeloa Heritage Park, and the Kalaeloa Renewable Energy Park.

Table 1. Tax Map Key Parcels and Ownership Within 'Akoko Survey Area

Survey Area	Size	TMK Parcel #	Parcel Owner
Project Resurvey Area	27.6 hectare (68.3 acres)	9-1-013:038	DHHL
		9-1-013:043	U.S. Navy
Survey Area 1	9.7-hectare (24.0 acre)	9-1-013:039	U.S. Navy
Survey Area 2	4.8-hectare (11.8 acre)	9-1-013:039	U.S. Navy
Survey Area 3	4.8-hectare (11.8 acre)	9-1-013:039	U.S. Navy
Survey Area 4	2.9-hectare (7.2 acre)	9-1-013:042	U.S. Navy

Project Resurvey Area (27.6 hectares, 68.3 acres):

The Project Resurvey Area includes a portion of the 68-hectare (168-acre) 2020 Project Study Area that was surveyed by Tetra Tech in June 2020. The Resurvey Area is based on the distance from the known 'akoko population in Tax Map Key (TMK) 9-1-013:039 (NTSR), the presence of suitable 'akoko habitat identified during the previous site visits, and the location of proposed Project components. The Project Resurvey Area includes the Right-of-Way east of Coral Sea Road from San Juacinto Street (also known as South Hanson Road) to TMK 9-1-013:040. It is bordered by Bismarck Sea Road (or Elrod Road) on the north.

Survey Area 1 (9.7 hectares, 24.0 acres):

Survey Area 1 extends 110 meters (360 feet) from the southern boundary of the Project Study Area on TMK 9-1-013:038 near San Juacinto Street south into the NTSR (TMK 9-1-013:039). Survey Area 1 includes a portion of the "2003 clean-up action area," which is an area that was scraped and cleared of vegetation in 2003 to remove arsenic-containing soils. This is the only portion of the 'Akoko Survey Area where 'akoko has been recorded in the last 20 years.

Survey Area 2 (4.8 hectares, 11.8 acres):

Survey Area 2 is in the western portion of the NTSR, and extends 100 meters (328 feet) east from the Right-of-Way off Coral Sea Road into TMK 9-1-013:039. This area is bounded by Survey Area 1 on the north and TMK 9-1-013:040 on the south.

Survey Area 3 (4.8 hectares, 11.8 acres):

Survey Area 3 is in the southern portion of the NTSR, and extends 100 meters (328 feet) north from TMK 9-1-013:040 into the NTSR (TMK 9-1-013:039). This area is bounded by Survey Area 2 on the west.

Survey Area 4 (2.9 hectares, 7.2 acres):

Survey Area 4 is within the STSR, and extends 100 meters (328 feet) east from TMK 9-1-013:040 into TMK 9-1-013:042. This area is bounded by Survey Area 3 on the north, the Project Study Area on the west, and TMK 9-1-013:041 (which includes Ordy Pond) on the southwest.

2.1 Climate

The climate in the 'Akoko Survey Area is characterized as arid and sunny. According to the Online Rainfall Atlas of Hawai'i (Giambelluca et al. 2013), the area receives a mean annual rainfall of approximately 21 inches (530 millimeters [mm]). Rainfall is typically highest in January and lowest in June-July (Giambelluca et al. 2013). The closest National Weather Service (NWS) rainfall gage to the 'Akoko Survey Area, Kalaeloa Airport (HJR), is roughly 1.6 kilometers (1 mile) to the southwest. This station recorded 1.10 inches in January 2021 (47% of normal), 1.22 inches in February 2021 (60% of normal), 3.12 inches in March 2021 (170% of normal), and 0.43 inches in April 2021 (38% of normal) (NWS 2021). The NWS rainfall data suggest this survey was conducted during the preferred survey period for this species (see Section 4).

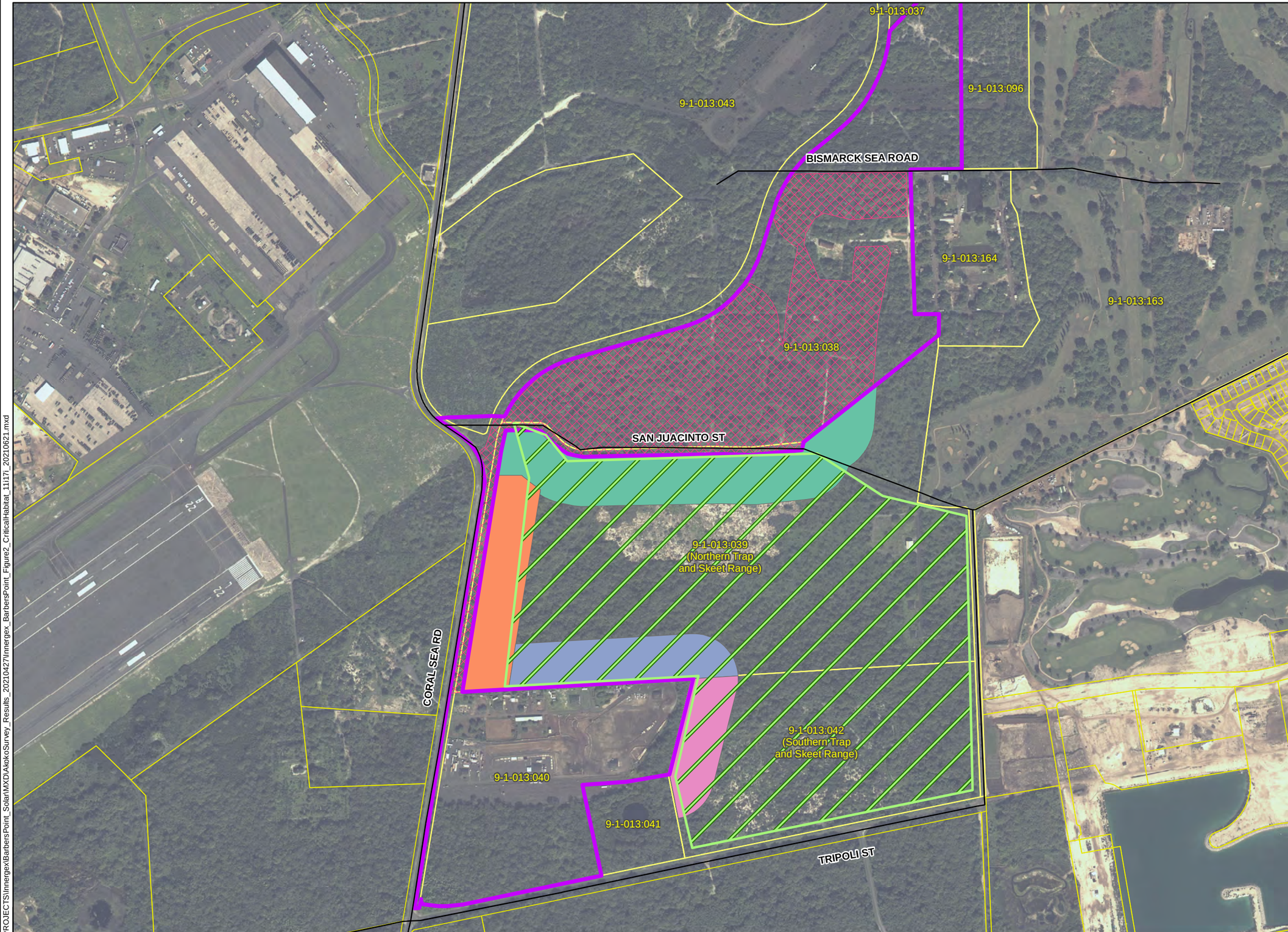
2.2 Topography and Soils

Coral reef limestone outcroppings and sinkholes (also referred to as limestone pits) are scattered throughout the 'Akoko Survey Area resulting in uneven topography. In general, soil cover across the Kalaeloa area consists of a thin layer of friable, red material present in cracks and crevices on coral outcrop. The Natural Resources Conservation Service (NRCS) identifies a single soil type, Coral Outcrop, in the 'Akoko Survey Area (NRCS 2019).

Barbers Point Solar

Figure 2
Designated Critical Habitat within the Akoko Survey Area

CITY AND COUNTY OF HONOLULU

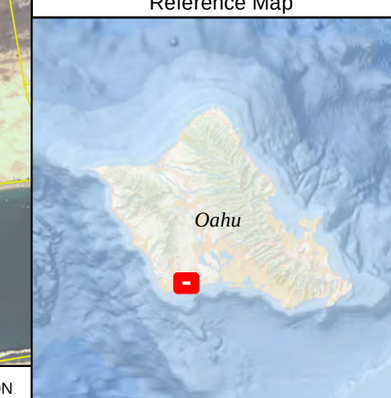


- 2020 Project Study Area
- Akoko Survey Area 1
- Akoko Survey Area 2
- Akoko Survey Area 3
- Akoko Survey Area 4
- Project Resurvey Area
- TMK Boundary
- Roads
- Critical Habitat (Oahu Lowland Dry - Unit 11)

TETRA TECH

Barbers Point Solar LLC

Reference Map



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3.0 Previous 'Akoko Surveys

Recent 'akoko surveys conducted in the 'Akoko Survey Area are briefly summarized below. Based on these survey reports, 'akoko has only been recorded at the NTSR within the last 20 years (within Survey Area 1) (Department of Navy 2011). The population within the NTSR has declined since 2003.

Chamaesyce skottsbergii botanical survey of the NAS Barbers Point, O'ahu, Hawai'i (Whistler 1998)

This survey included portions of the 2020 Project Study Area, Project Resurvey Area, and the STSR (including Survey Area 4). During the 1998 survey, a single 'akoko plant was found near the historic aircraft revetments between Mofet Street and Lamalle Road; however, this historic plant location was outside of the Project footprint and the 100 m buffer (east of the Project Resurvey Area). This report also states that 'akoko were previously found along Bismark Sea Road in 1997, but were not relocated during the 1998 survey. The specific location of the 1997 survey results were not provided.

'Akoko Survey of the NTSR at the former NAS Barbers Point (Whistler 2003)

This survey included a portion of the NTSR in the "2003 clean-up action area" prior to the soil removal. A total of 858 'akoko individuals were documented in the area during the survey.

Botanical Survey for 'Akoko on Seven Parcels at Kalaeloa, O'ahu, Hawai'i (Whistler 2008)

This survey included seven parcels at Kalaeloa including the Project Resurvey Area and portions of the NTSR. This survey did not include the "2003 clean-up action area" or 'akoko restoration site adjacent to Building 1527 within the NTSR. No 'akoko were documented in TMK 9-1-013:038 (including the Project Resurvey Area) during this survey. A total of 176 'akoko plants were recorded in the NTSR.

'Akoko restoration project, Kalaeloa, 'Ewa District, O'ahu, Final Report (AECOS 2008)

This survey was part of the conservation actions required due to the 2003 clean-up. Following the 5-year restoration period, a total of 941 'akoko plants were documented in nine clusters at the 'akoko restoration site near Building 1527. A total of 288 'akoko plants were found within the "2003 clean-up action area."

Botanical Survey for the 'Ewa Plains 'Akoko (Chamaesyce skottsbergii var. kalaeloana), Northern and Southern Trap and Skeet Range, Former Naval Air Station Barbers Point, O'ahu, Hawai'i (Department of the Navy and Isle Botanica 2012)

This survey included the entire NTSR and STSR. A total of 823 'akoko individuals were documented in the NTSR during this survey. Of these, 102 plants were within the "2003 clean-up action area." No 'akoko or suitable 'akoko habitat was observed in the STSR.

4.0 Methods

This survey methodology was approved by the DOFAW and USFWS on March 24, 2021 and March 29, 2021, respectively. Prior to the field surveys, linear parallel transects were created at regular intervals on a map-overlay with ARC GIS software. The transects were spaced 5 meters (16.4 feet) apart[1] and loaded on iPad Minis with Collector/Field Maps for ArcGIS. Previous known 'akoko locations from the 2012 survey in the area were also loaded on the iPad minis to facilitate re-discovery.

The field surveys were conducted over 5 days: April 8, 10, 12, 14 and 15, 2021. This time of year is preferred because the species is easier to identify after sufficient winter rain events due to the seasonal flush of new growth of leaves, and new seedlings may have germinated (Susan Ching/DOFAW O'ahu Botanist, pers. comm., February 2021). The weather during the survey was typical for the area, consisting of light winds, clear to partly cloudy skies, and warm to hot temperatures. Details on the rainfall prior to and during the survey is described in Section 2.1.

In the field, 3 botanists walked concurrently along adjacent transects looking for 'akoko. Areas where 'akoko was previously recorded, or areas with exposed limestone substrate with minimal groundcover and thin soils were more intensively examined. Transects were spaced 5 meters (16.4 feet) apart in 'Akoko Survey Area 1, Survey Area 2, Survey Area 3, and Survey Area 4. Transects were spaced 10 meters (32.8 feet) apart in the Project Resurvey Area. This modification to transect spacing in the Project Resurvey Area was made following approval from USFWS and DOFAW (Lindsy Asman/USFWS, pers. comm., April 2021; Susan Ching/DOFAW Botanist, pers. comm., April 2021), and was based on the notable substrate and vegetation differences in the Project Resurvey Area compared to known suitable 'akoko habitat. To document transect coverage, points were taken at the beginning, middle, and end of each transect. Transects were oriented north to south in the Project Resurvey Area, Survey Area 1, and Survey Area 3; transects were oriented east to west in Survey Areas 2 and 4 (Figure 3).

When found, the location of individual 'akoko plants or groups of 'akoko plants were recorded with an iPad Mini connected to a Geode or R1 receiver, which collect data to sub-meter accuracy. When a group of 'akoko plants was found, the point was taken in the center of the group. For each 'akoko point, botanists recorded number of individuals, height category, reproductive state, and notes about condition. DOFAW's O'ahu botanist joined the survey team on April 8, 2021; USFWS did not participate in the survey.

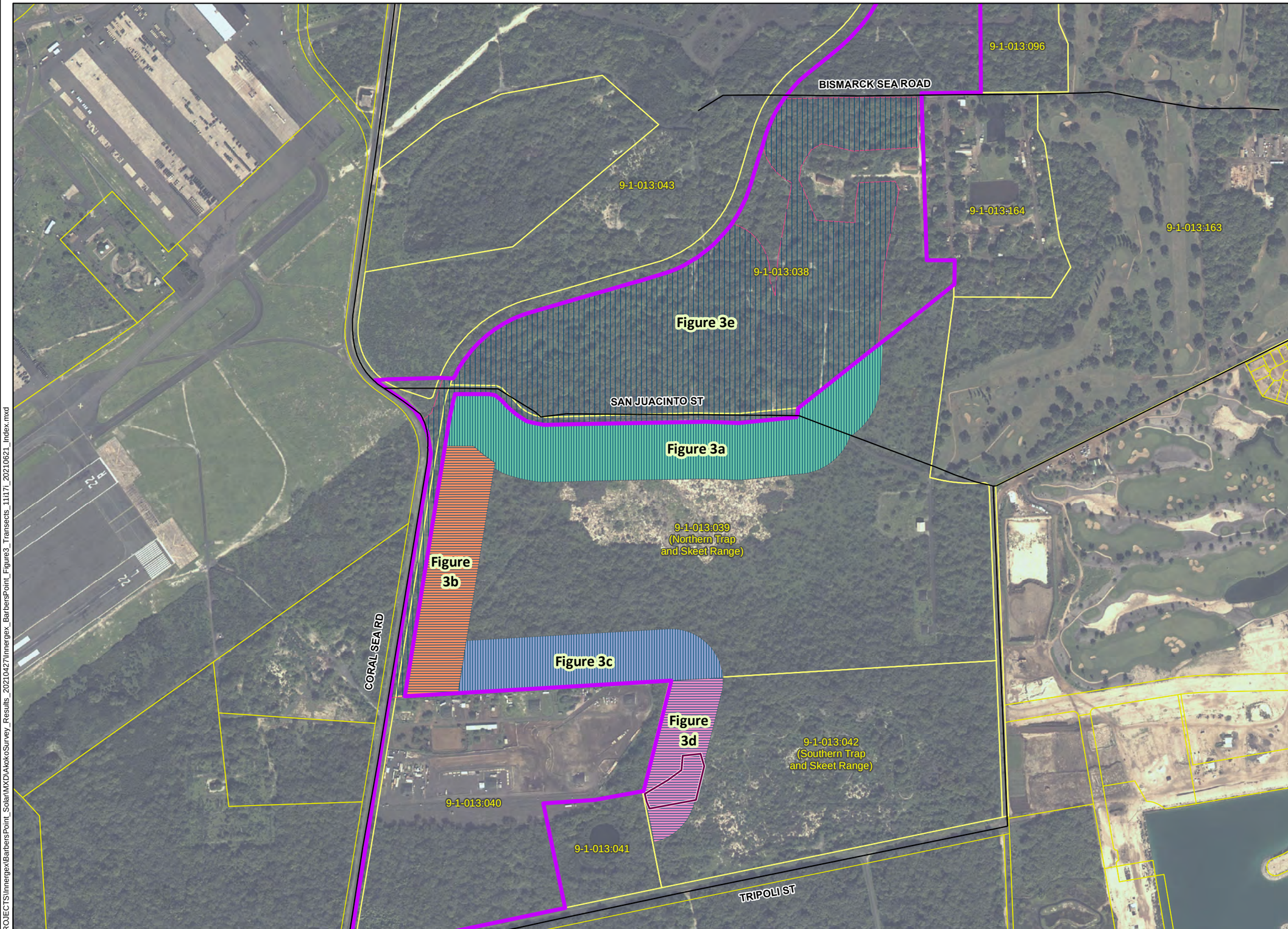
The taxonomy and nomenclature of the flowering plants are in accordance with Wagner et al. (1999, 2012), Wagner and Herbst (2003), and Imada (2012, 2019). Common/Hawaiian names are provided first, followed by scientific names in parentheses. If no common or Hawaiian name is known, only the scientific name is provided.

[1] 5-meter transects were used in this survey upon request from DOFAW and USFWS. Previous surveys in this area used 10-meter transects.

Barbers Point Solar

Figure 3
Transects within the 'Akoko Survey Area Index Map

CITY AND COUNTY OF HONOLULU

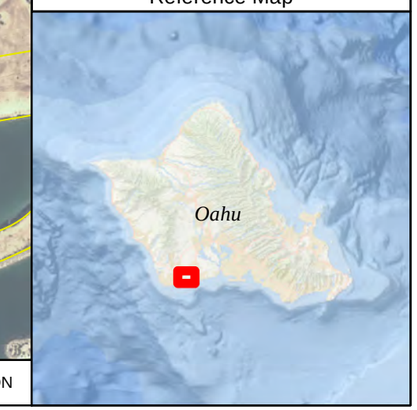


- 2020 Project Study Area
- Akoko Survey Area 1
- Akoko Survey Area 2
- Akoko Survey Area 3
- Akoko Survey Area 4
- Project Resurvey Area
- Transects
- TMK Boundary
- Roads
- Fenced Area

TETRA TECH

Barbers Point Solar LLC

Reference Map



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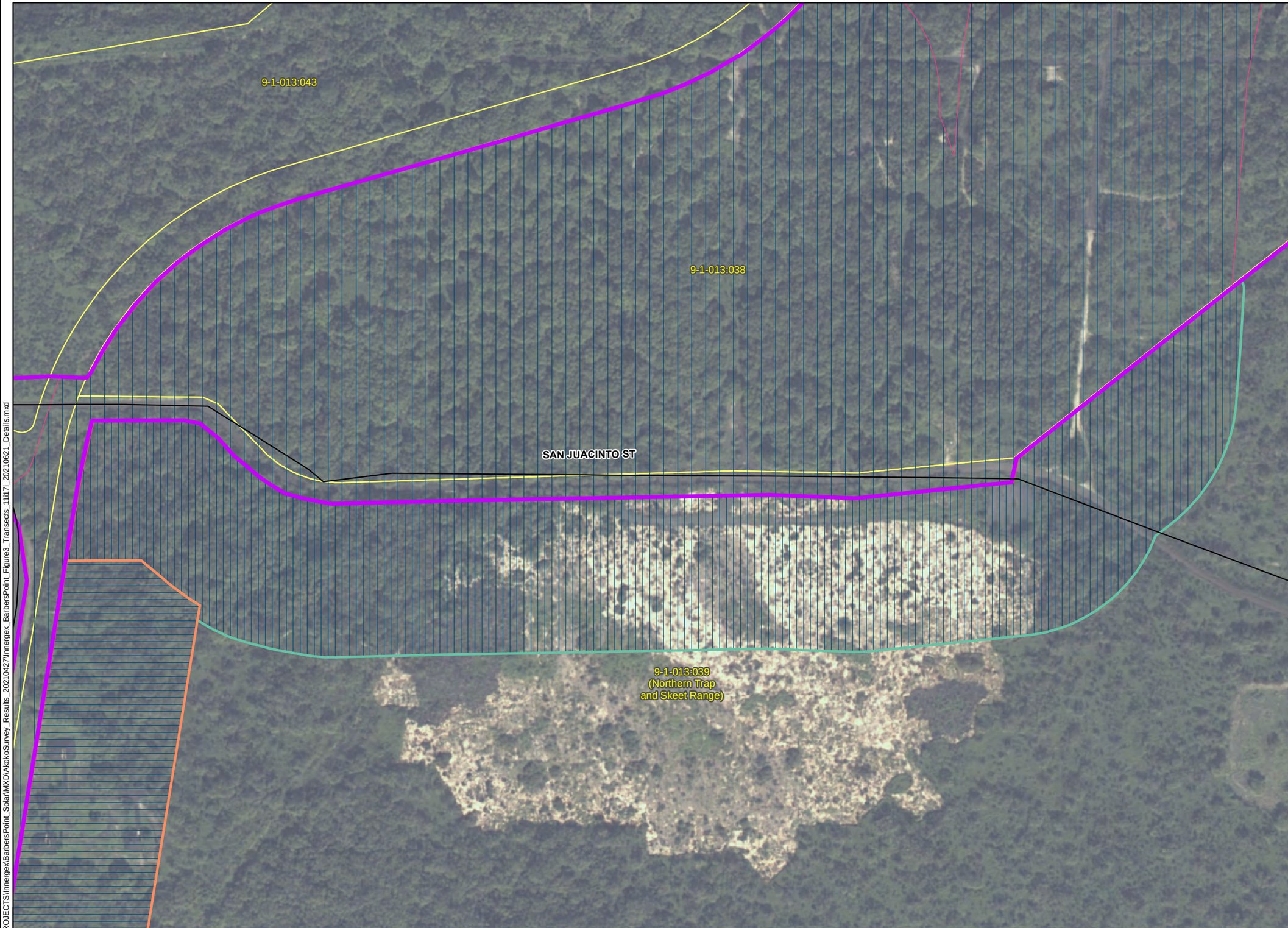
Barbers Point Solar

Figure 3a
Transects within the 'Akoko Survey Area
Akoko Survey Area 1

CITY AND COUNTY OF HONOLULU

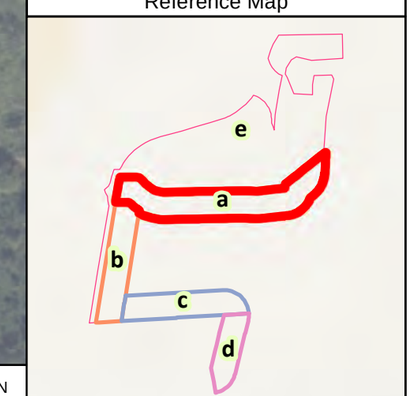


- 2020 Project Study Area
- Akoko Survey Area 1
- Akoko Survey Area 2
- Project Resurvey Area
- Transects
- TMK Boundary
- Roads

TETRA TECH

Barbers Point Solar LLC

Reference Map



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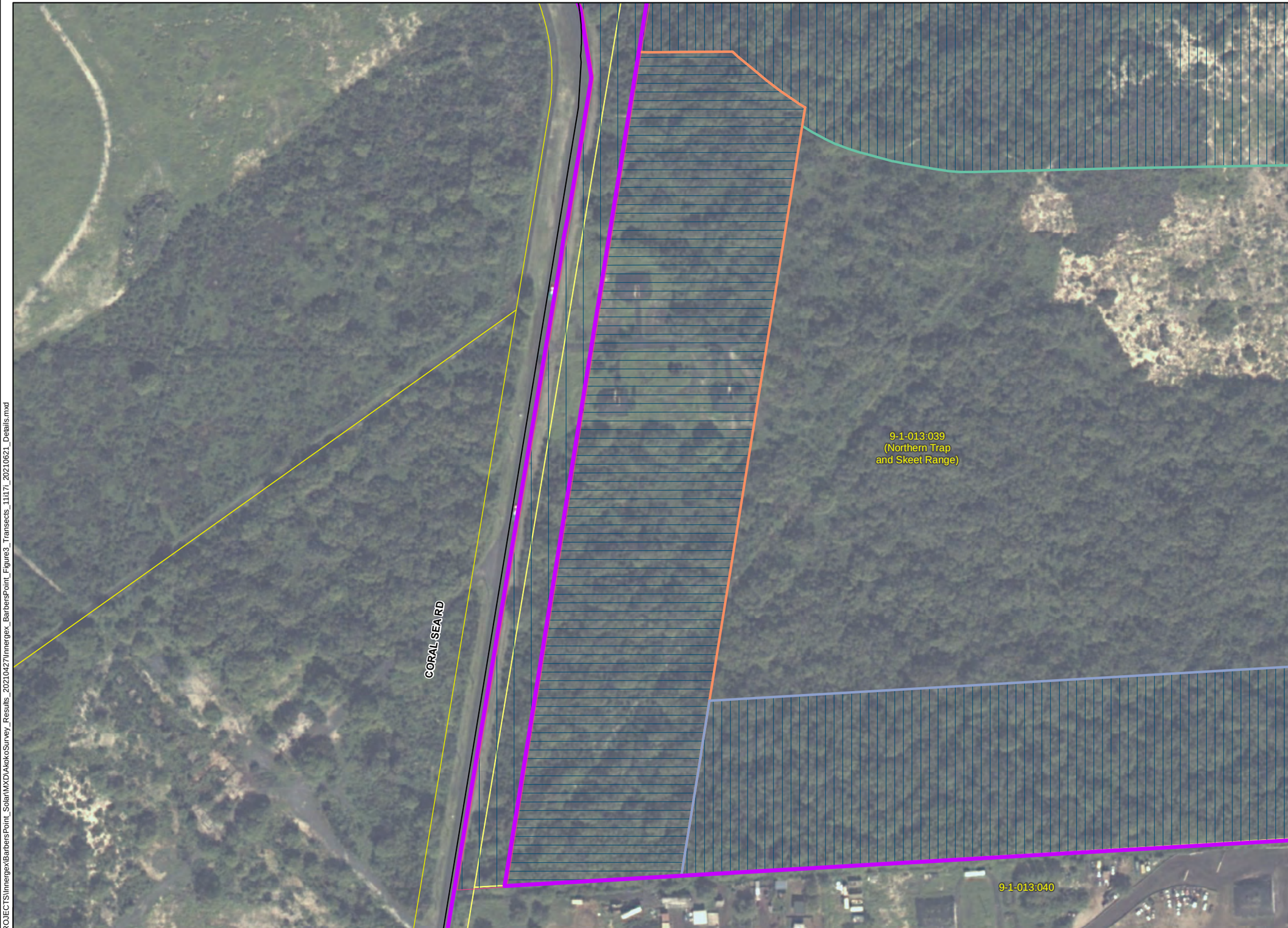
Barbers Point Solar

Figure 3b
Transects within the ‘Akoko Survey Area
Akoko Survey Area 2

CITY AND COUNTY OF HONOLULU

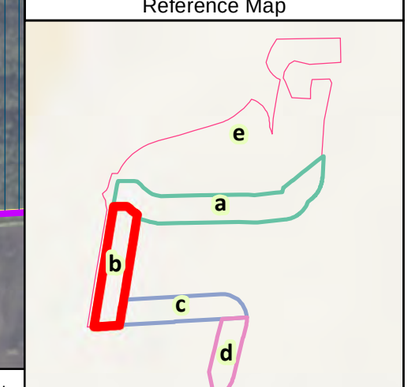


- 2020 Project Study Area
- Akoko Survey Area 1
- Akoko Survey Area 2
- Akoko Survey Area 3
- Project Resurvey Area
- Transects
- TMK Boundary
- Roads

TETRA TECH

Barbers Point Solar LLC

Reference Map



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Barbers Point Solar

Figure 3c
Transects within the 'Akoko Survey Area
Akoko Survey Area 3

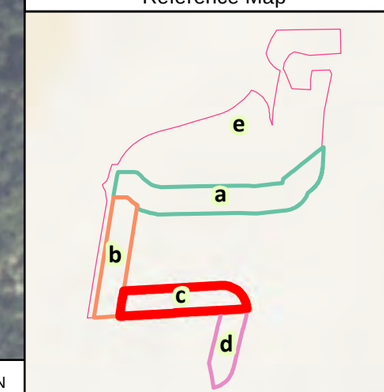
CITY AND COUNTY OF HONOLULU

- 2020 Project Study Area
- Akoko Survey Area 2
- Akoko Survey Area 3
- Akoko Survey Area 4
- TMK Boundary
- Fenced Area

TETRA TECH

Barbers Point Solar LLC

Reference Map



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Barbers Point Solar

Figure 3d
Transects within the
'Akoko Survey Area
Akoko Survey Area 4

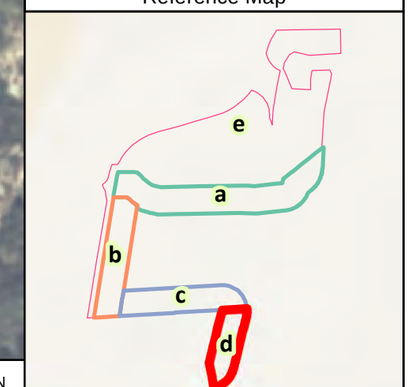
CITY AND COUNTY OF HONOLULU

- 2020 Project Study Area
- Akoko Survey Area 3
- Akoko Survey Area 4
- TMK Boundary
- Fenced Area

TETRA TECH

Barbers Point Solar LLC

Reference Map



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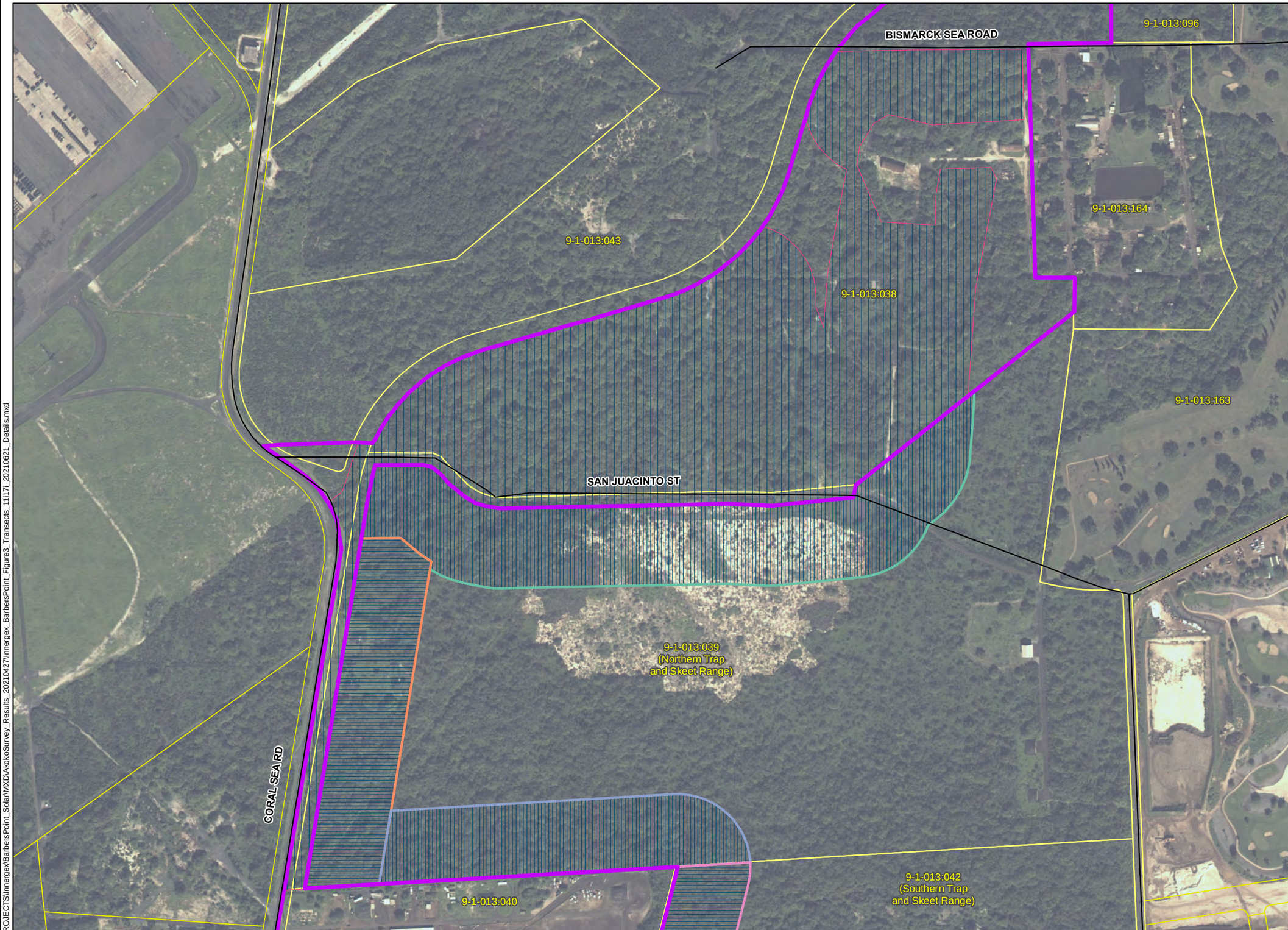
Barbers Point Solar

Figure 3e
Transects within the 'Akoko Survey Area Project Resurvey Area

CITY AND COUNTY OF HONOLULU

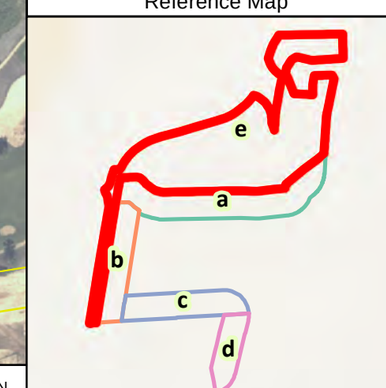


- 2020 Project Study Area
- Akoko Survey Area 1
- Akoko Survey Area 2
- Akoko Survey Area 3
- Akoko Survey Area 4
- Project Resurvey Area
- Transects
- TMK Boundary
- Roads

TETRA TECH

Barbers Point Solar LLC

Reference Map



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5.0 Results and Discussion

A total of 36 ʻakoko individuals were recorded within the ʻAkoko Survey Area. All ʻakoko plants were within Survey Area 1 in a portion of the NTSR "2003 clean-up action area." Twelve additional plant species native to the Hawaiian Islands were recorded during the survey (Table 2). Impacts from a March 2021 brush fire were evident in some of the survey areas. Details on each survey area are provided below. Representative photographs from the survey are included in Appendix A.

Table 2. Native Plant Species Recorded in the Survey Area

Common/Hawaiian Name	Scientific Name	Status	Location
ʻakoko	*Euphorbia skottsbergii* var. *skottsbergii*	E, End	Area 1
ʻānunu	*Sicyos pachycarpus*	E	Resurvey Area, Area 1, Area 2, Area 3
hoary abutilon	*Abutilon incanum*	I	Resurvey Area, Area 1, Area 2, Area 3
ʻiliahiʻaloʻe	*Santalum ellipticum*	E	Area 1
ʻilieʻe	*Plumbago zeylanica*	I	All survey areas
ʻilima	*Sida fallax*	I	All survey areas
kaunaʻoa pehu	*Cassytha filiformis*	I	Resurvey Area
kīpūkai, seaside heliotrope	*Heliotropium curassavicum*	I	Resurvey Area
pāʻū-o-Hiʻiaka	*Jacquemontia sandwicensis*	E	Resurvey Area
pololei	*Ophioglossum polyphyllum*	I	Resurvey Area, Area 1, Area 2
pōpolo	*Solanum americanum*	I	Resurvey Area, Area 1
wiliwili	*Erythrina sandwicensis*	E	Resurvey Area, Area 1, Area 3
ʻuhaloa	*Waltheria indica*	I	Resurvey Area, Area 1, Area 2

Status: E = Endemic (native only to the Hawaiian Islands); I = Indigenous (native to the Hawaiian Islands and elsewhere); End = Federally and State endangered.

Note: Wiliwili observed in Survey Area 2 and Area 4 were all dead.

5.1 Project Resurvey Area

No ʻakoko individuals were recorded within the Project Resurvey Area. In general, the vegetation in this area is dominated by large kiawe trees (*Prosopis pallida*), roughly 15 to 30 feet (5–9 m) tall, with dense mats of buffelgrass (*Cenchrus ciliaris*) in the understory (see Photo 1 in Appendix A). The kiawe canopy ranges from open to dense thickets. In areas with denser canopy cover, Guinea grass (*Megathyrsus maximus*), Chinese violet (*Asystasia gangetica*), and Zulu giant (*Stapelia gigantea*) are common (Photos 2 and 3). Koa haole (*Leucaena leucocephala*) and ʻopiuma (*Pithecellobium dulce*) trees are also widely scattered in the area. Sisal (*Agave sisalana*) also occurs in dense patches throughout the area. Common native plants in this area include hoary abutilon (*Abutilon incanum*), ʻilima (*Sida fallax*), and ʻuhaloa

(*Waltheria indica*). Three native plant species were found that were not recorded during the June 2020 surveys in the area – ʻānunu (*Sicyos pachycarpus*), pāʻū-o-Hiʻiaka (*Jacquemontia sandwicensis*), and pololei (*Ophioglossum polyphyllum*).

Vegetation in the Project Resurvey Area is disturbed by previous military activities. Large concrete aircraft revetments, paved parking areas, and paved runways and roads are present in this area (Photo 4). An old quarry pit from which limestone was extracted is present in the southeastern portion of the Project Resurvey Area; this heavily vegetated pit was not re-surveyed during April 2021 because of the previous disturbance, and suitable ʻakoko habitat is not present in the area. Sinkholes are scattered throughout the area, and are more abundant in the southwestern corner where several wiliwili (*Erythrina sandwicensis*) trees occur. No notable areas of suitable ʻakoko habitat are present in the Project Resurvey Area.

5.2 Survey Area 1

A total of 36 ʻakoko individuals were recorded within Survey Area 1. The plants occur at 3 locations in the northern central portion of the NTSR within the former "2003 clean-up action area" (see Figure 4). All of the ʻakoko individuals recorded during this survey are more than 100 meters from the Project's limits of disturbance.

Site 1 has the most ʻakoko individuals, with 4 mature plants and 29 seedlings (Table 3). Minimal ground cover and tree canopy is present at Site 1, whereas buffelgrass is abundant around the ʻakoko plants at Sites 2 and 3 (Photos 5-8). The vegetation and substrate in the former "2003 clean-up action area" is notably different than the surrounding; it is characterized by bare limestone substrate with thin soils and minimal vegetation cover (see Photos 9). In comparison, the western portion of Survey Area 1 has denser vegetation and canopy cover. Evidence of the March 2021 fire was observed near the eastern end of Survey Area 1 (Photo 10). A fire break was recently cleared on the western side of Survey Area 1 (Photo 11).

Table 3. ʻAkoko Sites and Individuals Recorded Within Survey Area 1

Site #	No. of individuals	Age/Height*	Reproductive	Notes
1	33	4 mature, 29 seedlings	4 mature plants flowering	South of large kiawe tree. Closest to Cluster 89 from 2012 survey.
2	2	2 mature	Both flowering	On the southern boundary of Survey Area 1.
3	1	mature	Flowering	Next to R6 tag.
*Mature plants are those with flowers or fruits, or plants ≥ 18 inches in height. Seedlings are plants ≤ 7 inches in height.				

Barbers Point Solar

Figure 4
'Akoko
recorded in the
'Akoko Survey Area.

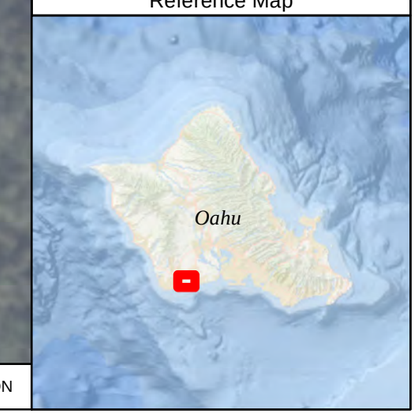
CITY AND COUNTY OF HONOLULU

- Akoko Observations
- 2020 Project Study Area
- Akoko Survey Area 1
- Project Resurvey Area
- TMK Boundary
- Road

TETRA TECH

Barbers Point Solar LLC

Reference Map



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5.3 Survey Area 2

No 'akoko individuals were recorded within Survey Area 2. The vegetation is dominated by kiawe and koa haole trees with buffelgrass and Guinea grass in the understory (Photo 12). The March 2021 fire burned portions of the understory in this area (Photo 13). The vegetation along the western edge of Survey Area 2 is disturbed by road clearance, debris, and gravel piles. The northern and southern portions of the area are less disturbed. A small area of relatively suitable 'akoko habitat remains at the northern edge of Survey Area 2 (Photo 14).

5.4 Survey Area 3

No 'akoko individuals were recorded within Survey Area 3. The vegetation is dominated by kiawe trees, with buffelgrass, Guinea grass, and Chinese violet in the understory (Photo 15). A portion of this area was impacted by the recent fire (Photo 16). Kiawe stands become increasingly denser toward the eastern side of Survey Area 3 (Photo 17).

5.5 Survey Area 4

No 'akoko individuals were recorded within Survey Area 4. Survey Area 4 is dominated by dense kiawe thickets where minimal light penetrates the canopy (Photo 18). A 0.63-hectare (1.6 acre) area within Survey Area 4 is fenced and could not be surveyed (see Figure 3 and Photo 19). A large area of downed kiawe logs is also present in the vicinity of the fence that excludes vegetation growth (Photo 20). Dense pluchea (*Pluchea* spp.) thickets occur at the southern tip of Survey Area 4. Observations during this survey confirm conclusions from the 2012 survey that suitable 'akoko habitat is not present in this area (Department of Navy and Isle Botanica 2012).

6.0 Conclusions and Recommendations

This survey was conducted to confirm that the federally and state listed 'akoko does not currently occur within the Project Study Area, and to determine the distance from the Project boundary to the closest 'akoko plant. As stated above, 'akoko was only recorded in Survey Area 1 in the former "2003 clean-up action area" in the NTSR. The number of 'akoko within this area has decreased since surveys in 2012 and 2008. Although evidence of the March 2021 fire was observed in Survey Areas 1-4, fire evidence was not seen in the immediate vicinity of the 'akoko plants.

With regards to the Project, Tetra Tech recommends the following measures to avoid and minimize potential impacts to the endangered 'akoko:

- Design the Project to maintain a 100-meter buffer from the remaining 'akoko individuals in the NTSR in accordance with USFWS recommendations (USFWS 2018).
- As part of the Project's environmental education and observation program, educate all construction and operational personnel about the nearby 'akoko and critical habitat. Staff should be trained to identify the species and to take appropriate steps if 'akoko are found.

- Although non-native weedy species are common in the area, implement invasive species minimization measures to avoid the unintentional introduction or transport of new invasive species to the area. This includes utilizing non-invasive species for landscaping; on-site gravel, rock, soil when practicable; purchasing raw materials (e.g., gravel, rock, soil) from a local supplier when practicable; utilizing certified, weed-free seed mixes; and washing and/or visually inspecting (as appropriate) construction materials or equipment arriving from outside O'ahu for excessive debris, plant materials, and invasive or harmful non-native species. Consult with O'ahu Invasive Species Committee if needed.
- Develop an Emergency Response Plan and Vegetation Management Plan to reduce potential fire risk to/from the Project.
- If the location of the Project's limits of disturbance changes, a comprehensive 'akoko survey may be needed in areas with suitable 'akoko habitat (if present) during the wet season following sufficient rains.

7.0 Literature Cited

AECOS. 2008. 'Akoko restoration project, Kalaeloa, 'Ewa District, O'ahu.

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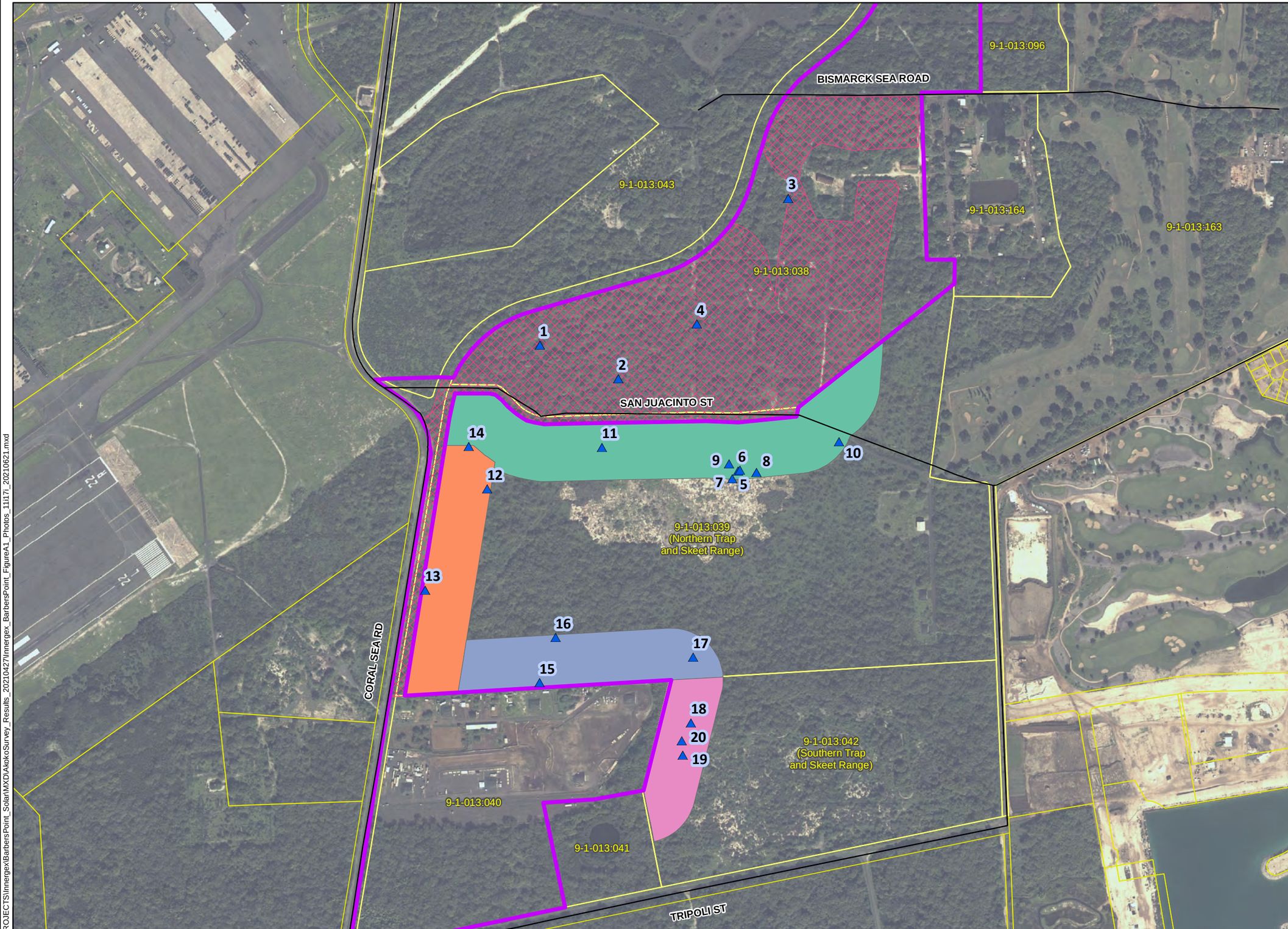
APPENDIX A

REPRESENTATIVE PHOTOGRAPHS OF THE 'AKOKO SURVEY AREA

Barbers Point Solar

Figure A-1
Photo Location Map

CITY AND COUNTY OF HONOLULU

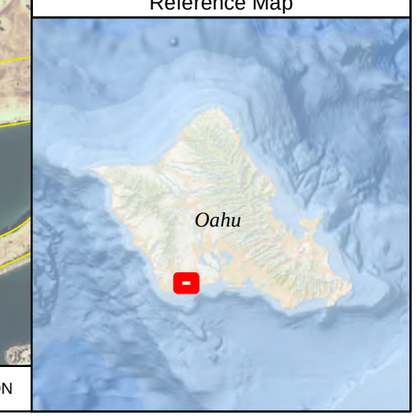


- Photo Points
- 2020 Project Study Area
- Akoko Survey Area 1
- Akoko Survey Area 2
- Akoko Survey Area 3
- Akoko Survey Area 4
- Project Resurvey Area
- TMK Boundary
- Roads

TETRA TECH

Barbers Point Solar LLC

Reference Map



1:7,000 WGS 1984 UTM Zone 4N

0 0.25 0.5 Miles

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Photo 1. Kiawe (*Prosopis pallida*) and buffelgrass (*Cenchrus ciliaris*) are abundant in the Project Resurvey Area. Location: 21.316077, -158.053246. April 10, 2021.

Photo 2. Typical area with Chinese violet (*Asystasia gangetica*) within the Project Resurvey Area. Location: 21.315487, -158.051798. April 10, 2021.

Photo 3. Kiawe with Guinea grass (*Megathyrsus maximus*) in the Project Resurvey Area. Location: 21.318609, -158.048619. April 12, 2021.

Photo 4. Numerous paved roads are present in the Project Resurvey Area. Location: 21.316434,-158.050331. April 12, 2021.

Photo 5. Survey team counting 'akoko plants at Site 1 within Survey Area 1, showing minimal ground and canopy cover. Location: 21.313882, -158.049547. April 8, 2021.

Photo 6. Mature 'akoko plant at Site 1 within Survey Area 1. Location: 21.313869, -158.049582. April 8, 2021.

Photo 7. Site 2 within Survey Area 1 which consisted of 2 mature plants. Location: 21.313733,-158.049694. April 8, 2021.

Photo 8. Site 3 within Survey Area 1, showing 1 mature plant and nearby R6 tag. Location: 21.313846, -158.049242. April 8, 2021.

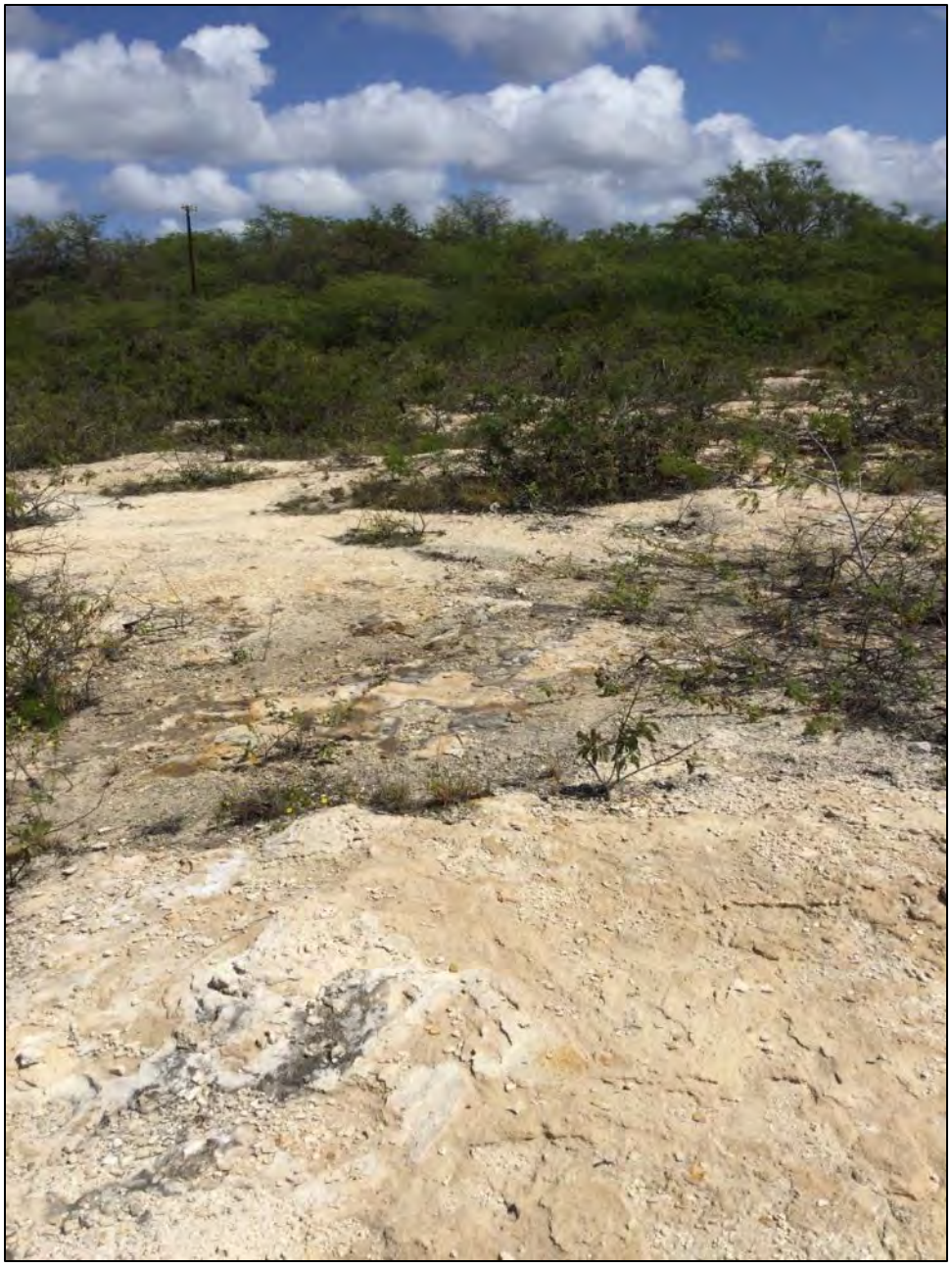

Photo 9. Typical substrate within the 2003 clean up action area where 'akoko has been recorded. Location: 21.313993, -158.049747. April 8, 2021.

Photo 10. Evidence of recent fire in Survey Area 1. Location: 21.3143672, -158.047707. April 10, 2021.

Photo 11. Fire break cleared in Survey Area 1. Location: 21.31429671, -158.0521043. April 10, 2021.

Photo 12. Kiawe and buffel grass within Survey Area 2. Location: 21.313586, -158.054239. April 14, 2021.

Photo 13. Showing recent fire that burned understory in Survey Area 2. Location: 21.311831, -158.055408. April 14, 2021.

Photo 14. Small area of suitable akoko habitat in Survey Area 2. Location: 21.31432457,-158.0545788. April 14, 2021.

Photo 15. Typical vegetation in Survey Area 3. Location: 21.310209, -158.053289. April 14, 2021.

Photo 16. Previously burned area in Survey Area 3. Location: 21.31099, -158.052991. April 14, 2021.

Photo 17. Kiawe becomes thicker toward the eastern side of Survey Area 3. Location: 21.310635,-158.050439. April 15, 2021.

Photo 18. Kiawe thicket in Survey Area 4. Location: 21.309494, -158.050482. April 15, 2021.

Photo 19. Fenced area within Survey Area 4. Location: 21.308934, -158.05064. April 15, 2021.

Photo 20. Downed kiawe logs within Survey Area 4. Location: 21.309179, -158.05066. April 15, 2021.

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APPENDIX D. CORRESPONDENCE FROM U.S. FISH AND WILDLIFE SERVICE AND STATE OF HAWAIʻI DEPARTMENT OF LAND AND NATURAL RESOURCES DIVISION OF FORESTRY

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INNERGEX

Renewable Energy.
Sustainable Development.

July 6, 2021

David Smith, Administrator
Division of Forestry and Wildlife
State of Hawai‘i, Department of Land and Natural Resources
Kalanimoku Building
1151 Punchbowl Street, Room 325
Honolulu, Hawai‘i 96813
david.g.smith@hawaii.gov

RE: Barbers Point Solar Project
‘Ewa District, O’ahu; Revised Request for Species List and Impact Avoidance Measures

---

Dear Mr. Smith,

Thank you for DOFAW’s previous coordination and input on the Barbers Point Solar Project (Project) located east of Kalaeloa Airport on the Island of O’ahu, Hawai‘i. Since our meeting in 2020, Barbers Point Solar LLC (Barbers Point Solar) has modified the Project Study Area. The Project will be located within a 163-acre Study Area and is bordered by Tripoli Road to the south, Coral Sea Road to the west, the Barbers Point Golf Course to the east, and vacant land and Roosevelt Ave/Geiger Road on the north. The Project will be primarily located on tax map keys (TMK) 9-1-013:038 and 9-1-013:040, which are owned by Department of Hawaiian Home Lands (DHHL). Project electrical collector and transmission lines will also be located on portions of TMK 9-1-016:027 (owned by Kapolei Infrastructure, LLC) and within rights-of-way owned by Hawai‘i Department of Transportation and Hawai‘i Community Development Authority. A preliminary Project layout is provided in Attachment 1.

As the Project will involve the use of lands owned by the state, compliance with Hawai‘i Revised Statutes (HRS) Chapter 343 is required, and the Project is currently preparing an Environmental Assessment (EA). DHHL has agreed to be the Accepting Authority for the EA. A pre-consultation letter was sent to your office in May 2021 requesting input on the scope of issues to be considered in the Draft EA. No federally owned lands will be utilized for the Project and no federal action is required. Therefore, the Project has no trigger for review under the National Environmental Policy Act and no requirement for consultation under Section 7 of the Endangered Species Act (ESA).

Tetra Tech, Inc. (Tetra Tech) has conducted several biological surveys for the Project. The purpose of the surveys was to characterize the existing plant and animal habitat and determine whether state or federally-listed endangered or threatened species (pursuant to the federal ESA or HRS Chapter 195D), or otherwise rare plants or animals have the potential to occur and could be impacted by construction or operation of the Project. Biological surveys were conducted in June

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Vancouver, British Columbia V6C 3K4
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info@innergex.com | www.innergex.com

Head Office
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Canada
Tel. 450 928-2550 | Fax 450 928-2544
info@innergex.com | www.innergex.com

Innergex Renewables USA, LLC
3636 Nobel Drive, Suite 260
San Diego, CA 92122
United States
Tel. 858 346-4004 | Fax 604 633-9991
info@innergex.com | www.innergex.com

2020, August 2020, October 2020, November 2020, April 2021, and May 2021. Surveys specific to detect the state-listed pueo or Hawaiian short-eared owl (*Asio flammeus sandwichensis*) specific surveys) were conducted on the morning of June 11, 2020 and the evenings of August 17, October 8, and November 16, 2020. As previously discussed with DOFAW, the April 2021 survey consisted of a supplemental wet season survey for the endangered 'akoko (*Euphorbia skottsbergii* var. *skottsbergii*) within portions of the Study Area and areas adjacent to the Study Area. Finally, Tetra Tech conducted a general plant and wildlife survey of the Coral Sea Road rights-of-way on May 5, 2021.

The enclosed reports (Attachments 2 and 3) summarize the results of the biological surveys, and offers recommendations to avoid and minimize potential impacts to listed species. As the Project intends to avoid impacts to federally and state listed species, we are also requesting Project-specific avoidance measures from DOFAW. A similar request for information has also been sent to the U.S. Fish and Wildlife Service.

We look forward to your response. Should you have any questions or require additional information, please feel free to contact me at (604) 345-4009 or via email at JMancinelli@innergex.com or Tiffany Agostini at (808) 271-7274 or via email at Tiffany.Agostini@tetratech.com.

Sincerely,

Barbers Point Solar LLC

Julia Mancinelli

Julia Mancinelli
Director - Environment

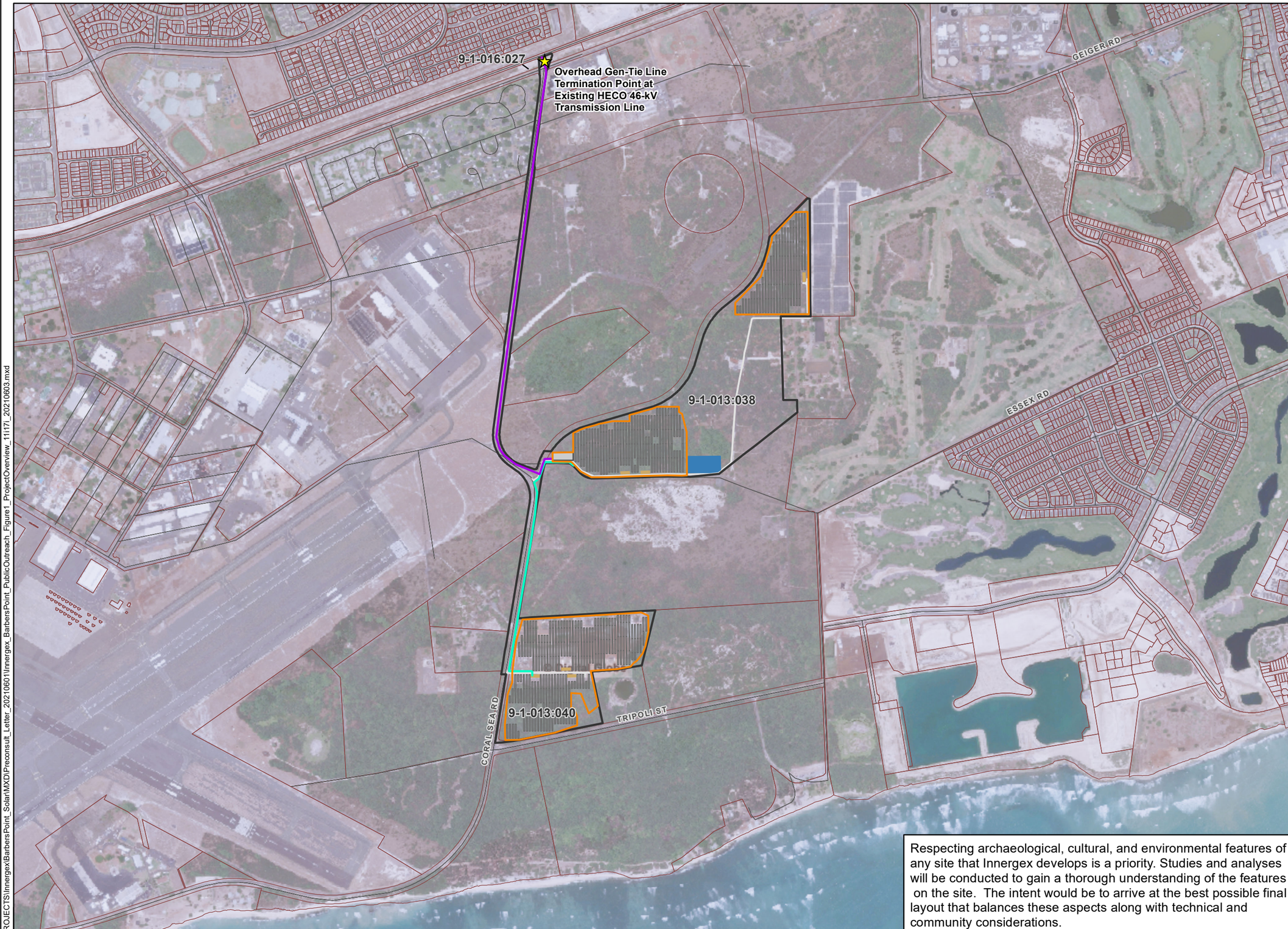
Attachments:
1. Preliminary Project Layout
2. Barbers Point Solar Project Revised Draft Biological Resources Survey Report (Tetra Tech 2021)
3. Barbers Point Solar Project Draft 'Akoko (*Euphorbia skottsbergii* var. *skottsbergii*) Survey Report (Tetra Tech 2021)

cc: Koa Matsuoka, DOFAW
Susan Ching, DOFAW
Tiffany Agostini, Tetra Tech
Leslie McClain, Tetra Tech

Barbers Point Solar Project

Figure 1 Conceptual Project Overview

HONOLULU COUNTY, HI



- Project Study Area
- Security Fence
- Solar Array
- Collector Line
- Project Substation
- Power Conversion System
- Temporary Laydown (Staging) Area
- Site Access Road & Collector Line
- 46-kV Transmission Line (Overhead and Underground)
- Existing Seconday Road
- TMK Boundary

Respecting archaeological, cultural, and environmental features of any site that Innergex develops is a priority. Studies and analyses will be conducted to gain a thorough understanding of the features on the site. The intent would be to arrive at the best possible final layout that balances these aspects along with technical and community considerations.

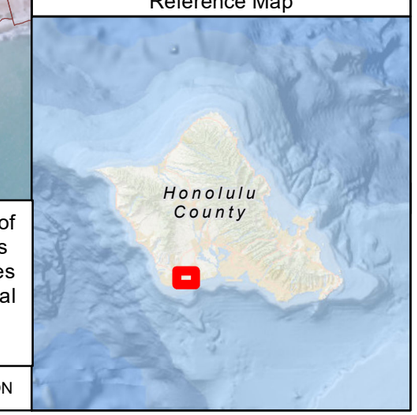
1:14,000 WGS 1984 UTM Zone 4N

0 0.25 0.5 1 Miles

NOT FOR CONSTRUCTION

Innergex Renewable Development USA LLC

Reference Map



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DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

ROBERT K. MASUDA
FIRST DEPUTY

M. KALEO MANUEL
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
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET, ROOM 325
HONOLULU, HAWAII 96813

July 15, 2021

Julia Mancinelli
Innergex Renewables USA, LLC
4660 La Jolla Village Drive, Suite 680
San Diego, CA 92122

Dear Ms. Mancinelli:

The Department of Land and Natural Resources, Division of Forestry and Wildlife (DOFAW) has received your revised request for a species list and impact avoidance measures for the Barbers Point Solar Project in ʻEwa on Oʻahu, Hawaiʻi, TMKs: (1) 9-1-013:038, 9-1-013-040, and 9-1-016:027. The proposed project consists of constructing a 15-megawatt (MW) solar photovoltaic system coupled with a 15 MW, 4-hour (60 MW-hour) photovoltaic coupled battery energy storage system (PV-Coupled ESS) as well as ancillary support infrastructure on 163-acres of undeveloped land.

We appreciate your proactive planning efforts with DOFAW on avoidance and minimization measures for listed species to inform the development of the proposed solar project. Based on the information from the updated June 2021 Draft Biological Resources Survey Report, DOFAW provides the following comments.

The wet season survey data from June 2021 report indicates that no *Euphorbia skottsbergii* var. *skottsbergii* were found within 100-meters of the proposed project area. If any *Euphorbia skottsbergii* var. *Skottsbergii* are observed during the construction and operation of the proposed solar project, DOFAW supports the U.S. Fish and Wildlife guidelines and does not support any digging within 100 meters of any endangered plants regardless of their location to the project boundaries.

Due to the arid climate and risks of wildfire to listed species, we recommend coordinating with the Hawaiʻi Wildfire Management Organization (808-850-900, admin@hawaiiwildfire.org) on how wildfire prevention can be addressed in the project area.

DOFAW recommends that any Wiliwili (*Erythrina sanwichensis*) trees present at the project site should not be damaged and avoided by project infrastructure when possible. While not State listed species, these Wiliwili have been species of concern in the past and are still a valuable resource for Hawaii's imperiled lowland dry forests. Additionally, we recommend reaching out to the Kalaeloa Heritage and Legacy Foundation near the project site about the best practices for caring for the Wiliwili trees in this area. Please visit: https://www.khlfoundation.org/ for more information.

The State endangered Pueo has been observed in the project site vicinity. Pueo are a crepuscular species, most active during dawn and dusk twilights. DOFAW recommends twilight pre-construction surveys by a qualified biologist prior to clearing vegetation for construction. If Pueo nests are present, a buffer zone of 46 m (150 feet) should be established in which no clearing occurs until nesting ceases, and DOFAW staff should be notified. Work should not resume until directed by DOFAW.

State listed waterbirds such as the Hawaiian Stilt (*Himantopus mexicanus knudseni*), Hawaiian Coot (*Fulica alai*), and Hawaiian Moorhen (*Gallinula galeata sandvicensis*) have the potential to occur in the vicinity of the proposed project site. It is against State law to harm or harass these species. If any of these species are present during construction activities, then all activities within 100 feet (30 meters) should cease, and the bird should not be approached. Work may continue after the bird leaves the area of its own accord. If a nest is discovered at any point, please contact the O'ahu DOFAW Office at (808) 973-9778.

We appreciate your efforts to work with our office for the conservation of Hawai'i's native species. Should the scope of the project change significantly, or should it become apparent that threatened or endangered species may be impacted, please contact our staff as soon as possible. If you have any questions, please contact Paul Radley, Protected Species Habitat Conservation Planning Coordinator at (808) 587-0010 or paul.m.radley@hawaii.gov.

Sincerely,

DAVID G. SMITH
Administrator

cc: Tiffany Agostini, Tetra Tech
Leslie McClain, Tetra Tech

INNERGEX

Renewable Energy.
Sustainable Development.

July 6, 2021

Lindsy Asman
Pacific Islands Fish and Wildlife Office
U.S. Fish and Wildlife Services
300 Ala Moana Blvd. Room 30122
Honolulu, Hawai'i 96850
Lindsy_Asman@fws.gov

RE: Barbers Point Solar Project
'Ewa District, O'ahu; Revised Request for Species List and Impact Avoidance Measures

---

Dear Ms. Asman,

Thank you for your previous coordination and input on the Barbers Point Solar Project (Project) located east of Kalaeloa Airport on the Island of O'ahu, Hawai'i. Since our meeting in 2020, Barbers Point Solar LLC (Barbers Point Solar) has modified the Project Study Area. The Project will be located within a 163-acre Study Area and is bordered by Tripoli Road to the south, Coral Sea Road to the west, the Barbers Point Golf Course to the east, and vacant land and Roosevelt Ave/Geiger Road on the north. The Project will be primarily located on tax map keys (TMK) 9-1-013:038 and 9-1-013:040, which are owned by Department of Hawaiian Home Lands (DHHL). Project electrical collector and transmission lines will also be located on portions of TMK 9-1-016:027 (owned by Kapolei Infrastructure, LLC) and within rights-of-way owned by Hawai'i Department of Transportation and Hawai'i Community Development Authority. A preliminary Project layout is provided in Attachment 1.

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Sincerely,

Barbers Point Solar LLC

Julia Mancinelli

Julia Mancinelli
Director - Environment

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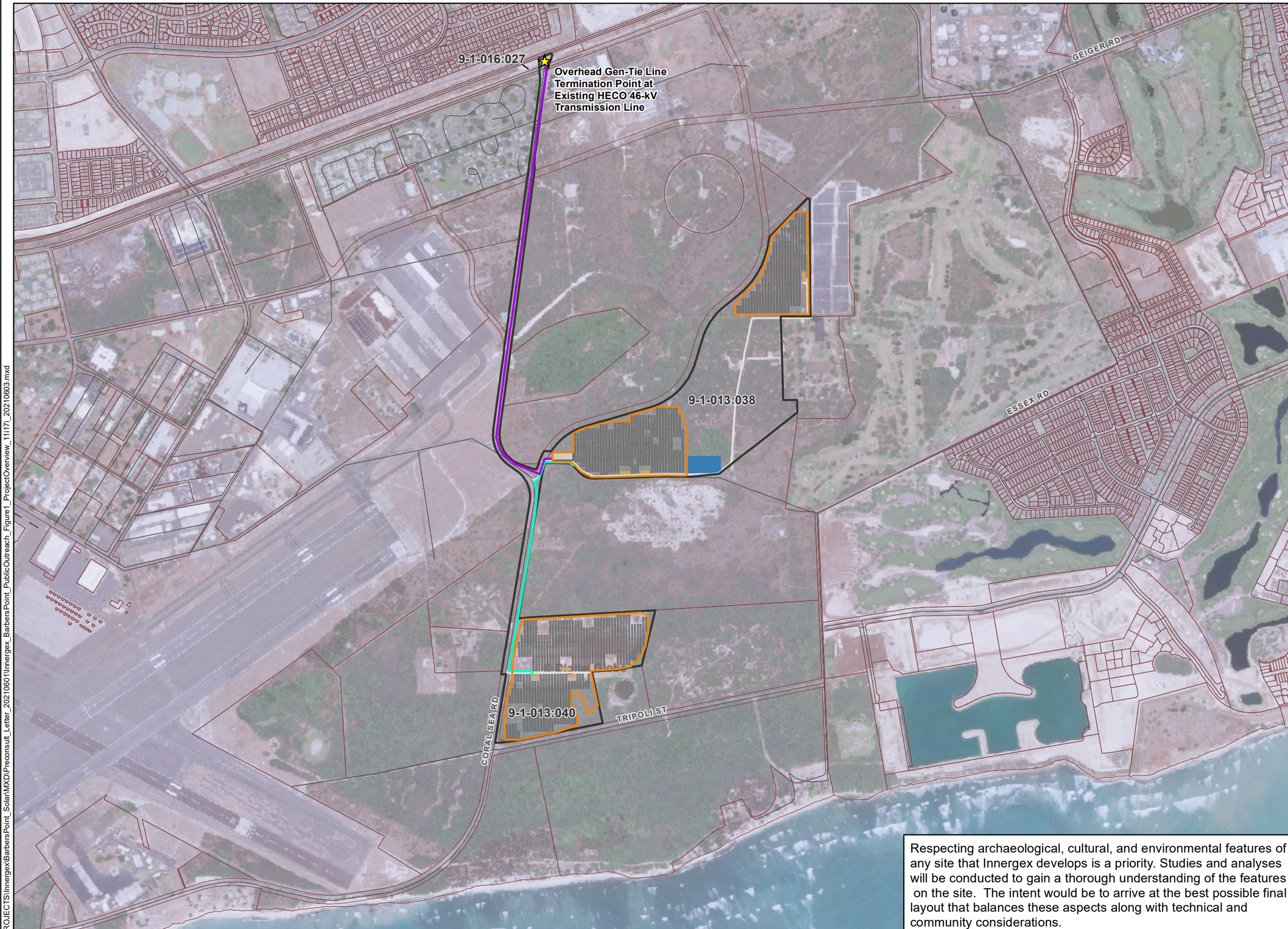
cc: Pacific Islands Fish and Wildlife Office, USFWS
Tiffany Agostini, Tetra Tech
Leslie McClain, Tetra Tech

Barbers Point Solar Project

Figure 1 Conceptual Project Overview

HONOLULU COUNTY, HI



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Innergex Renewable Development USA LLC

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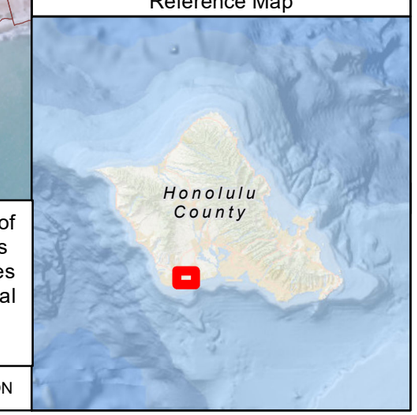

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McClain, Leslie

Subject: FW: [EXTERNAL] FW: Barbers Point Solar Project

From: Asman, Lindsy <Lindsy_Asman@fws.gov>
Sent: Wednesday, July 21, 2021 8:49 AM
To: Agostini, Tiffany <Tiffany.Agostini@tetratech.com>
Subject: Re: [EXTERNAL] FW: Barbers Point Solar Project

⚠ **CAUTION:** This email originated from an external sender. Verify the source before opening links or attachments. ⚠

Hi Tiffany, thank you for checking. I did get the reports. Sounds like there is no federal nexus, so the applicant won't be pursuing section 7 consultation.

Let me know if I can be of any further assistance.

From: Agostini, Tiffany <Tiffany.Agostini@tetratech.com>
Sent: Wednesday, July 21, 2021 8:28 AM
To: Asman, Lindsy <Lindsy_Asman@fws.gov>
Subject: RE: [EXTERNAL] FW: Barbers Point Solar Project

Aloha Lindsy –

I just wanted to check in to make sure you received the 2 reports and see if you have any questions.

Hope you are well!

Thanks,
Tiffany

From: Agostini, Tiffany
Sent: Friday, July 9, 2021 9:23 AM
To: Asman, Lindsy <Lindsy_Asman@fws.gov>
Subject: RE: [EXTERNAL] FW: Barbers Point Solar Project

Hi Lindsy –

Here is the akoko report. If you could confirm receipt of both reports that would be great.

Happy Friday,
Tiffany

From: Asman, Lindsy <Lindsy_Asman@fws.gov>
Sent: Friday, July 9, 2021 7:22 AM
To: Agostini, Tiffany <Tiffany.Agostini@tetratech.com>
Subject: Re: [EXTERNAL] FW: Barbers Point Solar Project

⚠ **CAUTION:** This email originated from an external sender. Verify the source before opening links or attachments. ⚠

Thank you for the letter Tiffany, can you also send the two reports referenced in the letter. Thank you!

Lindsy

From: Agostini, Tiffany <Tiffany.Agostini@tetratech.com>
Sent: Thursday, July 8, 2021 4:54 PM
To: Asman, Lindsy <Lindsy_Asman@fws.gov>
Subject: [EXTERNAL] FW: Barbers Point Solar Project

This email has been received from outside of DOI - Use caution before clicking on links, opening attachments, or responding.

Hi Lindy,

I sent you the 2 Barbers Point Solar survey reports yesterday, but the file size was pretty big. Can you please confirm you received them?

Thanks,
Tiffany

From: Agostini, Tiffany
Sent: Tuesday, July 6, 2021 6:02 PM
To: Asman, Lindsy <Lindsy_Asman@fws.gov>
Cc: Julia Mancinelli <jmancinelli@innergex.com>; McClain, Leslie <Leslie.McClain@tetratech.com>; pifwo_admin@fws.gov
Subject: RE: Barbers Point Solar Project

Aloha Lindsy,

Thank you so much for your previous coordination and input on the Barbers Point Solar Project. Since our previous meeting, Barbers Point Solar LLC has modified the Project Study Area, as shown in Figure 1. No federally owned lands will be utilized for the Project and no federal action is required. Additional information is provided in the attached letter. I am also attaching our Revised Draft Biological Resources Survey Report and the Project's Draft 'Akoko (*Euphorbia skottsbergii* var. *skottsbergii)* Survey Report.

Please feel free to reach out if you have any questions. We look forward to receiving your input.

Thank you,
Tiffany

Tiffany Bovino Agostini | **Senior Biologist/ Project Manager**
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From: Asman, Lindsy <Lindsy_Asman@fws.gov>
Sent: Monday, March 29, 2021 10:09 AM
To: Agostini, Tiffany <Tiffany.Agostini@tetratech.com>
Cc: Julia Mancinelli <jmancinelli@innergex.com>; McClain, Leslie <Leslie.McClain@tetratech.com>
Subject: Re: [EXTERNAL] RE: Barbers Point solar project.

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Good morning all. The survey methodology looks great. Our biologists have recently been surveying the refuge south of the NTSR and STSR and are seeing ‘akoko sprouting up in dense buffel grass and other non-native vegetation. They say they were literally standing right next to it and did not see it. Good luck and please let us know if we can be of any assistance.

Mahalo,

Lindsy

From: Agostini, Tiffany <Tiffany.Agostini@tetratech.com>
Sent: Tuesday, March 23, 2021 9:10 AM
To: Asman, Lindsy <Lindsy_Asman@fws.gov>
Cc: Julia Mancinelli <jmancinelli@innergex.com>; McClain, Leslie <Leslie.McClain@tetratech.com>
Subject: RE: [EXTERNAL] RE: Barbers Point solar project.

Aloha Lindsy –

Please see attached for our proposed survey methods for the wet season ‘akoko survey for Barbers Point Solar. We are planning to start our surveys on April 8th. We greatly appreciate your timely review of this document so that we don’t miss the wet season survey window.

Following up on our question about *Euphorbia skottsbergii* var. *skottsbergii* in the STSR, can you tell us when it was recorded there and generally what area? That will help with our efforts in Survey Area 4 (see attached figure) if surveying that area is required for the project.

Feel free to call me if you have any questions or concerns. 808-271-7274.

Thanks,

Tiffany

From: Agostini, Tiffany
Sent: Thursday, March 4, 2021 7:39 AM
To: Asman, Lindsy <Lindsy_Asman@fws.gov>
Cc: Julia Mancinelli <jmancinelli@innergex.com>; McClain, Leslie <Leslie.McClain@tetratech.com>
Subject: RE: [EXTERNAL] RE: Barbers Point solar project.

Mahalo Lindsy for the thorough feedback. Please see our responses and questions in **blue** below.

Aloha,
Tiffany

From: Asman, Lindsy <Lindsy_Asman@fws.gov>
Sent: Tuesday, March 2, 2021 3:52 AM
To: Agostini, Tiffany <Tiffany.Agostini@tetratech.com>
Cc: Julia Mancinelli <jmancinelli@innergex.com>; McClain, Leslie <Leslie.McClain@tetratech.com>
Subject: Re: [EXTERNAL] RE: Barbers Point solar project.

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Hello Tiffany, Leslie, and Julia,

I have attached the 2008 and 2012 survey reports for ‘akoko at the Barbers Point NTSR (Northern Trap and Skeet Range) and STSR (Southern Trap and Skeet Range). A few thoughts for your consideration:

1. The 2008 report is outdated and much of the content no longer applies. For example, the 2008 report was written prior genetic analysis, which demonstrated the Moloka‘i ‘akoko were a different genetic species. The ‘akoko on the NTSR are the last remaining wild population which requires special consideration. The only other ‘akoko populations are transplanted populations 1) within critical habitat on the Wildlife Refuge at Kalaeloa (outplanted), and 2) at the Heritage Site, adjacent to the NTSR. **We agree.**
2. The 2012 survey was considered a comprehensive survey for ‘akoko on the STSR and NTSR. ‘Akoko were documented to be present within the STSR parcel (Parcel ID 9-1-103042) and the NTSR (Parcel ID 9-1-103039) in 2012. We recommend you survey the STSR and western side of the NTSR in the

same manner as proposed for the northern portion of the NTSR as discussed (i.e., within 110 m of any proposed activity associated with the project). Site conditions change and the NTSR and STSR contains habitat features that foster the likelihood of ‘akoko establishment (i.e., raised coral outcrop, seed bank, adjacent occupancy [Heritage site], former occupancy, etc.) given conducive conditions, like precipitation. ‘Akoko plants may be present within the NTSR and STSR including within areas where there is invasive vegetation. We expect the NTSR and STSR may contain areas where ‘akoko could have established since the 2012 surveys. **You state above akoko was present in the STSR, but Art’s 2012 report states the species was not observed within STSR, and “Prime ‘akoko habitat was not observed in this parcel either because there was no organic substrate to grow on the exposed bedrock, or the area was covered by thick non-native vegetation.” Which year was akoko last recorded in the STSR, and can you tell us rough abundance in the STSR when it was last recorded?**

3. The 2008 and 2012 surveys were considered comprehensive assessments of ‘akoko at that time. However, currently we do not rely on these surveys to determine ‘akoko presence. We consider characteristics of a site to determine whether ‘akoko, and the other 16 plants for which the site is designated as critical habitat, are present on a site or whether the plants could potentially occupy the site if restored. Current comprehensive surveys of the sites are necessary to assess occupancy or likelihood of future occupancy. We recommend consideration of future site conditions and likelihood of listed plant presence adjacent to your project site in the future. If the critical habitat is restored to increase the ‘akoko distribution and abundance, and/or the other listed plants are outplanted to the critical habitat here, these plants may disperse and become established onto your adjacent parcels. This would require future consultation for associated effects from the maintenance and operations of the solar development (the plants are protected where ever they are found). Should this occur, reinitiation of the consultation would be necessary to evaluate effects that were not considered in the original consultation. Surveying the portions of the STSR and NTSR within 110 m of your project would a) establish a baseline should future occupancy occur, and b) aid in your evaluation of potential need to reinitiate the consultation. **Understood. Does the Service have data on the likely natural dispersal distance of *Euphorbia skottsbergii* var. *skottsbergii*?**
4. I spoke with our botanists and biologists who have been part of the Barbers Point ‘akoko listing and critical habitat designation process. Due to the density of vegetation currently at the site we do not believe ‘akoko present on the sites would be visible at 10-meter distances between surveyors. The methodology I sent you previously includes 10-meter distances between surveyors, which was considered sufficient during the 2008 and 2012 surveys, when there was higher abundance and distribution of ‘akoko and lower density of invasive vegetation (it was easier to see ‘akoko then). Currently, based on our recent visit to the sites (Feb 2020), we expect the current density of invasive vegetation on the NTSR/STSR would be prohibitive of seeing ‘akoko and the distance between surveyors needs to be shortened to account for this. During our site visit in 2020 the buffel grass was relatively dense, which would not prohibit the establishment of ‘akoko, but would prohibit a clear view of ‘akoko plants, especially young plants or those without leaves. We suggest a maximum of 5 meters between surveyors to ensure adequate visibility of ‘akoko. **Understood. We are ok with 5 m with 2-3 botanists.**
5. I did a quick review of the survey report and don't have any comments at this time. I will go through the report again in finer detail later, next week, and provide any comments if I have any. **Great, thanks!**

Thank you for your early coordination and please reach out to me with any questions or if I can be of any assistance.

Thank you,

Lindsy

From: Agostini, Tiffany <Tiffany.Agostini@tetratech.com>
Sent: Thursday, February 25, 2021 10:01 AM
To: Asman, Lindsy <Lindsy_Asman@fws.gov>
Cc: Julia Mancinelli <jmancinelli@innergex.com>; McClain, Leslie <Leslie.McClain@tetratech.com>
Subject: RE: [EXTERNAL] RE: Barbers Point solar project.

Mahalo, Lindsy! These methods align closely with what we had planned. I will send you a more formal methodology, incorporating some new info including resumes of the 3 botanists.

Are you able to also send us the survey data from the 2008 and 2012 surveys? We had digitized the points from Art's report, but the more accurate points would be great.

Thanks,
Tiffany

From: Asman, Lindsy <Lindsy_Asman@fws.gov>
Sent: Wednesday, February 24, 2021 1:48 PM
To: Agostini, Tiffany <Tiffany.Agostini@tetratech.com>
Cc: Julia Mancinelli <jmancinelli@innergex.com>; McClain, Leslie <Leslie.McClain@tetratech.com>
Subject: Re: [EXTERNAL] RE: Barbers Point solar project.

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Hello everyone,
It was great talking with you all. I will review the report you attached and get back to you with any comments or suggestions.

In the interim I have attached a survey methodology for surveying 'akoko.

Please let me know if there are any questions or if I can be helpful in any way.

From: Agostini, Tiffany <Tiffany.Agostini@tetratech.com>
Sent: Friday, February 19, 2021 8:16 AM
To: Asman, Lindsy <Lindsy_Asman@fws.gov>
Cc: Julia Mancinelli <jmancinelli@innergex.com>; McClain, Leslie <Leslie.McClain@tetratech.com>
Subject: [EXTERNAL] RE: Barbers Point solar project.

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Aloha Lindsy,

Thanks again for your time to discuss the Barbers Point Solar Project.

Attached is the draft biological report that was provided to Becca and DOFAW. Please note that after this draft was submitted we have conducted additional pueo surveys and initiated planning for wet season ‘akoko surveys in portions of the Study Area and in the adjacent occupied Navy parcel. Upon receiving comments from you folks we will update the biological report to reflect any changes.

We look forward to receiving your comments, ‘akoko location data on TMK 9-1-013:039, as well as the recommended plant survey protocol you mentioned during our call.

Mahalo,
Tiffany

From: Asman, Lindsy <Lindsy_Asman@fws.gov>
Sent: Monday, February 8, 2021 9:03 AM
To: Agostini, Tiffany <Tiffany.Agostini@tetratech.com>
Subject: Barbers Point solar project.

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Hi Tiffany, Darren assigned the Barbers Point solar project to me. Let's set up a time to chat on the phone and discuss the project.

I am free tomorrow after 11 am flexible the remainder of the week. Email me a good time to talk.

Lindsy

Lindsy Asman
U.S. Fish and Wildlife Service
Pacific Island Fish and Wildlife Office
300 Ala Moana Blvd., Room 3-122, Honolulu, HI 96850
Office Phone 808-792-9490
Check out our website! https://www.fws.gov/pacificislands/

APPENDIX E. CULTURAL IMPACT ASSESSMENT

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Pacific Legacy

Historic Preservation

DRAFT

CULTURAL IMPACT ASSESSMENT OF THE BARBERS POINT SOLAR PROJECT, HONOULIULI AHUPUA‘A, ‘EWA DISTRICT, ISLAND OF O‘AHU

[TMK: (1) 9-1-013:038, (1) 9-1-013:040, AND (1) 9-1-016:027 (POR.)]

CULTURAL RESOURCES CONSULTANTS

Hawai‘i Offices:
Kailua, O‘ahu

California Offices:
Business Office
Bay Area
Sierra/Central Valley

Pacific Legacy: Exploring the past, informing the present, enriching the future.

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DRAFT

CULTURAL IMPACT ASSESSMENT OF THE BARBERS POINT SOLAR PROJECT, HONOULIULI AHUPUA‘A, ‘EWA DISTRICT, ISLAND OF O‘AHU

[TMK: (1) 9-1-013:038, (1) 9-1-013:040, AND (1) 9-1-016:027 (POR.)]

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September 2021

ABSTRACT

As part of the Environmental Assessment process, Barbers Point Solar, LLC, requested a Cultural Impact Assessment (CIA) for the proposed Barbers Point Solar Project, located in Honouliuli Ahupuaʻa, ʻEwa District, Oʻahu [TMK: (1) 9-1-013:038 and 040]. This assessment is based upon archival research as well as ethnographic interviews. Under Act 50, the Hawaii 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.

The results of archival research indicate that the general area of ʻEwa Plain has a long and rich cultural history. From the archaeological record, traditional stories and myths, and historic documents attributed to the vast plain, it is evident that these lands have been the backdrop to many significant acts in Oʻahu's pre- and post-Contact history. Archival research indicated that a major feature of pre-Contact and early post-Contact Honouliuli, the Kualakaʻi Trail, passed near to the project area. Though the trail is no longer discernible within the project area, cultural resources, such as archaeological features attributed to this trail, may exist beneath the plantation-era soil. Numerous archaeological and architectural studies have been conducted within the project area and surrounding region, and these studies highlight the intensive use of this area during the pre-Contact period as well as the post-Contact period, including extensive military development during the 20th century.

For this study, two interviews were conducted and information was shared by one cultural informant via email. A site visit with the three participants was also arranged. Based on these consultations, previously identified archaeological resources, including deposits that are potentially contained within the numerous limestone pits in the area, were identified as being potentially impacted by the proposed development. This includes the possible presence of *iwi kūpuna*, or human ancestral remains. Through interviews conducted as part of this CIA, one feature that had been previously identified as a military or ranching feature was identified as a *kahua* used during Makahiki. No traditional cultural practices were noted as being carried out currently within the project area.

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Note: In this report, the spellings and the use of diacritical marks (glottal stops and macrons) follow conventions issued by Pukui and Elbert (1986) and Pukui et al. (1974) with limited exceptions – spellings and diacritical marks are used as the original sources used them in quotations, titles, and proprietary names. For example Pohakuloa Training Area is used without the macron in "Pohakuloa" because it is part of the name of the installation, but when referring to the region in general, the Hawaiian name "Pōhakuloa" is used.

Cover Image: Overview of invasive vegetation within the *kahua* (Makahiki grounds) in Parcel 40.

GLOSSARY OF HAWAIIAN WORDS USED IN THE TEXT

Most of these definitions are from the *Hawaiian Dictionary* by Mary Kawena Pukui and Samuel H. Elbert, published in 1986.

ahupuaʻa	traditional land division usually extending from the mountains to the sea and encompassing a range of environmental zones that were known and used by the land's early Hawaiian residents. It was "so called because the boundary was marked by a heap (*ahu*) of stones surmounted by an image of a pig (*puaʻa*), or because a pig or other tribute was laid on the altar as tax to the chief" (Pukui and Elbert 1971:8).
ʻāina	land, earth
aliʻi	the chiefly class in Hawaiian society
ʻāpana	land parcel portion, a term commonly used in *kuleana* land claims in the Māhele
heiau	traditional temple or shrine
helu	number, a term commonly used in *kuleana* land claims in the Māhele, e.g., LCA Helu 1004
hōlua	sled used on grassy slopes; the sled course
ʻili	land section, next in importance to *ahupuaʻa* and usually a subdivision of an *ahupuaʻa*
imu	underground oven
iwi kupuna	ancestral remains; pl. *iwi kūpuna*
kahua	an open place for camping or sports, such as *ʻulu maika* or *hōlua* sliding
kapu	taboo; ancient Hawaiian code of conduct covering all aspects of life, including lifestyle, gender roles, politics, and religion, that was strictly enforced until its abolishment in 1819.
kauhale	group of houses comprising a Hawaiian home
kiawe	Algaroba tree (*Prosopis pallida*), first planted in 1828 in Hawaiʻi. In dry areas, it has become one of the commonest trees.
konohiki	head of an *ahupuaʻa* land division under the chief. In some cases, land or fishing rights were under control of the *konohiki*.
kuleana	right, responsibility, property; the term is often used to refer to lands awarded to native claimants during the Māhele ʻAina, the land division of 1848, native tenant land holding
loʻi	irrigated terrace , especially for taro, but also for rice
makaʻāinana	the commoner class of native Hawaiians who tended to the land under the pre-Māhele land system
makai	seaward
mālama	to care for; to preserve and protect
manaʻo	thoughts, ideas, opinions, beliefs

mauka	inland
moku	land division, district; usually a subdivision of an island and containing several *ahupuaʻa*
moʻolelo	story; a tradition
ʻuala	sweet potato (*Ipomoea batatas*), a tuber that is a valuable staple food in Hawaiian culture.
ʻulu	breadfruit (*Artocarpus altilis*)
ʻulu maika	stone used in a game similar to bowling
wahi kūpuna	ancestral place

1.0 INTRODUCTION

Pacific Legacy, Inc. was contracted by Barbers Point Solar, LLC to prepare a Cultural Impact Assessment (CIA) for the proposed development of the Barbers Point Solar Project in Honouliuli Ahupuaʻa, ʻEwa District, Oʻahu Island.

Barbers Point Solar LLC is proposing to build and operate the Barbers Point Solar Project that will consist of a 15-megawatt (MW) solar photovoltaic (PV) system coupled with a 4-hour, 15-MW, 60-megawatt-hour (MWh) PV-coupled battery energy storage system. The Project will be primarily located on tax map keys (TMK) (1) 9-1-013:038 and 9-1-013:040, which are owned by Department of Hawaiian Home Lands (DHHL). Project electrical collector and transmission lines will also be located within rights-of-way owned by Hawaiʻi Department of Transportation (HDOT) (Coral Sea Road and Roosevelt Avenue), as well as within a portion of TMK: (1) 9-1-016:027, owned by Kapolei Infrastructure, LLC (Figure 1). Most of the project area was developed during the mid-twentieth century into the Marine Corps Air Station Ewa (MCAS Ewa) and was later expanded into the Naval Air Station Barber's Point (NASBP).

1.1 PURPOSE

Pacific Legacy, Inc. has prepared this CIA in keeping with Articles IX and XII of the state constitution, that requires government agencies to promote and protect cultural beliefs, practices, and resources of Native Hawaiians and other ethnic and collective groups in accordance with the Office of Environmental Quality Control's (OEQC) Guidelines for Assessing Cultural Impacts adopted by the State of Hawaiʻi Environmental Council in 1997 and amended in 2000 (Appendix A). Through archival research and cultural consultation efforts, this CIA provides an assessment of potential impacts to cultural beliefs, cultural practices, traditional cultural properties, and any physical properties human-made or natural that support these cultural practices or beliefs.

To determine the effects of the proposed development on cultural practices, resources, and beliefs, the OEQC's Guidelines for Assessing Cultural Impacts recommends the following tasks be 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.

Hawaiʻi Supreme Court Rulings
In addition, this CIA is done in accordance with a series of Hawaiʻi Supreme Court cases. The rulings reaffirmed the customary and traditional gathering rights of *ahupuaʻa* tenants, including *Kalipi*, *Pele Defense Fund v. Paty*, *Public Access Shoreline Haw. Cnty. Planning Comm'n* (commonly known as PASH), and *Ka Paʻakai O Ka ʻĀina v. Land Use Com'n, State of Hawaiʻi.*

Native Hawaiian subsistence lifestyle in the pre-Contact era centered around the *ahupuaʻa*:

> *Ahupuaʻa* varied in size and shape. A typical *ahupuaʻa* was a long strip of land, narrow at its mountain summit top and becoming wider as it ran down a valley into the sea to the outer edge of the reef. If there was no reef then the sea boundary would be about one and a half miles from the shore [...] People living in one *ahupuaʻa* were free to use whatever grew wild in that *ahupuaʻa* [...] Why did the chiefs divide the land into sections running from the mountains to the sea? They realized that within these sections were three different areas important to life in early Hawaiʻi: upland, plain and sea. They knew that together these three areas contained the range of products and resources their people needed to survive. (Williams 1996:13–16)

In the pre-Contact Native Hawaiian way of life, every environ from mountain to sea, and its resources, were accessible to all, in support of not just subsistence practices, but cultural and religious practices, as well. The introduction of private land ownership from the West affected this former way of life, which brought about the need for protection of Native Hawaiian gathering rights.

These indigenous cultural practices are protected in Hawaiʻi under the State Constitution. The Hawaiʻi Constitution, Article XII, Section 7, states

> The State reaffirms and shall protect all rights, customarily and traditionally exercised for subsistence, cultural and religious purposes and possessed by ahupuaʻa tenants who are descendants of native Hawaiians who inhabited the Hawaiian Islands prior to 1778, subject to the right of the State to regulate such rights.

A series of Hawaiʻi Supreme Court cases reaffirmed the customary and traditional gathering rights of *ahupuaʻa* tenants, most notably *Ka Paʻakai O Ka ʻĀina v. Land Use Com'n, State of Hawaiʻi*.

> In *Ka Paʻakai O Ka ʻĀina*, the Supreme Court provided further direction on the constitutional and statutory responsibility of state agencies to preserve and protect the rights of native Hawaiians to carry-out their traditional and customary practices to the extent feasible and, in so doing, "the Court introduced an analytical framework that governmental agencies must specifically consider when balancing their obligations to protect traditional and customary practices against private property (as well as competing public) interests." (MacKenzie et al. 2015:1109).
>
> In *Ka Paʻakai O Ka ʻĀina*, 94 Haw. at 35, 7 P.3d at 1072, the Court held that the State Land Use Commission (LUC) failed to satisfy its constitutional and statutory obligations to preserve and protect customary and traditional rights of native Hawaiians (Belatti 2003) [...]
>
> The Court stated that the LUC, as the reviewing state agency, must consider and make express findings of fact and conclusions of law regarding the cultural, historical, and natural resources of a subject property as they relate to Native Hawaiian rights when determining what restrictions should be placed on land use. [...]

> The Court [...] remanded the case to the LUC to make findings of fact and conclusions of law relating to:
>
> > (1) the identity and scope of "valued cultural, historical, or natural resources" in the petition area, including the extent to which traditional and customary native Hawaiian rights are exercised in the petition area;
> >
> > (2) the extent to which those resources - including traditional and customary native Hawaiian rights - will be affected or impaired by the proposed action; and,
> >
> > (3) the feasible action, if any, to be taken by the LUC to reasonably protect native Hawaiian rights if they are found to exist.
>
> The Court's framework seeks "to effectuate the State's obligation to protect native Hawaiian customary and traditional practices while reasonably accommodating competing private [property] interests." (Lee-Greig et al. 2020:84–87)

In the case of *Kalipi*, the Hawai'i Supreme Court ruled that any argument diminishing traditional native rights is invalid if based on the inconsistency of the exercising of the native rights with today's system of land tenure (private ownership). The Supreme Court extended the rights of native tenants beyond the boundaries of the *ahupua'a* in which they reside in *Pele Defense Fund v. Paty*. In *Public Access Shoreline Haw. v. Haw. Cnty. Planning Comm'n* (commonly known as PASH), the Court ruled that "legitimate customary and traditional practices must be protected to the extent feasible in accordance with article XII, section 7" (Lee-Greig et al. 2020:85).

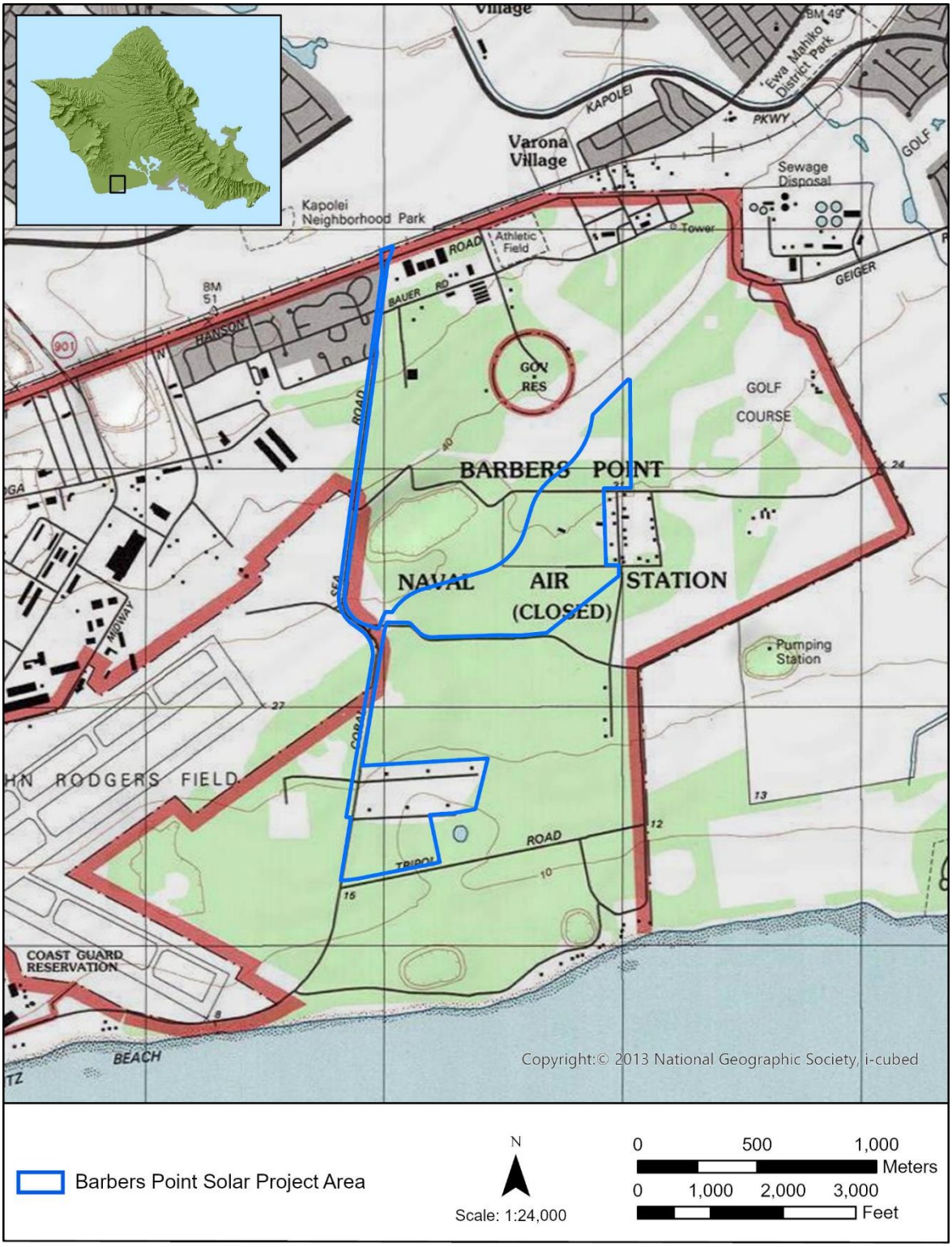

Figure 1. Location of Barbers Point Solar Project Area on USGS Ewa Quadrangle, 2003.

1.2 PROJECT AREA DESCRIPTION

The project area is east of the current Kalaeloa Airport (former NASBP), bounded by Tripoli Street on the south, Coral Sea Road on the west, and Roosevelt Boulevard on the north. The survey area includes three proposed solar array areas (Areas 1, 2, and 3), as well as access roads, electrical collector, and transmission line corridors (Figure 2). The revetment area, situated between Areas 1 and 2, was also included in the survey.

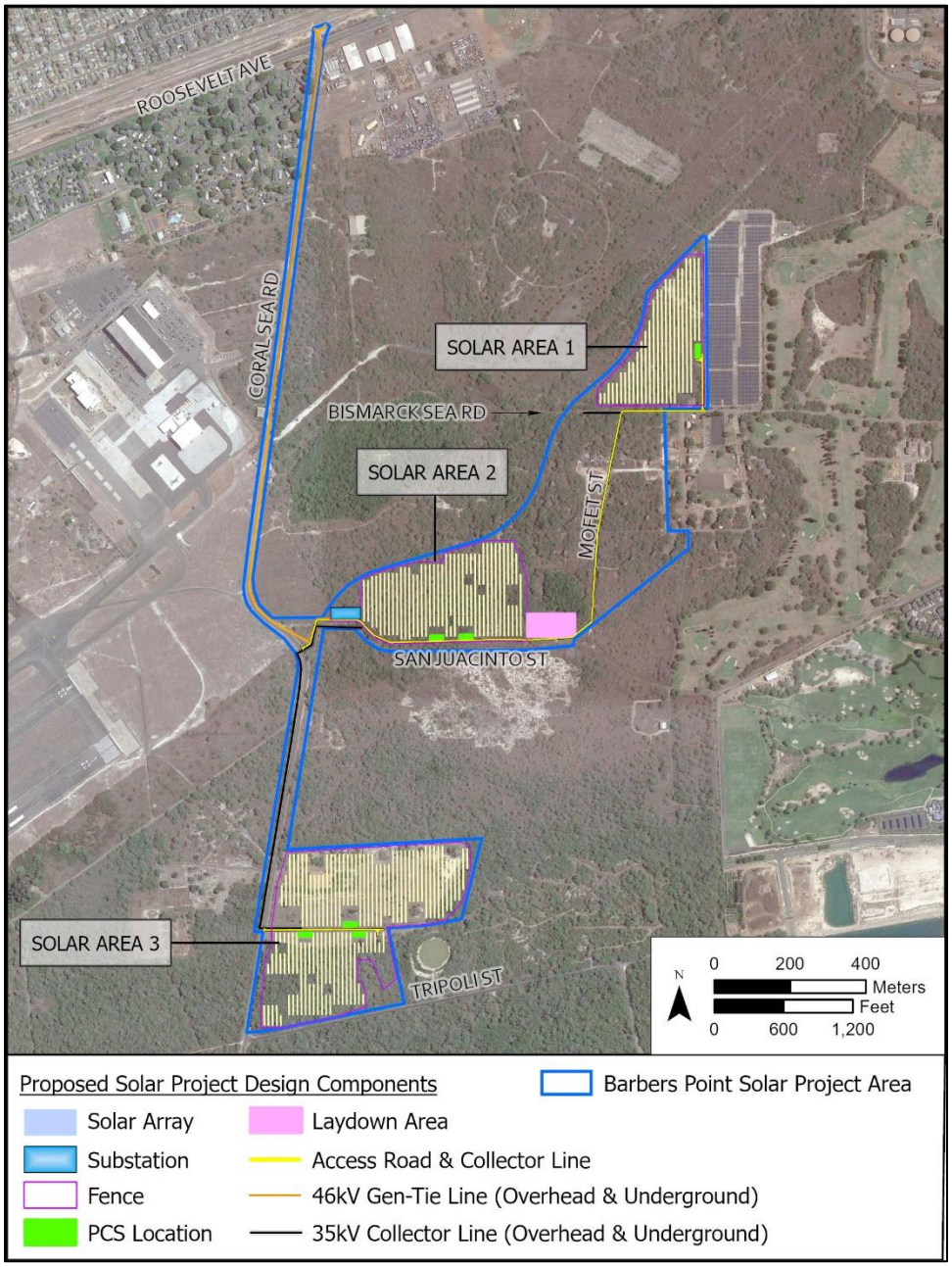

Figure 2. Proposed Barbers Point Solar Project area.

A portion of the survey area is situated in between Solar Area 1 and Solar Area 2 and a portion of this area is proposed for use by the Barbers Point Solar Project to connect the two solar array areas. This area contains historic aircraft revetments and associated structures. Much of the survey area has been modified extensively during construction of these and other twentieth-century U.S. military facilities.

1.3 CIA STUDY AREA

In keeping with the guidelines of the OEQC, in addition to the Hawai‘i Supreme Court rulings on the aforementioned court cases, the CIA study area includes the entire *ahupua‘a* of Honouliuli. The present report includes descriptions of the environment, traditional accounts, and post-Contact records concerning the activities conducted throughout Honouliuli Ahupua‘a.

1.4 ENVIRONMENT

The project area is located on the ‘Ewa Plain in the southwestern corner of O‘ahu Island, ascending gradually from approximately 10 to 40 ft above mean sea level. The project area lies between 0.6 and 2.6 km north-northeast of the ‘Ewa Plain’s southern coastline.

The project area is composed of Pleistocene limestone outcrop formed from coral reefs when sea levels were upwards of 7.5 m (24.6 ft) above current sea levels (McDonald et al. 1983:420–421). Following a drop in sea level and uplifting of O‘ahu Island, the exposed coral reef was eroded into a karst topography characterized by limestone sinks and subsurface caverns (Ziegler 2002:96). The sinks are typically “bell-shaped” in cross-section because of rainwater erosion that was more corrosive in the sink interiors due to a slower evaporation rate and mixing with groundwater (Ziegler 2002:97).

The limestone outcrop is covered with terrigenous soils eroded from the Wai‘anae Mountains in the northern portion of the project area. These soils are classified as Mamala cobbly silty clay loam with 0 to 12 percent slopes (Figure 3). A former airfield also in the northern portion of the project area is classified as land fill.

Annual rainfall on the ‘Ewa Plain averages 20 inches with the greatest amount of rainfall occurring in January with an average of 4.1 inches (Tuggle and Tomonari-Tuggle 1997:5). The variable rainfall throughout the year indicates the ‘Ewa Plain endured periods of drought and sometimes heavy rain. Although no intermittent or permanent streams exist in the project area, the water table was likely higher during the pre-Contact era and once provided an important water source. When the water table lowered, water was captured in the multitude of limestone sinks on the ‘Ewa Plain, including a large water-filled sink (Ordy Pond) adjacent to the project area (Tuggle and Tomonari-Tuggle 1994:8).

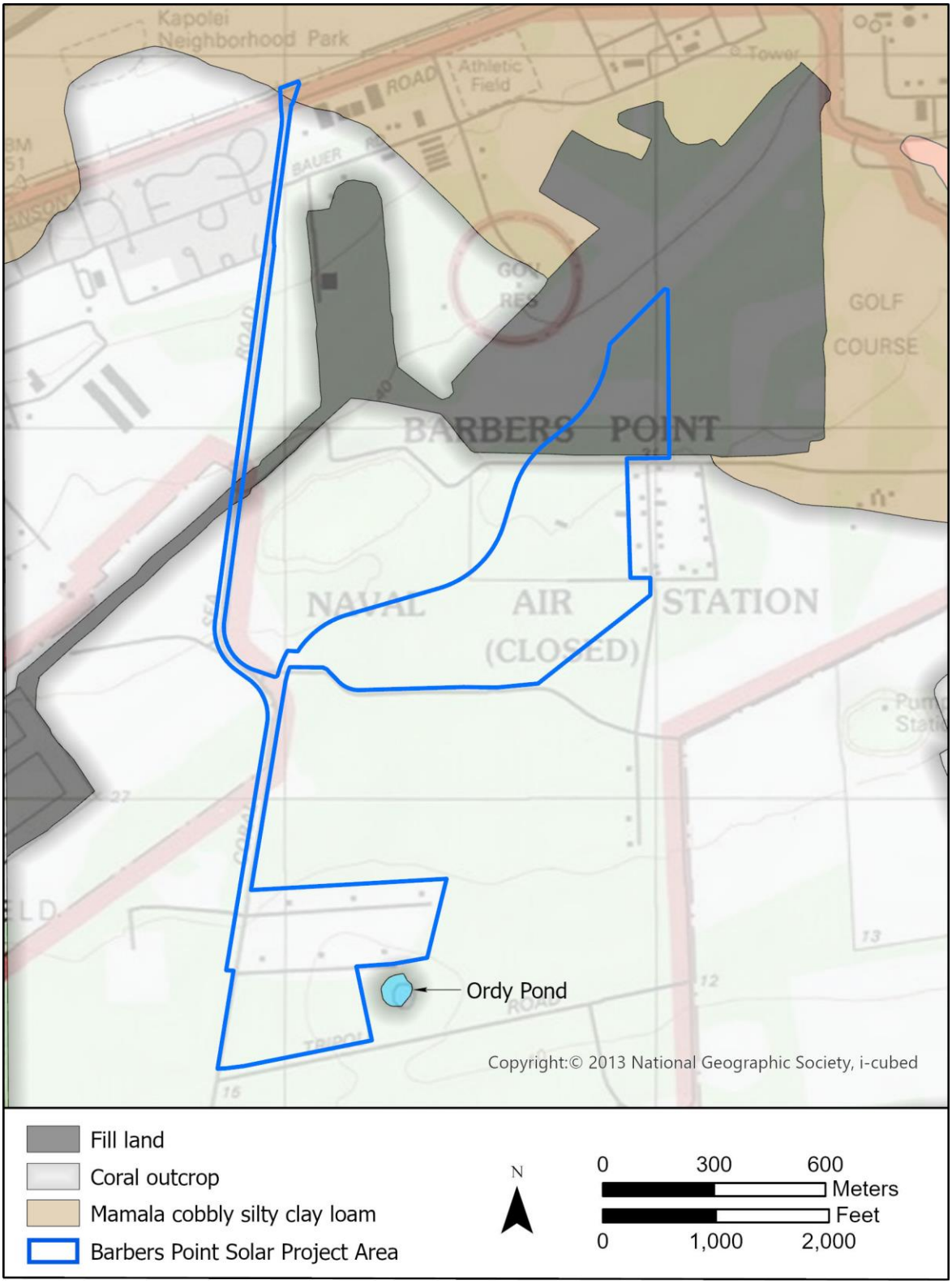

Figure 3. Soil classifications in the project area (Soil Survey Staff 2020).

2.0 METHODS

The methodology used in the preparation of this CIA followed the OEQC's Guidelines for Assessing Cultural Impacts (Appendix A).

2.1 ARCHIVAL RESEARCH

Pacific Legacy, Inc. conducted extensive archival research including the compilations of historic maps from the Hawai'i State Survey office, previous archaeological studies from the Hawai'i State Historic Preservation Division Office, relevant cultural impact studies from the Office of Environmental Quality Control (OEQC) online library. Information on mid-nineteenth-century Land Commission Awards (LCAs) was obtained from Waihona 'Aina Corporation's database (Waihona 'Aina 2000).

2.2 CONSULTATION

Initial letters soliciting participation in the proposed Barbers Point Solar Project CIA and requesting identification of knowledgeable individuals to be interviewed for the CIA were either mailed or emailed to 16 individuals, cultural groups, and government entities. Section 4 includes a list of these recipients, their affiliation with the proposed project area, and participation, if any, with the current CIA. While no response was received from 10 of the groups or individuals, 6 responded with referrals or additional information about the proposed project and 3 individuals agreed to participate in consultation for the CIA. The results of the interviews and correspondence are submitted in this CIA.

3.0 ARCHIVAL RESEARCH

3.1 TRADITIONAL HISTORY

The division of Oʻahu lands into political districts occurred in the 15th century under the rule of Māʻilikūkahi. This division resulted in the creation of 12 districts or *moku* during traditional times: ʻEwa, Kona, Koʻolaupoko, Koʻolauloa, Waialua and Waiʻanae. The Barbers Point Solar Project is located in the traditional land division called Honouliuli Ahupuaʻa, in the ʻEwa District. Honouliuli is the largest *ahupuaʻa* on the island of Oʻahu and forms a portion of the ʻEwa Plain. In general, an *ahupuaʻa* is a land division that extends from mountain to sea, so that people residing there have access to the range of resources in those environments, from marine resources to upland agriculture and everything in between (Alexander 1882:4).

3.1.1 Land Divisions and Named Places

In traditional Native Hawaiian culture, names are given to places of significance, and those names carry meaning. Thus, place names can convey much about the mythology of a place, the physical characteristics of a place, the qualities of the people who resided there, etc. Pukui et al. (1974) published a glossary entitled *Place Names of Hawaii*. In the preface, Samuel Elbert writes

> Hawaiians named taro patches, rocks and trees that represented deities and ancestors, sites of houses and *heiau* (places of worship), canoe landings, fishing stations in the sea, resting places in the forests, and the tiniest spots where miraculous or interesting events are believed to have taken place. (Pukui et al. 1976:x)

The Barbers Point Solar Project area is within the *ahupuaʻa* of Honouliuli, in the *moku* of ʻEwa. The traditional name for Barbers Point is Kalaeloa. See Table 1 for the definitions of these place names, as well as the places shown on the Figure 4 map.

Table 1. Place Names Associated with the Project Area

Place Name	Meaning, Description	Pg. No. in Pukui et al. 1974
ʻEwa	"crooked"	28
Honouliuli	"dark bay"	51
Kalaeloa	"the long point"; the southwest point of Oʻahu	72
Kanehili	Not listed in Pukui et al. 1974; however, *kane* is defined in Pukui and Elbert 1986 as Tinea, a fungus skin disease (ringworm). *Kāne* (note the diacritical) may be related and has the following potentially applicable definitions: 1. male; 2. the leading of the four great Hawaiian gods; 3. name given at ʻEwa for the Tahitian banana known as *polapola* and *hēʻī*. The following definitions for *hili* from Pukui and Elbert 1986 may be applicable: 1. to braid or plait; 2. to turn aside, deviate, wander, stray; 3. to whip, smite, thrash, batter.	n/a

Place Name	Meaning, Description	Pg. No. in Pukui et al. 1974
Keahi	"the fire"; point west of Pearl Harbor noted for *ʻōʻio* fish and as a surfing site	100
Kualakaʻi	*Tethys* (a sea creature); a spring here is called Hoaka-lei (lei reflection) because Hiʻiaka picked *lehua* flowers here to make a lei and saw her reflection in the water	119
Puʻukapolei	Variantly as Puʻu-o-kapolei. Kapolei means "beloved Kapo" (a sister of Pele). Puʻu means "hill." The pig-man demigod, Kamapuaʻa, established his grandmother here as queen after conquering most of Oʻahu.	203
Puʻuloa	"long hill"; land section, camp, salt works, station, street, playground, beach park, village, area east of Pearl Harbor, and old name for Pearl Harbor; it is said that breadfruit were brought here from Samoa	200–201
Puʻupālailai	"young *lai* fish hill"	205
Waimānalo	"potable water"; land division, road, and gulch in Barber's Pt. quad; site of the home of Chief Kākuhihewa	225

The name of the rains in Honouliuli is Nāulu. In the *moʻolelo* of the journey of Hiʻiaka, sister of the goddess Pele, Hiʻiaka travels to ʻEwa and describes it as dry, calling out to the Nāulu clouds to relieve the people.

ʻAʻole au e hele i ke kaha o Kaupeʻa	*I shall not tread Kaupeʻa's expanse*
Kēlā kaha kūpā koili a ka lā i ek kula	*That stretch where the sun beats down on the plain*
Ua kūpono aʻela ka lā i ka piko o Wākea	*The sun is right overhead, at the navel of Wākea*
Ola i ke ahe a ka makani Māunuunu	*I am spared by the Māunuunu wind*
I ka hapahapai mai a ka makani ʻAoʻaoa	*By the uplifting ʻAoʻaoa breeze*
*Ke koi lā i ke ao o ka **Nāulu** e hanini i ka wai*	*Urging the **Nāulu** storm clouds to pour down their waters*
Ola ihola nā kupa kamaʻāina i ka wai a ka ʻōpua	*The natives here survive on water from the clouds*
Ke halihali aʻela nā ʻōpua i ke awa lau	*Which billowing clouds carry along to the branching lochs*

(Akana and Gonzalez 2015:195)

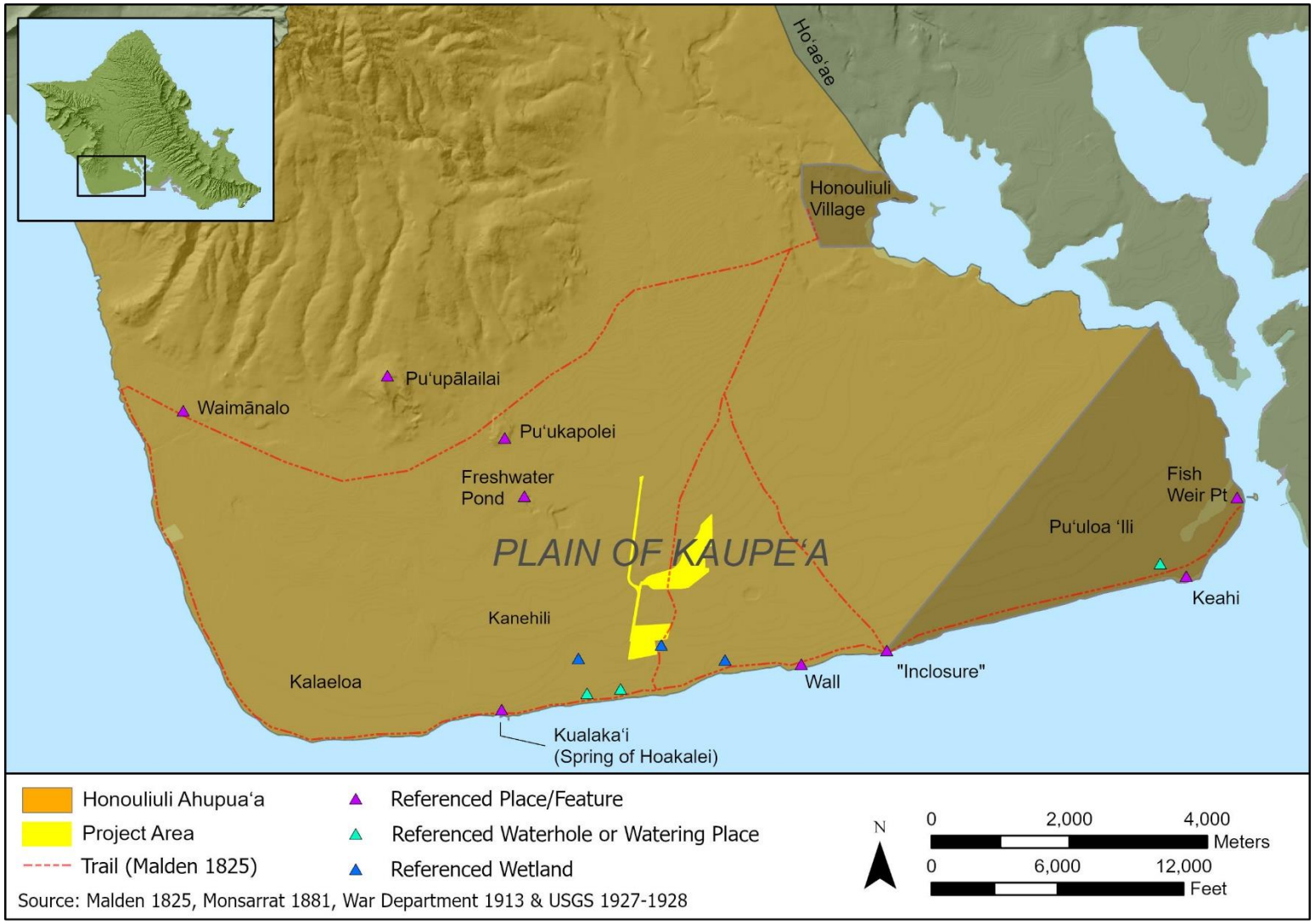

Figure 4. Traditional Hawaiian place names of 'Ewa Moku.

3.1.2 ʻŌlelo Noʻeau

Hawaiian proverbs, or *ʻōlelo noʻeau*, have been passed down through oral traditions. Many *ʻōlelo noʻeau* have been collected and published in Hawaiian language newspapers and other primary and secondary sources. The *ʻōlelo noʻeau* presented below were compiled by Mary Kawena Pukui in the book entitled *ʻŌlelo Noʻeau Hawaiian Proverbs and Poetical Sayings* (Pukui 1983). These *ʻōlelo noʻeau* often have both a literal and metaphorical meaning (called *kaona*). *ʻŌlelo noʻeau* about geographical features and areas can help us to understand natural phenomenon, land use, and the history of a place. There is one *ʻōlelo noʻeau* that is specifically attributed to Honouliuli Ahupuaʻa because of the *ʻanaeholo* fish that would populate the area.

> Ka iʻa hali a ka makani. (1330)
>
> The fish fetched by the wind.
>
> The ʻanaeholo, a fish that travels from Honouliuli, where it breeds, to Kaiapāpaʻu on the windward side of Oʻahu. It then turns about and returns to its original home. It is driven closer to shore when the wind is strong.

According to Pukui, there are fifteen *ʻōlelo noʻeau* that describe the people and attributes of the ʻEwa Moku.

> ʻĀina koi ʻula i ka lepo. (80)
>
> Land reddened by the rising dust.
>
> Said of ʻEwa, Oʻahu.

> Anu o ʻEwa i ka iʻa hāmau leo e. E hāmau! (123)
>
> ʻEwa is made cold by the fish that silences the voice. Hush!
>
> A warning to keep still. First uttered by Hiʻiaka to her friend Wahineʻomaʻo to warn her not to speak to Lohiʻau while they were in a canoe near ʻEwa.

> ʻEwa kai lumalumaʻi. (385)
>
> ʻEwa of the drowning sea.
>
> An epithet applied to ʻEwa, where kauwā were drowned prior to offering their bodies in sacrifice.

> ʻEwa nui a Laʻakona. (386)
>
> Great ʻEwa of Laʻakona.
>
> Laʻakona was a chief of ʻEwa, which was propserous in his day.

Haunāele ʻEwa i ka Moaʻe. (493)

ʻEwa is disturbed by the Moaʻe wind.

Used about something disturbing, like a violent argument. When the people of ʻEwa went to gather the pipi (pearl oyster), they did so in silence, for if they spoke, a Moaʻe breeze would suddenly blow across the water, repilling it, and the oysters would disappear.

He kai puhi nehu, puhi lala ke kai o ʻEwa. (661)

A sea that blows up nehu fish, blows up a quantity of them, is the sea of ʻEwa.

He lōʻihi o ʻEwa; he pali o Nuʻuanu; he kula o Kulaokahuʻa; he hiki mai koe. (768)

ʻEwa is a long way off; Nuʻuanu is a cliff; Kulaokahuʻa is a dry plain; but all will be here before long.

Said of an unkept promise of food, fish, etc. Oʻahu was once peopled by evil beings who invited canoe travelers ashore with promises of food and other things. When the travelers asked when these things were coming, this was the reply. When the visitors were fast asleep at night, the evil ones would creep in and kill them.

I Waialua ka poʻina a ke kai, o ka leo ka ʻEwa e hoʻolono nei. (1263)

The dashing of the waves is at Waialua but the sound is being heard at ʻEwa.

Sounds of fighting in one locality are quickly heard in another.

Ka iʻa hāmau leo o ʻEwa. (1331)

The fish of ʻEwa that silences the voice.

The pearl oyster, which has to be gathered in silence.

Ka iʻa kuhi lima o ʻEwa. (1357)

The gesturing fish of ʻEwa.

The pipi, or pearl osyter. Fishermen did not speak when fishing for them but gestured to each other like deaf-mutes.

Ke kai heʻe nehu o ʻEwa. (1721)

The sea where the nehu come to schools to ʻEwa.

Nehu (anchovy) come by the millions into Pearl Harbor. They are used as bait for fishing, or eaten dried or fresh.

Ke one kuilima laula o ʻEwa. (1776)

The sand on which there was a linking of arms on the breadth of ʻEwa.

ʻEwa, Oʻahu. The chiefs of Waikīkī and Waikele were brothers. The former wished to destroy the latter and laid his plot. He went fishing and caught a large niuhi, whose skin he stretched over a framework. Then he sent a messenger to ask his brother if he would keep a fish for him. Having gained his consent, the chief left Waikīkī, hidden with his best warriors in the "fish." Other warriors joined them along the way until there was a large army. The surrounded the residence of the chief of Waikele and linked arms to form a wall, while the Waikīkī warriors poured out of the "fish" and destroyed those of Waikele.

Ku aʻe ʻEwa; Noho iho ʻEwa. (1855)

Stand-up ʻEwa; Sit-down ʻEwa.

The names of two stones, now destroyed, that once marked the boundary between the chiefs' land (Kuaʻe ʻEwa) and that of the commoners (Noho iho ʻEwa) in ʻEwa, Oʻahu.

O ʻEwa, ʻāina kai ʻula i ka lepo. (2357)

ʻEwa, land of the sea reddened by earth.

ʻEwa was once noted for being dusty, and its sea was reddened by mud in time of rain.

Ua ʻai i ke kāi-koi o ʻEwa. (2770)

He has eaten the kāi-koi taro of ʻEwa.

Kāi is Oʻahu's best eating taro; one who has easten it will always like it. Said of a youth or a maiden of ʻEwa, who, like the kāi taro, is not easily forgotten.

3.1.3 The Mythical Era

Preserved in *moʻolelo* (story) are tales about a period in Hawaiʻi before *kānaka* (humans), when gods and deities inhabited the islands, often bringing about the creation of lands and resources. Below are excerpts of *moʻolelo* that occur in Honouliuli Ahupuaʻa and the larger ʻEwa Moku.

The Name of Honouliuli

An explanation of the name Honouliuli is provided by Westervelt (1915) who attributes the name of this *ʻāina* (land) to an Oʻahu chief who had the same name. In the *moʻolelo Lepe-a-moa,* Chief Honouliuli lives with his wife Chiefess Kapālama. Together they raise their granddaughter Lepea-a-moa in the uplands of Kapālama. As a descendant of Ke-ao-lewa (the-moving-cloud), a bird-woman who lived in the sky, Lepe-a-moa could change into a bird and "her body shone with beauty like the red path of the sunlight on the sea, or the rainbow bending in the sky" (Westervelt 1915). As she grew, she cared for her grandparents and "her grandfather gave his name, Honouliuli, to a land district west of Honolulu, while Kapālama gave hers to the place where they lived" (Westervelt 1915).

The Name of ʻEwa

For *kānaka maoli* (Native Hawaiians), names were indicators of the history and geographical features of that *wahi* (place). Sterling and Summers note that the name may originate from a *moʻolelo* (story) about two gods, Kāne and Kanaloa.

> When Kane and Kanaloa were surveying the islands they came to Oahu and when they reached Red Hill saw below them the broad plains of what is now Ewa. To mark boundaries of the land they would throw a stone and where the stone fell would be the boundary line. When they saw the beautiful land lying below them, it was their thought to include as much of the flat level land as possible. They hurled the stone as far as the Waianae range and it landed somewhere, in the Waimanalo section. When they went to find it, they could not locate the spot where it fell. So Ewa (strayed) became known by the name. The stone that strayed. (Told to E. Sterling by Simeon Nawaa, March 22, 1954; Sterling and Summers 1978:1)

Hiʻiakaikapoliopele

In the Hawaiian epic story of Hiʻiakaikapoliopele, the youngest sister of Pele travels from Hawaiʻi Island to Kauaʻi and back. On her journey back to Kīlauea, Hawaiʻi Hiʻiaka travels across Keahumoa, the plain between the *ahupuaʻa* of Waipiʻo and Honouliuli. There she sees a group of women gathering *maʻo* blossoms and she offers them the following *ʻoli* (chant):

E lei ana ke kula o Keahumoa i ka maʻo	*The plain of Keahumoa wears the maʻo blossoms as its lei*
ʻOhuʻohu wale nā wahine kui lei o ke kanahele	*Adorning the women who string garlands in the wild*
Ua like no a like me ka lehua o Hōpoe	*It is like the lehua blossoms of Hōpoe*
Me he pua koili lehua ala i ka lā	*Lehua blossom upon which the sun beats down*
Ka oni pua koaiʻa i ka pali	*On the nodding koaiʻa flowers of the cliff*
I nā kaupoku hale o ʻĀpuku	*On the rooftops of the houses at ʻĀpuku*
Ke ku no I ke alo o ka pali o Puʻukuʻua	*Rising in the presence of the cliff of Puʻukuʻua*
He aliʻi no naʻe ka ʻāina	*The land is indeed the chief*
He kauwā no naʻe ke kanaka	*Man is indeed a slave*
I kauwā no naʻe wau i ke aloha	*I am indeed a slave to aloha–love*
Na ke aloha no naʻe i kono e haele no māua	*It is love which invites us to two–come*
E hele no wau a—	*I come*
	(Ka Hoku o Hawaii 1927)

Legend of Nāmakaokapaoʻo
Nāmakaokapaoʻo was the son of a great chief, but lived with his mother, Pokai, in Keahumoa, an area on the plains of Honouliuli. Although small in stature, Nāmakaokapaoʻo was a brave, strong child, but he did not get along with his step-father Pualiʻi. One day Nāmakaokapaoʻo pulled up the *ʻuala* (sweet potatoes) that Pualiʻi had planted near their home. Angry at what Nāmakaokapaoʻo had done, Pualiʻi came after him with an axe. Nāmakaokapoʻo used his *mana* (power) to say a death prayer against Pualiʻi before slaying him and hurling his head into Waipouli, a cave on the beach in Honouliuli (Fornander and Thrum 1916:274–276).

Story of Palila
The *moʻolelo* entitled *He Kaʻao no Palila*, recorded by Fornander (1918), depicts the tale of Palila, a famous Kauaʻi *kupua* (demigod) who ventured from Kaʻena, Kauaʻi to Waikele, Oʻahu. Palila quickly traveled across the ʻEwa Plain with the aid of his *lāʻau pālau* (war club).

> Haʻalele keia ia Kaʻena, hele mai la a Kalena, a Pōhākea, Maunauna, Kānehoa, a ke kula o Keahumoa, nana ia ʻEwa. Kū kēia i laila nānā i ke kū a ka ea o ka lepo i nā kānaka, e pahu aku ana kēia i ka laʻau palau aia nei i kai o Honouliuli, kū ka ea o ka lepo, nu lalo o ka honua, me he olai la, makau nā kānaka holo a hiki i Waikele. A hiki o Palila, i laila, e paʻapu ana nā kānaka i ka nānā lealea a ke liʻi o Oʻahu nei, oai o Ahuapau.
>
> After leaving Kaʻena, he came to Kalena, then to Pōhākea, then to Manuanua [a peak in Honouliuli], then to Kānehoa [a peak in Honouliuli], then to the plain of Keahumoa [upland plain from Honouliuli to Waipiʻo] and looked toward ʻEwa. At this place he stood and looked at the dust as it ascended into the sky caused by the people who had gathered there; he then pushed his war club toward Honouliuli. When the people heard something roar like an earthquake they were afraid and they all ran to Waikele. When Palila arrived at Waikele he saw the people gathered there to witness the athletic games that were being given by the king of Oʻahu, Ahupuaa by name. (Fornander 1918:136–153)

Kānekuaʻana
Kānekuaʻana is the *moʻo* (lizard) goddess who maintained the abundant resources at Ke-awa-lau o Puʻuloa (the many harbored seas of Pearl Harbor). This *ʻāina* stretched from Pāʻakule, near the harbor's inlet, to the many *loko iʻa* (fishpond) along the shore. Kānuekuaʻana was known as the guardian or the protector of the *pipi* (Hawaiian pearl oyster) that were found throughout Puʻuloa. She was loved by the people of ʻEwa who built *heiau* in her honor and headed her *kapu* (taboo), restrictions. It was believed that making any noise while harvesting from the waters would cause the wind to blow, and the rippling waters would scare the fish and shellfish away. This belief was captured in an *ʻōlelo noʻeau* for the area: "*ka iʻa hāmau leo o ʻEwa*" meaning "'Ewa's fish that silence voices."

According to a *moʻolelo* recorded by Pukui and Curtis (1994), a *wahine* (woman) gathered *pipi* during a period of *kapu* when it was forbidden to do so. A *konohiki* (landlord) saw her and as

punishment she returned the *pipi* and was sent home empty-handed. Later that day the *konohiki* appeared at her house and demanded money as a fine for breaking the *kapu*. The *wahine* was very poor and only had one coin, but the *konohiki* took her money anyway. Kānekuaʻana saw what the *konohiki* had done and became very upset, and as a result she took the *pipi* away and went back to Kahiki (Pukui and Curtis 1994).

Kaʻahupāhau and the Sharks at Puʻuloa

Kaʻahupāhau is the beloved shark goddess who guards the waters of ʻEwa. She lived in an underwater cave near Mokuʻumeʻume (Ford Island) at Keanapuaʻa Point near the entrance of East Loch. Her brother, Kahiʻukā was famous for his tail that he would use to attack enemies or warn fishermen if danger was nearby.

The people of Puʻuloa (Pearl Harbor) treated Kaʻahupāhau with kindness and respect. They would feed her and scrap the barnacles off of her back. In return, she protected the people from man-eating sharks. The *ʻōlelo noʻeau*, "*Alahula o Puʻuloa, he alahele na Kaʻahupāhau*" (Everywhere in Puʻuloa is the trail of Kaʻahupāhau) was "said of a person who goes everywhere, looking, peering, seeing all, or of a person familiar with every nook and corner of a place" (Pukui 1983:4). It was a reminder of her viligance and dedication to guard the people of Puʻuloa.

In one *moʻolelo,* Mikololou, a man-eating shark from the island of Maui, visited Kaʻahupāhau at Puʻuloa. He rested on the shores, enjoying the hospitality of his host and the people of Puʻuloa; however, after a while he became hungry and angry when Kaʻahupāhau and her brother denied his request to eat his favorite food—humans. Furious, he killed all the men, women, and children in the village so he could satisfy his hunger.

Kaʻahupāhau and Kahiʻukā quickly learned about what had happened and conspired with their friends to avenge Mikololou. The next night, they made a feast in his honor at the top of the Waipahu river. There they provided him with so much food and *ʻawa* that he became stupefied. At the same time, people gathered at the base of the river, ready to trap and attack Mikolou. When he swam downstream, the people attacked him from the rear, and as he tried to swim away he became tangled and trapped in the nets. His body was then dragged onto the shore and burned, while the people were happy to be safe.

The special relation of the people to Kaʻahupāhau is also recorded in the *mele* Pūpū A O ʻEwa (Shells of ʻEwa) that was written by Elbert & Mahoe:

Pūpū (aʻo ʻEwa) i ka nuʻa (nā kānaka)	Shells of ʻEwa throngs of people Coming to learn
E naue mai (a e ʻike)	The news of the land
I ka mea hou (o ka ʻāina)	A land famous
Ahe ʻāina (ua kaulana)	From the ancient times
Mai nā kūpuna mai	All of Puʻuloa, the path trod upon
Alahula Puʻuloa he ala hele nō	by
Kaʻahupāhau, (Kaʻahupāhau)	Kaʻahupāhau
Alahula Puʻuloa he ala hele nō	All of Puʻuloa, the path trod upon
Kaʻahupāhau, Kaʻahupāhau	by
	Kaʻahupāhau

Nani Kaʻala hemolele i ka mālie *Kuahiwi kaulana aʻo ʻEwa* *E kiʻi ana i ka makani o ka ʻāina* *Hea ka Moaʻe eia au e ke aloha*	Beautiful Kaʻala, sublime in the calm Famous mountain of ʻEwa That fetches the wind of the land The tradewind calls, "here I am, beloved"
Kilakila ʻo Polea noho i ka ʻolu *Ia home hoʻohihi a ka malihini* *E walea ana i ka ʻolu o ke kiawe* *I ka pā kolonahe a ke Kiu*	Majestic Polea in the coolness Home delightful to visitors Relaxing in the coolness of the kiawe And the soft blowing of the Kiu wind

(Elbert and Mahoe 1970)

3.1.4 Aliʻi of ʻEwa

The *moʻolelo* of ʻEwa *aliʻi* (chiefs) document the famous battles, journeys, alliances, romances, and accomplishments that occurred throughout history and often reveal a little bit about the places where these events occurred. The excerpts below come from some of these *moʻolelo* and highlight events that are said to have occurred in Honouliuli Ahupuaʻa and the larger ʻEwa Moku.

Māweke
ʻEwa was once known as the political epicenter of Oʻahu. Fornander and Grant (Fornander and Grant 1996:47) write about Māweke, a great chief, who lived in ʻEwa in the mid-eleventh century. It is said that his son, Keaunui, navigated his way out of Puʻuloa (Pearl Harbor) by creating a path with his canoe. His descendants ruled Oʻahu until Chief Haka was defeated in around 1540 (Cordy 2002:24).

Kalaʻimanuia
Kalaʻimanuia, a powerful *wahine aliʻi* (female ruler), united Oʻahu around 1600–1620 (Cordy 2002). She divided the island amongst her four children, giving Haʻo responsibility of the ʻEwa and Waiʻanae districts. Her eldest son, Kū, was given the title of *mōʻī* (king) and the *kuleana* (responsibility) to ensure the safety and peace of all the districts. Kū however wanted full control and tried to take the land from his siblings. To stop him, Haʻo and his brother Kaʻihikapu fought together and defeated Kū. Kaʻihikapu became the new *mōʻī*; however, over time Kaʻihikapu grew jealous of the wealth and abundance of resources that Haʻo had in ʻEwa. In one *moʻolelo*, Kaʻihikapu sent a Trojan-horse-like surprise to Haʻo.

The chiefs of Waikīkī and Waikele were brothers. The former wished to destroy the latter and laid his plot. He went fishing and caught a large *niuhi* (man-eating shark), whose skin he stretched over a framework. He then sent a messenger to ask his brother if he would keep a fish for him. Having gained his consent, the chief left Waikīkī hidden with his best warriors in the "fish." Other warriors joined them along the way until there was a large army. They surrounded the residence of the chief of Waikele and linked arms to form a wall, while the Waikīkī warriors poured out of the fish, and destroyed those of Waikele (Pukui 1983:191).

In another version of the story, as told by Fornander, Kaʻihikapu sent the carcass of a man-eating shark to Haʻo and instructed him to sacrifice it at his *heiau* in Waikele (Fornander and Grant 1996:270–271). Seeing this as moment of vulnerability, Kaʻihikapu and his men attacked Haʻo and his priests during the ceremony, killing them all and taking control of ʻEwa.

A third version of the story seems to be a combination of the previous two (Kamakau 1991:67). Kaʻihikapu catches a shark in Waikīkī and offers it to Haʻo to sacrifice at his *heiau* in Waikele. When the shark is on the altar, Kaʻihikapu and his men jump out of the shark and kill Haʻo and the priests. Kaʻihikapu's men then place their bodies into the shark and offer it as a sacrifice. According to McAllister, this *heiau* is called Hapupu and is in the area of Paumakua, which means "all fiery eyed" (Kamakau 1991:61–67; Thrum 1922:65). The once peaceful relationship between the brothers—Kū, Haʻo, and Kaʻihikapu—is reflected in the *ʻōlelo noʻeau* "*Ke one kuilima laula o ʻEwa*. The sand on which there was a linking of arms [*kuilima*] on the breadth of ʻEwa" (Pukui 1983:191).

Kahahana

Chief Kahahana was the last independent ruler of Oʻahu. Born into a high ranking family on Oʻahu, Kahahana was sent to Maui to grow up in the court of his relative Chief Kahekili—ruler of Maui, Molokaʻi, Lānaʻi and Kahoʻolawe (Cordy 2002:42).

According to one *moʻolelo*, Kahahana was sent by Chief Kahekili to Waikīkī to meet with a *kahuna* (priest) named Kaʻōpulupulu. At first, Kahahana was a benevolent leader and cared for the people of Waikīkī; however, over time he grew ruthless and violent towards the people. Angry at Kahahana's behavior, Kaʻōpulupulu left Oʻahu and returned to Maui.

When Chief Kahekili learned of what had happened, he was furious. He ordered Kaʻōpulupulu to take his son, Kahulupue, and return to Oʻahu where they were to reunite with Kahahana in Waiʻanae. When they arrived, they were violently abused by Kahanana's men, who were following his order to physically stab and stone Kahulupue. Eventually, Kahekili learned about what had transpired and in retaliation he sent his men out to kill Kahahana, who had escaped with his wife, Kekuapoʻi, and friend Alapaʻi into the depths of ʻEwa.

For two years and four months, the three of them traveled and hid in the depths of ʻEwa, moving from Moanalua down to the lochs of Puʻuloa, before heading *mauka* (upland) to Waipiʻo, Wahiawā, Helemano, and Līhue. Eventually tired of running, Kahahana sent his wife to negotiate with her brother Kekuamanoha in Waikele. After learning the true hiding-place of Kahahana and Alapaʻi, Kekuamanoha sent a message to Kahekili who, at the time, was residing in Waikīkī. Seizing hold of this opportuinty, Kahekili sent his men to kill Kahahana and Alapaʻi at the plains of Hōʻaeʻae in Honouliuli.

Waipiʻo Kīmopō

After Kahahana's death in 1785, his father, ʻElani, conspired with other Oʻahu chiefs to kill Kahekili and his men. The Oʻahu chiefs coordinated to all attack on the same night. ʻElani and his men were to kill the chiefs of ʻEwa; Chief Makaʻioulu and Pupuka would attack Kahekili in Waikīkī; and Konamanu and Kalikoʻonui would kill Huʻeu in Waialua.

Someone informed Kahekili about the plot, and he sent a messenger to ʻEwa and Waiʻalua to warn the other men. The chiefs in ʻEwa escaped to the *moku* of Kona, but the messenger who was sent to Waialua did not make it in time, and so Huʻeu and his men were killed. To avenge the death of Huʻeu, Kahekili gathered his men together to wage war with the districts of ʻEwa

and Kona, ultimately killing all of the men, women, and children. It is said that the Kahoaʻaiʻai stream in ʻEwa was filled with dead bodies, and that the water flowed red and tasted bitter from the smashed brains of those who were massacred (Kamakau 1992:138). This incident was known as the Waipiʻo Kīmopō (Waipiʻo assassination) because the plot originated there, and from that day forward, ʻEwa was known as, "the land of deadly plots" (Sterling and Summers 1978).

3.1.5 Ka ʻOihana Mahi ʻAi no Honouliuli—Traditional Agriculture of Honouliuli

The backbone of Hawaiian society were the planters and fishermen, and *mahi ʻai* and *lawaiʻa* are the traditions of farming and fishing in Hawaiʻi. While the ruling *aliʻi* (chiefs) bloodlines fell in and out of power, the people who farmed and fished remained a constant and stable presence in Hawaiian society. In old Hawaiʻi, the upland farmers traded crops for fish with those who lived along the shore, exchanging the things they cultivated or collected to obtain what they could not easily get. This bond between *mauka* and *makai* has been preserved in the following *ʻōlelo noʻeau*: "*Ko koā uka, ko koā kai* (those of the upland, those of the shore)" (Pukui 1983:196).

Most of the people living in any *ahupuaʻa* were *makaʻāinana* (commoners). Literally, *makaʻāinana* means "people that attend the land." They prepared, planted, and harvested their own plots. They also cultivated the lands of whichever *aliʻi* happened to be in control at the time. The land was theirs to use; no one ever held title to it. Despite the absence of ownership, this system enjoyed a fairly high degree of stability. It was in the interest of the *aliʻi* to treat people fairly and maintain the occupancy of industrious *makaʻāinana*, who were free to relocate.

Taste the Kāī-koi of ʻEwa

From the abundance of *wai* grew a renowned variety of *kalo* named Kāī O ʻEwa. There were many sub-varieties of Kāī O ʻEwa: Kāīkeʻokeʻo, Kāīʻeleʻele, Kāīuliuli, Kāīʻulaʻula, Kāīkea, and Kāīkoi. Kāīkeʻokeʻo was said to be beloved by the chiefs for its unique aroma and flavor. Kāīkoi was known to spread out, quickly sending out *oha* (shoots) until it covered the entire *loʻi* (terrace). It was said that anyone who married someone from the area would never leave because the love of the *kāikoi* was so strong. This sentiment is captured in the following *ʻōlelo noʻeau* (Pukui 1983:305):

> Ua ʻai i ke kāi-koi o ʻEwa. (2770)
>
> *He has eaten the* kāi-koi *taro of ʻEwa.*
>
> Kāi *is Oʻahu's best eating taro; one who has easten it will always like it. Said of a youth or a maiden of ʻEwa, who, like the* kāi *taro, is not easily forgotten.*

At the base of Honouliuli Stream where the water deposits into the bay lies an area that was once known for its *loʻi kalo*. The abundance of water in this particular *ʻāina* nourished a bounty of crops that once sustained hundreds of Native Hawaiians.

3.1.6 Ka ʻOihana Lawaiʻa no Honouliuli—Traditional Fishing of Honouliuli

Honouliuli was known for the rich marine life that filled the surrounding waters. An oral history interview with Mark Kahalekulu (2014) revealed the many fish that filled the area, including *moi* (*Polydactylus sexfilis*), *awa* (*Chanos chanos*), *kala* (*Naso unicornis*), *palani* (*Acanthurus dussumieri*), *manini* (*Acanthurus triostegus sandvicensis*), *ʻōhua* (*Acanthurus triostegus sandvicensis*), *ʻamaʻama* (*Mugil cephalus*), *āholehole* (*Kuhlia sandvicensis*), *ʻōpae* (*Halocaridina rubra*), *heʻe* (*Octopus cyanea*) and the prized *ʻanae* (adult mullet, *Mugil cephalus*).

Traditionally *ʻanae* were associated with the waters of ʻEwa. These *ʻanae* traveled along the coast from Honouliuli in ʻEwa to Laʻiemaloʻo in the district of Koʻolauloa and were known *as Kaʻanae o Kaihuopalaʻai* (The *ʻanae* of Kaihuopalaʻai). A *moʻolelo* explains that Kaihuopalaʻai was the father of a supernatural eel named Laumeki, and the area where his family resided lacked fish. So Laumeki made a counter-clockwise circuit of the island, leading the fish from Honouliuli near Puʻuloa (Pearl Harbor) to his home in Laʻiemaloʻo. It's believed that the *ʻanae* of the area still travel this route today.

An alternate *moʻolelo* depicts the migration of the *ʻanae* as *ʻamaʻama,* young mullet. Although in a different life stage, these *iʻa* followed the same migratory pattern, moving from Honouliuli to Laʻie (Titcomb and Pukui 1977:64).

> Kaihuopalaʻai (a place) was famous from olden times down to the time when the foreigner ruled Honouliuli, after which time the famous old name was no longer used [...] It is said that in those days the *ʻamaʻama* heard and understood speech, for it was a fish born of a human being, a supernatural fish. These were the keepers of this fish [...] Kaulu, the husband, and Apokaʻa, the wife, who bore the children, Laniloa, the son, and Awawalei, the daughter. These two children were born with two other supernatural children, an eel and a young *ʻamaʻama*. From this *ʻamaʻama* child came all the *ʻamaʻama* of Kaihuopalaʻai, and thus did it gain renown for its *ʻamaʻama* [...] Laniloa went to Laʻie in Koʻolauloa, and there he married. His sister remained in Honouliuli and married Mokueo, and to them were born the poeple who owned the *ʻamaʻama*, including the late Mauliʻawa and others [...] These were fishermen who knew the art of making the fish multiply and make them come up to the sand [...] While Laniloa lived in Laʻie he heard of the great schools of *ʻamaʻama* at Honouliuli. There were no *ʻamaʻama,* large or small, where he lived. He thought of his younger sister, the *ʻamaʻama*, and guessed that [this] was the reason the place was growing so famous. He said to his wife, "I shall ask my sister to send us some fish for I have a longing for *ʻamaʻama*..." Laniloa left Laʻie to go to ʻEwa... He reached the house and found his parents and sister. His parents were quite old for he had been away a long time... He said, "I have come to my *ʻamaʻama* sister for a bit of fish as there is none where I live except for some *au moana* (sea-faring) crabs." [...] After three days and nights he left ʻEwa [...] The fish were divided into two groups, those that were going and those that were staying. As Laniloa's sister went along the shore, she went in her human form. The fish came from, that is, left Honouliuli without being seen on the surface. They went deep under water until they passed Kaʻaʻaliʻi, then they rose to the surface [...] They reached Waikīkī [...] They went on. The sister slept at Nuʻupia while the fish stopped outside of Na Moku Manu [...] Finally she reached Laʻie, and to this day this is the route taken by the *ʻamaʻama*.

The *ʻōlelo noʻeau* "*ka iʻa hali a ka makani* (the fish blown by the wind)" refers to this *moʻolelo* and the annual migration pattern of the *ʻanae* (Pukui 1983:145). When the *ʻanae* migrate they are known as *ʻanae-holo* (running or travelling mullet), but when they remain offshore or in the same area they are refered to as *ʻanae-pali* (cliff mullet).

Within the ʻEwa Moku, Puʻuloa Ahupuaʻa was known for the great variety of shellfish. The *pipi*

(Hawaiian pearl oyster) was a highly valued delicacy that was eaten raw. The shells were prized for making attractive fish lures that would be used to catch *aku* (*Katsuwonus pelamis*).

‘Ewa was also known for the *limu* (algae) that covered the coastline. In his interview, Kahalekulu (2014) shared that beds of *limu* could reach a height of two to three feet. This also included various types such as *līpoa* (*Dictyopteris plagiogramma*), *kala* (*Sargassum echinocarpum*), and *manauea* (*Gracilaria coronopifolia*). During certains seasons, Kahalekulu recalled that as a child he could smell the *limu* from Pōhākea Elementary School. Kahalekulu shared that his parents stressed the importance of managing the natural resources and only taking what one needed; however, due to multiple changes within the region, the *limu* began to dissappear until it was no longer able to replenish itself (Kahalekulu 2014).

3.2 REMNANTS OF THE PAST

The early archaeological survey of O‘ahu by McAllister (1933) lists many sites for the *ahupua‘a* of Honouliuli, most of which were recorded in the Pearl Harbor area and on the ridgetops of the Wai‘anae Range. Recorded sites include *heiau*, fishing shrines, fishponds, and house sites. For the Kalaeloa (Barbers Point) area of the ‘Ewa Plain, McAllister recorded features under a single site number, Site 146. McAllister (1933:109) states

> ‘Ewa Plains, throughout which are the remains of many sites. The great extent of old stone walls, particularly near the Puuloa Salt Works, belongs to the ranching period of about 75 years ago [ca. 1850s]. It is probable that the holes and pits in the coral were formerly used by the Hawaiians. Frequently the soil on the floor of the larger pits was used for cultivation and even today one comes upon bananas and Hawaiian sugar cane still growing in them. They afford shelter and protection, but I doubt if previous to the time of Cook there was ever a large population here.

During the 1950s and 1960s, Bishop Museum archaeologists recorded burials in sinkholes at the Standard Oil Refinery and the Naval Air Station, as well as a possible fishing shrine and beach midden site in the area (Bishop Museum Anthropology Department Files). During the 1970s, Bishop Museum conducted a 900-acre survey of Kalaeloa (Barrera 1975) and testing at the previously identified beach midden site (Davis & Griffin 1978). Excavations at sinkholes undertaken by Davis in the Kalaeloa area revealed stratigraphic regularities and provide insights into the geologic substrate in the area (Davis 1995). Based on formative conditions of sediments, Allen (1995) defined depositional units, leading to the proposal of a three-phase stratigraphic sequence including a basal deposit characterized by carbonate silts overlain by sediments resulting from structural collapse of the sinkhole walls, over which a dark-colored loamy deposit had formed. Surface architecture dating to the pre-Contact period includes features made of stacked limestone slabs, uprights, and cobbles (see Tuggle 1997).

A multitude of archaeological surveys and excavations conducted over the past four decades documented an archaeological landscape on the ‘Ewa Plain indicative of traditional Hawaiian settlement during the pre-Contact and early post-Contact era, as well as post-Contact land use primarily associated with commercial agriculture, such as sugarcane and sisal, and U.S. military training (discussed below). These include studies by Sinoto 1976, Hammatt and Folk 1981, Welch 1987, Haun 1991, Dunn et al. 1991, Tuggle and Tomonari-Tuggle 1997, Wickler and

Tuggle 1997, and Beardsley 2001, among others. All identified traditional Hawaiian archaeological sites were built with locally derived limestone and characterized by various types of enclosures, platforms, walls, alignments (among other limestone features), and walled limestone depressions commonly referred to as pits. An unusual feature type called "vaulted" mounds were also identified on the ʻEwa Plain and named for their crypt-like spaces (Tuggle and Tomonari-Tuggle 1997; Beardsley 2001). Despite their vaulted character, testing of these features did not identify burials with this feature type, and the archaeological materials identified during testing suggested a storage or cooking function.

The documented traditional Hawaiian sites are often characterized by large concentrations of features revealing settlements of two to three families who subsisted off marine resources and dryland farming, the latter done in enclosed limestone pits and clusters of planting mounds (Tuggle 1997:15). Burials were also identified in stone structures but more commonly within soil floors or beneath overhangs of limestone pits (e.g., Wickler and Tuggle 1997; Beardsley 2001). Using data from 200 radiocarbon dates from the ʻEwa Plain sites, Tuggle (1997:17) estimated three temporal periods of short-term settlement of the ʻEwa Plain: 1) AD 1300–1450; 2) AD 1450–1700; and 3) after AD 1700.

Significant fossil remains of extinct or extirpated birds have been identified in the limestone pit features and some in contexts with traditional Hawaiian cultural deposits (e.g., Wickler and Tuggle 1997, discussed below). According to Athens et al. (2002:57), some researchers have attributed bird extinction on the ʻEwa Plain to Polynesian colonization of the Hawaiian Islands, either through predation or landscape alteration. More recent paleoenvironmental data, however, suggest a "very rapid vegetation change" due to the introduction of the Polynesian rat (*Rattus exulans*) as the main cause of extinction or extirpation of some land birds, particularly flightless taxa and passerines (Athens et al. 2002:75). Archaeological evidence disputing the human predator theory includes the general absence of bird remains in most of the ʻEwa Plain occupation sites, the natural deposition of fossil bird remains generally found below cultural deposits or in questionable mixed interfaces with cultural deposits (Athens et al. 2002:57), and the lack of cultural use shown on the fossil bird remains, such as burning or breakage patterns (e.g., Wickler and Tuggle 1997:iv).

3.3 POST-CONTACT PERIOD

A significant turning point in Hawaiʻi's history is the arrival of Captain James Cook in 1778 which began an influx of visitors from the West who ultimately left a lasting effect on the landscape and people. The effects of Western influence on Honouliuli are described below.

3.3.1 Barbers Point

The post-Contact name Barbers Point comes from Captain Henry Barber, whose ship, the *Arthur*, ran aground there.

> In October 1796, a ship went aground at Kalaeloa, Oahu. This ship had visited the island on several occasions during the rule of Ka-lani-ku-pule. This was the first time a foreign ship had grounded on these shores. Kamehameha was on Hawaii, but Young had remained on Oahu. All the men on the ship came ashore at night in their boats. At daylight when the ship was seen ashore Ku-i-helani placed a ban on the property of the ship and took care of the foreigners. Hawaiian divers recovered the valuables, and they were given over to the care of Ku-i-helani, but part were given by Captain Barber to the men who had recovered them. (Kamakau 1991:174)

Prasad (2018) summarized the stories about Captain Barber related in Sterling and Summer's *Sites of Oahu* which paint him as an unsavory character.

> Sterling and Summers (1978) describe accounts related to Captain Barber, mostly re-telling the same event(s) with slight variations. One of the stories recalls an incident just prior to the ship running aground when Captain Barber tried to trick Kamehameha by giving the king a gift of a keg of diluted brandy because he felt that providing a keg of good brandy would be a waste. After the wreck of his ship, Barber appealed to the king for assistance in retrieving goods that had been stolen off the ship. During a feast, the ship's captain found the *'awa* he was given had been similarly diluted by Kamehameha (Joseph Emerson, as told to Mrs. Beatrice Greenwell, in Sterling and Summers 1978:39). Some accounts describe Barber as an unscrupulous man whose primary interest was in trading sea otter pelts and transporting supplies to and from penal colonies in Australia (Sterling and Summers 1978:39–40). (Prasad 2018:10)

3.3.2 Population and Landscape

One of the earliest Western accounts of Kalaeloa (Barber's Point) is by Captain George Vancouver who led a voyage to Hawai'i in 1792. Of Kalaeloa, he wrote "this tract of land was of some extent but did not seem to be populous, nor to possess any great degree of fertility; although we were told that at a little distance from the sea, the soil is rich, and all necessaries of life are abundantly produced" (Vancouver and Vancouver 1798:361–363).

Although it is the driest region of the island, Native Hawaiians did subsist on the 'Ewa Plain. Its residents had access to the resources of the Wai'anae Mountains, as well as the marine resources in Pearl Harbor; in addition to fishing, wetland agriculture was maintained in the irrigable lowlands of the harbor.

However, in Honouliuli, just as it was across the islands, introduced diseases drastically decreased the Native Hawaiian population. Missionaries first arrived in the islands in the 1820s and undertook census data collection. They recorded a Native Hawaiian population of 1,026 in 1832, but by 1836, it had decreased to 870 (Schmitt 1973:19–22). A Protestant missionary named Artemas Bishop worked in 'Ewa and observed that

> The people of the district are rapidly diminishing, and whole neighborhoods where in former years were numerous families and cultivated lands, there are now no inhabitants, and the land is left to run to waste. The fathers have died off, and the children wander into other parts, and there are none to fill their places. (Bishop 1854)

3.3.3 Māhele, Private Land Ownership, and New Enterprises in Honouliuli

In 1848, King Kamehameha III and 245 *ali'i* (royalty) and *konohiki* (landlord) came together to divide the lands of the kingdom into three classifications. The Crown and the *ali'i* received their land titles and awards for both whole *ahupua'a* and individual parcels within an *ahupua'a* which were then subsequently formally granted in 1850 (Alexander 1890:114). The lands given to the *ali'i* and *konohiki* were referred to as Konohiki Lands, and lands retained by the King as Crown Lands. The distinction of Crown land is important and defined as

> private lands of His Majesty Kamehameha III., to have and to hold for himself, his heirs and successors forever; and said lands shall be regulated and disposed of according to his royal will and pleasure subject only to the rights of tenants. (Kingdom of Hawaii 1848)

At the death of Kamehameha IV and with lack of a clear heir, there was some confusion as to the inheritance of Crown lands and whether or not it followed the family line or the throne. It was decided by the Supreme Court that under the confirmatory Act of June 7th, 1848, "the inheritance is limited to the *successors* to the *throne* [...] the wearers of the crown which the conqueror had won," and that at the same time, "each successive possessor may regulate and dispose of the same according to his will and pleasure as private property, in the manner as was done by Kamehameha III" (Alexander 1890:121).

The *ahupuaʻa* of Honouliuli was claimed by Kamehameha I following his conquest of Oʻahu. He gave the *ahupuaʻa* to Kalanimoku, who passed the land on to his sister, Wahinepiʻo. The entire *ahupuaʻa* was awarded to Kamehameha's granddaughter, Miriam Keʻahi-Kuni Kekauʻōnohi, except for *kuleana* awards, located primarily within and adjacent to the Honouliuli Gulch. Upon Kekauʻōnohi's death, the lands passed to her third husband, Levi Haʻalelea. Upon his death, the land passed to his surviving wife, who then leased the land to James Dowsett and John Meek for ranching. In 1877, most of the land in Honouliuli was sold to James Campbell. Campbell used much of the land for cattle grazing and agricultural production.

At the time, there was not much water in the dry plains of ʻEwa. In 1879, Campbell imported a well-driller from California and bore 250 feet into the earth where "a sheet of pure water flowing like a dome of glass from all sides of the well casing" gushed forth (Campbell 2003). With the discovery of water and the presence of a new fence, Campbell opened Honouliuli Ranch in 1881 and focused his efforts on cattle ranching (Campbell 2003).

In 1890, the Ewa Plantation Company was established, who controlled over 12,000 acres of land by the 1920s. In the 1920s, the Ewa Plantation Company had great success, being known as the richest sugar plantation in the world, and in the following decade, expanded to become a community with homes, schools, and other infrastructure to support the laborers (Campbell 1994). At that time, the Honouliuli Ranch held the lease on 20,000 acres of land. The OR&L Railway (Oahu Rail & Land Company), established in 1889, crossed the ʻEwa Plain and operated until 1947 (Figure 5). Sugar industry activities continued in the area until the 1970s, and military training activities were conducted in some areas during the 1930s and 1940s. Both had detrimental impacts to the natural and cultural landscape of the ʻEwa Plain (see Tuggle 1997).

Figure 5. OR&L Co. train (Hawai‘i Historic Foundation 2014).

In addition to the Crown Lands passed down by Kamehameha I, some *maka‘āinana* of Honouliuli made claims for their house lots and farm lands. In an act ratified on August 6th, 1850, the gathering rights of the common people for personal use, which included the gathering of both terrestrial and marine resources, in addition to the right to water and the right-of-way on the lands of the *konohiki*, were guaranteed and embodied in Section 10477 of the Civil Code (Alexander 1890:114–115). By this same act, resolutions passed by the Privy Council granted fee-simple titles, free of all commutation, with the exception of awards granted within the towns of Honolulu, Lāhainā, and Hilo, to all native tenants for their cultivated lands and house lots (hereafter referred to as *kuleana* land) (Alexander 1890:115). Claims of the native tenants, or *kuleana* land claims, were presented to and heard by the Land Commission whose duty was to:

> ascertain the nature and extent to each claimant's rights in land, and to issue an Award for the same which is prima facie evidence of title "and shall furnish as good and sufficient a ground upon which to maintain an action for trespass, ejectment or other real action against any other person or persons whatsoever, as if the claimant, his heirs or assigns had received a Royal Patent for the same." (Alexander 1890:110)

Testimony for *kuleana* lands often included claims for multiple *‘ili*, or *‘āpana*, located both *mauka* and *makai*. These claims were recorded under a single *helu*, or case number, and brought before the Land Commission for consideration. *Kuleana* land awards, or *kuleana* claims that were approved by the Land Commission, were granted to tenants of the land, native Hawaiians, naturalized foreigners, non-Hawaiians born in the islands, or long-term resident foreigners, who could prove occupancy on the parcels prior to 1845 (hereafter referred to as Land Commission Awards [LCA]). Despite the effort to allocate lands to the *maka‘āinana*, much of these lands would ultimately be obtained by foreigners in payment for services rendered to the Kingdom or sold as land grants for commercial agriculture enterprises. *Kuleana* land awards for Honouliuli are detailed in Table 2.

Table 2. Kuleana Land Awards associated with Honouliuli

Place Name	LCA No. and Description
Aihonu (moʻo)	LCA 831 to Kaekuna: "Apana 2. Mau loi 2 me ke kula ma ka moo Aihonu, Poohilo, Honouliuli, E.O. [0.126 acre] Apana 3. He kahuahale ma kula o Aihonu, Honouliuli, E.O. [0.365 acres] Apana 4. He loi ma Aihonu, Poohilo, Honouliuli, E.O. [0.085 acre]." Also LCA 847:2 to Hinaa and LCA 1570:1 to Kekua 1. (AB 2:218, 241; 6:137)
Aimea (kōʻele)	Claim no. 1666B by Kuahilo for "an apana moo aina called Kaleipuawa in the ili of Poohilo, Honouliuli, Ewa, Oahu… bounded H[onolulu] by the koele of Aimea" (FT 9:132)
Ako (*loʻi*)	LCA 763 to Keliiaa: "Apana 2. He loi Ako ma Poohilo, Honouliuli, E.O." 0.119 acre. LCA 832 to Opiopio: "He moo kalo Ako, ili o Poohilo, Honouliuli, Ewa, Oahu." 0.669 acre. (AB 2:163, 219)
Alae (*kōʻele, loʻi*)	Claim no. 1580B by Kapioho: "Apana 1. Namooelua [q.v.] is bounded M[auka] by the loi Alae of deponant [Kikala, claim no. 681] & the koele of Alae" (FT 9:133)
Haalelenui (*loʻi*)	LCA 1570 to Kekua 1: "Ap. 2. He loi Haalelenui ma Aihonu, Poohilo, Honouliuli, Ewa. Oahu." 0.248 acre
Hakelo (*loʻi*)	Claim no. 1605B by Nakai is for "a moo aina in 3 pieces, & having 6 lois, one called Hakelo" (FT 9:131.)
Halawa (*moʻo*)	LCA 845 to Kaukahiko: "[Apana 1] Moo aina Halawa, ili o Niukee, Honouliuli, Ewa, Oahu." 1.234 acre (AB 7:258)
Haleokane (*loʻi*)	Claim no. 5654:2 by Kuhiana is for "a loi called Kalokoloa in the moo aina Waianu, ili Poohilo, Honouliuli, Ewa, Oahu… Bounded Makai by the loi Haleokane of Kekua [claim no. 1570 or 1598?]" (FT 9:134)
Halulu (*moʻo*)	LCA 898 to Kaneaola: "Apana 3. Moo aina Halulu, ili o Polapola, Honouliuli, E.O." (AB 2:297)
Haole (*moʻo*)	LCA 839 to Kaaiawaawa: "Ap. 5. He kula mahiai iloko o ka moo aina o Haole." 0.33 acre (IN 765; AB 2:233)
Hiwalalo (*moʻo*)	LCA 1580B to Kapioho: "Section 2 - Is in the moo land of Hinalalo. Mauka by Alae ditch / Honolulu by Kapalakai of Maio moo land / Makai by the konohiki's poalima / Waianae by Lopanui, Kalaoa's moo land." 2 ap., 1.505 acres (RP 2868)
Hiwaluna (*loʻi*)	Claim no. 5653C [LCA 751] by Kalauli for "3 lois called Hiwalalo in the moo aina Malua, ili of Polapola..." is bounded "Makai by the loi Hiwaluna no Keliiaa [claim 763:3]" (FT 9:143)
Hopeiki (*moʻo*)	LCA 1701 to Alauka: "Ap. 1. Ekolu loi, Hopeiki, ili o Poohilo, Honouliuli, Ewa, Oahu." 0.802 acre (AB 6:136)
Hopenui (*moʻo*)	LCA 1701 to Alauka: "Ap. 2. He loi iloko o Hopenui, Poohilo, Honouliuli, Ewa, Oahu." 0.087 acre (AB 6:136)
Iao (*loʻi*)	Claim no. 5653 by Kua: "1st a moo aina of 2 lois & a kula called Kahui in the ili of Maui, Honouliuli, Ewa, Oahu. It is bounded... W[aianae] by the loi called Iao of Leleaupa." (FT 9:142)
Kaaimano (*loko*)	Claim no. 5653B by Kanehekili in the *moʻo* [Ka]Mookahi is bounded "makai by the loko Kaaimano of konohiki." (FT 9:143)
Kaaiopelu (*loʻi*)	Claim no. 1570 by Kekua 1: "Apana 4. 2 lois called Kaaiopelu & Kalokoloa in the moo aina of Waianu, Poohilo, Honouliuli, Ewa, Oahu" (FT 9:139)
Kaakau (*ʻili ʻaina*)	LCA 755 to Kainohananui for Kaope: "Apana 2. Kahuahale i kula o Kaakau Honouliuli." 1.53 acres (IN 765; AB 2:149)

Place Name	LCA No. and Description
Kaamaikeaha (*loʻi*)	Claim no. 5653C [LCA 751] by Kalauli for "3 lois called Hiwalalo in the moo aina Malua, ili of Polapola" is bounded "Waianae by the loi Kaamaikeaha of Mili." (FT 9:143)
Kaaumakua (*ʻili ʻaina*)	LCA 1719 to Hiilea is for his "Moo aina Kanuwahine, ili o Kaaumakua, Honouliuli, E.O." 1.01 acres. Also mentioned in LCA 748 to Kalauhala, LCA 756 to Kauouo, LCA 762 to Kalama, LCA 768 to Pio for Wahinenui, LCA 905 to Kaimuena, LCA 910 to Nunu, LCA 917 to Kaulu for Kaoliko, LCA 1570B to Pekane, 1570C to Hanolowaa, LCA 1580 to Kanahuna and LCA 1670 to Moano. Claim no. 883 by Kumupopo was not awarded. (IN 766; AB 6:130; NR 2:502)
Kaauwaiwai (*moʻo*)	LCA 1570C to Naholowaa: "Ap. 2. He moo aina Kaauwaiwai, ili o Kaaumakua, Honouliuli, Ewa, Oahu." 1.674 acres. Written "Kaauwewai" in FT 9:140 (AB 6:138)
Kahakumaka (*loʻi*)	Claim no. 5653 by Kua: "1st a moo aina of 2 lois & a kula called Kahui in the ili of Maui, Honouliuli, Ewa, Oahu. It is bounded M[auka] by the loi called Kahakumaka of Koi" (FT 9:142)
Kahewamakawalu (*moʻo*)	LCA 755 to Kainohananui: "He moo aina Kahewamakawalu, Niukee, Honouliuli, E.O." (AB 2:149)
Kahiwapalaai (*ʻili ʻaina)*	Claim no. 1580B by Kapioho "consists first of 2 moos named Namooelua [q.v.] & 2d one loi in the moo aina Hiwalalo, both in the ili Kahiwapalaai, Honouliuli, Ewa, Oahu." In the Award Book Namooelua is in the *ʻili* of Polapola. This is probably a garble for Kaihuopalaai (q.v.). (FT 9:133)
Kahoopauli (*moʻo*)	LCA 754 to Kaunahi: "Apana 2. He 3 mau loi iloko o ka moo Kahoopauli, Niukee, Honouliuli, W. O." 0.523 acre. (AB 2:147)
Kahui (*moʻo*)	LCA 839 to Kaaiawaawa: "Apana 3, 4. He apana moo aina Kahui, ili o Kamilomilo, Honouliuli, E.O." LCA 5950 to Pihana no Puniawa: "He moo aina, Kahui, ili o Kamoku, Honouliuli, Ewa, Oahu." 1.156 acres. Also recorded in LCA 1580 to Kanahuna: "Ap. 3. Moo aina, Kahui, ili o Kamilomilo, Honouliuli, Ewa, Oahu." (AB 2:233, 6:133, 6:135) Claim no. 5653 by Kua: "1st a moo aina of 2 lois & a kula called Kahui in the ili of Maui, Honouliuli, Ewa, Oahu." (FT 9:142)
Kahuilalo (*moʻo*)	LCA 1713 to Kealani: "Ap. 1. He moo aina, Kahuilalo, ili o Niukee, Honouliuli, Ewa, Oahu." 1.07 acres (AB 6:130)
Kahuiluna (*moʻo*)	LCA 876 to Nohunohu: "Moo aina o Kahuiluna, ili o Niukee, Honouliuli, E.O." 1.047 acres (AB 2:277)
Kahuiopalaai (*ʻili ʻaina*)	Claim no. 5670B by Kaohai "is called Lopanui in the ili Kaihuopalaai, Honouliuli, Ewa, Oahu" but the LCA is placed in Polapola (q.v.) (FT 9:137)
Kailikahi (*ʻili ʻaina*)	LCA 752 to Haae: "He ili aina Kailikahi, Honouliuli, Ewa, Oahu." 5.448 acres. LCA 839 to Kaaiawaawa: "Apana 2. Kahuahale, kula o Kailikahi, Poohilo, Honouliuli." 0.426 acre (IN 766; AB 2:143, 233)
Kalahu (*loko*)	Claim no. 1570C by Naholowaa is for "a moo aina called Kaauwewai [sic, Kaauwaiwai] in the ili Kaaumakua, Honouliuli, E.O.... contains 3 lois & a kula mahiai and is bounded... Makai by the loko of konohiki called Kalahu." (FT 9:140)
Kalaipuawa (*moʻo*)	LCA 839 to Kaaiawaawa: "Apana 1. He moo kalo Kalaipuawa, ili o Poohilo, Honouliuli, Ewa, Oahu." 1.127 acres. Misspelt "Kaluipuawa" (q.v.) in LCA 1666B to Kuahilo but written "Kaleipuawa" in FT 9:132
Kalawaha (*loʻi*)	Claim no. 1580 by Kanahuna is for "3 lois and a kahuahale in 2 pieces. The lois are named Kalawaha, Poina & Palakai in the ili Kamilomilo, Honouliuli, Ewa, Oahu.... Apana 2 [kahuahale] is bounded... W[aianae] by the koele Kalawahaiki." (FT 9:133)

Place Name	LCA No. and Description
Kaleipuawa (*moʻo*)	Claim no. 1666B by Kuahilo for "an apana moo aina called Kaleipuawa in the ili of Poohilo, Honouliuli, Ewa, Oahu." (FT 9:132)
Kaloiiki (*loʻi*)	Claim no. 1570 by Kekua 1: "Ap. 2. A loi called Haalelenui in the moo Waianu, ili of Poohilo, bounded M[auka] by the lois Kamalua and Kaloiiki of Kauhailepa (claim no. 911)." (FT 9:139)
Kaloiliili (*loʻi*)	LCA 901 to Kuahine: "Apana 2. Kaloiliili, ili o Niukee, Honouliuli, E.O." (AB 2:301)
Kaloiloa (*moʻo*)	Claim no. 1713:1 by Kealani is "a moo aina called Kahui in the ili Niukee, Honouliuli, Ewa, Oahu, contains 3 lois & is bounded... Makai by the moo Kaloiloa of Aoao [claim no. 892], W[aianae] by the auwai & a loi called Kaloiiki." (FT 9:136)
Kalokoeli (*moʻo*)	LCA 1565 to Kaalauahi: "Ap. 1. He moo aina Kalokoeli, N[i]ukee, Honouliuli, Ewa, Oahu." 1.642 acres. (AB 6:131)
Kalokoloa (*loʻi*)	Claim no. 5654:2 by Kuhiana is for "a loi called Kalokoloa in the moo aina Waianu, ili Poohilo, Honouliuli, Ewa, Oahu." (FT 9:134) LCA 914 to Kamaala: "He moo aina Kalokoloa, ili o Niukee, Honouliuli, E.O." 0.791acre. (AB 2:331)
Kalole (*moʻo*)	LCA 768 to Pio: "Ap. 1. He moo aina Kalole, ili o Niukee, Honouliuli, E.O." 0.358 acre. "Apana 2. He kahuahale ma Kalole, ili o Niukee." 0.202 acre. In claim no. 1605B by Nakai, "Kalole is one of 6 lois in the ili Niukee." (AB 2:171; FT 9:131)
Kaluakanaka (*moʻo*)	LCA 832 to Opiopio: "Ap. 2. Elua loi, Kaluakanaka, Poohilo, Honouliuli, E.O." 0.538 acre (AB 2:219)
Kaluamanoiki (*moʻo*)	LCA 832 to Opiopio: "Ap. 2. Elua loi, Kaluakanaka, Poohilo, Honouliuli, E.O." 0.538 acre (AB 2:169)
Kaluamoo (*moʻo*)	LCA 1666 to Mauwele: "He moo kalo Kaluamoo, ili o Poohilo, Honouliuli, Ewa, Oahu." 0.506 acre. LCA 907 to Luana: "Apana 1. He moo aina Kaluamoo, ili Niukee, Honouliuli, Ewa, Oahu." 1.176 acres. (AB 6:135, 7:650)
Kaluamooiki (*ʻili ʻaina*)	LCA 766 to Paele: "Apana 2. He kahuahale ma kula o Kaluamooiki, Honouliuli." 0.316 acre (IN 766, AB 2:169)
Kaluanonomuku (*kūʻula*)	Claim no. 1570 by Kekua 1: "Apana 3, a kula mahiai called Kaluanonomuku in the moo aina of Aihonu, ili of Poohilo, Honouliuli, Ewa, Oahu." (FT 9:139)
Kamaieleele (*loʻi*)	Claim no. 5653 by Kua: "Apana 2, one loi in the moo aina of Kamalua in the ili Polapola, Honouliuli, Ewa, Oahu & is bounded... W[aianae] by the loi Kamaieleele of Laamaikahiki (no. 874)." (FT 9:142)
Kamaihiili (*moʻo*)	LCA 831 to Kaekuna: "He moo aina Kamaihiili, Poohilo, Honouliuli, E.O." 1.030 acres. (AB 2:217)
Kamaipipipi (*ʻili ʻaina*)	LCA 760 to Kuhemu: "Apana 2. He kahuahale ma kula o Kamaipipipi, Honouliuli." 0.198 acre. Also LCA 907 to Luana. (IN 766; AB 2:157, 7:260)
Kamalua (*loʻi, moʻo*)	Claim no. 5950 by Pihana: "Apana 2. 1 loi o Kamalua ka inoa iloko o ka moo o Kekee ma ka ili o Kamoku i Honouliuli, Ewa, Oahu." Written "Malua" in FT. (NT 9:287; FT 9:141) LCA 911 to Kauhailopa: "He moo aina Kamalua, Poohilo, Honouliuli, E.O." 1.245 acres. (AB 2:327) Claim no. 5653 by Kua: "Apana 2, one loi in the moo aina of Kamalua in the ili Polapola, Honouliuli, Ewa, Oahu & is bounded... Makai by the loi Kamalua of Kikala (no. 881)." Claim no. 5653C [LCA 751] by Kalauli is for "3 lois called Hiwalalo in the moo aina Malua, ili of Polapola." (FT 9:142, 143).

Place Name	LCA No. and Description
Kamilomilo (*ʻili ʻaina*)	LCA 839 to Kaaiawaawa: "Apana 3. He apana moo aina Kahui, ili o Kamilomilo, Honouliuli, E.O." Also Apana 4. LCA 917 to Kaulu: "Ap. 1. He moo aina Kumuniu, ili o Kamilomilo, Honouliuli, Ewa, Oahu." Also LCA 1703 to Aemaikai. Claim no. 757 by Kaniau was not awarded. (IN 766; AB 2:233, 333, 6:139; NR 2:414)
Kamoku (*ʻili ʻaina*)	LCA 886 to Kahalewai: "[Apana 1.] He moo aina Pi, ili Kamoku, Honouliuli, E.O." Claim no. 5950 by Pihana: "Apana 2. 1 loi o Kamalua ka inoa iloko o ka moo o Kekee ma ka ili o Kamoku i Honouliuli, Ewa, Oahu." Also LCA 751 to Kalauli, LCA 753 to Manuwa, LCA 906 to Kanoho for Abrahamson, LCA 1672 to Makue. (IN 766; AB 2:141, 145, 309, 6:133, 7:259)
Kamooiki (*loʻi*)	LCA 911 to Kauhailopa: "Ap. 2. He loi Kamooiki, Hopenui, Poohilo, Honouliuli, E.O." 0.389 acre. (AB 2:327)
Kamookahi (*moʻo*)	LCA 5653B to Kanehekili: "Ap. 1. He kula iloko o Kamookahi, Poohilo, Honouliuli, Ewa. Oahu. Ap. 2. He loi iloko o Kamookahi, Poohilo..." 0.833 acre in the two apana. Written "Mookahi" in FT 9:143. (AB 6:138)
Kamoomuku (*moʻo*)	LCA 933 to Uia: "Ap. 1. He moo aina, Kamoomuku, ili o Niukee, Honouliuli, Ewa. Oahu." 0.637 acre. (AB 6:132)
Kamuku (*moʻo*)	LCA 892 to Samuela Aoao: "Apana 1. He moo aina Kamuku ili o Niukee, Honouliuli, E.O." 1.387 acres. (IN 767; AB 2:291)
Kamumuku (*moʻo*)	LCA 1573 to Kawahamana: "Ap. 1. He moo aina Kamumuku, ili o Niukee, Honouliuli, Ewa, Oahu." 0.671 acre. (AB 6:131)
Kaneakiha (*moʻo*)	LCA 1672 to Makue: "He moo aina Kaneakiha, ili o Kamoku, Honouliuli, Ewa, Oahu." 1.699 acres. (AB 6:133)
Kanenelu (*moʻo*)	LCA 990 & 1688 to Poopuu: "He moo aina Kanenelu, ili Loloulu, Honouliuli, Ewa, Oahu." 0.712 acre (AB 6:133)
Kanuoopu (*moʻo*)	LCA 762 to Kalama: "He moo aina Kanuoopu, ili o Kaaumakua, Honouliuli, E.O." 5.0 acres. Written "Kanuoopa" in FT 9:140. (AB 2:161)
Kanuwahine (*moʻo*)	LCA 1719 to Hiilea: "Moo aina Kanuwahine, ili o Kaaumakua, Honouliuli, Ewa, Oahu." 1.01 acre. (AB 6:130)
Kapaiokiha (*moʻo*)	LCA 5654 to Kuhiena: "He moo kalo Kapaiokiha, ili o Maui, Honouliuli, Ewa, Oahu." 0.606 acre. (AB 6:135)
Kapalaha (*loʻi*)	Claim no. 5670C by Kumupopo: "Apana 2. A loi called Mooiki in the ili Loloulu, Honouliuli, Ewa, Oahu, is bounded M[auka] by the loi Kapalaha of Kekua (claim no. 1570 or 1598)." (FT 9:138)
Kapapapuhi (*ʻili ʻaina*)	LCA 887 to Kaihikapu: "Ap. 2. He kahuahalae ma Kapapapuhi, Honouliuli, E.O." 0.45 eka. Also LCA 767 to Hapauea, LCA 845 to Kukahiko, LCA 892 to Aoao, LCA 914 to Kamaala, LCA 1565 to Kaalauahi, LCA 1598 to Kekua 2, LCA 173 to Healani, 10933 to Uwia. Kapapapuhi is misfiled in Hoaeae in IN 765, and misspelt "Kapapahi" in IN 766–767. (IN 765; AB 2:285,291,331, 6:130,131,132, 7:258,265, 9:382; Sterling and Summers 1978:34)
Kapaua (*moʻo*)	LCA 874 to Laamaikahiki: "Apana 1. Elua loi ma Kapaua, ili o Polapola, Honouliuli. (AB 2:273)
Kapoepoe (*loʻi*)	Claim no. 5653 by Kua: "Apana 2, one loi in the moo aina of Kamalua in the ili Polapola, Honouliuli, Ewa, Oahu & is bounded... M[auka] by the loi Kapoepoe of Kikala (no. 881)." (FT 9:142)
Kauakahimalolo (*moʻo*)	LCA 933 to Uwia: "Ap. 2. Moo Kauakahimalolo, ili o Niukee, Honouliuli, Ewa, Oahu." 1.299 acres. (AB 6:132)
Kauhikuakua (*moʻo*)	LCA 1570 to Moano: "Ap. 1. He moo aina Kauhikuakua, ili o Loloulu, Honouliuli, Ewa, Oahu." 0.605 acre. (AB 6:134)
Kauilahanau (*moʻo*)	Claim no. 764 by Maeaea is "ma Kauilahanau ma Lihue i Honouliuli... [Apana 1]... ma ka Akau Pumaialau, ma ka Hikina Kalahiki, ma ka Hema Kawaipapa. [Apana 2]... ma ka Akau o Kawaipapa, ma ka Hikina o Kalahiki, ma ka Hema ke alapii o Pohakea, ma ke Komohana o Pohakea." (NR 2:420)

Place Name	LCA No. and Description
Kaulaula (*ʻili ʻaina*)	LCA 749 to Mahina is for "He ili aina o Kaulaula, Honouliuli, Ewa, Oahu. 1.358 acres" less 20 *loʻi* of Makaula containing 0.412 acre, net 0.946 acre. (IN 767; AB 9:435)
Kaumaka (*moʻo*)	LCA 1605B to Nakai: "Ap. 1. He kahuahale ma Kaumaka, ili o Niukee, Honouliuli, Ewa, Oahu." 0.255 acre. (AB 6:140)
Kauwahine (*moʻo*)	LCA 754 to Kaunahi: "Apana 1. He auwai me ka pahale ma Kauwahine, ili Niukee, Honouliuli, Ewa, Oahu." 0.456 acre. (AB 2:147)
Keaniani (*moʻo*)	LCA 768 to Pio for Wahinenui: "Apana 3. He moo aina Keanini, ili o Kaaumakua, Honouliuli, E.O." 1.687 acres. (AB 2:171)
Kekee (*moʻo*)	Claim no. 5950 by Pihana: "a loi called Malua in the moo of Kekee, ili of Kamuku [sic, Kamoku], Honouliuli, Ewa, Oahu... bounded M[auka] by the loi Kekee of Makue (no. 1672)... Makai by the moo aina Kekee..." Written "Kamalua" in NT. (FT 9:141)
Kepoe (*moʻo*, *ʻili ʻaina*)	LCA 5670C to Kumupopo: "Ap. 1. He moo aina Kepoe, ili o Kepoe, Honuliuli. E.O." 1.369 acres. (IN 767; AB 6:141)
Kepoi (*moʻo*)	Claim no. 5670C by Kumupopo: "Apana 1 is a moo aina called Kepoi in the ili Poohilo, Honouliuli, Ewa, Oahu. It contains 7 lois and a kula kahuahale." (FT 9:138)
Kihewamakawalu (*loko*)	Claim no. 1605B by Nakai for a moo aina in Niukee: "Apana 1 is bounded M[auka] by the kula of konohiki & the loko Kihewamakawalu... W[aianae] by the loi called Kapaiki of Kaunahi [claim 754] & a part of Kihewamakawalu... M[akai] by the pali of Kihewamakawalu." (FT 9:131)
Kohepalaoa (place)	Claim no. 5584 by Kauhi (not awarded) "is situated in the place called Kohepalaoa, Puuloa, Ewa, Oahu." (FT) "...kona pahale ma Kohepalaoa, he wahi pana aia ma ka ili o Puuloa, E.O." (NT) Claims no. 5977 by Mahoe, no. 5594 by Kauhane were not awarded (FT 9:144, 195; NT 9:290)
Kohumakahou (*kūʻula*)	Claim no. 1570B by Pekane: "Apana 2, the fishpond [Mokumeha] is bounded... W[aianae] by the kula alialia Kohumakahou." (FT 9:140)
Koula (*moʻo*)	LCA 917 to Kaulu: "Ap.2 [deleted] He moo aina o Koula, ili o Kamilomilo, Honouliuli, E.O." 1.958 acres. Also LCA 1703 to Aemaikai: "He moo aina Koula, ili o Kamilomilo." 1.296 acres. (AB 2:333, 6:139)
Kuaihee (*moʻo*)	LCA 1570B to Pekane: "Ap. 2. Elua moo aina i Mooiki me Kuaihee, ili o Kaaumakua, Honouliuli, Ewa, Oahu." 2.876 acres (AB 6:140)
Kuaihoe (*loʻi*)	Claim no. 5653C [751] by Kalauli for "Ap. 3, a kahuahale & a loi in Puaaluu ili of Honouliuli, E.O., bounded... W[aianae] by the loi Kuaihoe of konohiki." (FT 9:143)
Kuaiopelu (*loʻi*)	Claim no. 5653C [751] by Kalauli for "Ap. 3, a kahuahale & a loi in Puaaluu ili of Honouliuli, E.O., bounded... W[aianae] by the loi Kuaihoe of konohiki." (AB 6:137)
Kuaipuaa (*loʻi*)	Claim no. 5670B:2 by Kaohai is for "a loi called Kuamano in the moo Makawela & ili Kaihuopalaai, Honouliuli, Ewa, Oahu. It is bounded H[onolulu] by the loi Kuaipuaa." (FT 9:137)
Kuaka (*loʻi*)	LCA 901 to Kuahine: "He loi o Kuaka, ili o Niukee, Honouliuli, E.O." (AB 2:301)
Kuamano (*loʻi*)	Claim no. 5670B:2 by Kaohai is for "a loi called Kuamano in the moo Makawela & ili Kaihuopalaai, Honouliuli, Ewa, Oahu. It is bounded M[auka] by the loi Kuamanoiki." (FT 9:137)
Kumuhahane (*moʻo*)	LCA 827 to Kauakahilau: "He moo aina Kumuhahane, Poohilo, Honouliuli, E.O." 1.597 acres. Also claim no. 9351 by Kauakahilau (AB 2:213; NR 4:444)
Kumuhau (*moʻo*)	LCA 848 to Kapule: "Apana 1. He moo aina Kumuhau, ili Poohilo, Honouliuli, E.O." 0.984 acre. (AB 7:260)
Kumuniu (*moʻo*)	LCA 917 to Kaulu: "Ap. 1. He moo aina Kumuniu, ili o Kamilomilo, Honouliuli, Ewa, Oahu." 0.713 acre. LCA 898 to Kaneaola: "Ap. 1. He moo Kumuniu, ili o Polapola, Honouliuli, E.O." (AB 2:333, 2:297)

Place Name	LCA No. and Description
Kumupali (*loʻi, moʻo*)	Claim no. 8658 by Kapoli for "he loi a me kahi kula no, a me kahi kio, o Kumupali ka inoa o ua loi nei aia i Loloulu i Honouliuli" was not awarded. (NR 4:365) LCA 881 to Kikala: "He moo aina Kumupali, ili o Polapola, Honouliuli, E.O." 2.61 acres. (AB 2:281)
Kumuula (*moʻo*)	LCA 905 to Kaimuena: "Apana 2. He moo kalo, Kumuula, ili o Kaaumakua, Honouliuli, E.O." (AB 2:307)
Kumuulu (*kōʻele*)	Claim no. 1580 by Kanahuna is for "3 lois and a kahuahale in 2 pieces. The lois are named Kalawaha, Poina & Palakai in the ili Kamilomilo, Honouliuli, Ewa, Oahu. Apana 1 is bounded makai by the koele Kumuulu... Apana 2 [kahuahale] is bounded mauka by the koele Kumuulu." (FT 9:133)
Kunia (*ʻili ʻaina*)	Claim no. 764 by Maeaea (not awarded) for two parcels in Lihue, each "bounded Honolulu by vacant land called Kunia." (FT 2:285)
Kupaihi (*moʻo*)	LCA 1605B to Nakai: "Ap. 3. He loi ma Kupaihi, ili o Niukee, Honouliuli, Ewa. Oahu." 0.162 acre. (AB 6:141)
Lihue (*ʻili ʻaina*)	Claim no. 764 by Maeaea (not awarded) "is in Lihue, Honouli [sic], Ewa, in two pieces. [Part] 1 is bounded Honolulu by Kunia (land), *mauka* Kanehoa (land), *makai* by Opunahaa (land). Waianae by Pohakea (Pali). [Part] 2. Second lot: bounded *mauka* by Nakai [LCA 1605B], Honolulu by vacant land called Kunia, *makai* by Opunaha [sic] stream, Waianae by a ravine." See Kauilahanau for another description. Lihue is shown on the USGS 1928 Schofield and Waiʻanae quads at about N21-27-00, W158-06-00, in Honouliuli. It is named in a survey of Hoʻāeae as lying north and west of that land, south of Kunia Camp. Some sources extend the region northward to include Wahiawā and Waiʻanae Uka (see catalog no. 176.02.027) (FT 2:285; BCT 1:133; USGS 1928 (Schofield, Waianae); Coulter 1935:179.)
Loloulu (*ʻili ʻaina*)	LCA 872 to Kahakuliilii: "He moo aina Paakai ili Loloulu, Honouliuli, E.O." 1.66 acres. Also LCA 860 & 1688 to Poopuu, 916 to Kama, LCA1598 to Kekua 2, LCA1670 to Moana, LCA 5670C:4 to Kumupopo. Claims no. 759 by Liliu, LCA 883 by Kumupopo, LCA 1566 by Kaheananui, LCA 1688 by Poopuu, LCA 8658 by Kapoli were not awarded. (IN 767; AB 2:271, 6:141; NR 2:415,502, 3:165,210, 4:376.)
Lopanui (*loʻi*)	LCA 5670B to Kaohai: "Elua mau loi Lopanui, ili Polapola, Honouliuli, Ewa, Oahu." 0.678 acre. Placed in the ili Kaihuopalaai in FT 9:137 (AB 6:137)
Mahuna (*loʻi*)	LCA 1605B to Nakai: "Ap. 2. He moo aina ma ka ili o Mahuna, Honouliuli, E.O." 0.885 acre. But in FT 9:131, Mahuna is a loʻi in the ʻili Niukee (IN 767; AB 6:141; FT 9:131; NT 9:277)
Makaii (*ʻili ʻaina*)	LCA 1670 to Moano: "Ap. 2. He kahuahale, ma Makaii, ili o Kaaumakua [Honouliuli, Ewa, Oahu]." 0.091 acre. LCA 916 to Kama: "He kahuahale ma Makaii, Honouliuli, E.O." 0.135 acre. Claim no. 914 by Kamaala in Niukee is bounded on the south by "ka muliwai o Makaii". (NR) (IN 767; AB 6:134, 7:259; NR 2:526.)
Makawela (*moʻo*)	LCA 5204 to Kalama 2: "He moo aina Makawela ili o Polapola, Honouliuli, Ewa, Oahu." 0.925 acre. (AB 7:539)
Makawelaiki (*moʻo*)	LCA 881 to Kikala: "Apana 2. Moo Makawelaiki, ili Polapola, Honouliuli, E.O." 1.114 acres. (AB 2:281)
Makue (*moʻo*)	Claim no. 5950 by Pihana "i Kamoku i Honouliuli Ewa mokupuni o Oahu.... Eia ka lua o koʻu kuleana aina i ka moo aina o Makue." (NR 5:187)
Manaole (*kūʻula*)	Claim no. 1570 by Kekua 1: "Ap. 2. A loi called Haalelenui in the moo Waianu, ili of Poohilo, bounded M[akai] by the lois & kula called Manaole (claim no. 911). (FT 9:139)

Place Name	LCA No. and Description
Maukapuaa (*ʻili ʻaina*)	Claim no. 763 by Keliiaa: "Eia ke kolu o koʻu kuleana aina. Aia ma Mauakapuaa i Honouliuli." Not awarded (NR 2:419)
Maui (*moʻo, ʻili ʻaina*)	LCA 756 to Kauouo: "Moo aina Maui, ili Kaaumakua, Honouliuli, E.O." 1.922 acres. LCA 1580 to Kanahuna: "He pahale ma kula o Maui, ili o Kaaumakua, Honouliuli, Ewa, Oahu." (AB 2:151, 6:135) LCA 763 to Keliiaa: "Apana 1. He kahuahale me kula mahiai, kula o Maui, Hono. E.O." 3.66 acres. LCA 869 to Pue: "Apana 1. Moo aina Kumupali, ili o Maui, Honouliuli, E.O." Also LCA 910:2 to Nunu, 5653 to Kua, 1699 to Leleiupa (IN 767; AB 2:163,269,313, 6:130, 7:26)
Mauiau (*moʻo*)	Claim no. 1570B:1 by Pekane is for "3 moo ainas in one piece, called Mauiau, Mooiki & Kuaihee, being 10 lois & a kahuahale in the ili of Kaaumakua, Honouliuli, E.O." (FT 9:140)
Mokumehua (*puʻuone*)	LCA 1570B to Pekane: "Ap. 1. He puuone, Mokumeha, ili o Kaaumakua, Honouliuli, Ewa, Oahu." 1.739 acres. (AB 6:140)
Mooiki (*loʻi, moʻo*)	Claim no. 5670C by Kumupopo: "Apana 2. A loi called Mooiki in the ili Loloulu, Honouliuli, Ewa, Oahu." (FT 9:138) LCA 1570B to Pekane: "Ap. 2. Elua moo aina i Mooiki me Kuaihee, ili o Kaaumakua, Honouliuli, Ewa, Oahu." 2.876 acres. LCA 5670C to Kumupopo: "Ap. 2. Elua loi Mooiki, ili o Puaaluu, Honouliuli, Ewa, Oahu." 0.44 acre. (AB 6:140-141)
Mooloihi (*moʻo*)	LCA 753 to Manuwa: "Apana 2. He moo aina Mooloihi, Kamoku [Ewa, Oahu]." 0.5 acre. "Apana 3. Ma Mooloihi." 1.349 acres. (AB 2:145)
Namooelua (*moʻo*)	LCA 1580B to Kapioho: "Ap. 1. He moo aina, Namooelua, ili o Polapola, Honouliuli, Ewa, Oahu." 1.256 acres. "...in the ili Kahiwapalaai." in FT 9:133 (AB 6:139)
Naopala (*moʻo*)	LCA 760 to Kuhemu: "He moo aina Naopala, ili o Niukeee, Honouliuli, E.O." 1.548 acres. (IN 767; AB 2:157)
Nihola (*moʻo*)	LCA 767 to Hapauea: "Apana 1. He moo aina Nihola, ili o Niukee, Honouliuli, Ewa, Oahu." 0.984 acre. (AB 9:382)
Niukee (*moʻo*)	LCA 758 to Nihua: "He moo aina Niukee, ili Niukee, Honouliuli, E.O." 1.449 acres. Often written "Nukee" in NR (AB 2:155) LCA 892 to Samuela Aoao: "Apana 1. He moo aina Kamuku ili o Niukee, Honouliuli, E.O." 1.387 acres. Also 17 other LCA. Frequently written "Nukee" in NR. (IN 767; AB 2:291)
Paakai (*moʻo*)	LCA 872 to Kahakuliilii: "He moo aina Paakai ili Loloulu, Honouliuli, E.O." 1.66 acres. (AB 2:271)
Paeokiha (*moʻo*)	Claim no. 5654:1 by Kuhiana is for "a moo aina called Paeokiha in the ili of Maui, Honouliuli, Ewa, Oahu." (FT 9:134)
Palaau (*loʻi*)	LCA 848 to Kapule: "Apana 2. Ekolu mau loi Palaau, Poohilo." 0.673 acre
Palahemo (*moʻo*)	LCA 761 to Kinolua: "Apana 2. He kahuahale ma kula o Palahemo, Honouliuli." 0.256 acre. Also LCA 765 to Kamalae. Perhaps named for the famous "water hole inland from South Point Kaʻū, Hawaiʻi." (PEM 176) (IN 768; AB 2:159, 167)
Palakai (*loʻi*)	Claim no. 1580 by Kanahuna is for "3 lois and a kahuahale in 2 pieces. The lois are named Kalawaha, Poina & Palakai in the ili Kamilomilo, Honouliuli, Ewa, Oahu." (FT 9:133)
Panaenui (*ʻauwai*)	Claim no. 5670B:2 by Kaohai is for "a loi called Kuamano in the moo Makawela & ili Kaihuopalaai, Honouliuli, Ewa, Oahu. It is bounded W[aianae] by the auwai Panaenui." (FT 9:137)

Place Name	LCA No. and Description
Panahaha (*moʻo*)	LCA 748 to Kalauhala: "Apana 1. He moo aina Panahaha ili Kaaumakua, Honouliuli, E.O.... Apana 2. He kahua hale ma kula o Panahaha, ili o Kaaumakua." Total 1.294 acres. (AB 2:135)
Paneenui (*moʻo*)	LCA 898 to Kaneaola: "Ap. 2. He loko kalo, Paneenui, ili o Polapola, Honouliuli, E.O." (AB 2:297)
Pi (*moʻo*)	LCA 886 to Kahalewai: "[Apana 1.] He moo aina Pi, ili Kamoku, Honouliuli, E.O." 1.359 acres. "Apana 2. He loi i mokuaku i ke koele maloko o Pi." 0.137 acre. (AB 7:259)
Poaiwaikele (*ʻili ʻaina*)	LCA 1699 to Leleiupa: "Apana 1. He kahuahale ma ke kula o Poaiwaikele, Honouliuli." 0.193 acre. (IN 768; AB 7:261)
Poepoe (*loʻi*)	Claim no. 1570 by Kekua 1: "Apana 3, a kula mahiai called Kaluanonomuku in the moo aina of Aihonu, ili of Poohilo, Honouliuli, Ewa, Oahu. It is bounded... H[onolulu] by the loi called Poepoe of Manaole (q.v.)." (FT 9:139)
Poina (*moʻo*)	LCA 1580 to Kanahuna: "Ap. 2. Moo aina Poina, ili o Kamilomilo, Honouliuli, Ewa, Oahu." (AB 6:135)
Polapola (*ʻili ʻaina*)	LCA 1720 to Hilinae: "Apana 1. Moo aina iloko o ka ili o Polapola, Honouliuli, Ewa, Oahu. 0.781 eka. Apana 2. He pahale ma kula o Polapola. 0.146 eka." Also LCA 763:3 to Keliiaa: "He moo aina Hiwa, ili o Polapola, Honouliuli, E.O." 5.534 acres. Also LCA 751 to Kalauli, 874 to Laamaikahiki, 881 to Kikala, 898 to Kaneaola, 1580B to Kapioho, 5204 to Kalama 2, 5670B to Kaohai. Polapola is also known as Kaihuopalaai in Foreign Testimony. (IN 768; AB 9:383)
Poohilo (*ʻili ʻaina*)	LCA 1701 to Alauka: "Ap. 1. Ekolu loi, Hopeiki, ili o Poohilo, Honouliuli, Ewa, Oahu. Ap. 2. He loi iloko o Hopenui, Poohilo, Honouliuli, Ewa, Oahu." 0.802 acre and 0.087 acre. Also claims no. 763 by Keliiaa, 827 by Kauakahilau, 828 by Kawahaea, 831 by Kaekuna, 832 by Opiopio, 834 by Oni, 839 by Kaaiawaawa, 847 by Hinaa, 848 by Kapule, 911 by Kauahailepa, 1570 by Kekua 1, 1666 by Mauwele, 1666B by Kuahilo, 5653B by Kanehekili; claim no. 9351 by Kauakahilau was not awarded (see no. 827). Claims no. 844 by Kuailau, no. 883 by Kumupopo, no. 946 by Kauinui were not awarded. (IN 768–769; AB 6:136; NR 2:466,471,502,553, 4:444)
Poopoo (*moʻo*)	LCA 828 to Kawahaea: "He pahale ma ke kula o Poopoo, ili o Poohilo, Honouliuli, Ewa, Oahu." 0.255 acre. (AB 2:215)
Puaaluu (*ʻili ʻaina*)	LCA 5670C to Kumupopo: "Ap. 2. Elua loi Mooiki, ili o Puaaluu, Honouliuli, Ewa, Oahu." 0.44 acre. Also claim no. 5653C {751] by Kalauli: "Ap. 3, a kahuahale & a loi in Pualuu [sic] ili of Honouliuli, E.O." Claim no. 883 by Kumupopo was not awarded. (IN 769; AB 6:141; FT 9:143; NR 2:502)
Puehuehu (*moʻo*)	LCA 1670 to Moano: "Ap. 3. Moo aina Puehuehu, ili o Kaaumakua, Honolulu [sic; Honouliuli]." 0.824 acre. Claim no. 844 by Kuailau was not awarded. (AB 6:134; NR 2:471)
Pulehu (*loʻi*)	Claim no. 5670B:2 by Kaohai is for "a loi called Kuamano in the moo Makawela & ili Kaihuopalaai, Honouliuli, Ewa, Oahu. It is bounded M[akai] by the loi Pulehu." (FT 9:137)
Puowaikele (*loʻi*)	Claim no. 5653 by Kua: "1st a moo aina of 2 lois & a kula called Kahui in the ili of Maui, Honouliuli, Ewa, Oahu. It is bounded... Makai by the loi called Puowaikele of konohiki." (FT 9:142)
Waianu (*moʻo*)	Claim no. 5654:2 by Kuhiana is for "a loi called Kalokoloa in the moo aina Waianu, ili Poohilo, Honouliuli, Ewa, Oahu." (FT 9:134)
Waimanana (*ʻili ʻaina*)	Claim no. 902 by Haakue "ma Waimanana i Honouliuli, Ewa" was not awarded (NR 2:516)

Place Name	LCA No. and Description
Waioha (*moʻo*)	LCA 768 to Pio for Wahinenui: "Apana 4. He pahale ma kula o Waioha, ili o Kaaumakua, E.O." 0.387 acre. Also LCA 905 to Kaimuena, 1570C to Naholowaa. (AB 2:171, 307, 6:138) LCA 917 to Kaulu: "Ap. 3. He puuone ma Waioha, ili o Kamilomilo, Honouliuli, E.O." 0.693 acre. (AB 2:333)
Waioipu (*kōʻula*)	Claim no. 5584 by Kauhi (not awarded) "is situated in the place called Kohepalaoa, Puuloa, Ewa, Oahu... and is bounded... H[onolulu] by the kula Waioipu." (FT 9:144)

3.3.4 Military

There was a major shift in land use in Honouliuli from agricultural to military in the late nineteenth century as interest grew from the U.S. in Hawaiʻi as a geographically strategic base. Although the main interest lay in utilization of the lochs of Pearl Harbor, the adjacent plains of ʻEwa at Barbers Point were also a focal point for U.S. military development in Hawaiʻi. An in-depth account of the military history at Barbers Point can be found in Appendix B of the Cultural Resource Survey done by Tuggle and Tomonari-Tuggle in 1997 (Denfeld 1995). The interested reader should seek the full account there. The following is a summary of the details relevant to the project from that account, in addition to various other military archival resources. The reader is referred to the archaeological inventory survey (AIS) report for the Barbers Point Solar project (Robins et al. 2021) for additional information about identified military properties within the project area.

The military presence in the area started with a reciprocity treaty in 1887 which granted the US exclusive rights to Ke-Awa-Lau-o-Puʻuloa, better known today as Pearl Harbor. Strategically, having use of the lochs of Puʻuloa was a great advantage to the US military operations because of Hawaiʻi's central location within the Pacific.

In 1921, the Barbers Point Military Reservation was established. In July 1931, a battery of two 16-inch guns named Battery Hatch was started:

> Battery Hatch was comprised of two gun emplacements with 360 degree fields of fire. There was also a railroad connecting the dispersed emplacements, barracks, and pillboxes for machine guns to provide local defense. (Denfeld 1995:175)

Battery Hatch was named after Brigadier General Henry J. Hatch, who served in Hawaiʻi as a captain. The battery stood at the Fort Barrette military reservation (Denfeld 1995:175).

The Ewa Mooring Mast Field, which later became known as the Marine Corps Air Station Ewa (MCAS Ewa), was established at the project area:

> In 1932, the Navy leased 206 acres of the Campbell ranch to build a steel tower mooring mast for dirigibles [...] An oil-surfaced, 150 by 1500 foot emergency landing field was also constructed [n.a. 1947]. A few blimps were anchored here, but no dirigibles were ever brought to the field [...] Active military use of the mooring mast area was reinstituted in 1940 when the Navy increased its leased area to 3,500 acres. A Marine Corps airfield, known as Ewa Mooring Mast Field [...] was

> built on the original leased area and completed in June 1941 [n.a. 1947:144]. The larger area of over 3,000 acres was used for development of Naval Air Station, Barbers Point, with construction beginning in November 1941. (Tuggle and Tomonari-Tuggle 1997:27)

On December 7, 1941, the day of the attack on Pearl Harbor, the outline of the future Barbers Point runway was visible, the naval air station had been laid out, and clearing had begun (Denfeld 1995:177).

> The original design for Barbers Point was permanent concrete construction. Much of the cement and reinforcing steel bars had been received and was in warehouses at the time of the attack on Pearl Harbor. It was going to be a small base to support the NAS Pearl Harbor on Ford Island. The consortium of Pacific Naval Air Base (PNAB) was to build facilities for two aircraft carrier groups and station personnel. This would include two runways, two hangars, shops, warehouses, and barracks for 2,000 enlisted, 250 officers, and 800 civilian workers (US Navy Bureau of Yards and Docks, 1947:141–142). (Denfeld 1995:178)

However, the function of the station shifted from an auxiliary airfield to a full naval air station because of the onset of WWII and construction plans were modified accordingly (n.a. 1947). The new plans increased the capacity of the station to four carrier groups (Tuggle and Tomonari-Tuggle 1997:35,38).

Construction proceeded at a blistering speed, and the Naval Air Station (NAS) Barbers Point was commissioned by Commander H.F. MacComsey on April 15, 1942. In 1943, the runways were completed (Denfeld 1995:177).

Ewa Mooring Mast Field

The Ewa Mooring Mast Field was meant to be incorporated into the Barbers Point base, but instead was retained as a Marine Corps airfield. The new airfield became known as Marine Corps Air Station (MCAS) Ewa and functioned as a staging field for Marine Corps air units and planes during WWII. MCAS Ewa serviced many planes.

> Construction was completed by [the consortium of the Pacific Naval Air Base (PNAB)] with minor work and finish activities by the 16th Seabees who arrived April 1943. The Seabees took over the former contractors' camp, located between the Ewa and the Barbers Point landing fields. The 16th Seabees were replaced by the Construction Battalion Maintenance Unit (CBMU) 522 on March 1, 1944. In November 1944 a detachment of the 14th Seabees arrived to do some final work. (Denfeld 1995:179)

The Ewa Mooring Mast Field was added to the National Register of Historic Places in 2016 for eligibility under Criterion A, for its association with the attack on Pearl Harbor on December 7, 1941. The NRHP nomination form lists these structures which "convey direct and important contributing resources that were present on December 7, 1941":

- The 1941 asphalt runways
- A concrete warming-up platform with visible attack damage
- The concrete foundation of former Hangar 123
- An asphalt mooring apron
- The remains of a swimming pool marking the location of a key defensive position

There are remnants of other features as well, which are not considered part of the NRHP site, but may contain information. "Portions of the 1941 installation, such as the former camp area,

that were part of the battlefield core area but no longer retain significant features associated with the battle, have been determined to lack sufficient integrity and are not included within the eligible site" (NRHP Registration Form 2014:5).

Many military features were constructed after the December 7, 1941 attack, in association with US involvement in World War II. Ewa Mooring Mast Field was renamed Marine Corps Air Station Ewa (MCAS Ewa) in 1942 and the installation boundary was increased to encompass 900 acres. Over 600 new buildings and structures were constructed on the expanded installation, including barracks, storehouses, shops, operations buildings, and recreation facilities. Less than 100 of the 600 buildings constructed remain, many of which are concrete aircraft revetments located south of the battlefield site (NRHP Registration Form 2014:7,10).

The Ewa Mooring Mast Field has been inactive since the 1950s. The area has been substantially disturbed by post-war demolition and overgrowth of dense vegetation. However, the 206-acre installation still retains characteristics that convey its significant association with the 1941 Japanese attack. The NRHP nomination form described the current condition of the Ewa Mooring Mast Field:

> All of the approximately 100 buildings, tents, and other structures that stood within Ewa Mooring Mast Field during the attack are missing today, which alters the appearance of the installation, especially in the former camp area and other locations to the north of the eligible site boundary, the former camp area now holds several Cold War-era buildings and structures, as well as scattered concrete elements such as fragments of curbing, pads and foundations. Areas immediately outside of the proposed eligible site boundary also contain additional World War II-era aviation features such as a concrete compass rose and the remains of the expanded asphalt runway system. Other subsequent developments which have altered the character of surrounding areas include a golf course and wastewater treatment plant, both constructed to the east of the proposed eligible site, and a solar field, located directly south of the site. North of the former installation boundary, some areas of the former Varona plantation village and Oahu Railway & Land Company (OR&L) rail line remain. (NRHP Registration Form 2014:7)

Ewa Plain Battlefield Historic District

On Sunday, December 7, 1941 at 7:55 AM the United States Pacific Fleet base at Pearl Harbor Naval Base was attacked by the Imperial Japanese Navy. More than 2,400 Americans died in the attack and another 1,000 people were wounded. Nearly half of the planes stationed at the neighboring Barbers Point Station were destroyed.

Two minutes prior to the attack on Pearl Harbor, an attack was made on the ʻEwa Plains. Located approximatly 5.5 miles southwest of Ford Island, the ʻEwa Marine Corps Air Station was established in January 1941 on land that was previously owned by the Campbell Estate (Sigall 2020). As a result of the attack, 24 planes were destroyed, 13 individuals were wounded, and four had been killed. In the weeks to follow, the Imperial Japanese Navy submarines awaited offshore, and continued to threaten the area until December 31, 1941. Throughout World War II the ʻEwa Marine Corps Air Station was known as the "Crossroads of the Pacific." In 1952, the ʻEwa Marine Corps Air Station became a part of the Barbers Point Naval Station. In the months and years to follow, Barbers Point Naval Air Station became an important site for military operations and support. Operations continued at Barbers Point until 1998 when it was decomissioned by the US Navy and taken over by the State of Hawaiʻi to use as the Kalaeloa Airport. The site of the attack was officially registered as the ʻEwa Plain Battlefield on the National Register of Historic Places on May 23, 2016 (National Park Service 2016).

Revetments
A Historic American Buildings Survey (HABS) was completed for the aircraft revetments at Naval Air Station Barbers Point, Marine Corps Air Station Ewa.

> The 75 revetments are located on Naval Air Station Barbers Point, in an area to the south of the former Marine Corps Air Station Ewa air field in an area bounded by Bismark Sea Road to the north, Brown Road to the east, and Tomes Road on the west. They extend below Hamilton Road at the south. Except for the pavements leading to and interconnecting the revetments, they are typically surrounded by dense growths of trees and brush…
>
> [T]hese revetments were erected in 1942 to provide protection "for carrier based planes," according to the drawings dated April 25, 1942…
>
> The revetments are built with a parabolic-shaped cast-in-place concrete beam over the one opening to each revetment. Each beam is 6 feet high and 12 inches thick. Although the title of the drawings says they are "44' Clear Span" they actually span about 53 feet. The 44-foot clear span measurement is based on the span between points at which there is a 7-foot vertical clearance. The maximum clear height of the front arch is 16'9". The beam is further reinforced with five concrete fins, each six inches thick, which act as buttresses for the beam and as a further interconnection between the beam and the revetment shell…
>
> The perimeter footings of the shell are relatively small: only 2'-0" wide by 1'-6" deep. They are set on a solid coral bed and the footings were connected to that coral rock base by 5/8" steel dowels grouted into three-foot deep holes in the coral at four feet on center.
>
> After completion, the revetments were covered with about ten feet of sand. Many of the revetments are still completely covered by the sand, with grass and trees growing from the mounds. The top surface[s] of some revetments are partially exposed due to erosion. The floors of the revetments are covered with asphalt paving.
>
> …All the revetments at MCAS Ewa were completed by February 1943…
>
> Today, approximately 14 of the revetments are used as stables for horses. Paddock areas in front of those revetments have been fenced with white-painted wood fences. A couple of other revetments are used sporadically for parking vehicles. One revetment is being used for a lizard research project. The remaining structures are abandoned. (Mason 1995, HABS No. HI-279-A)

Seabee Camp
Historical logs of the 5th Naval Construction Battalion (a.k.a. CBs or Seabees) show that the Seabees arrived at Pearl Harbor on 21 June 1942. Although only Pearl Harbor is named, it is likely that the battalion was deployed to other installations on the island of Oʻahu, including at Honouliuli. According to a roster dated 15 September 1942, there were 8 officers and 61 men, a total of 69, located at Pearl Harbor. The number increased by 18 January 1943 to 8 officers and 130 men—138 total. In April 1943, all detachments sent out to other locations in the Pacific were reassembled at Pearl Harbor, swelling the number of Seabees to a recorded 910 total in July 1943. The 5th battalion was recorded to have left Pearl Harbor to travel back to the U.S. in March 1944 (Naval History & Heritage Command n.d.-a).

> Detail KOALA deployed from Gulfport in September, 1971, to Oahu, Hawaii, where the Detail was headquartered at the Naval Air Station, Barbers Point […] At Barbers Point, a sewage collection system was completed for cottages on Officers Beach […] Throughout the deployment, the Detail spent much time and effort upgrading the quarters to which they were assigned. This

workload involved painting the exterior of the quarters, replacing the roofing, panelling the TV and recreation rooms, and finishing the transformation of the cubicles into rooms. (Naval History and Heritage Command n.d.-b:109)

3.4 SUMMARY OF ARCHIVAL RESEARCH

The numerous named places, myths, and proverbs associated with Honouliuli intimate that in the traditional era, the region was populated and traversed. This is further shown by the many *kuleana* claims that were submitted during the Māhele by the residents who were living on and cultivating the land. In the post-Contact period, as Western influence in the islands grew, the area was also under agricultural use from the late nineteenth to early twentieth centuries when it transitioned to use for sugarcane and ranching.

In the 1930s, in the Barbers Point Solar project area, Ewa Mooring Mast Field was developed, which would eventually be expanded into the Naval Air Station Barbers Point. This was a result of the air station being targeted in the 1941 Japanese attack which led to the U.S.'s engagement in World War II. Plans morphed into an air station with greater capacity because of the involvement in the war. The U.S. Coast Guard remained in Honouliuli, but the U.S. Navy closed the air field in 1999, and it became Kalaeloa Airport, as it remains today.

Remnants of traditional use in the Barbers Point Solar project area that may have existed are most likely disturbed, if not destroyed. Because of the history of agriculture followed by military development, extensive ground disturbance has occurred in the Barbers Point Solar Project area. However, structures from the military era, such as revetments, and remnants from the 1941 attack still exist and are recognized in the National Register of Historic Places.

4.0 CONSULTATION METHODS AND RESULTS

4.1 SCOPING AND COMMUNITY OUTREACH

In order to identify individuals with knowledge of traditional cultural practices carried out within and adjacent to the area of the proposed project as it relates to this study, government agencies, advisory councils, local community organizations, and individuals with generational ties to the proposed project area was initiated. Letters and project area maps were mailed or emailed to individuals containing the following text:

> Pacific Legacy is conducting a cultural impact assessment (CIA) for the proposed Barber's Point Solar Project, which is planned for an area of approximately 100 acres that will be leased from the Department of Hawaiian Home Lands (DHHL). The project area is located in the *ahupuaʻa* of Honouliuli, ʻEwa Moku, Oʻahu [TMK (1) 9-1-013:016 (por.), 038 (por.), 039 (por.) 040, 043 (por.), 096 (por.)] (Attachment 1, Figures 1 and 2).
>
> The proposed project is a 15 MW_{AC} solar photovoltaic system coupled with a 15 MW, 4-hour (60MWh) DC-coupled battery energy storage system (DC-ESS). The Project infrastructure would include solar fields with solar photovoltaic panels that would be arranged in rows, a network of electrical collector lines, battery energy storage and inverter units, step-up transformers, collector substation and transformer, overhead generation tie-line, and access roads. The project is proposed to be located on land owned by DHHL in the former Naval Air Station (NAS) Barber's Point. The solar array and associated infrastructure would utilize approximately 100 acres. A 46-kilovolt (kV) generator-tie line would extend approximately 0.25-miles northeast from the solar array to connect into the existing Hawaiian Electric grid. Once in operation, the proposed project would power approximately 6,200 Oʻahu households with clean, renewable energy. Based on the proposed Power Purchase Agreement (PPA) with Hawaiian Electric, the Project is expected to have an operational period of approximately 25 years. At that point in time, the Project may be re-powered under a re-negotiated PPA or other contract (with subsequent permits/approvals) or decommissioned. Decommissioning will involve removal of all equipment associated with the Project and returning the Project Study Area to substantially the same condition as existed prior to Project development. Decommissioning would include consideration of local environmental factors to minimize effects such as erosion during the removal process, and the recycling of materials demolished or removed from the site to the extent feasible.
>
> The purpose of the CIA is to evaluate potential impacts to traditional cultural practices as a result of the proposed project, in accordance with the guidelines for assessing cultural impacts, which were adopted by the State of Hawaiʻi Environmental Council on Nov. 19, 1997. For the CIA, the *ahupuaʻa* of Honouliuli is considered the overall study area, while the project area is defined as the 100-acre area shown in Figure 2. We are reaching out to you for this assessment because you have been identified as a source of knowledge of Honouliuli.
>
> We are seeking your *kōkua* regarding the following components of our study:
> - Cultural associations of Honouliuli Ahupuaʻa such as *moʻolelo* or connections to legendary accounts.
> - Knowledge of past and present land use within and near the project area.
> - Knowledge of past and present traditional gathering practices in Honouliuli.

- Knowledge of cultural resources which may be impacted by the proposed project, including traditional plant and animal gathering sites, traditional access trails, archaeological sites, historic sites, and burials.
- Any other cultural concerns that community members may have in relation to traditional Hawaiian or other cultural practices within or near the proposed project area.
- Referrals to other knowledgeable individuals who may be willing to share their cultural knowledge of the proposed project area and wider Honouliuli Ahupuaʻa.

Table 3. Outreach Summary

Name	Affiliation	Contacted (Y/N)	Comments
Mr. Mana Caceres	Oʻahu Island Burial Council	Y	Agreed to participate
Ms. Kimberly Kalama	Hoakalei Cultural Foundation	Y	No response; emailed 07/20/20
Ms. Momiala Kamahele	University of Hawaii, Leeward Community College	Y	Declined to participate
Mr. Shad Kane	Kalaeloa Heritage and Legacy Foundation	Y	Agreed to participate
Ms. Celene Kuahiwinui	State of Hawaii, Kapolei High School	N	Could not obtain contact info; no longer employed at Kapolei HS
Mr. Kai Markell	Office of Hawaiian Affairs, Native Hawaiian Preservation Council	Y	No response; mailed letter 07/20/20
Mr. Kepā Maly	Hoakalei Cultural Foundation	Y	Declined to participate
Ms. Manulani Meyer	Leeward Community College	Y	Declined to participate
Ms. Kandiss Nahulu-Mahelona	State of Hawaii, Kapolei High School	N	Could not obtain contact info; no longer employed at Kapolei HS
Ms. Keala Norman	ʻOhana Keaweamahi	Y	Agreed to participate
Mr. McD Philpotts	Community Member	Y	No response; emailed 07/30/20
Mr. Kawika Shook	Kalaeloa Heritage and Legacy Foundation	Y	No response; emailed 08/13/20
Ms. Kaʻāhiki Solis	State Historic Preservation Division	Y	No response; emailed 07/30/20
-	Ewa Pu'uloa Hawaiian Civic Club	Y	No response; emailed 07/29/20
-	Siwila Hawai'i o Kapolei	Y	No response; emailed 07/30/20

4.2 COMMUNITY OUTREACH INTERVIEWS AND RESULTS

Scoping letters were sent to individuals who are affiliated with a range of organizations. Contacted individuals included representatives of Native Hawaiian Organizations (NHOs) including the Office of Hawaiian Affairs (OHA), as well as local NHOs based in the *moku* of ʻEwa and the city of Kapolei. In addition, Pacific Legacy delivered an informational presentation to the Oʻahu Island Burial Council as part of the outreach for both the AIS and CIA for this project.

Three people responded and were interviewed as part of the CIA, either in person, via Zoom videoconferencing, or through email correspondence. Collectively, those interviewed shared important *moʻolelo* (oral traditions) specific to the region and emphasized significant archaeological features, including the presence of trails, the use of limestone sinks/pit caves for the interment of *iwi kupuna*, gathering of *limu* and other coastal resources, and traditional agricultural practices that were carried out in the area. They also emphasized the dramatic changes to the landscape during the recent past. The generation tie-line corridor of the project area was changed following the initial outreach for the Project. The three CIA participants were sent a Project Update Notice, and the change in project area was also discussed during a site visit with CIA participants in June 2021.

4.2.1 Mr. Shad Kane

Born to Hattie and Tazoni Kane in Honolulu on February 23, 1945, Shad Spearman Kane grew up in Wahiawa and later moved to Kalihi where he resided for most of his teenage years. After attending Kamehameha Schools, he graduated from the University of Hawaiʻi then went on to Central Michigan University, where he earned a master's degree in public administration. Following his university studies, he joined the Honolulu Police Department, and is now a retired Lieutenant. Mr. Kane has served as president of Ahahui Siwila Hawaii O Kapolei Hawaiian Civic Club and Chair of the Makakilo-Kapolei Neighborhood Board as well as a member of the State Environmental Council, the Hawaii Energy Policy Forum, the Kapolei Outdoor Circle, the Friends of Honouliuli, Ka Papa O Kakuhihewa and the Kapolei Lions Club. He also previously served as the representative for the ʻEwa District on the Oʻahu Island Burial Council.

Uncle Shad is acclaimed as the resident historian for the *ahupuaʻa* of Honouliuli and has done a great deal of archival research on the subject in addition to being a recipient of oral histories from local *kūpuna* on the cultural history of the ʻEwa District, including Arline Eaton and Thelma Parrish. In researching the history of the ʻEwa Moku and the *ahupuaʻa* of Honouliuli, he also worked closely with Rubellite Kawena Johnson, a historian at the University of Hawaiʻi at Mānoa. Her research draws from the scholarly works of John Papa ʻĪʻī, Samuel Kamakau, and Joseph Emerson. As with other localities of Honouliuli Ahupuaʻa, Mr. Kane has an impressive knowledge of traditional chronicles and myths associated with the project area. He identifies the general area as the backdrop of several ancient legends.

In recalling his earliest memories of the area, Uncle Shad describes Honouliuli as a place of agriculture (namely sugarcane production), *kiawe*, and military bases. He didn't come to realize the cultural significance of the area until he joined the Ahahui Siwila Hawaii O Kapolei Hawaiian Civic Club and consulted with Campbell regarding the master planning of Kapolei. It was then that he began studying the history of the ʻEwa Plain, where Hawaiians settled and subsisted on shellfish, lobster, crab, shoreline fishing, and *limu* gathering along the coast and

planted sweet potatoes and taro in limestone mounds and sinkholes, which were also used as final resting places for *iwi kūpuna*.

During the 1990s, Uncle Shad also consulted with archaeologists Dave Tuggle and Myra Tomonari-Tuggle regarding the features they documented in the immediate vicinity of the project area. He noted the presence of interesting structures in the former southern trap and skeet range along Tripoli Road [immediately east of the Barbers Point Solar project area]. Of particular significance is a *kahua*, or Makahiki grounds, that is filled with sand [within the project area, in Parcel 40], as well as many features in the area that utilize the Tahitian style of construction using upright slabs as foundation stones. The settlement pattern was dispersed, with individual families occupying spaces near water sources. As the steward for the Kalaeloa Heritage Park, which is immediately west of Parcel 40 on the western side of Coral Sea Road, Uncle Shad has restored and cared for many archaeological features, as well as *ʻakoko* plants that are only present within this area. [There are no *ʻakoko* on parcels 038 and 040; *ʻakoko* was only noted in parcel 039 (Tetra Tech 2021).] He noted the presence of a trail within the Kalaeloa Heritage Park parcel that connects with the *kahua* and Ordy Pond [east of Parcel 40]. With regards to the recent history of the area, Uncle Shad noted the leasing of a portion of the area to Paradise Lua and the construction of a racetrack.

When asked what he thought about the project proposal, Uncle Shad noted that he is a big supporter of renewable energy and getting away from fossil fuels. He expressed interest in seeing the project design and participating in a site visit.

4.2.2 Ms. Keala Norman

Keala Norman grew up in ʻEwa Beach. She shared the following information via email:

> I will say that Puʻu o Kapolei was once the home of Kamapuaʻa's grandmother. I believe there is literature available online about that. Also, when I was a young girl, I was told that Puʻu o Kapolei was a bird sanctuary, I'm not real sure about that though.
>
> Oneʻula a.k.a. Hau Bush a.k.a. "Shark Country" is a story of Kaʻahupahau the shark god and her grandmother that you will be able to find online. As a young girl, I loved to sing the song Pupu A O Ewa, not realizing that the song speaks of Kaʻahupahau because I did not and still don't speak fluent Hawaiian. You can find the lyrics with a little story below the lyrics on Huapala.org, although there may be small kine inaccuracies in the story like they say that Puʻuloa means Pearl Harbor which is wrong. You may be able to find more accurate information elsewhere.
>
> I have canoe paddled and surfed at Puʻuloa beach aka Ewa Beach park. Growing up there we always called it Puʻuloa beach park. I don't know when it has changed to Ewa Beach park anyway, I have never seen a shark. I have seen turtles, dolphins, sting ray and flying fish but, never a shark. When I was a teenager, I used to drop my brother and his friends off at Oneʻula beach park so that they could go surfing and my brother used to say that they would be bumped by reef sharks but, they were never bit by a shark. Growing up and until this day, I have never heard of anyone dying on Oʻahu from a shark bite. I tend to believe that it's because of the protection of Kaʻahupahau.

Kaʻahupahau and her brother Kahiʻukā who is also a shark god, resided in the waters of Puʻuloa a.k.a. West Loch and East Loch.

When we paddled our canoes in the wintertime, there would be mounds of limu about 2 feet high all along the coast. We had to paddle our canoe out about 30 ft from the shore to clear all the limu that once drifted into shore. The limu was so abundant that we could smell the limu when we were at school. We no longer see limu like that in the winter.

I do remember several years ago, Oneʻula beach, Haseko project, Iwi Kupuna were impacted. I could be wrong because it's been a while but, I believe this Kupuna was female with a niho palaoa.

I also recall hearing that there were families that had land in Ewa Beach and once raised cattle there.

As a child, the night drive from the freeway on the way to our home in Ewa Beach seemed to be a long drive because we had to go pass miles of sugar cane and a cemetery (the one next to Zippys) with no street lights. In the 70s there was only 1 lane into Ewa Beach and 1 lane out. Even with just the 2 lanes there wasn't a lot of traffic. Ewa Beach was surrounded by sugar cane all the way to Kapolei except for Barbers Point.

Every now and then when I pass the junction where Kahi Mohala is and the Puʻu o Kapolei, I still look for pueo hoping that they are still around. These were the areas I used to see them the most. I believe that Mike Lee wrote something about the pueo and was trying to protect them in the Ewa plains.

Gosh, recalling all these things makes me miss those days. Mahalo for letting me share the memories of my childhood.

There used to be Hawaii Raceway Park at Campbell Industrial Park. It was located on the Ewa mauka corner of Kalaeloa Blvd and Malakole. My childhood, best friend's father used to race cars there. She used to live on the corner of Hanakahi Street and North Road a couple of blocks away from where I used to live, we lived in an area call Ewa Estate, anyway one night, I went to visit my friend and while we were sitting on her brick wall talking we could hear engines rumbling and then cars racing. I didn't know what that noise was so, I asked my friend and she said that it was the raceway park. Isn't that something? We could actually hear the cars circling the raceway from that distance. I would suppose it's because there weren't a lot of buildings back then that allowed the noise from the raceway park to carry miles away.

We used to swim in a freshwater stream it might have been a large punawai that was located on a dead-end street off the mauka side of Hanaloa St. I don't know the name of this stream but, it looked like an oasis to me because it had date trees that lined the stream. I remember the water being really cold. After we swam, we would pick the dates and eat them on the way home which was only a 10 or 15 minute walk. I don't know if that stream is still there. It might have been filled in when the Hawaii Prince Golf course was put in.

In the area we called Honoʻuliʻuli, the beginning of Old Fort Weaver Rd, there were pig farms and farther down the road, coming into Ewa Beach there was Kahua farm that had cows. When you traveled further down Fort Weaver Rd, to

> the right where the Child and Family Services are now, there used to be Saint Barnabas Church with a water flume before it that crossed over Fort Weaver Rd and then there was the cemetery. When you come to the Renton Rd traffic light (there wasn't a traffic light back then though), to the left there was a chicken farm where we would buy our eggs. All those things except for the cemetery are no longer there. Back then Ewa Beach was considered country...lol...I hardly consider it country today.

4.2.3 Mr. Mana Caceres

Norman Kaleilani "Mana" Caceres was born in Orange County, California on October 7, 1976. He and his family moved to Kapolei in 2004 and he currently serves as the ʻEwa representative on the Oʻahu Island Burial Council (OIBC). He and his wife have genealogical ties to the ʻEwa region and specifically to Kapolei. He and his wife are recognized cultural descendants who care for *iwi kūpuna* in the area.

Mana's familiarity with the region began when he was a child visiting his grandparents. His earliest memory of the area was when he was around 6 or 7 years old and was able to visit the Naval Air Station Barbers Point with his grandfather, who retired from the Army and had base access. They went to a beach, and Mana remembers the area having open space and less *kiawe* back then. He remembered seeing bunkers and broken-down buildings in the area, as well as many coral mounds, which we now recognize as cultural features.

When asked about the types of features in the area, Mana noted that he was familiar with temporary housing structures, many of which were related to fishing. He also spoke about how there may have been permanent structures near where water sources were situated in the past. He wonders about the gulches coming down from Makakilo into Kapolei and is interested to know how recently water flowed down these areas, as he is curious to see what events led to the lack of water in these areas. Mike Lee observed that there was a karst system, and Mana would like to follow up on that. With regard to more historic uses of the area, these unfortunately led to a lot of pushing over of the cultural sites, now considered push piles. Mana noted that he was very impressed with the preserves in the Haseko area, as he observed that the structures there are very pristine when he was involved in the reinterment in the preserve area. He noted that it would be interesting to see if we have similar features intact within the current project area.

With regards to traditional cultural practices being carried out in the area, Mana noted that he was not aware of any, aside from Shad Kane's group caring for the *ʻāina* [at the Kalaeloa Heritage Center]. Mana learned a lot from Shad Kane, having participated in OIBC meetings when Shad was the representative for the ʻEwa Moku. Another person he has learned from is Kawika McKeague, who used to be the chair of the OIBC. Mana considers both Shad and Kawika to be resources for cultural information on Honouliuli. Most of Mana's familiarity with the *ahupuaʻa* is centered on the care of *iwi kūpuna* and his involvement in the community is centered around this role. He noted that Honouliuli has burial locations in either a karst/underground cave or on the ground surface covered with coral cobbles. In the past, some burial features were mistaken as agricultural mounds, but human remains were found within after further investigation.

Mana noted that he has had positive experiences with the solar developments in the area. In his experience, cultural sites were always preserved as-is, and solar panels were placed to avoid

features and create pockets of preservation areas. He noted that you can't go wrong with the sun. He had a question of whether it is safe for the people and would contribute towards the preservation of culture. Mana has no reason to believe that our own *kūpuna* wouldn't have done it. His specific request was that "the project do everything in its power to preserve what is found on-site, work around it, if that is the case, we will give full support of the project from start to finish. Whenever possible, we realize that it is not always possible to preserve everything."

4.2.4 Site Visit with CIA Participants

On June 17, 2021, a site visit was organized. All three CIA participants came together to visit significant archaeological sites in portions of the project area. The site visit was facilitated by Mara Mulrooney, Krickette Pacubas, and Myriam Bernede-Martin (Barbers Point Solar LLC). The group visited the *kahua* and neighboring habitation and agricultural features that are recommended for preservation (portions of SIHP 50-80-12-05106) in Parcel 40. During the site visit, the group discussed how to best care for these sites, including possibly clearing the *kahua* and reactivating the space for Makahiki activities. The trail that Uncle Shad had mentioned was not relocated; he noted that the thick vegetation was likely obscuring it. The group also visited a *kauhale* (traditional Hawaiian habitation complex; SIHP 50-80-12-05100) located in Parcel 38 and also recommended for preservation. Discussion centered on a vaulted platform that had been excavated previously and was interpreted as a cooking house. During the site visit, Mana and Uncle Shad noted that the interpretation of this feature as an above-ground oven made sense, as the digging of a traditional subsurface *imu (*underground oven) would not be possible due to the limestone karst substrate. The CIA participants remarked at how well-preserved many of the sites are in the Barbers Point area.

5.0 SUMMARY AND RECOMMENDATIONS

The State of Hawaiʻi is under a constitutional and statutory obligation to protect Native Hawaiian customary and traditional gathering rights. Guidelines provided by the Office of Environmental Quality Control (OEQC) outline acceptable methods to identify the types of cultural practices and beliefs that are subject to a Cultural Impact Assessment (CIA). In addition, a series of Hawaiʻi Supreme Court cases reaffirmed the customary and traditional gathering rights of *ahupuaʻa* tenants, including *Kalipi*, *Pele Defense Fund v. Paty*, *Public Access Shoreline Haw. Cnty. Planning Comm'n* (commonly known as PASH), and *Ka Paʻakai O Ka ʻĀina v. Land Use Com'n, State of Hawaiʻi*.

To carry out the CIA for the Barbers Point Solar Project, archival research was conducted, followed by community consultations to identify cultural practices, cultural resources, and beliefs associated with the area. Cultural practices are typically customs relating to subsistence, commerce, residency, agriculture, recreation, religion, spirituality, and collection of cultural resources, which may be carried out by Hawaiian practitioners or practitioners from other ethnic groups. Cultural resources, such as natural feature and archaeological sites associated with these types of customs are also subject to this CIA.

The following sections provide an analysis of potential effects to known traditional and cultural practices within and adjacent to the Barbers Point Solar Project area. Recommendations for managing potential impacts to cultural practices and preserving the integrity of cultural resources in the area are presented below.

5.1 ANALYSIS OF POTENTIAL PROJECT-RELATED EFFECTS TO TRADITIONAL AND CUSTOMARY PRACTICES

5.1.1 Traditional Cultural Resources and Customary Practices Specific to the Proposed Project Area

The archaeological record within the project area provides insights into pre-Contact and post-Contact use of this area for dryland agricultural, habitation, and ceremonial activities. Many of the sites that have been identified in this area are reflective of the traditional land use practices described in Section 3.1.5, Ka ʻOihana Mahi ʻAi no Honouliuli—Traditional Agriculture of Honouliuli. The identification of a *kahua* (Makahiki grounds) within the project area and the wider region of the ʻEwa Plain in the Ahupuaʻa of Honouliuli provides a rare window into the annual Makahiki ceremony in traditional Hawaiian culture as a highly significant ceremonial space. Flora and fauna that were identified in the project area through the biological survey (Tetra Tech 2021) may have been used for *lāʻau lapaʻau* in the past, but as of this writing, there are no known individuals who are currently engaged in traditional or customary gathering practices in the area.

5.1.2 Traditional Cultural Resources and Customary Practices Identified within Honouliuli Ahupuaʻa and Adjacent to the Proposed Project

The ʻEwa Plain and Honouliuli Ahupuaʻa hold much significance for Native Hawaiians, as demonstrated by ethnographic data as well as the archaeological record. Numerous *moʻolelo* attest to the traditional and historic significance of the region, and cultural uses of the wider area continue to the present day. There are active initiatives to restore and reactivate many of

the *wahi kūpuna* (ancestral sites), including those located within the Kalaeloa Heritage Park, directly west of the Barbers Point Solar Project area. Although access to the wider area within which the project is situated was limited due to the presence of NASBP during much of the 20th century, cultural traditions centered on the preservation and protection of archaeological sites and burial places in the area adjacent to the project area and throughout the *ahupuaʻa* reflect a continued connection to the land by cultural descendants in the area.

5.2 SUMMARY OF FINDINGS

Archival research has revealed that, in general, the ʻEwa Plain in which the proposed solar development is to be built has a long and interesting history. From the archaeological record, *moʻolelo*, and historic documents attributed to the vast area, it is evident that these lands have been the stage of many significant events in Oʻahu's pre- and post-Contact history.

Archaeological research conducted within the project area has identified historic properties that were constructed during the pre-Contact period as well as more recent times. It is possible that a major feature of pre-Contact and early Contact Honouliuli, the Kualakaʻi Trail, cut across or passed near to the project area according to the Malden (1825) map featuring the south coast of Oʻahu (Figure 6). This prominent trail once connected Honouliuli Village to the coastal settlements of Oneʻula and Kualakaʻi, and would have been crucial to life on the ʻEwa Plain and its coast.

Ethnographical evidence supports the possibility of cultural practices occurring on the property prior to the large-scale modification of large portions of the area by military activity. Based on information shared by Shad Kane, portions of the project area were used by Hawaiians for a variety of activities. For example, sinkholes in the larger general area were utilized as natural planters for *kalo* (taro, dry-land variety), temporary shelters, storage features, and sources of water. Shad Kane also recalled the existence of a *kahua*, or Makahiki grounds, as well as numerous trails in the area that connected to trails in the Kalaeloa Heritage Park.

It has not been demonstrated that any cultural practices have been ongoing from the pre-Contact era or post-Contact era to the present. As the majority of the project area has been heavily disturbed by military activities prior to this CIA, contemporary cultural practices taking place in the project area related to *lāʻau lapaʻau* (medicine) are not currently being carried out. In the adjacent Kalaeloa Heritage Park parcel, cultural practices center on caring for archaeological features and natural resources.

CIA participants did not identify any direct or indirect effects that the Barbers Point Solar Project will have on traditional cultural practices in the area; however, during the site visit, they collectively expressed a desire to *mālama* (take care of) the traditional Hawaiian sites within the project area, which they observed were in very good condition. They envisioned clearing the invasive vegetation and reactivating the *kahua* for Makahiki activities and caring for nearby archaeological features. Preservation is recommended for these features, with possible interpretation and reactivation through traditional cultural practices in the future.

5.3 RECOMMENDATIONS

Consultation undertaken through the current CIA complements the extensive archaeological studies that have been undertaken within and adjacent to the project area, which have identified significant archaeological features dating to the pre-Contact period as well as the more recent past. A primary concern of those interviewed was the potential for limestone pit features in the area to contain *iwi kūpuna*. As such, a program of archaeological data recovery of pits that will be impacted by the project is recommended, as is an archaeological monitoring program during construction of the project.

The cultural descendants who participated in this study should be further consulted to develop protocols for the appropriate protection and preservation of sites, and these protocols should be recognized in future land uses and transactions. Their *manaʻo* (thoughts, ideas, opinions) on procedures for clearing, caring for, and reactivating the *kahua* would be invaluable as well. Given the existence of Hawaiian burials in close proximity to the project area, there is potential for natural limestone pit features to contain burials. Should a burial be identified during the construction of the Barbers Point Solar Project, the CIA participants and other cultural descendants should also be involved in the decision-making process in accordance with State law.

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APPENDIX A

Guidelines for Assessing Cultural Impacts
Obtained from the 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 ahupuaʻa 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 Hawai‘i’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, Hawai‘i 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] welfare, social welfare, and cultural practices 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 ahupuaʻa 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.

6. 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.

7. 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.

8. An explanation of confidential information that has been withheld from public disclosure in the assessment.

9. A discussion concerning any conflicting information in regard to identified cultural resources, practices and beliefs.

10. 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.

11. 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.

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APPENDIX F. VISUAL IMPACT ASSESSMENT REPORT

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Barbers Point Solar Project

Visual Impact Assessment Report

Prepared for:

Barbers Point Solar, LLC

July 2021

TETRA TECH

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Appendix A. Photo Simulations

1.0 Introduction

Barbers Point Solar, LLC is proposing to build and operate the Barbers Point Solar Project (Project) located in east Kalaeloa, ‘Ewa District, on the island of O‘ahu. The Project will consist of a 15-megawatt (MW) solar photovoltaic (PV) system coupled with a 15 MW, 4-hour (60 MW-hour) photovoltaic coupled battery energy storage system (PV-Coupled BESS) as well as ancillary support infrastructure. The Project area encompasses approximately 163-acres[1] primarily located within tax map keys (TMKs): 9-1-013:038 and 9-1-013:040, both owned by Department of Hawaiian Home Lands (DHHL). Project electrical transmission lines will also be located on portions of TMK 9-1-016:027 (owned by Kapolei Infrastructure, LLC) and within rights-of-way (ROW) owned by Hawai‘i Department of Transportation (HDOT). The Project location and conceptual layout are shown in Figures 1 and 2, respectively.

2.0 Project Description

The Project consists of construction and operation of a 15-MW solar PV system coupled with a 15 MW, 4-hour (60 MW-hour) PV-Coupled BESS as well as related interconnection and ancillary support infrastructure. Specifically, it includes the following major components:

1. solar PV system,
2. direct current electrical collector lines,
3. power conversion systems including PV-Coupled BESS units and step-up transformers,
4. alternating current electrical collector lines,
5. Project collector substation,
6. a generation-tie line (combination overhead and underground),
7. communication equipment,
8. access roads and fencing , and
9. temporary laydown areas.

Each of these components is described in the following subsections. Barbers Point Solar, LLC anticipates that the total combined footprint of the Project components located on DHHL lands will be less than 100 acres, of which the solar panels will cover approximately 45 acres. All major components will be located within the Project fence line with the exception of the generation-tie line, select access roads, and portions of the collector lines located in the public ROWs. The preliminary site layout is shown in Figure 2.

[1] Based on the preliminary design, the Project layout is not expected to occupy the entire 163-acre Project area (see Figure 2). The final area secured for the Project is anticipated to be a subset of the 163-acre Project area. Any such reduction in the Project area would not substantively change the size, scope, intensity, use, location, or timing of the Project itself, as described herein.

3.0 Affected Environment

The Project area is located on the lower slopes of the southern Waiʻanae Mountains and is surrounded by the ʻEwa plain, which is an expansive plain extending from the base of the Waiʻanae Mountains to the shoreline. It is bordered by Tripoli Road to the south, Coral Sea Road to the west, the Barbers Point Golf Course and Kalaeloa Renewable Energy Park to the east, and vacant land and Roosevelt Avenue/Geiger Road to the north. Project components are primarily located on two parcels owned by DHHL: TMKs 9-1-013:038 and 9-1-013:040. However, linear areas for access roads, collector lines, and a generation-tie line located within public ROWs (Coral Sea Road, Roosevelt Avenue, and unnamed ROW owned by HDOT) and one privately owned parcel (TMK 9-1-016:027) are also included in the Project area (Figure 2).

Much of the Project area was developed during the mid-20th century into the Marine Corps Air Station ʻEwa and later the Naval Air Station Barbers Point (NASBP). The Marine Corps Air Station ʻEwa was used by the Marine Corps during World War II as a training facility and was decommissioned in 1952. The NASBP was established as a naval air station in 1942 and was closed in 1999. The northern portion of the Project area is located within the ʻEwa Battlefield Historical District which was one of the sites attacked by Japanese Imperial Navy forces on December 7, 1941. A portion of the Project area within TMK 9-1-013:038 is located in the proposed ʻEwa Field Aircraft Revetment Historic District.

Since the closure of the NASBP, portions of the Project area have been (or will be) disposed of by the U.S. Navy to non-federal agencies. TMK parcels 9-1-013:038 and 9-1-013:040 were transferred from the U.S. Navy to DHHL in 1996 as part of a settlement agreement under the Hawaiian Home Lands Recovery Act (P.L. 1-4-42).

Some areas of the DHHL owned parcels are leased to tenants for commercial and agricultural purposes. There are large cleared, concrete and asphalt paved areas, as well as debris, bunkers, aircraft revetments and associated structures, and abandoned vehicles and equipment in the Project area. The majority of the Project area is vacant and overgrown by kiawe and koa haole. A private horse stable business operates in revetments located on TMK 9-1-013:164 immediately adjacent to and east of the Project area and the U.S. Navy's former Northern Trap and Skeet Range. The former Northern and Southern Trap and Skeet Range are located on U.S. Navy owned parcels TMK 9-1-013:039 and TMK 9-1-013:042 located north and east of Project parcel TMK 9-1-013:040. These adjacent parcels are vacant and overgrown by kiawe and various grasses.

The Project site is located approximately 0.35 miles north of the Pacific Ocean. The topography of the Project site is gently sloping in a southwesterly direction with elevations ranging between approximately 38 feet (12 meters) above mean sea level at the northeastern extent to approximately 10 feet (3 meters) above mean sea level at the southwestern extent of the Project site.

Despite the extent of urban development in the Project area, the visual setting of this region includes views of the Waiʻanae Mountains and the Pacific Ocean. Major roadways that provide landscape views

toward the Waiʻanae Mountains in the vicinity of the Project area include H-1 Freeway, Farrington Highway, Kapolei Parkway, and Roosevelt Avenue.

4.0 O'ahu Scenic Resource Goals and Objectives

4.1 General Plan

The General Plan sets forth the long-range objectives and policies for the general welfare, providing a framework to guide the programs and activities of the City and County of Honolulu. The following applicable goals, objectives, and policies are identified in the General Plan to protect the county's applicable identified scenic resources:

> *Section III. Natural Environment*
>
> *Objective A: To protect and preserve the natural environment.*
>
> *Policy 3: Retain the Island's streams as scenic aquatic, and recreation resources.*
>
> *Policy 4: Require development projects to give due consideration to natural features such as slope, flood and erosion hazards, water- recharge areas, distinctive land forms, and existing vegetation.*
>
> *Objective B: To preserve and enhance the natural monuments and scenic views of Oahu for the benefit of both residents and visitors.*
>
> *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.*

4.2 'Ewa Development Plan

Together with the General Plan, the 'Ewa Development Plan is one of eight O'ahu community-based plans intended to guide public policy, infrastructure investment, and land use decision-making. The following applicable goals, objectives, and policies are identified in the 'Ewa Development Plan to protect the planning area's identified scenic resources:

Exhibit 3.2 and Table 3.2 of the 'Ewa Development Plan indicates the locations of scenic resources in the 'Ewa Development Plan Area. These include the following significant views and vistas:

- Distant vistas of the shoreline from the H-1 Freeway above the 'Ewa Plain;
- Views of the ocean from Farrington Highway between Kahe Point and the boundary of the Waiʻanae Development Plan Area;
- Views of the Waiʻanae Range from H-1 Freeway between Kunia Road and Kaloʻi Gulch and from Kunia Road;

- Views of Nā Puʻu at Kapolei, Pālailai, and Makakilo;
- Mauka and makai views; and
- Views of central Honolulu and Diamond Head, particularly from Puʻu O Kapolei, Puʻu Pālailai, and Puʻu Makakilo.

Guidelines

Guideline 3.1.1 General Policies

Use open space to: Protect scenic views and natural, cultural, and historic resources.

Guideline 3.4.1 General Policies

Retain significant vistas whenever possible.

Guideline 3.4.2.2 Impacts of Development on Historic and Cultural Resources

Public Views - Design and site all structures, where feasible, to reflect the need to maintain and enhance available views of significant landmarks and vistas. Whenever possible, relocate or place underground overhead utility lines and poles that significantly obstruct public views, under criteria specified in State law.

Based on the above information, this visual assessment considers the following views and view planes as scenic resources identified by the county and that may have visual impacts from the Project:

- Views from the H-1 Freeway above the ʻEwa Plain that may have views of the Project.
- Mauka and makai view planes from public access points that may have views of the Project.

5.0 Visual Assessment Methods

5.1 Visual Impact Criteria

Visual impacts are generally defined in terms of a project's physical characteristics and potential visibility, as well as the extent to which the project's presence would change the perceived visual character and quality of the environment in which it would be located. As the DHHL and the City and County of Honolulu do not have a visual assessment guide or formal visual resource management system, Tetra Tech followed the contrast rating system used by the U.S. Bureau of Land Management (BLM) to objectively measure potential changes to the visual environment[2]. The BLM's contrast rating system is commonly used by federal agencies to assess potential visual resource impacts from proposed projects.

[2] See BLM Visual Resource Management System (BLM 1986).

5.2 Visual Change Criteria

Potential visual impacts were characterized by determining the level of visual contrast introduced by the Project based on comparing existing conditions and photo simulations. Visual contrast is a means to evaluate the level of modification to existing landscape features. Existing landscape is defined by the visual characteristics (form, line, color, and texture) associated with the landform (including water), vegetation, and existing development. The level of visual contrast introduced by a project can be measured by changes in the visual characteristics that would occur as a result of project implementation. The greater the difference between the character elements found within the existing landscape and with a proposed project, the more apparent the level of visual contrast. The following general criteria[3] were used when evaluating the degree of contrast:

- *None* – The contrast is not visible or perceived.
- *Weak* – The contrast can be seen but does not attract attention.
- *Moderate* – The element contrast begins to attract attention and begins to dominate the characteristic landscape.
- *Strong* – The element contrast demands attention, would not be overlooked, and is dominant in the landscape.

5.3 Viewshed/Viewpoints

The viewshed is generally defined as the area that is visible from an observer's viewpoint and includes the screening effects of intervening vegetation, terrain, and/or structural features. The degree of visibility would depend on distance and view angle. Distance is only one of the factors that determine visibility of a site from a viewpoint. Terrain, vegetation, and structural features can obscure views that might otherwise be available at a certain distance. A detailed visual assessment considers intervening structures, vegetation, and terrain from selected viewpoints to assess where project components may be potentially visible and noticeable to the casual observer. The "casual observer" is considered an observer who is not actively looking or searching for the project components, but who is engaged in activities at locations with potential views of the project, such as walking or driving along a scenic road. If the project components are not noticeable to the casual observer, visual impacts can be considered minor to negligible.

Based on an initial field assessment of various viewsheds from different distances from the Project, Tetra Tech determined the Project would be discernable at locations adjacent or near the Project site but would not be viewable from surrounding areas due to the Project area's flat terrain and surrounding vegetation. Therefore, the visual assessment primarily focuses on potential impacts to viewsheds near the Project (i.e., the viewshed assessment area).

[3] These criteria are based on the BLM Visual Resource Management System, a process using the concept of "contrast" to objectively measure potential changes to the landscape features.

The detailed visual assessment includes the collection of photographs from selected viewpoints to capture existing views, a qualitative assessment of whether the view may or may not have an unobstructed view, and where appropriate, the creation of photo-realistic simulations (see Section 5.4). Viewpoints were selected:

- within the viewshed assessment area in locations where the Project components may be visible and noticeable to the casual observer,
- from public viewsheds (i.e., from public right of ways, parks), and
- based on spatial distribution.

The following specific viewpoint locations were identified for detailed visual assessment and creation of photo simulations. Four viewpoints represent views from public viewsheds (Figure 3):

- Viewpoint 1: ‘Ewa Battlefield Proposed Visitor Center
- Viewpoint 2: ‘Ewa Battlefield 1941 Runway
- Viewpoint 3: Coral Sea Road south of the intersection of Coral Sea Road and Casablanca Street
- Viewpoint 4: Coral Sea Road at Intersection of Coral Sea Road and HDOT ROW

5.4 Methodology for Generation of Photo Simulations

In January 2021, Tetra Tech conducted site visits to document views from the pre-selected viewpoints. Documentation included recording global positioning system (GPS) coordinates, taking a series of photographs to capture the existing views, and field notes (e.g., date/time photographs were taken, weather, direction of photograph). In addition, at each viewpoint location, GPS coordinates were recorded for “control points,” which are objects such as buildings or light poles that appear within the series of photographs taken.

Simulations were created from the four specific viewpoint locations described above in Section 5.3 (see Appendix A). To create the photo simulations, the location data captured by the GPS device was transferred to geographic information system software that combined data of the preliminary layout of Project components to produce a reference map. This map was then exported at true scale and imported into 3D modeling software to create a scaled 3D model of the Project including the proposed solar panels in spatially accurate locations and elevations. NexTracker solar tracking system with the panels slightly tilted and standing at a height of approximately 10 feet, were modeled and used for the photo simulations. The views from the existing photographs were then matched in the 3D model using virtual cameras with the same focal length and field of view as the digital camera used to take the photographs. Date- and time-specific lighting was added to the 3D model, and renderings from the virtual cameras were created. These renderings were blended into the existing conditions photographs utilizing digital photograph editing software. Tetra Tech modified the existing vegetation in the photographs to reflect Project associated changes to the landscape where tree/vegetation removal is anticipated due to Project development as these changes would be visible from some of the viewpoints.

This process ensured that the spatial relationships of the landscape, Project components, and viewer perspective are accurate and match the existing site photographs.

6.0 Potential Visual Impact Analysis

During construction and operation, where visible and noticeable, the Project may introduce visual contrast and have the potential to create visual effects within the surrounding areas for the casual observer. If the Project components are not visible or perceived, no visual impact would occur. If the Project components introduce contrast to the view but does not attract the attention of casual observer, the contrast is considered weak, and the visual impacts could be considered minor to negligible. If the visual contrast introduced by the Project begins to attract attention and begins to dominate the view, the contrast is considered moderate, and the impact could be considered moderate. If the Project components introduce contrast that demands attention, would not be overlooked, and is dominant in the view, the contrast is considered strong, and the impact could be considered significant. The potential visual impacts anticipated as a result of construction and operation of the Project are discussed below.

6.1 Construction Impacts

Short term visual effects would occur during construction activities on the Project site and the presence of equipment and crews. As described in Section 2.2 of the Environmental Assessment for the proposed Barbers Point Solar Project, construction activities would include transport and delivery of Project equipment and materials, site preparation, equipment installation, and revegetation and landscaping. These activities would be visible to varying degrees from surrounding locations, including nearby roadways (such as Coral Sea Road).

In many areas intervening structures and vegetation screen views toward the Project area resulting in views that are either fragmented or blocked; however, unobstructed views would occur along Coral Sea Road. Construction activities would be visible from these locations, but these impacts would be short term for travelers because they would only be paralleling the Project site for a limited time and their focus would be on the road ahead. Furthermore, visual impacts associated with construction activities would be short term, as construction equipment and crews would be removed from the Project area once construction is complete.

6.2 Scenic Vistas

The Project would not change visual landmarks and significant vistas identified in the ‘Ewa Development Plan (City and County of Honolulu 2020). These include panoramic views of the distant shoreline from the H-1 Freeway above the ‘Ewa Plain and mauka and makai views. Views from the H-1 Freeway were analyzed to determine if the Project would be visible from a public viewpoint. The Project is located approximately 3.4 miles south of the H-1 Freeway. Views of the Project to the casual observer from this location would be limited because of the distance and screening by terrain and vegetation. Where views of the Project are visible to the casual observer, the Project would blend in with the existing land use

patterns and would not attract attention and would be a subordinate feature in the landscape setting. As the contrast is anticipated to be weak from H-1 Freeway, the visual impacts are considered minor.

6.3 Viewpoints

The photo simulations developed for each viewpoint are included in Appendix A. Figure 3 shows the Project area, proposed solar array, and the four viewpoints.

<u>'Ewa Battlefield Proposed Visitor Center (Viewpoint 1)</u>

This viewpoint is located on the 'Ewa Battlefield Proposed Visitor Center site (Louis Berger 2020). The photograph was taken from the Proposed Visitor Center site, looking southeast. The existing landscape setting is characterized by flat terrain with dense vegetation, limiting views to the immediate foreground. The primary vegetation includes dense stands of large kiawe trees with an understory of grasses and shrubs. The vegetation consists of irregular, organic forms: grasses are continuous with irregular clumps and dense irregular shaped trees. Existing structural features are limited to the remnants of the mooring apron and concrete barriers, consisting of horizontal lines and gray color.

The Project would introduce dark gray color, geometric shapes, and horizontal lines into the landscape setting. This viewpoint reflects the views of visitors to the 'Ewa Battlefield looking southeast. The Project would not be visible from this location by a casual observer because of the screening of the Project site by existing vegetation; therefore, there would be no visual impacts from Viewpoint 1.

<u>Ewa Battlefield 1941 Runway (Viewpoint 2)</u>

This viewpoint is located on the 'Ewa Battlefield 1941 Runway. The photograph was taken from the 1941 Runway, looking southwest. The existing landscape setting is characterized by flat terrain with dense vegetation lining the remnants of the 1941 Runway, limiting views to either side of the runway. The primary vegetation includes dense stands of large kiawe trees with an understory of grasses and shrubs. The vegetation consists of irregular, organic forms: grasses are continuous with irregular clumps and dense irregular shaped trees. Existing structural features are limited to the 1941 Runway, consisting of horizontal lines and gray color.

The Project would introduce dark gray color, geometric shapes, and horizontal lines into the landscape setting; the colors, regular geometric forms and horizontal lines associated with the solar arrays and associated infrastructure would result in a visual contrast with the irregular, organic forms, and colors of the existing vegetation. However, views of the Project from this location by a casual observer would be limited because of the screening of the Project site by vegetation. The portions of the Project that are visible would not attract attention and would be a subordinate feature in the landscape setting. This viewpoint reflects the views of visitors to the 'Ewa Battlefield 1941 Runway looking southwest. As the contrast is anticipated to be weak from Viewpoint 2, the visual impacts are considered minor.

Coral Sea Road south of the intersection of Coral Sea Road and Casablanca Street (Viewpoint 3)

This viewpoint is located at Coral Sea Road south of the intersection of Coral Sea Road and Casablanca Street where the Project's southern site entrance will be constructed. The photograph was taken from the west side of Coral Sea Road, looking east. The existing landscape setting is characterized by flat terrain with dense vegetation limiting views to the immediate foreground. The primary vegetation includes dense stands of large kiawe trees with an understory of grasses and shrubs. Existing structural features include the roadway, fencing, and utility poles and lines. Dominant colors for the landscape are tans and greens while the structures are gray and brown. The vegetation consists of irregular, organic forms: grasses are continuous with irregular clumps and dense irregular shaped trees. The linear and horizontal lines associated with the structures are visible and prominent from this viewpoint.

The Project would introduce dark gray color, geometric shapes, and horizontal lines into the landscape setting; the colors, regular geometric forms and horizontal lines associated with the solar arrays and associated infrastructure would result in a visual contrast with the irregular, organic forms, and colors of the existing vegetation. However, the structures in the vicinity also possess gray color (roadway and fencing) and horizontal and vertical lines (roadway, fencing, and utility poles and lines). Additionally, views of the Project from this location by a casual observer would be limited because of the proposed screening of the Project site by Project landscaping (note the contrast between the Viewpoint 3-No Landscaping and Viewpoint 3-With Proposed Landscaping simulations, see Appendix A). The portions of the Project that are visible would attract attention and would be a co-dominate feature in the landscape setting. This viewpoint reflects the views of drivers looking east from Coral Sea Road. As the contrast is anticipated to be moderate from Viewpoint 3, the visual impacts are considered moderate. These impacts would be short term for travelers because they would only be paralleling the Project site for a limited time and their focus would be on the road ahead.

Coral Sea Road at Intersection of Coral Sea Road and HDOT ROW (Viewpoint 4)

This viewpoint is located at Coral Sea Road at the intersection of Coral Sea Road and the HDOT ROW. The photograph was taken from the west side of Coral Sea Road, looking northeast. The existing landscape setting is characterized by flat terrain with dense vegetation limiting views to the immediate foreground. The primary vegetation includes dense stands of large kiawe trees with an understory of grasses and shrubs. Large white rocks line the edge of the stand of trees. Dominant colors for the landscape are tans and greens. The vegetation consists of irregular, organic forms: grasses are continuous with irregular clumps and dense irregular shaped trees.

The Project would introduce dark gray color, geometric shapes, and horizontal lines into the landscape setting; however, the existing dense vegetation would screen views of the Project from this location. The Project would also introduce light gray color and the horizontal vertical lines associated with the Project access road and fencing into the landscape setting. A small portion of the access road and fencing would be visible from Coral Sea Road, however, these visual elements would be similar to the existing Coral Sea Road and the existing fencing on the west side of Coral Sea Road. These elements would not attract attention and would be a subordinate feature in the landscape setting. The Project

substation would be located near this viewpoint, however, views of the substation would be mostly screened by the existing vegetation that will be left in place. This viewpoint reflects the views of drivers looking east from Coral Sea Road. These impacts would be short term for travelers because they would only be paralleling the Project site for a limited time and their focus would be on the road ahead. As the contrast is anticipated to be weak from Viewpoint 4, the visual impacts are considered minor.

7.0 Conclusion

During construction and operation, where visible and noticeable, the Project may introduce visual contrast and have the potential to create visual effects within the surrounding areas for the casual observer. If the Project components are not visible or perceived, no visual impact would occur. Based on a viewshed assessment (which considers terrain only and not existing vegetation or structures that may obstruct the view), it is anticipated that views of the Project would be primarily from areas immediately adjacent to the Project site. The Project will not block mountain or ocean views.

The visual assessment includes an impact analysis of specific viewpoints from the adjacent public roadways and from locations within the ‘Ewa Battlefield. The visual impact analysis shows that in many cases the Project will be partially or fully screened by existing vegetation.

The Project is anticipated to be completely screened by terrain and existing vegetation at Viewpoint 1. The Project will introduce weak contrast to the landscape setting at Viewpoints 2 and 4 and a moderate contrast at Viewpoint 3.

After decommissioning, the Project site will be returned to substantially the same condition as existed prior to Project development. Considering all features, the Project is expected to have minimal or no significant impact on the City and County of Honolulu’s scenic and visual resources.

8.0 References

BLM (Bureau of Land Management). 1986. Visual Resource Inventory. *BLM Manual Handbook H-8410-1*.

City and County of Honolulu. 2020. ‘Ewa Development Plan. Adopted July 2013, Amended 2020. Available at: Ewa_DP_2013_Amended_2020_Ordinance_20-46.pdf (honolulu.gov)

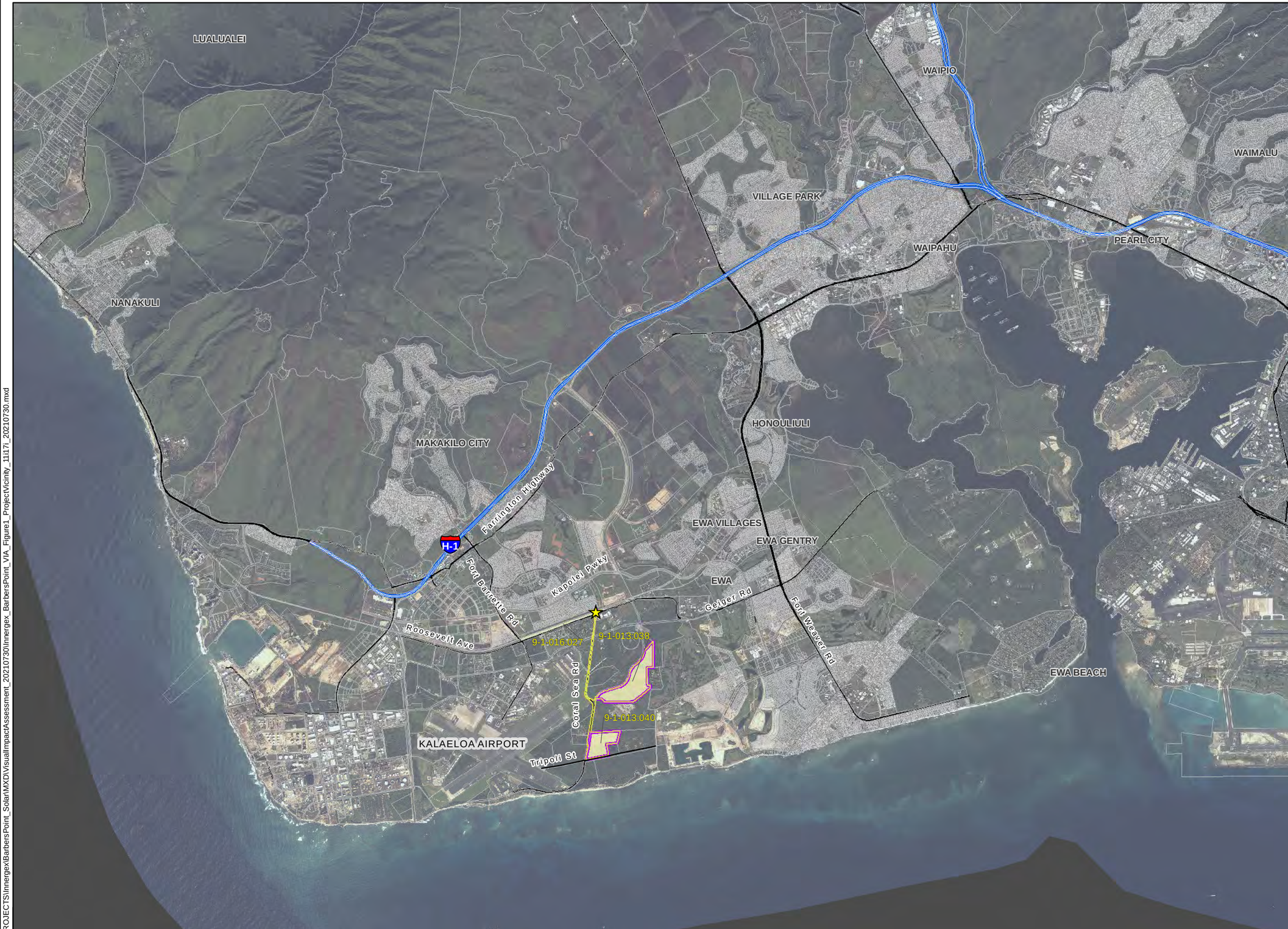
Louis Berger. 2020. Draft ‘Ewa Battlefield Plan, February 2020.

Figures

Barbers Point Solar Project

Figure 1
Project Vicinity

CITY AND COUNTY OF HONOLULU

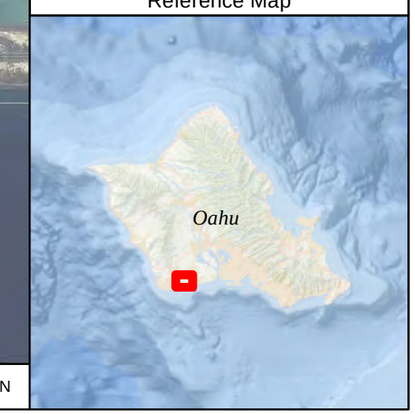


Project Area
Project TMK
DHHL Lands
TMK Boundary
Interstate Highway
State Highway
County Road

TETRA TECH

Barbers Point Solar LLC

Reference Map



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0 1 2 Miles

NOT FOR CONSTRUCTION

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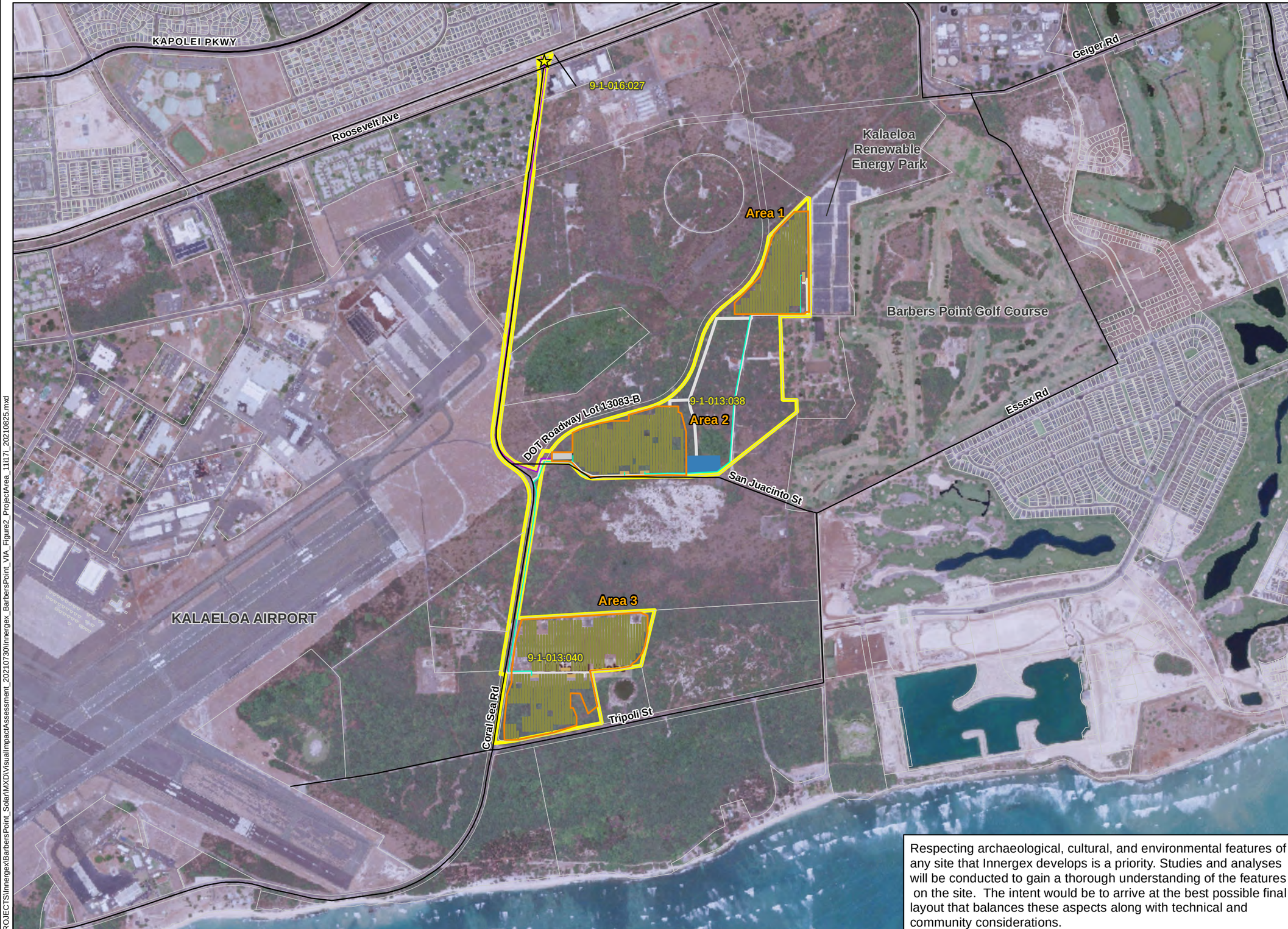
Barbers Point Solar Project

Figure 2
Project Area

CITY AND COUNTY OF HONOLULU



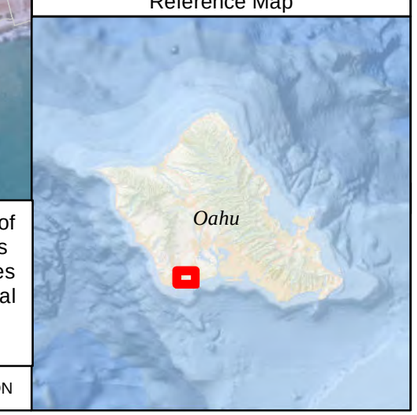
Respecting archaeological, cultural, and environmental features of any site that Innergex develops is a priority. Studies and analyses will be conducted to gain a thorough understanding of the features on the site. The intent would be to arrive at the best possible final layout that balances these aspects along with technical and community considerations.

- Project Area
- TMK Boundary
- Road
- Overhead Gen-Tie Line Termination Point at Existing HECO 46-kV Transmission Line
- Security Fence
- Solar Array
- Collector Line
- Project Substation
- Power Conversion System
- Temporary Laydown (Staging) Area
- Site Access Road & Collector Line
- 46-kV Transmission Line (Overhead and Underground)

TETRA TECH

Barbers Point Solar LLC

Reference Map



1:14,000 WGS 1984 UTM Zone 4N

0 0.25 0.5 1 Miles

NOT FOR CONSTRUCTION

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Barbers Point Solar Project

Figure 3
Viewpoints

CITY AND COUNTY OF HONOLULU

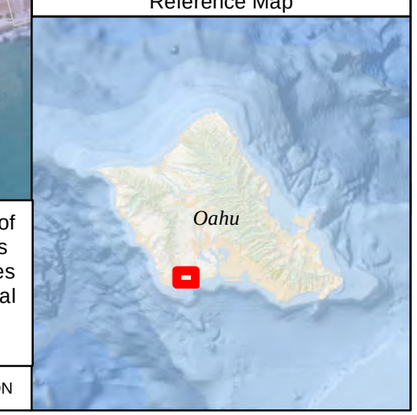
Respecting archaeological, cultural, and environmental features of any site that Innergex develops is a priority. Studies and analyses will be conducted to gain a thorough understanding of the features on the site. The intent would be to arrive at the best possible final layout that balances these aspects along with technical and community considerations.

- Project Area
- TMK Boundary
- Road
- Overhead Gen-Tie Line Termination Point at Existing HECO 46-kV Transmission Line
- Security Fence
- Solar Array
- Collector Line
- Project Substation
- Power Conversion System
- Temporary Laydown (Staging) Area
- Site Access Road & Collector Line
- 46-kV Transmission Line (Overhead and Underground)
- Viewpoint
- Ewa Battlefield Historical District

TETRA TECH

Barbers Point Solar LLC

Reference Map



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0 0.25 0.5 1 Miles

NOT FOR CONSTRUCTION

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APPENDIX A
PHOTO SIMULATIONS

BARBERS POINT SOLAR PROJECT

PHOTO SIMULATION

Viewpoint 1:
Ewa Battlefield
View From
Proposed Visitor Center

Existing Conditions

Simulated Conditions

Photograph Information

Time of photograph:	3:38 PM
Date of photograph:	12/07/2020
Weather condition:	Partly Cloudy
Viewing direction:	Southeast
Latitiude:	21.326572°
Longitude:	-158.047383°

INNERGEX

BARBERS POINT SOLAR PROJECT

PHOTO SIMULATION

Viewpoint 2: Ewa Battlefield

View From
Historic Runway

Existing Conditions

Simulated Conditions

Photograph Information

Time of photograph:	1:24 PM
Date of photograph:	12/07/2020
Weather condition:	Partly Cloudy
Viewing direction:	Southwest
Latitiude:	21.326148°
Longitude:	-158.043643°

INNERGEX

BARBERS POINT SOLAR PROJECT

PHOTO SIMULATION

Viewpoint 3:
Coral Sea Road
No Landscaping

Existing Conditions

Simulated Conditions

Photograph Information

Time of photograph:	2:55 PM
Date of photograph:	12/11/2020
Weather condition:	Partly Cloudy
Viewing direction:	East
Latitiude:	21.309562°
Longitude:	-158.056263°

INNERGEX

BARBERS POINT SOLAR PROJECT

PHOTO SIMULATION

Viewpoint 3: Coral Sea Road

With Proposed Landscaping

Existing Conditions

Simulated Conditions

Photograph Information

Time of photograph:	2:55 PM
Date of photograph:	12/11/2020
Weather condition:	Partly Cloudy
Viewing direction:	East
Latitiude:	21.309562°
Longitude:	-158.056263°

INNERGEX

BARBERS POINT SOLAR PROJECT

PHOTO SIMULATION

Viewpoint 4: Coral Sea Road

Near San Juacinto Street

Existing Conditions

Simulated Conditions

Photograph Information

Time of photograph:	4:15 PM
Date of photograph:	12/11/2020
Weather condition:	Partly Cloudy
Viewing direction:	Northeast
Latitiude:	21.314886°
Longitude:	-158.055408°

INNERGEX

BARBERS POINT SOLAR PROJECT

PHOTO SIMULATION

Viewpoint 4: Coral Sea Road

Near San Juacinto Street

Existing Conditions

Simulated Conditions

Photograph Information

Time of photograph:	4:15 PM
Date of photograph:	12/11/2020
Weather condition:	Partly Cloudy
Viewing direction:	Northeast
Latitiude:	21.314886°
Longitude:	-158.055408°

INNERGEX

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APPENDIX G. GLARE ANALYSIS REPORT AND FAA DETERMINATION OF NO HAZARD TO AIR NAVIGATION

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Barbers Point Solar Project

Glare Analysis Report

Prepared for:

Barbers Point Solar, LLC

July 2021

TETRA TECH

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1.0 Introduction

At the request of Barbers Point Solar, LLC (Barbers Point Solar), Tetra Tech, Inc. (Tetra Tech) conducted a glare analysis of the proposed Barbers Point Solar Project (Project) located in east Kalaeloa, ‘Ewa District, on the island of O‘ahu. The Project will consist of a 15-megawatt (MW) single-axis tracker solar photovoltaic (PV) system coupled with a four-hour, 15-MW, 60 MW-hour (MWh) battery energy storage system, as well as ancillary support infrastructure.

With growing numbers of solar energy systems being proposed and installed throughout the United States, the potential impact of glare (a continuous source of bright light) from PV panels is receiving increased attention. The Federal Aviation Administration (FAA) developed a *Technical Guidance for Evaluating Selected Solar Technologies on Airports* in 2010 (FAA 2010). The FAA guidance recommends that glare analyses should be performed on a site-specific basis using the Sandia Laboratories Solar Glare Hazard Analysis Tool (SGHAT). This guidance applies to solar facilities located on/near airport property but is also considered to be an industry best practice for solar facilities in general.

Tetra Tech conducted a glare analysis using the SGHAT software through an online tool (GlareGauge) hosted by ForgeSolar. Glare was analyzed from representative observation points (OPs) around the Project associated with residential and public interest view points; and the final approach flight paths and the air traffic control towers (ATCT) associated with Kalaeloa Airport (JRF) and Daniel K Inouye International Airport (HNL). This report provides the results of the glare analyses and assesses whether the Project is anticipated to create glare-related impacts to the surrounding community and/or the surrounding airports. Included as appendices are the Project Layout that formed the basis of the analysis (Appendix A), the FAA Notice Criteria Tool output (Appendix B), and the glare analysis report generated through the use of the ForgeSolar tool (Appendix C).

1.1 Project Description

The Project area encompasses approximately 163 acres and is bordered by Tripoli Road to the south, Coral Sea Road to the west, the Barbers Point Golf Course to the east, the Kalaeloa Renewable Energy Park (5 MW solar facility) to the northeast, and vacant land and Roosevelt Ave/Geiger Road on the north. The Project area is primarily composed of two parcels owned by DHHL: TMKs 9-1-013:038 and :040. However, linear areas for access roads, collector lines, and a transmission line located within public ROWs (Coral Sea Road, Roosevelt Avenue, and Roadway Lot 13083-B) and one privately owned parcel (TMK 9-1-016:027) are also included in the Project area.

Much of the Project area was developed during the mid-20th century into the Marine Corps Air Station ‘Ewa (MCAS ‘Ewa) and later the Naval Air Station Barbers Point (NASBP). The MCAS Ewa was used by the Marine Corps during World War II as a training facility and was decommissioned in 1952 and the NASBP was established as a naval air station in 1942 and was closed in 1999. The northern portion of the Project area is located within the ‘Ewa Battlefield Historic District which was one of the areas attacked

by Japanese Imperial Navy forces on 7 December 1941. A portion of the Project area within TMK 9-1-013:038 is located in the proposed 'Ewa Field South Revetment Historic District.

Since the closure of the NASBP, portions of the Project area have been (or will be) disposed of by the U.S. Navy to non-federal agencies. TMK parcels 9-1-013:038 and 9-1-013:040 were transferred from the U.S. Navy to DHHL in 1996 as part of a settlement agreement under the Hawaiian Home Lands Recovery Act (P.L. 1-4-42).

Some areas of the DHHL owned parcels are leased to tenants for commercial and agricultural purposes. There are large cleared, concrete and asphalt paved areas, as well as debris, bunkers, aircraft revetments and associated structures, and abandoned vehicles and equipment in the Project area. The majority of the Project area is vacant and overgrown by kiawe and koa haole. A private horse stable business operates in revetments located on TMK 9-1-013:164 immediately adjacent to and east of the Project area and the Navy's former Northern Trap and Skeet Range and Southern Trap and Skeet Range are located on Navy owned parcels TMK 9-1-013:039 and 042 located north and east of Project parcel 9-1-013:040. The Kalaeloa Airport (JRF) is located west of the Project area.

The Project's solar arrays will include three areas: Area 1 in the northern portion of TMK 9-1-013:038, Area 2 in the southern portion of TMK 9-1-013:038, and Area 3 located on TMK 9-1-013:040. Access to Areas 1 and 2 on TMK 9-1-013:038 will be provided by a new driveway off of Coral Sea Road. This driveway will be located within an existing HDOT ROW associated with Roadway Lot 13083-B. Access to DHHL's parcel 9-1-013:040 will be via the existing intersection of Coral Sea Road and Casablanca Street.

The Project includes the following major components: (1) solar photovoltaic system, (2) direct current (DC) electrical collector lines, (3) power conversion systems including PV-Coupled ESS units and step-up transformers, (4) alternating current (AC) electrical collector lines, (5) Project collector substation, (6) a generation-tie line (combination overhead and underground), (7) communication equipment, (8) access roads and fencing, and (9) temporary laydown areas. Barber's Point Solar anticipates that the total combined footprint of the Project components will be approximately 89 acres, of which the solar panels will cover approximately 45 acres. All major components will be located within the Project fence line with the exception of the generation-tie line, select access roads, and portions of the collector lines located in the public ROWs. The preliminary site layout is shown in Appendix A. The power generated by the Project will be sold to Hawaiian Electric under a new 25-year power purchase agreement (PPA).

1.2 Glint vs. Glare

As an industry standard, the term "glint and glare analysis" is typically used to describe an analysis of potential ocular impacts to defined receptors. As a point of clarification, ForgeSolar defines glint and glare in the following statement:

> *Glint is typically defined as a momentary flash of bright light, often caused by a reflection off a moving source. A typical example of glint is a momentary solar reflection from a moving car. Glare is defined as a continuous source of bright light. Glare is generally associated with*

> *stationary objects, which, due to the slow relative movement of the sun, reflect sunlight for a longer duration* (Sandia Laboratories 2016).

Based on the ForgeSolar definitions of glint and glare and that the Project's PV panels will not likely rotate faster than the relative daily motion of the sun, the potential reflectance from the Project modeled throughout this report will be referred to as glare.

Glare is categorized by the SGHAT online tool, GlareGauge, into three tiers of severity (ocular hazards) that are shown by different colors in the model output:

- Red glare: glare predicted with a potential for permanent eye damage (retinal burn)
- Yellow glare: glare predicted with a potential for temporary after-image
- Green glare: glare predicted with a low potential for temporary after-image

These categories of glare are calculated using a typical observer's blink response time, ocular transmission coefficient (the amount of radiation absorbed in the eye prior to reaching the retina), pupil diameter, and eye focal length (the distance between where rays intersect in the eye and the retina). As a point of comparison, direct viewing of the sun without a filter is considered to be on the border between yellow glare and red glare, while typical camera flashes are considered to be lower tier yellow glare (approximately three orders of magnitude less than direct viewing of the sun). Upon exposure to yellow glare, the observer may experience a temporary spot in their vision after the exposure. Upon exposure to green glare, the observer may experience a bright reflection but typically no spot lasting after exposure.

1.3 Glare Analysis Method

The SGHAT is considered to be an industry best practice for analysis of glare related to solar energy generating facilities. Tetra Tech utilized the SGHAT technology as part of an online tool (GlareGauge) developed by Sandia National Laboratories and hosted by ForgeSolar. GlareGauge provides a quantitative assessment of the following:

- When and where glare has the potential to occur throughout the year for a defined solar array polygon; and
- Potential effects on the human eye at locations where glare is predicted.

The following statement was issued by Sandia Laboratories regarding the SGHAT technology:

> *Sandia developed SGHAT v. 3.0, a web-based tool and methodology to evaluate potential glint/glare associated with solar energy installations. The validated tool provides a quantified assessment of when and where glare will occur, as well as information about potential ocular impacts. The calculations and methods are based on analyses, test data, a database of different photovoltaic module surfaces (e.g. anti-reflective coating, texturing), and models developed over several years at Sandia. The results are presented in a simple easy-to-interpret plot that specifies*

when glare will occur throughout the year, with color indicating the potential ocular hazard (Sandia Laboratories, 2016).

Note, however, that technology changes continue to occur to address issues such as reflectivity. The model, therefore, presents a conservative assessment based upon simplifying assumptions inherent in the model as well as industry improvements since the most recent update of such assumptions.

Based on the predicted retinal irradiance (intensity) and subtended angle (size/distance) of the glare source to receptor, the GlareGauge categorizes potential glare where it is predicted by the model to occur in accordance with three tiers of severity (ocular hazards) that are shown by different colors in the model output:

- Red glare: glare predicted with a potential for permanent eye damage (retinal burn)
- Yellow glare: glare predicted with a potential for temporary after-image
- Green glare: glare predicted with a low potential for temporary after-image

These categories of glare are calculated using a typical observer's blink response time, ocular transmission coefficient (the amount of radiation absorbed in the eye prior to reaching the retina), pupil diameter, and eye focal length (the distance between where rays intersect in the eye and the retina). As a point of comparison, direct viewing of the sun without a filter is considered to be on the border between yellow glare and red glare, while typical camera flashes are considered to be lower tier yellow glare (approximately 3 orders of magnitude less than direct viewing of the sun). Upon exposure to yellow glare, the observer may experience a temporary spot in their vision temporarily lasting after the exposure. Upon exposure to green glare, the observer may experience a bright reflection but typically no spot lasting after exposure.

2.0 FAA Notice Criteria Consultation

The FAA developed Technical Guidance for Evaluating Selected Solar Technologies on Airports in 2010, in addition to FAA regulatory guidance under 78 FR 63276 Interim Policy, FAA Review of Solar Energy System Projects on Federally Obligated Airports (collectively referred to as FAA Guidance). The FAA Guidance recommends that glare analyses should be performed on a site-specific basis using the Sandia Laboratories SGHAT. This guidance applies to solar facilities located on federally-obligated airport property; it is not mandatory for a proposed solar installation that is not on an airport (and for which a Form 7460-1 is filed with FAA pursuant to CFR Title 14 Part 77.9, as discussed below), but is considered to be an industry best practice for solar facilities in general. The SGHAT is the standard for measuring potential ocular impact as a result of solar facilities (78 FR 63276).

According to 78 FR 63276, the FAA has determined that "glint and glare from solar energy systems could result in an ocular impact to pilots and/or air traffic control (ATC) facilities and compromise the safety of the air transportation system." The FAA has developed the following criteria for analysis of solar energy projects located on jurisdictional airports:

- No potential for glint or glare in the existing or planned ATCT cab; and
- No potential for glare or "low potential for after-image" along the final approach path for any existing landing threshold or future landing thresholds (including any planned interim phases of the landing thresholds) as shown on the current FAA-approved Airport Layout Plan (ALP). The final approach path is defined as two miles from 50 feet above the landing threshold using a standard three-degree glidepath.

The online FAA Notice Criteria Tool (NCT) reports whether a proposed structure is in proximity to a jurisdictional air navigation facility and if formal submission to the FAA OEG under CFR Title 14 Part 77.9 (Safe, Efficient Use, and Preservation of the Navigable Airspace) is recommended. The NCT also identifies final approach flight paths that may be considered vulnerable to a proposed structure's impact on navigation signal reception. The NCT was utilized to determine if the proposed Project is located within an FAA-identified impact area based on the Project boundaries and height above ground surface. The FAA NCT Report stated that a formal filing with the FAA OEG is recommended, and referenced JRF and HNL. Based on this information, this airport facility was included in the SGHAT analysis, as further discussed below in Sections 3 and 4.

3.0 Glare Analysis Methods

3.1 Glare Analysis Inputs

The Project Layout inputted into the GlareGauge model consists of six separate "PV Array Areas" (Figure 1), which are segmented polygons generally representative of the proposed Project Layout (Appendix A). Segmentation of the Project Layout allows GlareGauge to more accurately represent potential ocular impacts as a result of the Project. The Project will use PV panels that have smooth glass surface material with an anti-reflection coating (ARC). The reflective value of the panels is a parameter that must be selected in the glare analyses. Values associated with panel reflectivity and reflective scatter were not altered from the GlareGauge standard input averaged from various panel reflectance profiles produced from panel research concluded in 2016; therefore, as previously noted in Section 1.3, the GlareGauge model does not incorporate further advances in anti-reflective coatings since 2016 and therefore this is a conservative parameter.

It is Tetra Tech's understanding that Barbers Point Solar is in the process of finalizing the tracking specifications of the array; therefore, Tetra Tech modeled the most likely scenario of single axis tracking with no backtracking. The input features used in the analysis are summarized in Table 1 and Table 2.

Table 1. Analysis Design Parameters

Racking Type	Module Orientation[1]	Tracking Maximum[2] (degrees)	Resting Angle[3] (degrees)	Module Height[4] (feet)
Single Axis Tracking	East-facing	±60	±60	7.9

1. PV Array Areas modeled as single axis tracking modules from east-facing in the morning hours to west-facing in the evening hours.
2. The module tilt varies through the day as they track the sun, the maximum tracking angle tilt is ±60˚ east/west.
3. Angle of rotation of panels when sun is outside tracking range.
4. Average module centroid height above ground surface.

Table 2. Analysis Input Features

Flight Path/ ATCT Name	Associated Airport	True Direction (degrees)	Threshold Crossing Height (feet)	Glide Path[1] (degrees)	Height Above Ground (feet)
JRF RWY 11	Kalaeloa Airport	118	48	3	-
JRF RWY 22L	Kalaeloa Airport	235	32	3	-
JRF RWY 22R	Kalaeloa Airport	235	33	3	-
JRF RWY 29	Kalaeloa Airport	298	52	3	-
JRF RWY 4L	Kalaeloa Airport	55	35	3	-
JRF RWY 4R	Kalaeloa Airport	55	55	3	-
5-ATCT	Kahului Airfield	-	-	-	50[2]
HNL RWY 8L	Daniel K Inouye Intl Airport	89	71	3	-
HNL RWY 8R	Daniel K Inouye Intl Airport	90	96	3.25	-
HNL RWY 22L	Daniel K Inouye Intl Airport	233	80	3.44	-
HNL RWY 22R	Daniel K Inouye Intl Airport	233	50	3	-
HNL RWY 26L	Daniel K Inouye Intl Airport	270	75	3	-
HNL RWY 26R	Daniel K Inouye Intl Airport	270	65	3.25	-
HNL RWY 4L	Daniel K Inouye Intl Airport	53	50	3	-
HNL RWY 4R	Daniel K Inouye Intl Airport	53	71	3	-
4-ATCT	Daniel K Inouye Intl Airport	-	-	-	50[2]

1. Angle of descent along final approach flight path.
2. Unable to be confirmed based on public information. A conservative height of 50 feet was used based on aerial photography and Google street views.

As noted in Section 1.0, the glare analysis was conducted to analyze glare from different receptor characteristics and associated OPs. The analysis included representative OPs from the Hoakalei Country Club (OP 1), Kalaeloa Rental Homes (OP 2), and Ka Makana Ali'i Mall (OP 3); and two segmented vehicular routes along the nearby Coral Sea Road and Tripoli Road (see Figure 2). The OP locations were selected from Tetra Tech's comprehensive viewshed and line-of-sight analysis of representative

proximal receptors. For the OPs, associated glare was analyzed at a first-floor view height (6 feet above ground surface) and for the vehicular traffic routes, glare was analyzed at 5 feet above ground surface (i.e., typical commuter vehicle receptor height).

The analysis also included six 2-mile final approach flight paths and one ATCT associated with JRF, which is approximately 0.5 miles to the west of the Project, and eight 2-mile finale approach flight paths and one ATCT associated with HNL, which is approximately 6.5 miles to the east of the Project (Figure 3). The true directions, threshold crossing heights, and glide paths of the flight paths were obtained from the FAA Airport Database (Table 2).

3.2 Glare Analysis Assumptions

The GlareGauge model is bound by conservative limitations. The following assumptions provide a level of conservatism to the GlareGauge model:

- The GlareGauge model simulates PV arrays as infinitesimally small modules within planar convex polygons exemplifying the tilt and orientation characteristics defined by the user. Gaps between modules, variable heights of the PV array within the polygons, and supporting structures are not considered in the analysis. Since the actual module rows will be separated by open space, this model assumption could result in indication of glare in locations where panels will not be located. In addition, the supporting structures are considered to have reflectivity values that are negligible relative to the module surfaces included in the model.
- The GlareGauge model assumes that the observation point receptor can view the entire PV array segment when predicting glare minutes. However, it may be that the receptor at the observation point may only be able to view a small portion (typically the most proximal edge) of the PV array segment. Therefore, the predicted glare minutes and intensity from a specific PV array to a specific observation point are conservative as the observer will likely not experience glare from the entire PV array segment at once.
- The GlareGauge model does not consider obstacles (either man-made or natural) between the defined PV arrays and the receptors such as vegetative screening (existing or planted), buildings, topography, etc. Where such features exist, they would screen views of the Project and, thus, minimize or eliminate glare from those locations.
- The GlareGauge model does not consider the potential effect of shading from existing topography between the sun and the Project outside of the defined areas.
- The direct normal irradiance (DNI) is defined as variable using a typical clear day irradiance profile. This profile has a lower DNI in the mornings and evenings and a maximum of 1,000 Watts per square meter (W/m2) at solar noon. The irradiance profile uses the coordinates from Google Maps and a sun position algorithm to scale the DNI throughout the year. The actual daily DNI would be affected by precipitation, cloud cover, atmospheric attenuation (radiation intensity affected by gaseous constituents), and other environmental factors not considered in the GlareGauge model. This may result in modeled predicted glare occurrences when in fact the glare is not actually occurring due to cloud cover, rain, or other atmospheric conditions.

Note that hazard zone boundaries shown in the Glare Hazard plots are an approximation; actual ocular impacts encompass a continuous, not discrete, spectrum.

4.0 Glare Analysis Results

Tetra Tech performed the glare analysis to provide a quantitative assessment of the potential for glare from the Project based on different receptor characteristics. The analysis consisted of six PV Arrays with no simulated backtracking, three OPs at six feet above ground surface (typical first story receptor height), two segmented vehicular traffic routes at five feet above ground surface (typical commuter vehicle receptor height), 14 two-mile final approach flight paths and two ATCT.

Table 3 represents the glare summary in annual minutes of glare predicted. Based on the SGHAT results, limited amounts of green glare are predicted at JRF RWY 22L and 22R. No yellow or red glare is predicted at the defined receptors.

Table 3. Predicted Annual Minutes of Glare Summary

Receptor	Location	Green Glare	Yellow Glare	Red Glare
OP 1	Hoakalei Country Club	0	0	0
OP 2	Kalaeloa Rental Homes	0	0	0
OP 3	Ka Makana Ali'i Mall	0	0	0
Coral Sea Rd-1	-	0	0	0
Tripoli Road-1	-	0	0	0
JRF RWY 11	Kalaeloa Airport	0	0	0
JRF RWY 22L	Kalaeloa Airport	14,249	0	0
JRF RWY 22R	Kalaeloa Airport	4,653	0	0
JRF RWY 29	Kalaeloa Airport	0	0	0
JRF RWY 4L	Kalaeloa Airport	0	0	0
JRF RWY 4R	Kalaeloa Airport	0	0	0
5-ATCT	Kahului Airfield	0	0	0
HNL RWY 8L	Daniel K Inouye Intl Airport	0	0	0
HNL RWY 8R	Daniel K Inouye Intl Airport	0	0	0
HNL RWY 22L	Daniel K Inouye Intl Airport	0	0	0
HNL RWY 22R	Daniel K Inouye Intl Airport	0	0	0
HNL RWY 26L	Daniel K Inouye Intl Airport	0	0	0
HNL RWY 26R	Daniel K Inouye Intl Airport	0	0	0
HNL RWY 4L	Daniel K Inouye Intl Airport	0	0	0
HNL RWY 4R	Daniel K Inouye Intl Airport	0	0	0
5-ATCT	Kahului Airfield	0	0	0

5.0 Summary

The Project Layout was modeled using GlareGauge to evaluate the potential extent of glare the Project may cause to receptors at three OPs representing proximal residential and public interest areas surrounding the Project; two segmented vehicle routes; six proximal 2-mile final approach flight paths and one ATCT associated with JRF; and eight proximal 2-mile final approach flight paths and one ATCT associated with HNL. A summary of total glare predicted based on the analysis is presented in Table 5.

Table 4. Project Glare Summary

Total Green Glare Predicted (annual minutes)	Total Yellow Glare Predicted (annual minutes)	Total Red Glare Predicted (annual minutes)	Total Glare Predicted (annual minutes)[1]	Total Potential Glare Percentage of Annual Daylight Hours[2]
18,902	0	0	18,902	7.2
1. Total annual daylight minutes equal approximately 262,800. 2. Total annual daylight hours equal approximately 4,380.				

Based on the SGHAT results, none of the modeled OPs, segmented vehicle routes, nor any receptors at HNL (approximately 6.5 miles to the east of the Project) are predicted to experience glare as a result of the Project. The analysis predicts that JRF RWY 22R will experience 4,653 annual minutes (1.77% of annual daylight minutes) of accumulated instances of green glare from August to May from approximately 8:00 AM to 10:00 AM. The JRF RWY 22L is predicted to experience 14,249 annual minutes (5.42% of annual daylight minutes) of accumulated instances of green throughout the year from approximately 8:00 AM to 10:00 AM for green glare. The analysis predicted no glare at the other JRF receptors including the ATCT.

As previously noted, the GlareGauge model does not account for varying ambient conditions (i.e., cloudy days, precipitation); atmospheric attenuation; screening due to existing topography not located within the defined array layouts; or existing vegetation or structures (including fences or walls); therefore, the predicted results are considered to be conservative.

The analysis predicted glare for the flight paths that cross the PV Array Areas (Array 4, 5 and 6). Based on the configuration of the GlareGauge model, there will be predicted glare for the pilot if the flight path and PV Array intersect no matter the parameters inputted. This means the predicted amount of glare observed is a conservative result.

As noted in Section 2.0, the FAA has developed the following criteria (78 FR 63276) for analysis of solar energy projects located on jurisdictional airports:

- No potential for glint or glare in the existing or planned ATCT cab; and

- No potential for glare or “low potential for after-image” along the final approach path for any existing landing threshold or future landing thresholds (including any planned interim phases of the landing thresholds) as shown on the current FAA-approved ALP

Based on the results of the FAA NCT, the Project is recommended to formally file with the FAA OEG due to its proximity to JRF and HNL. With the parameters within the analysis, only green glare (“low potential for after image”) is predicted for the two-mile final approach paths for JRF RWY 22R and RWY 22L and would meet the FAA criteria.

6.0 References

FAA (Federal Aviation Administration), 2010a. Federal Aviation Administration. CFR Title 14 Part 77.9 Notice of Proposed Construction or Alteration Requiring Notice. 2010.

FAA, 2018. Technical Guidance for Evaluating Selected Solar Technologies on Airports. 2018.

Ho et al. Sandia National Laboratories, Solar Glare Hazard Analysis Tool (SGHAT) Technical Reference Manual. March 2015.

Sandia Solar Glare Hazard Analysis Tool, GlareGauge hosted by ForgeSolar. Accessed online https://www.forgesolar.com/.

Sandia, 2016. Sandia National Laboratories, Solar Glare Hazard Analysis Tool (SGHAT) User's Manual v. 3.0. December 6, 2016.

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Figures

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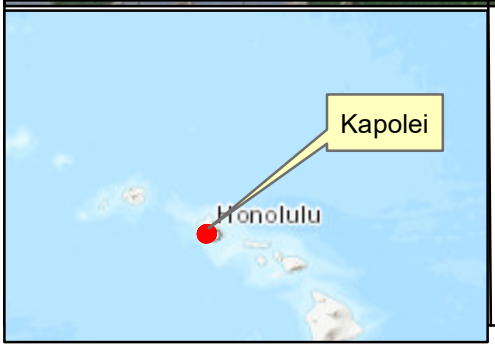


Legend

Project Layout (PV Array Areas)

*Locations are approximate

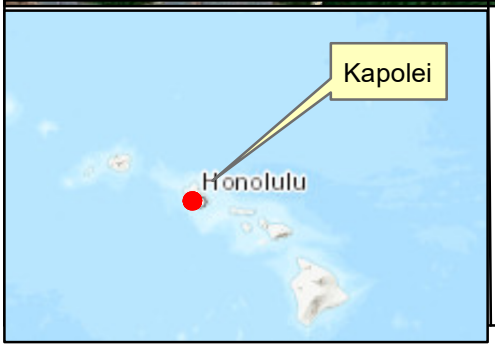
Approximate Scale:

0 550 1,100 2,200 Feet

TETRA TECH

Figure 1
PV Array Areas

Barber's point Solar
Kapolei, Hawaii



Legend

- Project Layout (PV Array Areas)
- Observation Points
- Tripoli Rd
- Coral Sea Rd

*Locations are approximate

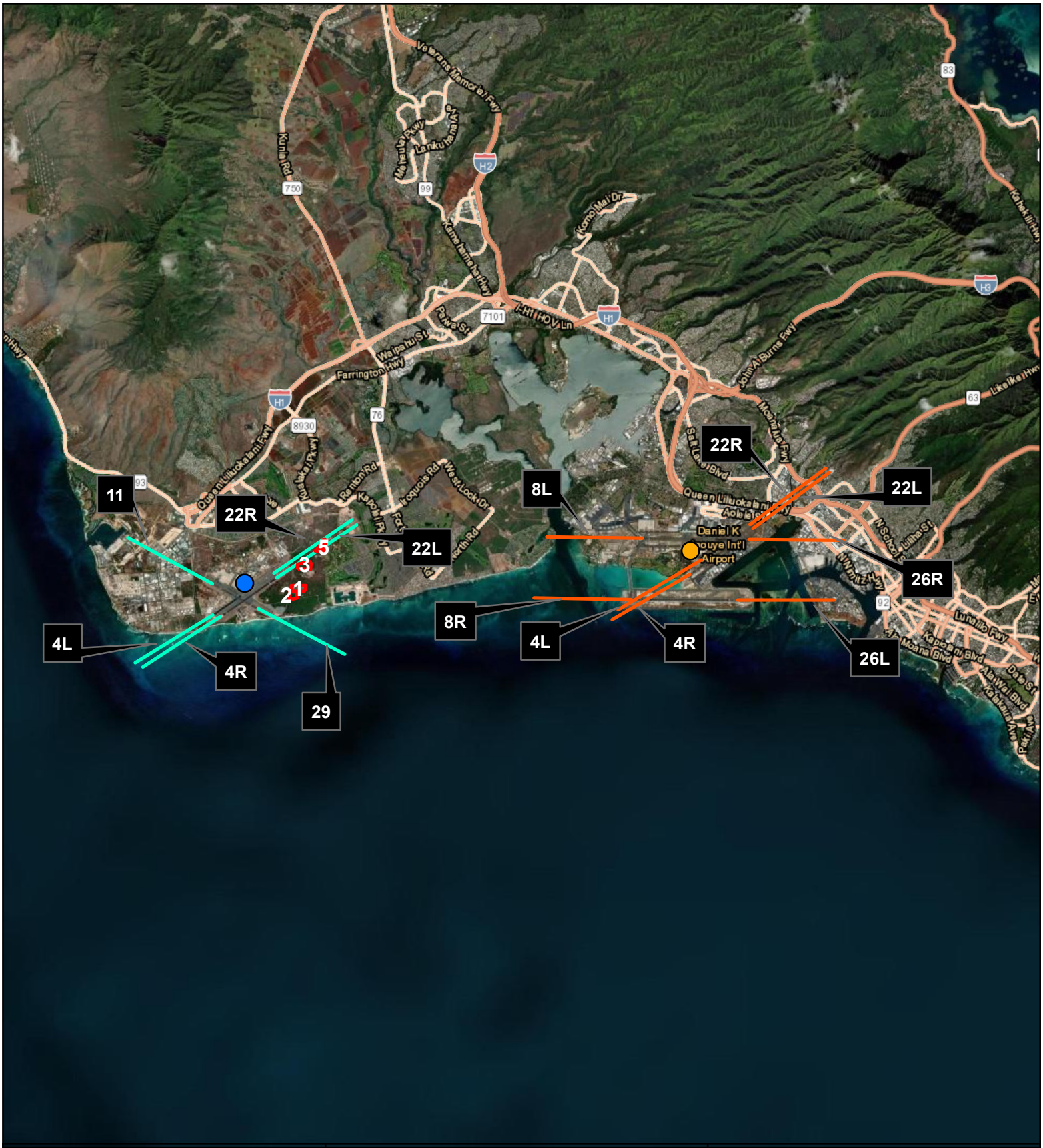
Approximate Scale:

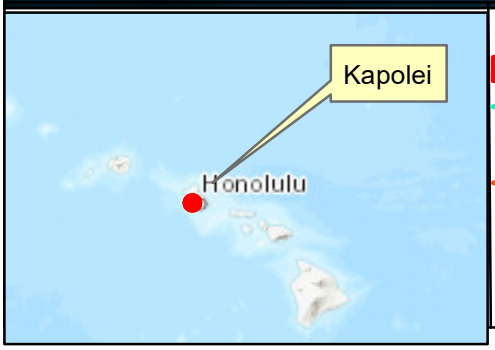
0 750 1,500 3,000 Feet

TETRA TECH

Figure 2
PV Array Area and Receptors

Barber's point Solar
Kapolei, Hawaii





Legend

- Project Layout (PV Array Areas)
- JRF 2-Mile Final Approach
- JRF ATCT
- HNL 2-Mile Final Approach
- HNL ATCT

*Locations are approximate

Approximate Scale:

0 1.5 3 6 Miles

TETRA TECH

Figure 3
Airport Receptors

Barber's point Solar
Kapolei, Hawaii

Appendix A. Project Layout

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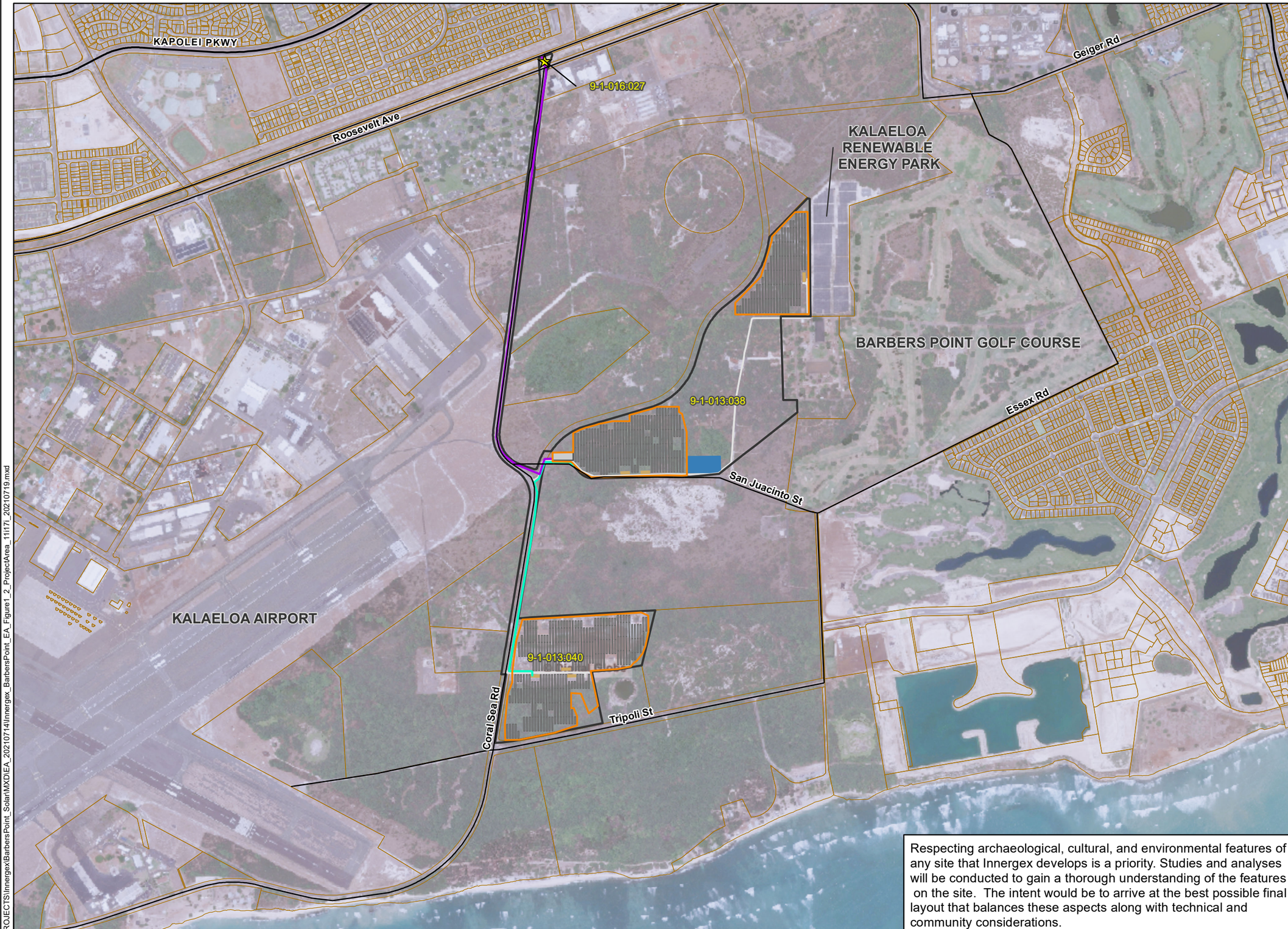
Barbers Point Solar Project

Site Plan

HONOLULU COUNTY, HI



- Project Area
- TMK Boundary
- Road
- Security Fence
- Solar Array
- Collector Line
- Project Substation
- Power Conversion System
- Temporary Laydown (Staging) Area
- Site Access Road & Collector Line
- 46-kV Transmission Line (Overhead and Underground)

Respecting archaeological, cultural, and environmental features of any site that Innergex develops is a priority. Studies and analyses will be conducted to gain a thorough understanding of the features on the site. The intent would be to arrive at the best possible final layout that balances these aspects along with technical and community considerations.

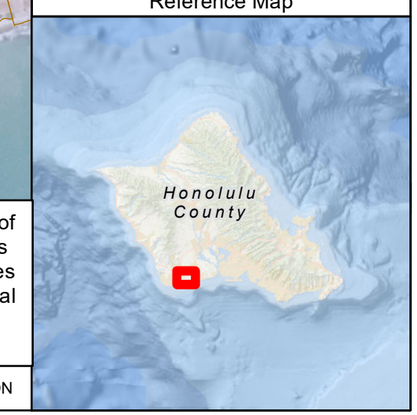
1:14,000 WGS 1984 UTM Zone 4N

0 0.25 0.5 1 Miles

NOT FOR CONSTRUCTION

Innergex Renewable Development USA LLC

Reference Map



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Appendix B. Notice Criteria Tool Output

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Federal Aviation Administration

« OE/AAA

Notice Criteria Tool

Notice Criteria Tool - Desk Reference Guide V_2018.2.0

The requirements for filing with the Federal Aviation Administration for proposed structures vary based on a number of factors: height, proximity to an airport, location, and frequencies emitted from the structure, etc. For more details, please reference CFR Title 14 Part 77.9.

You must file with the FAA at least 45 days prior to construction if:

- your structure will exceed 200ft above ground level
- your structure will be in proximity to an airport and will exceed the slope ratio
- your structure involves construction of a traverseway (i.e. highway, railroad, waterway etc...) and once adjusted upward with the appropriate vertical distance would exceed a standard of 77.9(a) or (b)
- your structure will emit frequencies, and does not meet the conditions of the FAA Co-location Policy
- your structure will be in an instrument approach area and might exceed part 77 Subpart C
- your proposed structure will be in proximity to a navigation facility and may impact the assurance of navigation signal reception
- your structure will be on an airport or heliport
- filing has been requested by the FAA

If you require additional information regarding the filing requirements for your structure, please identify and contact the appropriate FAA representative using the Air Traffic Areas of Responsibility map for Off Airport construction, or contact the FAA Airports Region / District Office for On Airport construction.

The tool below will assist in applying Part 77 Notice Criteria.

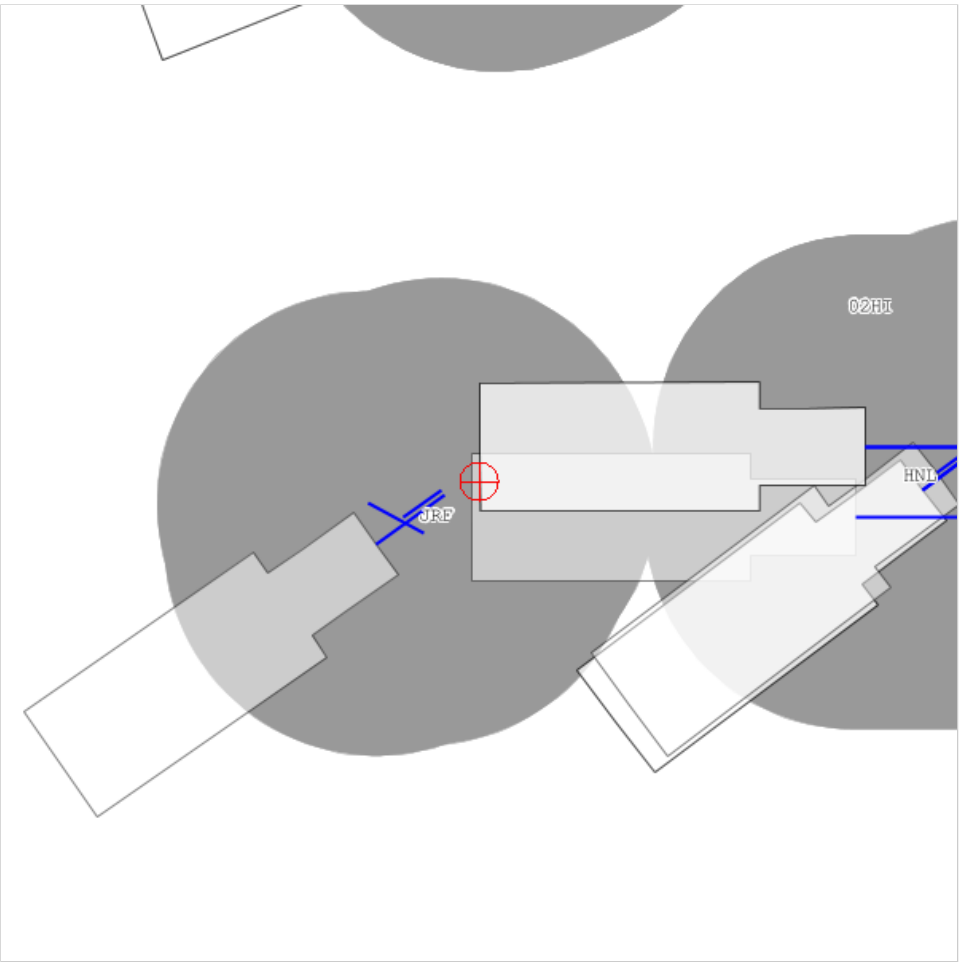
Latitude:	21 Deg 18 M 56.86 S N
Longitude:	158 Deg 3 M 2.82 S W
Horizontal Datum:	NAD83
Site Elevation (SE):	20 (nearest foot)
Structure Height :	8 (nearest foot)
Traverseway:	No Traverseway (Additional height is added to certain structures under 77.9(c)) User can increase the default height adjustment for Traverseway, Private Roadway and Waterway
Is structure on airport:	(●) No ( ) Yes

Results

You exceed the following Notice Criteria:

Your proposed structure is in proximity to a navigation facility and may impact the assurance of navigation signal reception. The FAA, in accordance with 77.9, requests that you file.

The FAA requests that you file


02HI
JRF
HNL

Appendix C. ForgeSolar Glare Analysis Report

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FORGESOLAR GLARE ANALYSIS

Project: **Innergex - Hawaii**
Kuawehi and Wailea Solar

Site configuration: **Analysis 1 Barbers Point 06092021 No Backtracking**
Analysis conducted by Drew Timmis (drew.timmis@tetratech.com) at 14:25 on 10 Jun, 2021.

U.S. FAA 2013 Policy Adherence

The following table summarizes the policy adherence of the glare analysis based on the 2013 U.S. Federal Aviation Administration Interim Policy 78 FR 63276. This policy requires the following criteria be met for solar energy systems on airport property:

- No "yellow" glare (potential for after-image) for any flight path from threshold to 2 miles
- No glare of any kind for Air Traffic Control Tower(s) ("ATCT") at cab height.
- Default analysis and observer characteristics (see list below)

ForgeSolar does not represent or speak officially for the FAA and cannot approve or deny projects. Results are informational only.

COMPONENT	STATUS	DESCRIPTION
Analysis parameters	PASS	Analysis time interval and eye characteristics used are acceptable
2-mile flight path(s)	PASS	Flight path receptor(s) do not receive yellow glare
ATCT(s)	PASS	Receptor(s) marked as ATCT do not receive glare

Default glare analysis parameters and observer eye characteristics (for reference only):

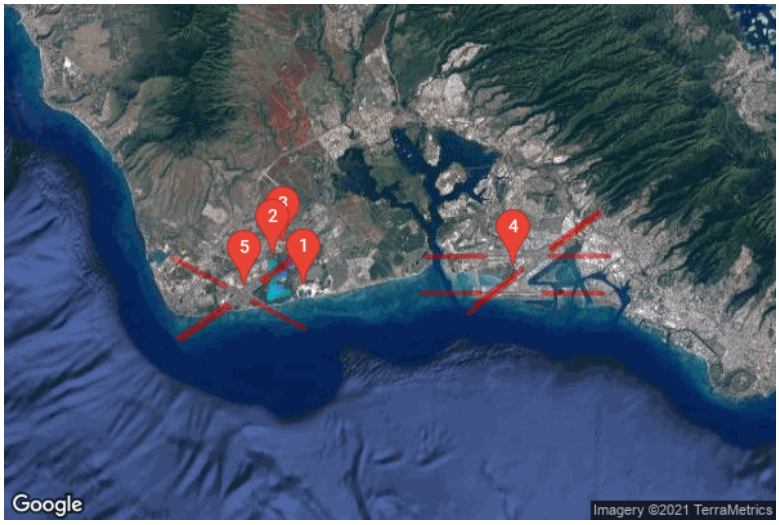
- Analysis time interval: 1 minute
- Ocular transmission coefficient: 0.5
- Pupil diameter: 0.002 meters
- Eye focal length: 0.017 meters
- Sun subtended angle: 9.3 milliradians

FAA Policy 78 FR 63276 can be read at https://www.federalregister.gov/d/2013-24729

SITE CONFIGURATION

Analysis Parameters

DNI: peaks at 1,000.0 W/m^2
Time interval: 1 min
Ocular transmission coefficient: 0.5
Pupil diameter: 0.002 m
Eye focal length: 0.017 m
Sun subtended angle: 9.3 mrad
Site Config ID: 54838.3684



PV Array(s)

Name: PV array 1
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	21.309929	-158.055930	19.69	7.90	27.59
2	21.310189	-158.051102	17.48	7.90	25.38
3	21.308290	-158.051477	9.84	7.90	17.74
4	21.307810	-158.053323	6.55	7.90	14.45
5	21.307820	-158.056241	16.41	7.90	24.31

Name: PV array 2
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	21.307815	-158.056262	16.41	7.90	24.31
2	21.305766	-158.056680	15.31	7.90	23.21
3	21.305646	-158.056584	13.81	7.90	21.71
4	21.306206	-158.053810	9.84	7.90	17.74
5	21.307285	-158.054020	9.41	7.90	17.31
6	21.307295	-158.053298	6.56	7.90	14.46
7	21.307815	-158.053317	6.58	7.90	14.48

Name: PV array 3
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	21.315071	-158.050511	19.69	7.90	27.59
2	21.315091	-158.049631	19.69	7.90	27.59
3	21.316011	-158.049653	20.30	7.90	28.20
4	21.316481	-158.049679	22.75	7.90	30.65
5	21.317260	-158.050007	26.19	7.90	34.09
6	21.317265	-158.050919	25.10	7.90	33.00
7	21.316891	-158.052120	24.44	7.90	32.34
8	21.316261	-158.053858	27.91	7.90	35.81
9	21.315721	-158.053890	27.90	7.90	35.80
10	21.315301	-158.053901	27.72	7.90	35.62
11	21.314972	-158.053601	26.23	7.90	34.13

Name: PV array 4
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	21.323083	-158.046193	36.09	7.90	43.99
2	21.320574	-158.046278	31.17	7.90	39.08
3	21.320564	-158.048253	31.22	7.90	39.12

Name: PV array 5
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	21.323063	-158.046182	36.09	7.90	43.99
2	21.323043	-158.045173	35.97	7.90	43.87
3	21.320554	-158.045184	29.53	7.90	37.43
4	21.320574	-158.046300	31.17	7.90	39.07

Name: PV array 6
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: -
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	21.323082	-158.046208	36.09	7.90	43.99
2	21.323052	-158.045184	36.02	7.90	43.92
3	21.324116	-158.045162	37.04	7.90	44.94
4	21.324096	-158.045543	38.03	7.90	45.93

Flight Path Receptor(s)

Name: HNL RWY 22L
Description:
Threshold height: 80 ft
Direction: 233.0°
Glide slope: 3.44°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	21.328566	-157.906459	8.50	80.00	88.50
Two-mile	21.345966	-157.881642	99.01	624.30	723.32

Name: HNL RWY 22R
Description:
Threshold height: 50 ft
Direction: 233.0°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	21.329596	-157.907444	7.50	50.00	57.50
Two-mile	21.346996	-157.882627	112.69	498.26	610.96

Name: HNL RWY 26L
Description:
Threshold height: 75 ft
Direction: 270.0°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	21.306827	-157.911132	9.80	75.00	84.80
Two-mile	21.306832	-157.880062	8.33	629.93	638.26

Name: HNL RWY 26R
Description:
Threshold height: 65 ft
Direction: 270.0°
Glide slope: 3.25°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	21.325244	-157.907622	8.40	65.00	73.40
Two-mile	21.325244	-157.876548	19.07	654.01	673.08

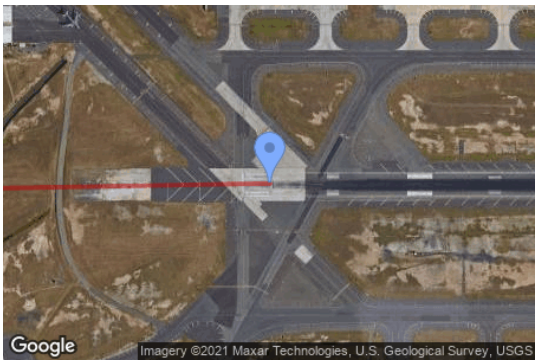
Name: HNL RWY 4L
Description:
Threshold height: 50 ft
Direction: 53.0°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	21.318641	-157.922964	9.80	50.00	59.80
Two-mile	21.301241	-157.947780	-24.56	637.82	613.26

Name: HNL RWY 4R
Description:
Threshold height: 71 ft
Direction: 53.0°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	21.314199	-157.926759	8.10	71.00	79.10
Two-mile	21.296799	-157.951574	-81.65	714.21	632.56

Name: HNL RWY 8L
Description:
Threshold height: 71 ft
Direction: 89.0°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°



Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	21.325291	-157.942772	11.80	71.00	82.80
Two-mile	21.324787	-157.973842	0.65	635.61	636.26

Name: HNL RWY 8R
Description:
Threshold height: 96 ft
Direction: 90.0°
Glide slope: 3.25°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	21.306839	-157.945388	9.60	96.00	105.61
Two-mile	21.306839	-157.976458	-12.56	717.84	705.28

Name: JRF RWY 11
Description:
Threshold height: 48 ft
Direction: 118.0°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	21.310498	-158.081490	30.00	48.00	78.00
Two-mile	21.324072	-158.108924	27.49	603.97	631.46

Name: JRF RWY 22L
Description:
Threshold height: 32 ft
Direction: 235.0°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	21.312251	-158.060624	27.00	32.00	59.00
Two-mile	21.328834	-158.035172	31.66	580.80	612.46

Name: JRF RWY 22R
Description:
Threshold height: 33 ft
Direction: 235.0°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	21.313655	-158.061737	29.00	33.00	62.00
Two-mile	21.330239	-158.036285	32.81	582.65	615.46

Name: JRF RWY 29
Description:
Threshold height: 52 ft
Direction: 298.0°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	21.302901	-158.066481	10.00	52.00	62.00
Two-mile	21.289328	-158.039049	-38.10	653.55	615.46

Name: JRF RWY 4L
Description:
Threshold height: 35 ft
Direction: 55.0°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	21.301098	-158.080897	21.00	35.00	56.00
Two-mile	21.284514	-158.106347	-24.49	633.94	609.46

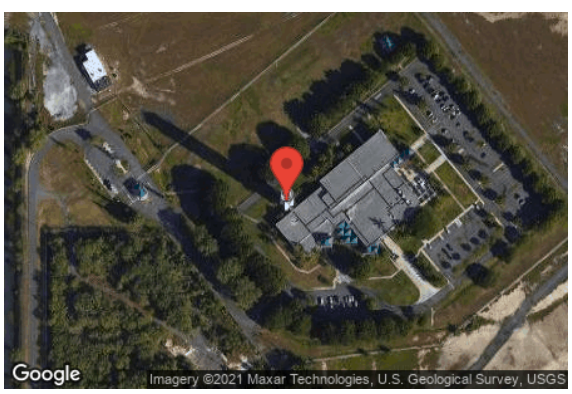
Name: JRF RWY 4R
Description:
Threshold height: 55 ft
Direction: 55.0°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	21.300243	-158.079001	11.00	55.00	66.00
Two-mile	21.283659	-158.104451	-28.36	647.82	619.46

Discrete Observation Receptors

Name	ID	Latitude (°)	Longitude (°)	Elevation (ft)	Height (ft)
OP 1	1	21.310926	-158.039380	18.63	6.00
OP 2	2	21.325740	-158.055590	49.22	6.00
OP 3	3	21.332502	-158.050472	52.50	6.00
4-ATCT	4	21.320912	-157.927217	6.77	50.00
5-ATCT	5	21.310405	-158.070936	29.53	50.00

Map image of 4-ATCT



Map image of 5-ATCT

Route Receptor(s)

Name: Coral Sea Rd-1
Path type: Two-way
Observer view angle: 50.0°

Note: Route receptors are excluded from this FAA policy review. Use the 2-mile flight path receptor to simulate flight paths according to FAA guidelines.

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	21.321891	-158.055999	45.73	5.00	50.73
2	21.319232	-158.056385	35.59	5.00	40.59
3	21.317423	-158.056621	33.54	5.00	38.54
4	21.316274	-158.056803	29.53	5.00	34.53
5	21.315934	-158.056750	29.53	5.00	34.53
6	21.315624	-158.056546	29.53	5.00	34.53
7	21.315274	-158.056031	27.80	5.00	32.80
8	21.314974	-158.055645	26.47	5.00	31.47
9	21.314714	-158.055462	26.25	5.00	31.25
10	21.314385	-158.055344	26.25	5.00	31.25
11	21.313945	-158.055366	26.25	5.00	31.25
12	21.310217	-158.056063	20.58	5.00	25.58
13	21.307628	-158.056557	16.41	5.00	21.41
14	21.304649	-158.057104	13.12	5.00	18.12

Name: Tripoli Road-1
Path type: Two-way
Observer view angle: 50.0°

Note: Route receptors are excluded from this FAA policy review. Use the 2-mile flight path receptor to simulate flight paths according to FAA guidelines.

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	21.305379	-158.057157	14.05	5.00	19.05
2	21.305659	-158.055677	13.12	5.00	18.12
3	21.306119	-158.053338	8.49	5.00	13.49
4	21.306628	-158.050667	9.84	5.00	14.84
5	21.307108	-158.048103	9.91	5.00	14.91

GLARE ANALYSIS RESULTS

Summary of Glare

PV Array Name	Tilt (°)	Orient (°)	"Green" Glare min	"Yellow" Glare min	Energy kWh
PV array 1	SA tracking	SA tracking	0	0	-
PV array 2	SA tracking	SA tracking	0	0	-
PV array 3	SA tracking	SA tracking	0	0	-
PV array 4	SA tracking	SA tracking	6,752	0	-
PV array 5	SA tracking	SA tracking	6,715	0	-
PV array 6	SA tracking	SA tracking	5,435	0	-

Total annual glare received by each receptor

Receptor	Annual Green Glare (min)	Annual Yellow Glare (min)
HNL RWY 22L	0	0
HNL RWY 22R	0	0
HNL RWY 26L	0	0
HNL RWY 26R	0	0
HNL RWY 4L	0	0
HNL RWY 4R	0	0
HNL RWY 8L	0	0
HNL RWY 8R	0	0
JRF RWY 11	0	0
JRF RWY 22L	14249	0
JRF RWY 22R	4653	0
JRF RWY 29	0	0
JRF RWY 4L	0	0
JRF RWY 4R	0	0
OP 1	0	0
OP 2	0	0
OP 3	0	0
4-ATCT	0	0

Receptor	Annual Green Glare (min)	Annual Yellow Glare (min)
5-ATCT	0	0
Coral Sea Rd-1	0	0
Tripoli Road-1	0	0

Results for: PV array 1

Receptor	Green Glare (min)	Yellow Glare (min)
HNL RWY 22L	0	0
HNL RWY 22R	0	0
HNL RWY 26L	0	0
HNL RWY 26R	0	0
HNL RWY 4L	0	0
HNL RWY 4R	0	0
HNL RWY 8L	0	0
HNL RWY 8R	0	0
JRF RWY 11	0	0
JRF RWY 22L	0	0
JRF RWY 22R	0	0
JRF RWY 29	0	0
JRF RWY 4L	0	0
JRF RWY 4R	0	0
OP 1	0	0
OP 2	0	0
OP 3	0	0
4-ATCT	0	0
5-ATCT	0	0
Coral Sea Rd-1	0	0
Tripoli Road-1	0	0

Flight Path: HNL RWY 22L

0 minutes of yellow glare
0 minutes of green glare

Flight Path: HNL RWY 22R

0 minutes of yellow glare
0 minutes of green glare

Flight Path: HNL RWY 26L

0 minutes of yellow glare

0 minutes of green glare

Flight Path: HNL RWY 26R

0 minutes of yellow glare
0 minutes of green glare

Flight Path: HNL RWY 4L

0 minutes of yellow glare
0 minutes of green glare

Flight Path: HNL RWY 4R

0 minutes of yellow glare
0 minutes of green glare

Flight Path: HNL RWY 8L

0 minutes of yellow glare
0 minutes of green glare

Flight Path: HNL RWY 8R

0 minutes of yellow glare
0 minutes of green glare

Flight Path: JRF RWY 11

0 minutes of yellow glare
0 minutes of green glare

Flight Path: JRF RWY 22L

0 minutes of yellow glare
0 minutes of green glare

Flight Path: JRF RWY 22R

0 minutes of yellow glare
0 minutes of green glare

Flight Path: JRF RWY 29

0 minutes of yellow glare
0 minutes of green glare

Flight Path: JRF RWY 4L

0 minutes of yellow glare
0 minutes of green glare

Flight Path: JRF RWY 4R

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: 4-ATCT

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: 5-ATCT

0 minutes of yellow glare
0 minutes of green glare

Route: Coral Sea Rd-1

0 minutes of yellow glare
0 minutes of green glare

Route: Tripoli Road-1

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 2

Receptor	Green Glare (min)	Yellow Glare (min)
HNL RWY 22L	0	0
HNL RWY 22R	0	0
HNL RWY 26L	0	0
HNL RWY 26R	0	0
HNL RWY 4L	0	0
HNL RWY 4R	0	0
HNL RWY 8L	0	0
HNL RWY 8R	0	0
JRF RWY 11	0	0
JRF RWY 22L	0	0
JRF RWY 22R	0	0
JRF RWY 29	0	0
JRF RWY 4L	0	0
JRF RWY 4R	0	0
OP 1	0	0
OP 2	0	0
OP 3	0	0
4-ATCT	0	0
5-ATCT	0	0
Coral Sea Rd-1	0	0
Tripoli Road-1	0	0

Flight Path: HNL RWY 22L

0 minutes of yellow glare
0 minutes of green glare

Flight Path: HNL RWY 22R

0 minutes of yellow glare
0 minutes of green glare

Flight Path: HNL RWY 26L

0 minutes of yellow glare
0 minutes of green glare

Flight Path: HNL RWY 26R

0 minutes of yellow glare
0 minutes of green glare

Flight Path: HNL RWY 4L

0 minutes of yellow glare
0 minutes of green glare

Flight Path: HNL RWY 4R

0 minutes of yellow glare
0 minutes of green glare

Flight Path: HNL RWY 8L

0 minutes of yellow glare
0 minutes of green glare

Flight Path: HNL RWY 8R

0 minutes of yellow glare
0 minutes of green glare

Flight Path: JRF RWY 11

0 minutes of yellow glare
0 minutes of green glare

Flight Path: JRF RWY 22L

0 minutes of yellow glare
0 minutes of green glare

Flight Path: JRF RWY 22R

0 minutes of yellow glare
0 minutes of green glare

Flight Path: JRF RWY 29

0 minutes of yellow glare
0 minutes of green glare

Flight Path: JRF RWY 4L

0 minutes of yellow glare
0 minutes of green glare

Flight Path: JRF RWY 4R

0 minutes of yellow glare

0 minutes of green glare

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: 4-ATCT

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: 5-ATCT

0 minutes of yellow glare
0 minutes of green glare

Route: Coral Sea Rd-1

0 minutes of yellow glare
0 minutes of green glare

Route: Tripoli Road-1

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 3

Receptor	Green Glare (min)	Yellow Glare (min)
HNL RWY 22L	0	0
HNL RWY 22R	0	0
HNL RWY 26L	0	0
HNL RWY 26R	0	0
HNL RWY 4L	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
HNL RWY 4R	0	0
HNL RWY 8L	0	0
HNL RWY 8R	0	0
JRF RWY 11	0	0
JRF RWY 22L	0	0
JRF RWY 22R	0	0
JRF RWY 29	0	0
JRF RWY 4L	0	0
JRF RWY 4R	0	0
OP 1	0	0
OP 2	0	0
OP 3	0	0
4-ATCT	0	0
5-ATCT	0	0
Coral Sea Rd-1	0	0
Tripoli Road-1	0	0

Flight Path: HNL RWY 22L

0 minutes of yellow glare
0 minutes of green glare

Flight Path: HNL RWY 22R

0 minutes of yellow glare
0 minutes of green glare

Flight Path: HNL RWY 26L

0 minutes of yellow glare
0 minutes of green glare

Flight Path: HNL RWY 26R

0 minutes of yellow glare
0 minutes of green glare

Flight Path: HNL RWY 4L

0 minutes of yellow glare
0 minutes of green glare

Flight Path: HNL RWY 4R

0 minutes of yellow glare

0 minutes of green glare

Flight Path: HNL RWY 8L

0 minutes of yellow glare
0 minutes of green glare

Flight Path: HNL RWY 8R

0 minutes of yellow glare
0 minutes of green glare

Flight Path: JRF RWY 11

0 minutes of yellow glare
0 minutes of green glare

Flight Path: JRF RWY 22L

0 minutes of yellow glare
0 minutes of green glare

Flight Path: JRF RWY 22R

0 minutes of yellow glare
0 minutes of green glare

Flight Path: JRF RWY 29

0 minutes of yellow glare
0 minutes of green glare

Flight Path: JRF RWY 4L

0 minutes of yellow glare
0 minutes of green glare

Flight Path: JRF RWY 4R

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: 4-ATCT

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: 5-ATCT

0 minutes of yellow glare
0 minutes of green glare

Route: Coral Sea Rd-1

0 minutes of yellow glare
0 minutes of green glare

Route: Tripoli Road-1

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 4

Receptor	Green Glare (min)	Yellow Glare (min)
HNL RWY 22L	0	0
HNL RWY 22R	0	0
HNL RWY 26L	0	0
HNL RWY 26R	0	0
HNL RWY 4L	0	0
HNL RWY 4R	0	0
HNL RWY 8L	0	0
HNL RWY 8R	0	0
JRF RWY 11	0	0
JRF RWY 22L	6752	0
JRF RWY 22R	0	0

Receptor	Green Glare (min)	Yellow Glare (min)
JRF RWY 29	0	0
JRF RWY 4L	0	0
JRF RWY 4R	0	0
OP 1	0	0
OP 2	0	0
OP 3	0	0
4-ATCT	0	0
5-ATCT	0	0
Coral Sea Rd-1	0	0
Tripoli Road-1	0	0

Flight Path: HNL RWY 22L

0 minutes of yellow glare
0 minutes of green glare

Flight Path: HNL RWY 22R

0 minutes of yellow glare
0 minutes of green glare

Flight Path: HNL RWY 26L

0 minutes of yellow glare
0 minutes of green glare

Flight Path: HNL RWY 26R

0 minutes of yellow glare
0 minutes of green glare

Flight Path: HNL RWY 4L

0 minutes of yellow glare
0 minutes of green glare

Flight Path: HNL RWY 4R

0 minutes of yellow glare
0 minutes of green glare

Flight Path: HNL RWY 8L

0 minutes of yellow glare
0 minutes of green glare

Flight Path: HNL RWY 8R

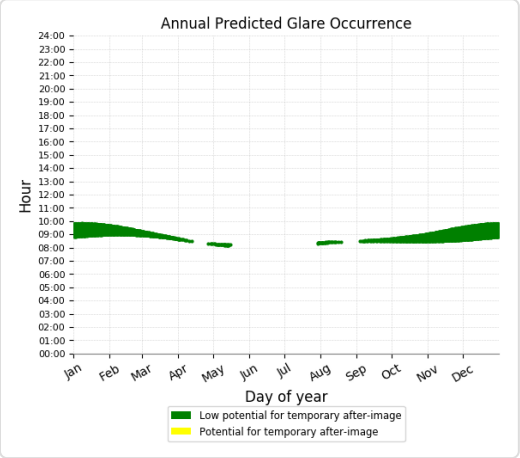
0 minutes of yellow glare
0 minutes of green glare

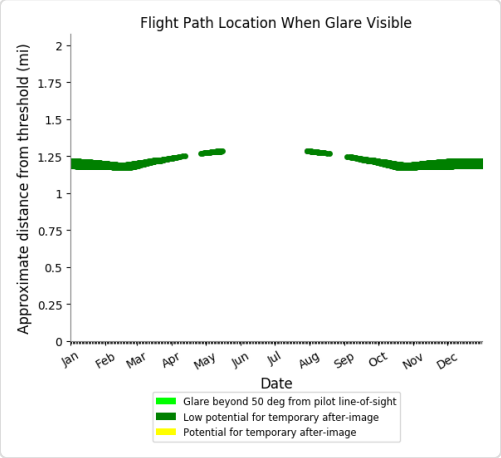
Flight Path: JRF RWY 11

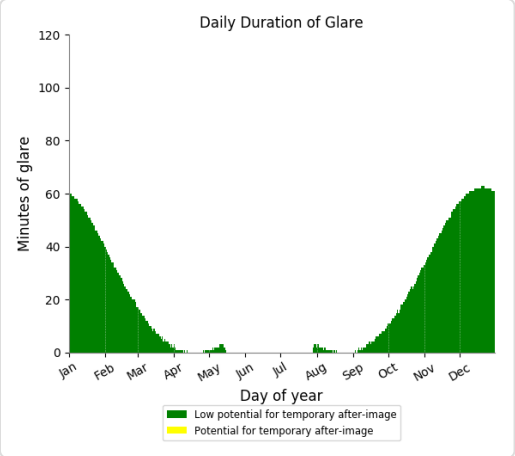
0 minutes of yellow glare
0 minutes of green glare

Flight Path: JRF RWY 22L

0 minutes of yellow glare
6752 minutes of green glare







Flight Path: JRF RWY 22R

0 minutes of yellow glare
0 minutes of green glare

Flight Path: JRF RWY 29

0 minutes of yellow glare
0 minutes of green glare

Flight Path: JRF RWY 4L

0 minutes of yellow glare
0 minutes of green glare

Flight Path: JRF RWY 4R

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: 4-ATCT

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: 5-ATCT

0 minutes of yellow glare
0 minutes of green glare

Route: Coral Sea Rd-1

0 minutes of yellow glare
0 minutes of green glare

Route: Tripoli Road-1

0 minutes of yellow glare

0 minutes of green glare

Results for: PV array 5

Receptor	Green Glare (min)	Yellow Glare (min)
HNL RWY 22L	0	0
HNL RWY 22R	0	0
HNL RWY 26L	0	0
HNL RWY 26R	0	0
HNL RWY 4L	0	0
HNL RWY 4R	0	0
HNL RWY 8L	0	0
HNL RWY 8R	0	0
JRF RWY 11	0	0
JRF RWY 22L	6715	0
JRF RWY 22R	0	0
JRF RWY 29	0	0
JRF RWY 4L	0	0
JRF RWY 4R	0	0
OP 1	0	0
OP 2	0	0
OP 3	0	0
4-ATCT	0	0
5-ATCT	0	0
Coral Sea Rd-1	0	0
Tripoli Road-1	0	0

Flight Path: HNL RWY 22L

0 minutes of yellow glare
0 minutes of green glare

Flight Path: HNL RWY 22R

0 minutes of yellow glare
0 minutes of green glare

Flight Path: HNL RWY 26L

0 minutes of yellow glare
0 minutes of green glare

Flight Path: HNL RWY 26R

0 minutes of yellow glare
0 minutes of green glare

Flight Path: HNL RWY 4L

0 minutes of yellow glare
0 minutes of green glare

Flight Path: HNL RWY 4R

0 minutes of yellow glare
0 minutes of green glare

Flight Path: HNL RWY 8L

0 minutes of yellow glare
0 minutes of green glare

Flight Path: HNL RWY 8R

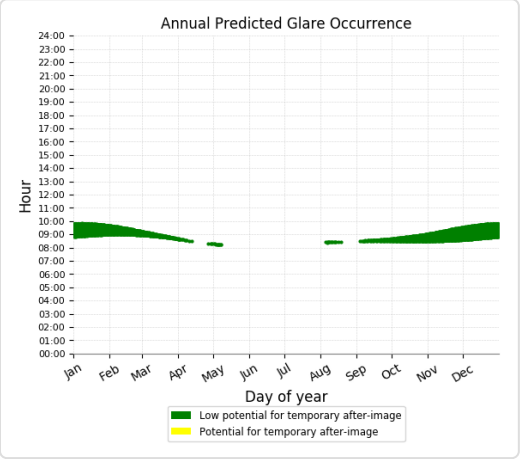
0 minutes of yellow glare
0 minutes of green glare

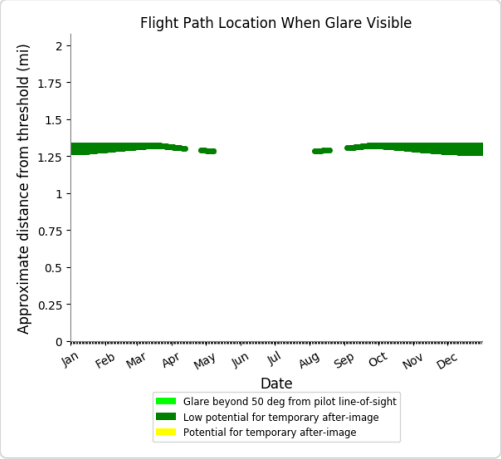
Flight Path: JRF RWY 11

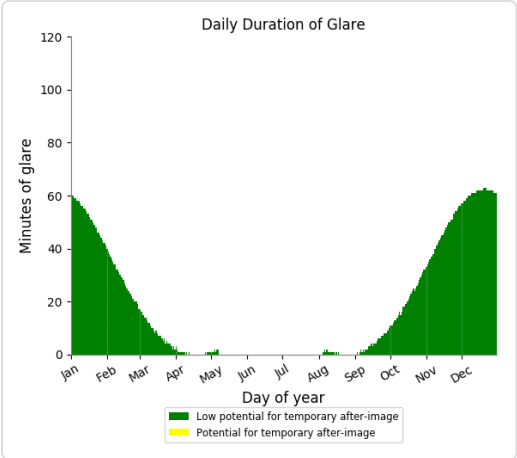
0 minutes of yellow glare
0 minutes of green glare

Flight Path: JRF RWY 22L

0 minutes of yellow glare
6715 minutes of green glare







Flight Path: JRF RWY 22R

0 minutes of yellow glare
0 minutes of green glare

Flight Path: JRF RWY 29

0 minutes of yellow glare
0 minutes of green glare

Flight Path: JRF RWY 4L

0 minutes of yellow glare
0 minutes of green glare

Flight Path: JRF RWY 4R

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: 4-ATCT

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: 5-ATCT

0 minutes of yellow glare
0 minutes of green glare

Route: Coral Sea Rd-1

0 minutes of yellow glare
0 minutes of green glare

Route: Tripoli Road-1

0 minutes of yellow glare
0 minutes of green glare

Results for: PV array 6

Receptor	Green Glare (min)	Yellow Glare (min)
HNL RWY 22L	0	0
HNL RWY 22R	0	0
HNL RWY 26L	0	0
HNL RWY 26R	0	0
HNL RWY 4L	0	0
HNL RWY 4R	0	0
HNL RWY 8L	0	0
HNL RWY 8R	0	0
JRF RWY 11	0	0
JRF RWY 22L	782	0
JRF RWY 22R	4653	0
JRF RWY 29	0	0
JRF RWY 4L	0	0
JRF RWY 4R	0	0
OP 1	0	0
OP 2	0	0
OP 3	0	0
4-ATCT	0	0
5-ATCT	0	0
Coral Sea Rd-1	0	0
Tripoli Road-1	0	0

Flight Path: HNL RWY 22L

0 minutes of yellow glare
0 minutes of green glare

Flight Path: HNL RWY 22R

0 minutes of yellow glare
0 minutes of green glare

Flight Path: HNL RWY 26L

0 minutes of yellow glare
0 minutes of green glare

Flight Path: HNL RWY 26R

0 minutes of yellow glare
0 minutes of green glare

Flight Path: HNL RWY 4L

0 minutes of yellow glare
0 minutes of green glare

Flight Path: HNL RWY 4R

0 minutes of yellow glare
0 minutes of green glare

Flight Path: HNL RWY 8L

0 minutes of yellow glare
0 minutes of green glare

Flight Path: HNL RWY 8R

0 minutes of yellow glare
0 minutes of green glare

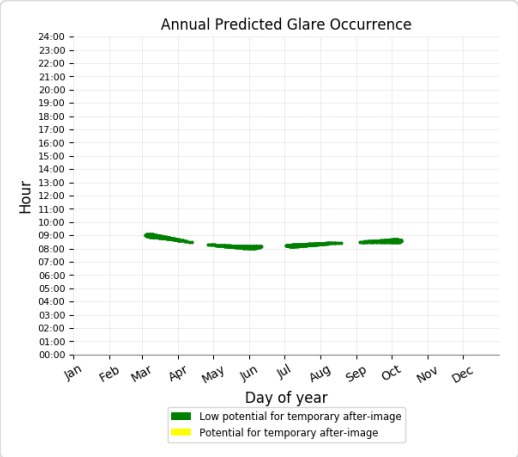
Flight Path: JRF RWY 11

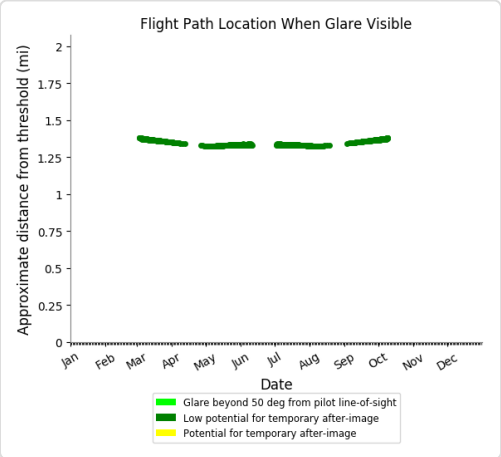
0 minutes of yellow glare
0 minutes of green glare

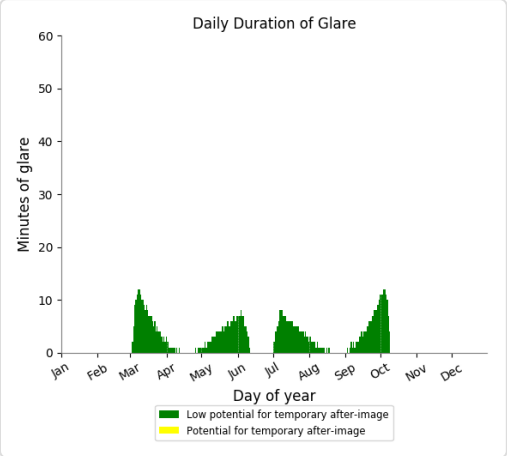
Flight Path: JRF RWY 22L

0 minutes of yellow glare

782 minutes of green glare



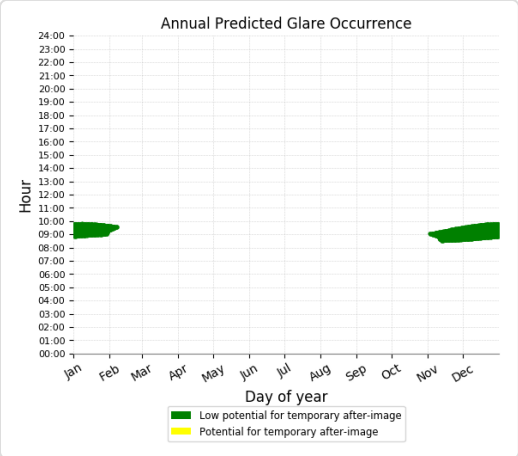


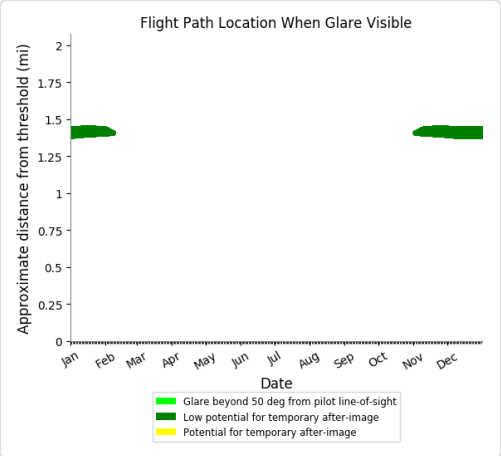


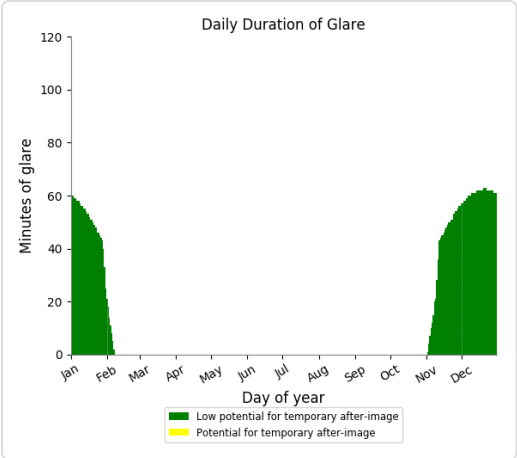
Flight Path: JRF RWY 22R

0 minutes of yellow glare

4653 minutes of green glare







Flight Path: JRF RWY 29

0 minutes of yellow glare
0 minutes of green glare

Flight Path: JRF RWY 4L

0 minutes of yellow glare
0 minutes of green glare

Flight Path: JRF RWY 4R

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: 4-ATCT

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: 5-ATCT

0 minutes of yellow glare
0 minutes of green glare

Route: Coral Sea Rd-1

0 minutes of yellow glare
0 minutes of green glare

Route: Tripoli Road-1

0 minutes of yellow glare
0 minutes of green glare

Assumptions

"Green" glare is glare with low potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
"Yellow" glare is glare with potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.
Glare analyses do not account for physical obstructions between reflectors and receptors. This includes buildings, tree cover and geographic obstructions.
Several calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results for large PV footprints. Additional analyses of array sub-sections can provide additional information on expected glare.
The subtended source angle (glare spot size) is constrained by the PV array footprint size. Partitioning large arrays into smaller sections will reduce the maximum potential subtended angle, potentially impacting results if actual glare spots are larger than the sub-array size. Additional analyses of the combined area of adjacent sub-arrays can provide more information on potential glare hazards. (See previous point on related limitations.)
Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.
Glare vector plots are simplified representations of analysis data. Actual glare emanations and results may differ.
The glare hazard determination relies on several approximations including observer eye characteristics, angle of view, and typical blink response time. Actual results and glare occurrence may differ.
Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid based on aggregated research data. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.
Refer to the Help page at **www.forgesolar.com/help/** for assumptions and limitations not listed here.

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FAA DETERMINATION OF NO HAZARD TO AIR NAVIGATION

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2021-AWP-9918-OE

Issued Date: 08/17/2021

Julia Mancinelli
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888 Dunsmuir Street
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Vancouver, V6C3K4

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Solar Panel BP 1-1
Location:	Kalaeloa, HI
Latitude:	21-19-26.73N NAD 83
Longitude:	158-02-42.82W
Heights:	38 feet site elevation (SE) 15 feet above ground level (AGL) 53 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part 1)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part 2)

Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking/ lighting are accomplished on a voluntary basis, we recommend it be installed in accordance with FAA Advisory circular 70/7460-1 M.

This determination expires on 02/17/2023 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.
(c) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is based, in part, on the foregoing description which includes specific coordinates, heights, frequency(ies) and power. Any changes in coordinates, heights, and frequencies or use of greater power, except those frequencies specified in the Colo Void Clause Coalition; Antenna System Co-Location; Voluntary Best Practices, effective 21 Nov 2007, will void this determination. Any future construction or alteration, including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.This determination includes all previously filed frequencies and power for this structure.

If construction or alteration is dismantled or destroyed, you must submit notice to the FAA within 5 days after the construction or alteration is dismantled or destroyed.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

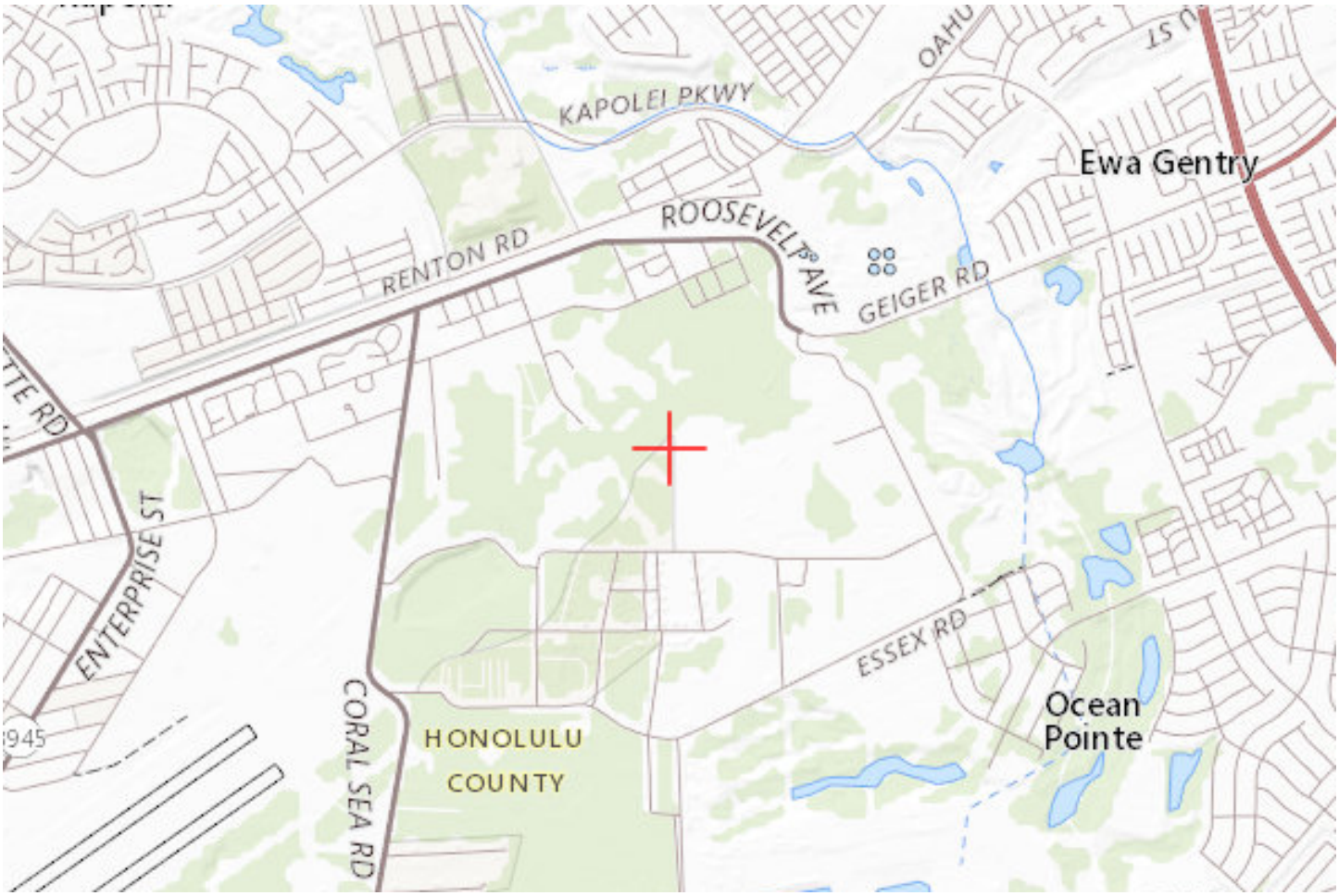
This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

If we can be of further assistance, please contact our office at (907) 271-5863, or robert.van.haastert@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2021-AWP-9918-OE.

Signature Control No: 486022131-491744859 (DNE)
Robert van Haastert
Supervisor

Attachment(s)
Map(s)

TOPO Map for ASN 2021-AWP-9918-OE



Sectional Map for ASN 2021-AWP-9918-OE

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Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2021-AWP-9919-OE

Issued Date: 08/17/2021

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**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Solar Panel BP 1-2
Location:	Kalaeloa, HI
Latitude:	21-19-13.57N NAD 83
Longitude:	158-02-42.68W
Heights:	30 feet site elevation (SE)
	15 feet above ground level (AGL)
	45 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

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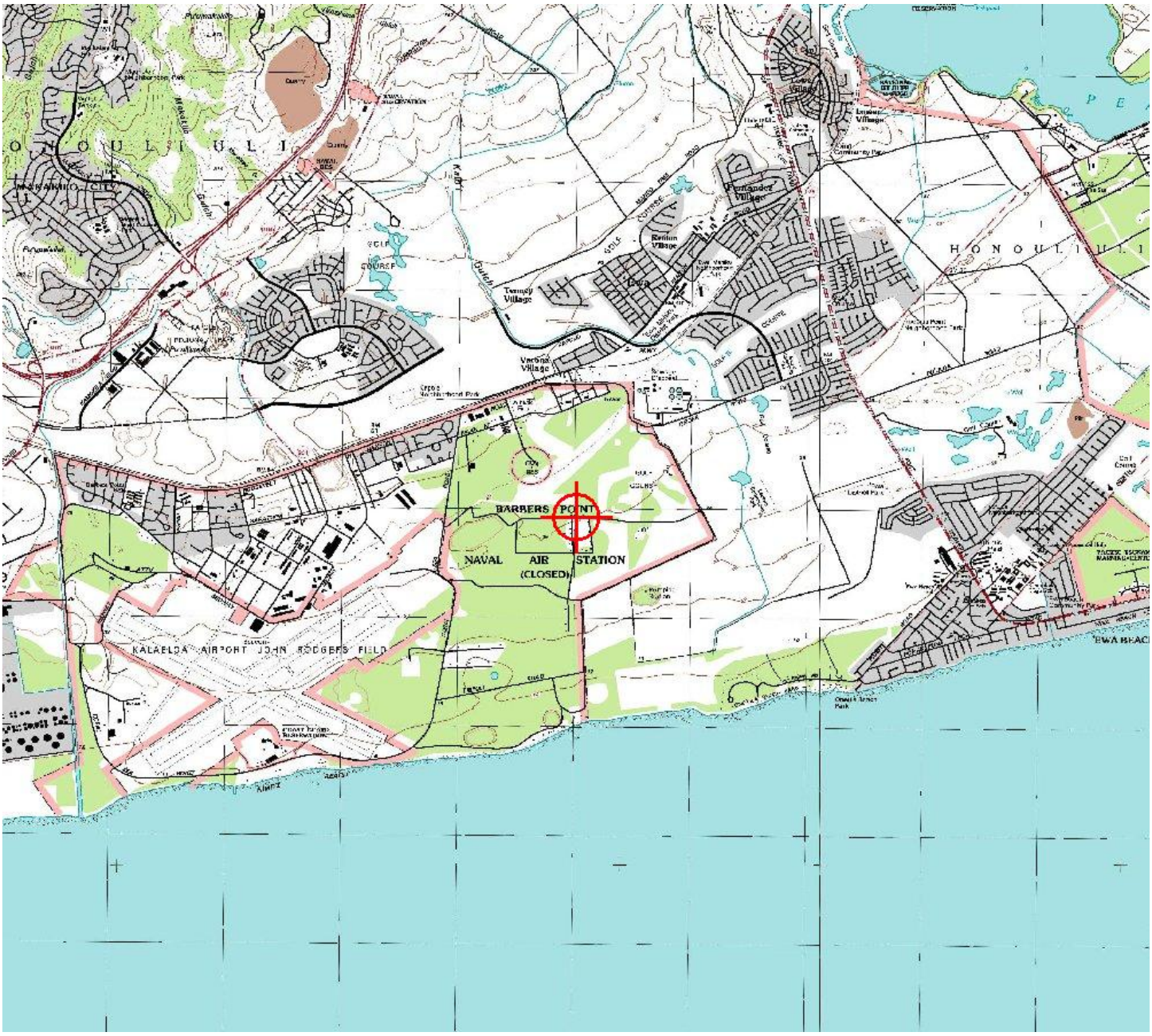
If we can be of further assistance, please contact our office at (907) 271-5863, or robert.van.haastert@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2021-AWP-9919-OE.

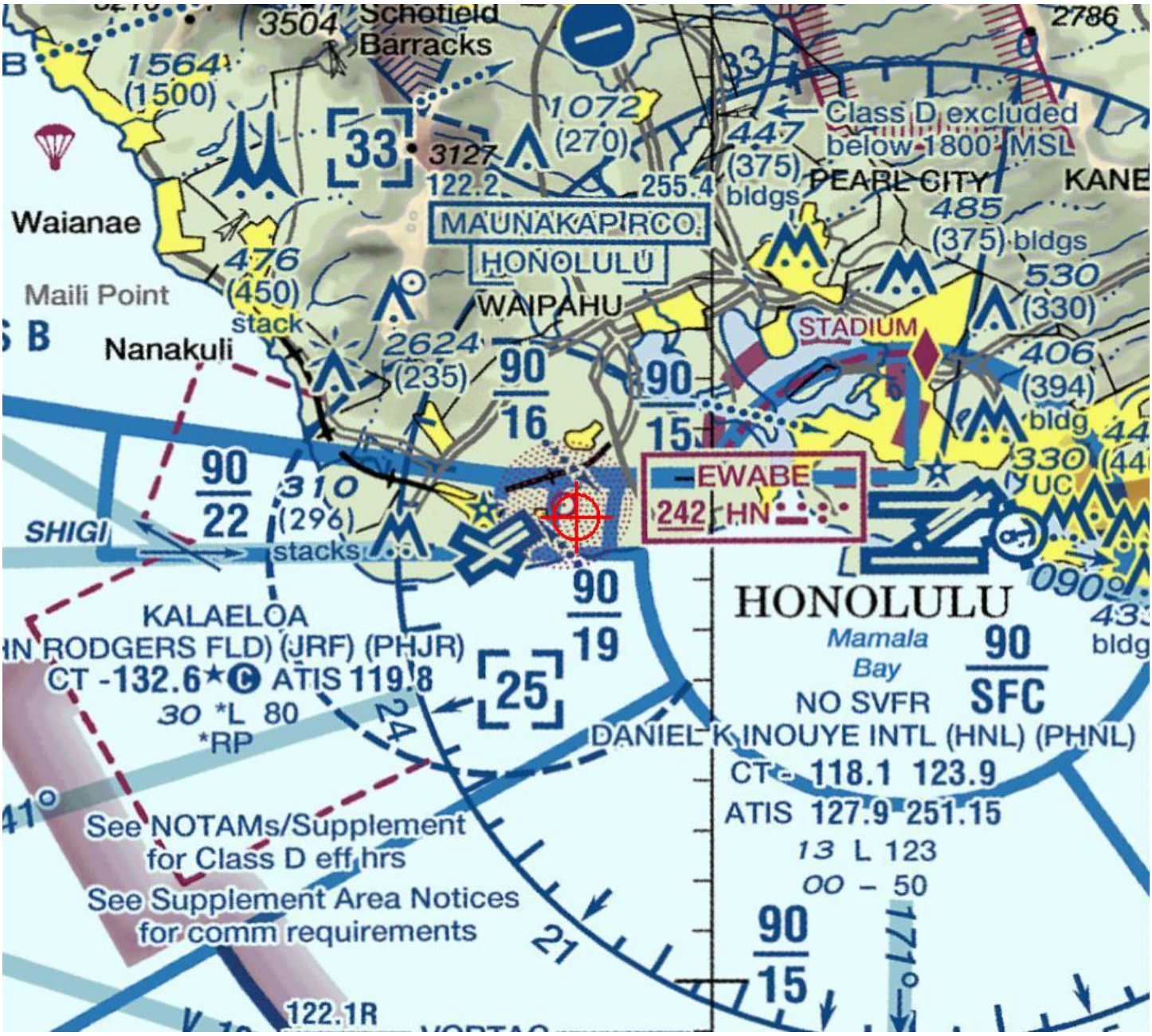
Signature Control No: 486022132-491744853 (DNE)
Robert van Haastert
Supervisor

Attachment(s)
Map(s)

TOPO Map for ASN 2021-AWP-9919-OE



Sectional Map for ASN 2021-AWP-9919-OE



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10101 Hillwood Parkway
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Aeronautical Study No.
2021-AWP-9920-OE

Issued Date: 08/17/2021

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**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Solar Panel BP 1-3
Location:	Kalaeloa, HI
Latitude:	21-19-13.83N NAD 83
Longitude:	158-02-52.79W
Heights:	32 feet site elevation (SE) 15 feet above ground level (AGL) 47 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part 1)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part 2)

Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking/ lighting are accomplished on a voluntary basis, we recommend it be installed in accordance with FAA Advisory circular 70/7460-1 M.

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NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

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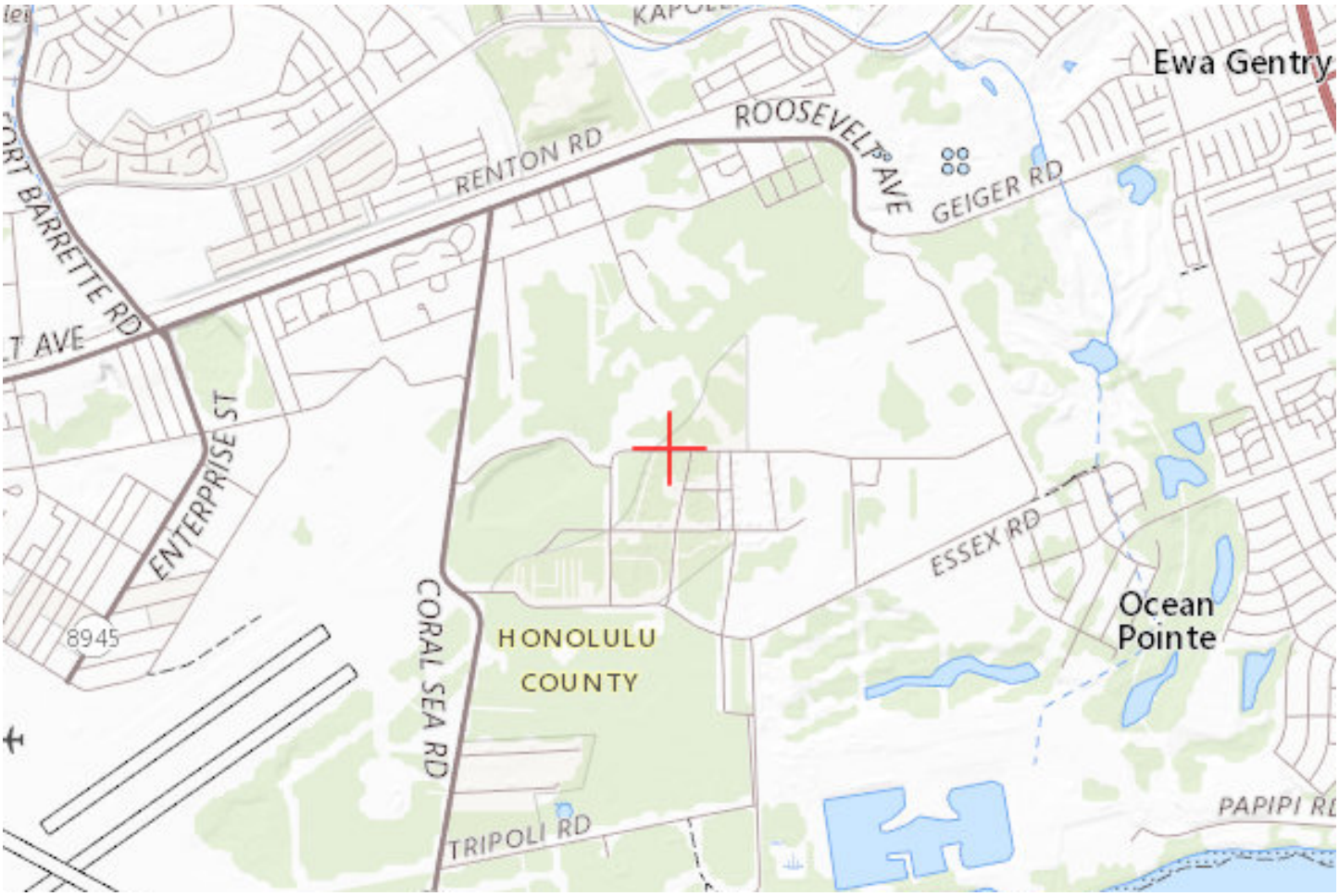
If we can be of further assistance, please contact our office at (907) 271-5863, or robert.van.haastert@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2021-AWP-9920-OE.

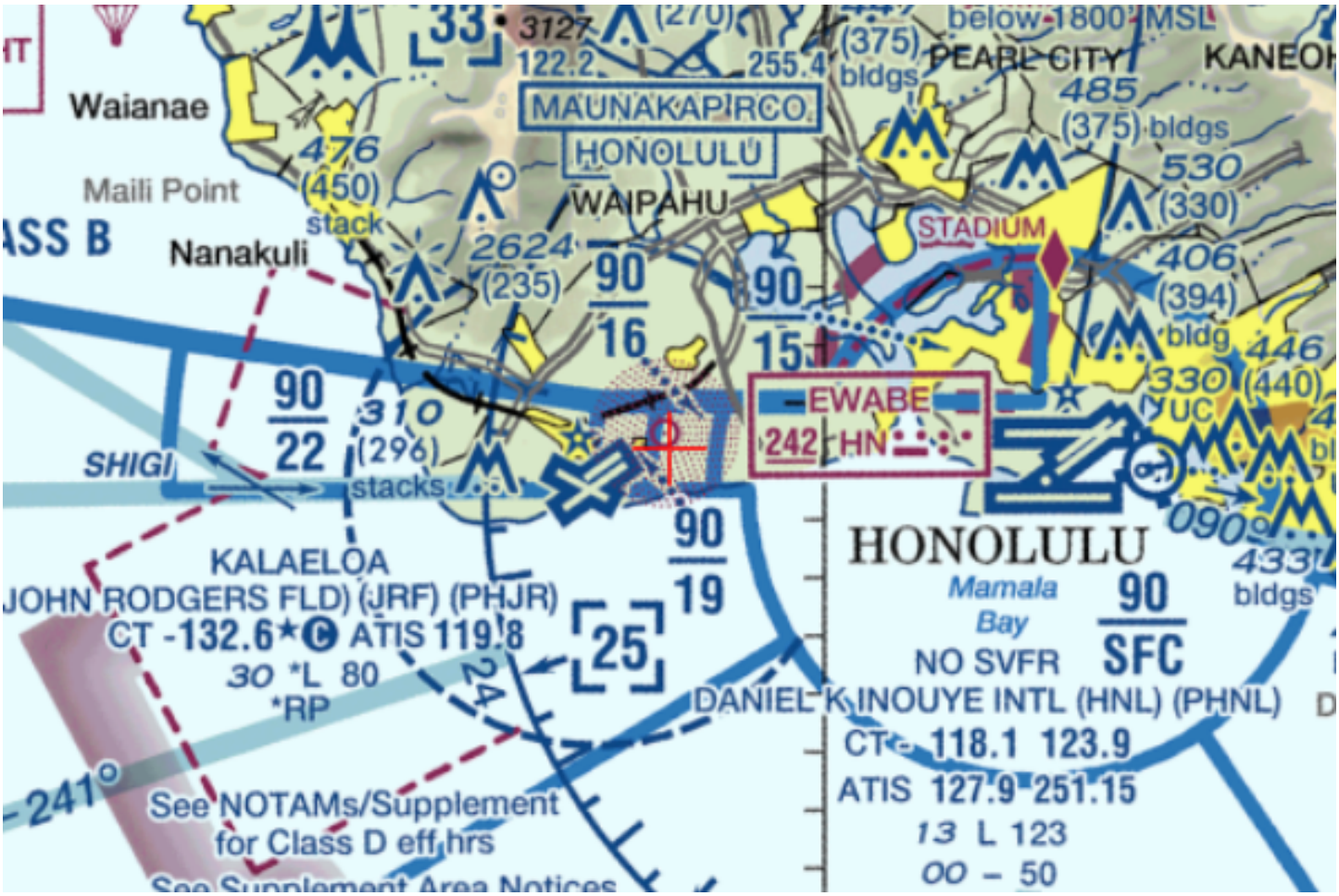
Signature Control No: 486022133-491744869 (DNE)
Robert van Haastert
Supervisor

Attachment(s)
Map(s)

TOPO Map for ASN 2021-AWP-9920-OE



Sectional Map for ASN 2021-AWP-9920-OE



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Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2021-AWP-9921-OE

Issued Date: 08/17/2021

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Vancouver, V6C3K4

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Solar Panel BP 2-1
Location:	Kalaeloa, HI
Latitude:	21-19-02.29N NAD 83
Longitude:	158-02-59.05W
Heights:	26 feet site elevation (SE)
	15 feet above ground level (AGL)
	41 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part 1)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part 2)

Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking/ lighting are accomplished on a voluntary basis, we recommend it be installed in accordance with FAA Advisory circular 70/7460-1 M.

This determination expires on 02/17/2023 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.
(c) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is based, in part, on the foregoing description which includes specific coordinates, heights, frequency(ies) and power. Any changes in coordinates, heights, and frequencies or use of greater power, except those frequencies specified in the Colo Void Clause Coalition; Antenna System Co-Location; Voluntary Best Practices, effective 21 Nov 2007, will void this determination. Any future construction or alteration, including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.This determination includes all previously filed frequencies and power for this structure.

If construction or alteration is dismantled or destroyed, you must submit notice to the FAA within 5 days after the construction or alteration is dismantled or destroyed.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

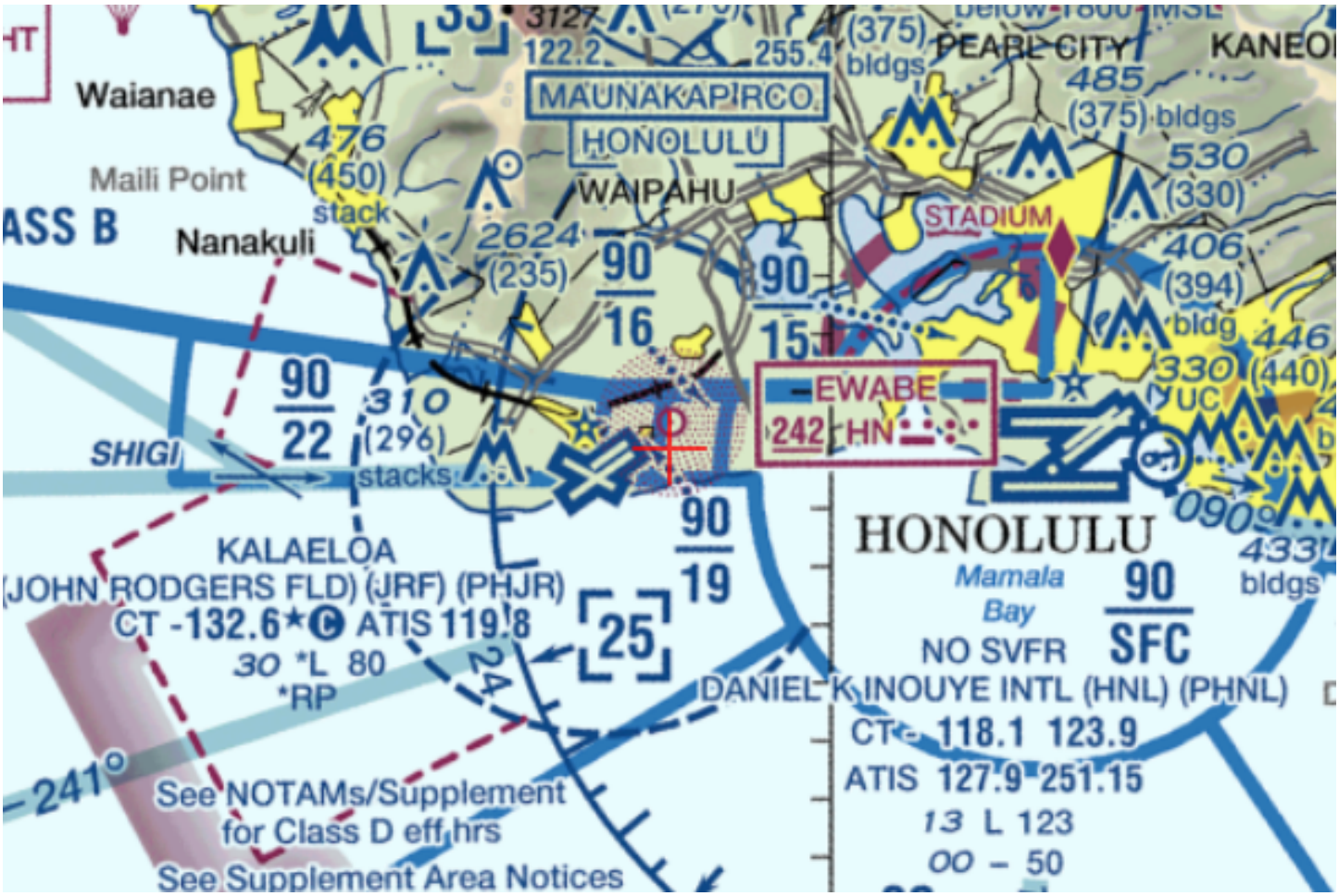
If we can be of further assistance, please contact our office at (907) 271-5863, or robert.van.haastert@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2021-AWP-9921-OE.

Signature Control No: 486022134-491744857 (DNE)
Robert van Haastert
Supervisor

Attachment(s)
Map(s)

TOPO Map for ASN 2021-AWP-9921-OE

Sectional Map for ASN 2021-AWP-9921-OE



Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2021-AWP-9922-OE

Issued Date: 08/17/2021

Julia Mancinelli
Innergex
888 Dunsmuir Street
Suite 1100
Vancouver, V6C3K4

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Solar Panel BP 2-2
Location:	Kalaeloa, HI
Latitude:	21-18-53.99N NAD 83
Longitude:	158-02-58.42W
Heights:	20 feet site elevation (SE) 15 feet above ground level (AGL) 35 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part 1)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part 2)

Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking/ lighting are accomplished on a voluntary basis, we recommend it be installed in accordance with FAA Advisory circular 70/7460-1 M.

This determination expires on 02/17/2023 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.
(c) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is based, in part, on the foregoing description which includes specific coordinates, heights, frequency(ies) and power. Any changes in coordinates, heights, and frequencies or use of greater power, except those frequencies specified in the Colo Void Clause Coalition; Antenna System Co-Location; Voluntary Best Practices, effective 21 Nov 2007, will void this determination. Any future construction or alteration, including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.This determination includes all previously filed frequencies and power for this structure.

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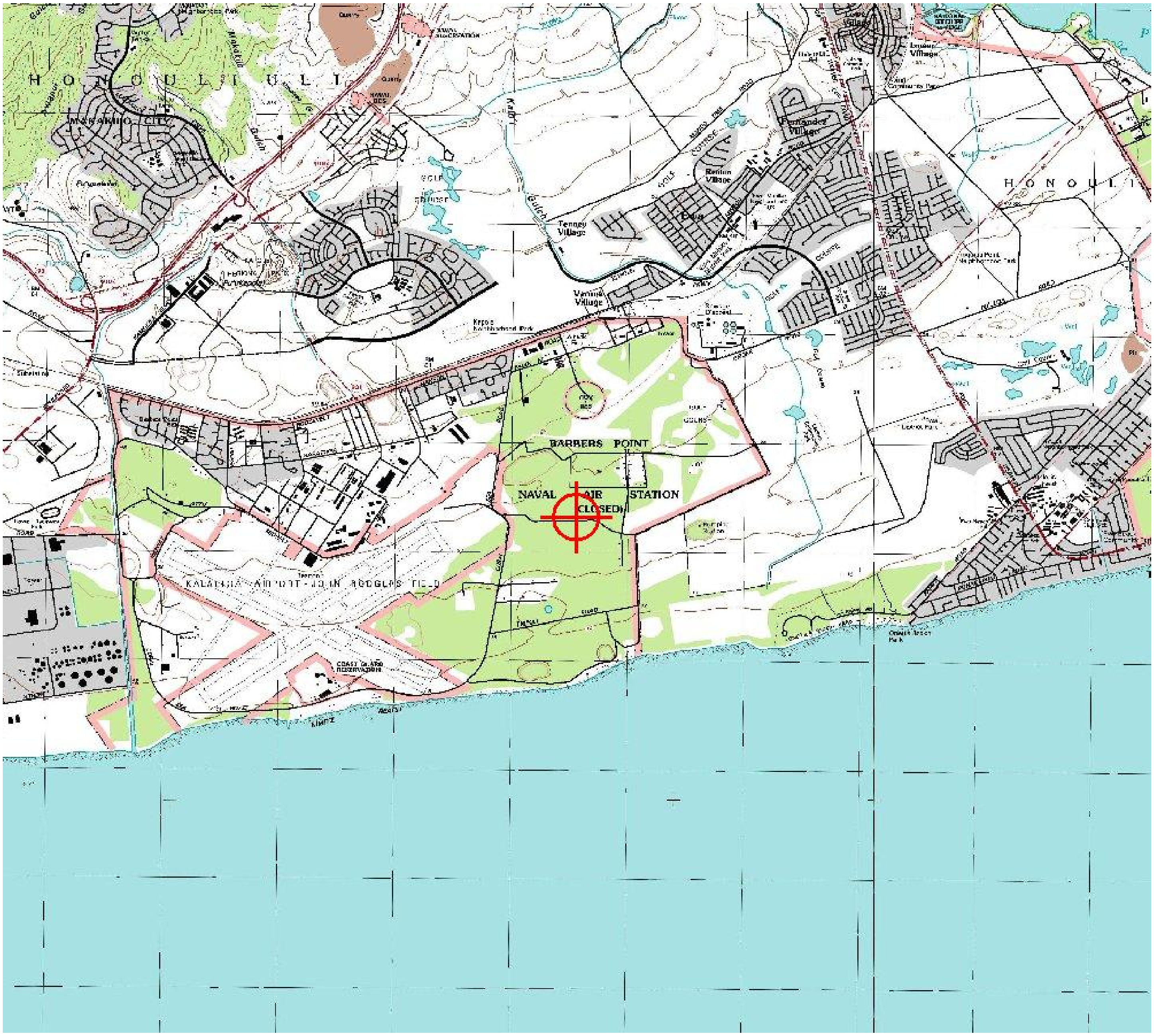
This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

If we can be of further assistance, please contact our office at (907) 271-5863, or robert.van.haastert@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2021-AWP-9922-OE.

Signature Control No: 486022135-491744864 (DNE)
Robert van Haastert
Supervisor

Attachment(s)
Map(s)

TOPO Map for ASN 2021-AWP-9922-OE



Sectional Map for ASN 2021-AWP-9922-OE

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Federal Aviation Administration
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Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2021-AWP-9923-OE

Issued Date: 08/17/2021

Julia Mancinelli
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**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Solar Panel BP 2-3
Location:	Kalaeloa, HI
Latitude:	21-18-53.56N NAD 83
Longitude:	158-03-11.47W
Heights:	23 feet site elevation (SE) 15 feet above ground level (AGL) 38 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part 1)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part 2)

Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking/ lighting are accomplished on a voluntary basis, we recommend it be installed in accordance with FAA Advisory circular 70/7460-1 M.

This determination expires on 02/17/2023 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.
(c) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is based, in part, on the foregoing description which includes specific coordinates, heights, frequency(ies) and power. Any changes in coordinates, heights, and frequencies or use of greater power, except those frequencies specified in the Colo Void Clause Coalition; Antenna System Co-Location; Voluntary Best Practices, effective 21 Nov 2007, will void this determination. Any future construction or alteration, including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.This determination includes all previously filed frequencies and power for this structure.

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This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

If we can be of further assistance, please contact our office at (907) 271-5863, or robert.van.haastert@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2021-AWP-9923-OE.

Signature Control No: 486022136-491744863 (DNE)
Robert van Haastert
Supervisor

Attachment(s)
Map(s)

TOPO Map for ASN 2021-AWP-9923-OE

Sectional Map for ASN 2021-AWP-9923-OE

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10101 Hillwood Parkway
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Aeronautical Study No.
2021-AWP-9924-OE

Issued Date: 08/17/2021

Julia Mancinelli
Innergex
888 Dunsmuir Street
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Vancouver, V6C3K4

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Solar Panel BP 2-4
Location:	Kalaeloa, HI
Latitude:	21-18-55.56N NAD 83
Longitude:	158-03-14.04W
Heights:	27 feet site elevation (SE) 15 feet above ground level (AGL) 42 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part 1)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part 2)

Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking/ lighting are accomplished on a voluntary basis, we recommend it be installed in accordance with FAA Advisory circular 70/7460-1 M.

This determination expires on 02/17/2023 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.
(c) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

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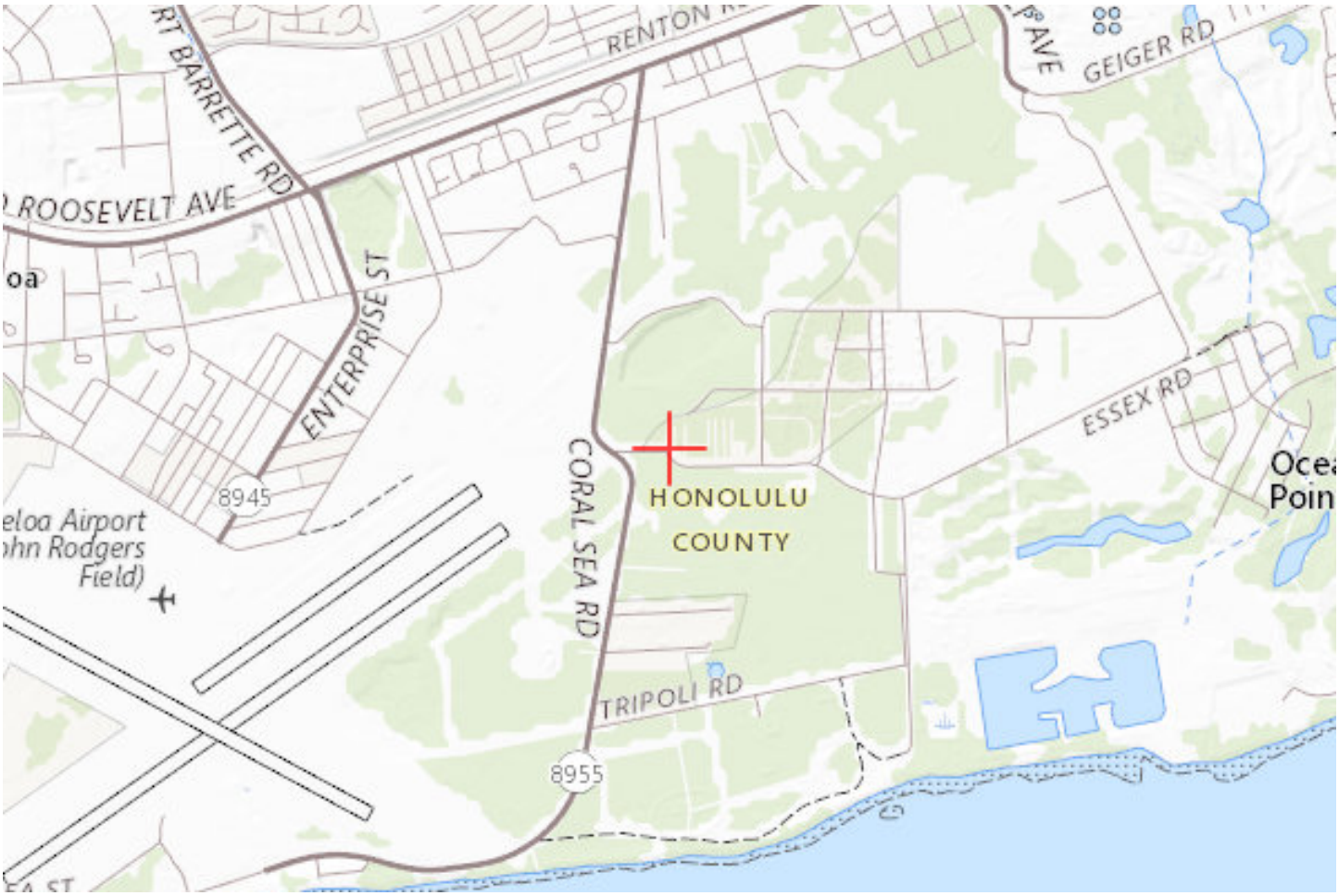
This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

If we can be of further assistance, please contact our office at (907) 271-5863, or robert.van.haastert@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2021-AWP-9924-OE.

Signature Control No: 486022137-491744862 (DNE)
Robert van Haastert
Supervisor

Attachment(s)
Map(s)

TOPO Map for ASN 2021-AWP-9924-OE



Sectional Map for ASN 2021-AWP-9924-OE

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Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
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Aeronautical Study No.
2021-AWP-9925-OE

Issued Date: 08/17/2021

Julia Mancinelli
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**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Solar Panel BP 2-5
Location:	Kalaeloa, HI
Latitude:	21-18-59.50N NAD 83
Longitude:	158-03-14.00W
Heights:	30 feet site elevation (SE)
	15 feet above ground level (AGL)
	45 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part 1)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part 2)

Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking/ lighting are accomplished on a voluntary basis, we recommend it be installed in accordance with FAA Advisory circular 70/7460-1 M.

This determination expires on 02/17/2023 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.
(c) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

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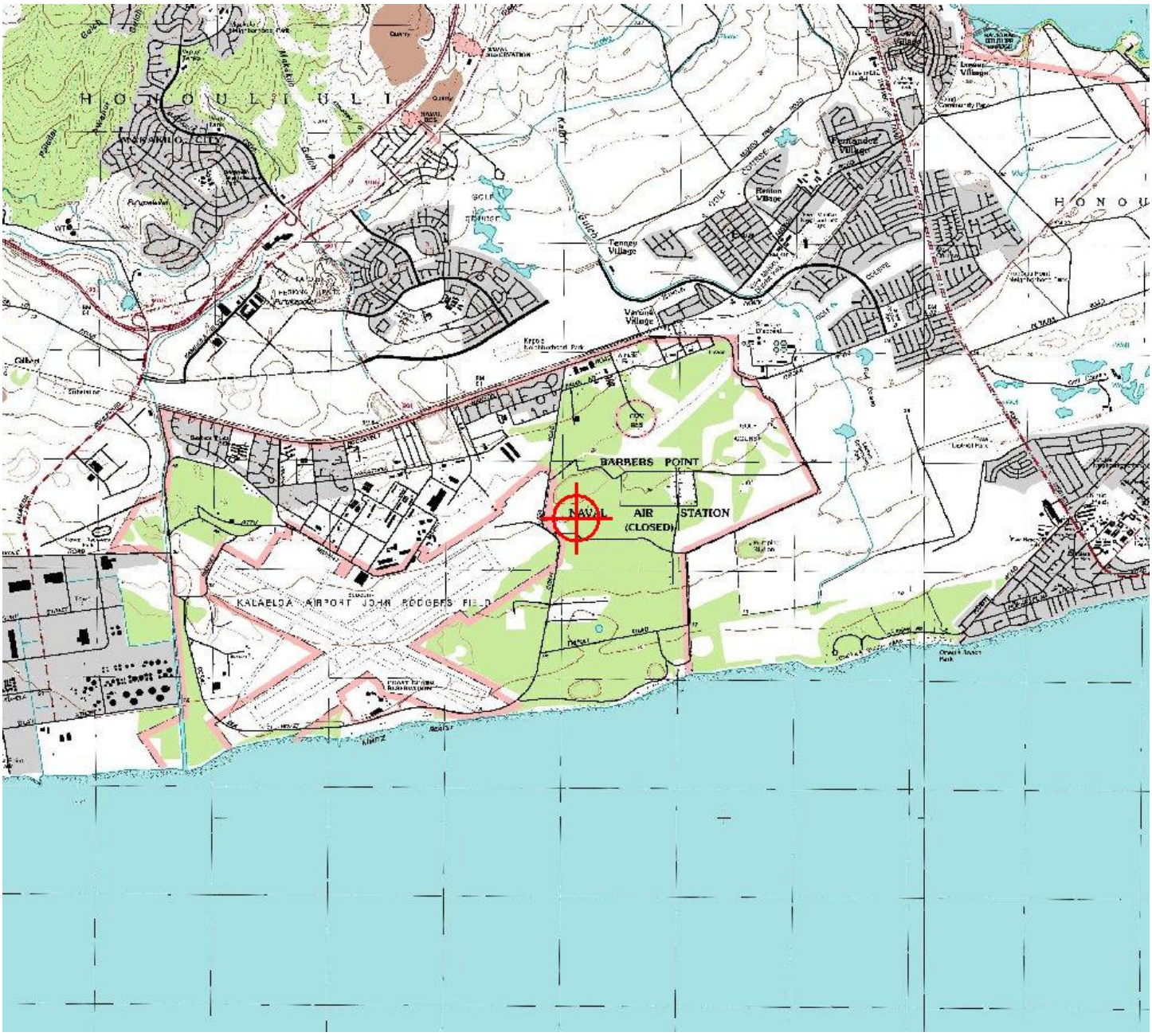
This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

If we can be of further assistance, please contact our office at (907) 271-5863, or robert.van.haastert@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2021-AWP-9925-OE.

Signature Control No: 486022138-491744854 (DNE)
Robert van Haastert
Supervisor

Attachment(s)
Map(s)

TOPO Map for ASN 2021-AWP-9925-OE



Sectional Map for ASN 2021-AWP-9925-OE

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Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2021-AWP-9926-OE

Issued Date: 08/17/2021

Julia Mancinelli
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888 Dunsmuir Street
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Vancouver, V6C3K4

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Solar Panel BP 3-1
Location:	Kalaeloa, HI
Latitude:	21-18-36.03N NAD 83
Longitude:	158-03-21.28W
Heights:	20 feet site elevation (SE) 15 feet above ground level (AGL) 35 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part 1)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part 2)

Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking/ lighting are accomplished on a voluntary basis, we recommend it be installed in accordance with FAA Advisory circular 70/7460-1 M.

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NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

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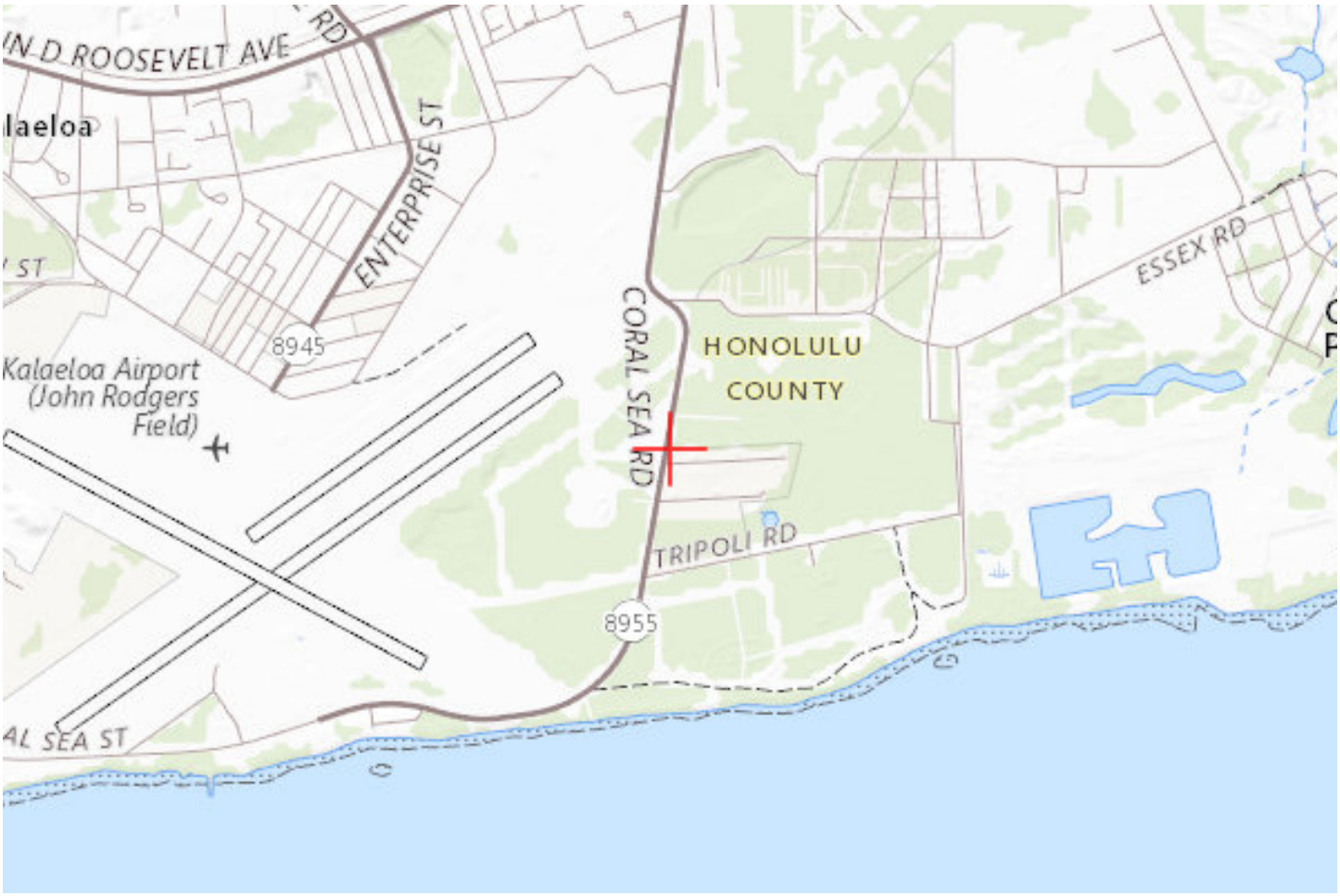
If we can be of further assistance, please contact our office at (907) 271-5863, or robert.van.haastert@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2021-AWP-9926-OE.

Signature Control No: 486022139-491744860 (DNE)
Robert van Haastert
Supervisor

Attachment(s)
Map(s)

TOPO Map for ASN 2021-AWP-9926-OE



Sectional Map for ASN 2021-AWP-9926-OE

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2021-AWP-9927-OE

Issued Date: 08/17/2021

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**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Solar Panel BP 3-2
Location:	Kalaeloa, HI
Latitude:	21-18-36.47N NAD 83
Longitude:	158-03-03.53W
Heights:	18 feet site elevation (SE) 15 feet above ground level (AGL) 33 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part 1)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part 2)

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(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.
(c) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is based, in part, on the foregoing description which includes specific coordinates, heights, frequency(ies) and power. Any changes in coordinates, heights, and frequencies or use of greater power, except those frequencies specified in the Colo Void Clause Coalition; Antenna System Co-Location; Voluntary Best Practices, effective 21 Nov 2007, will void this determination. Any future construction or alteration, including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.This determination includes all previously filed frequencies and power for this structure.

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This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

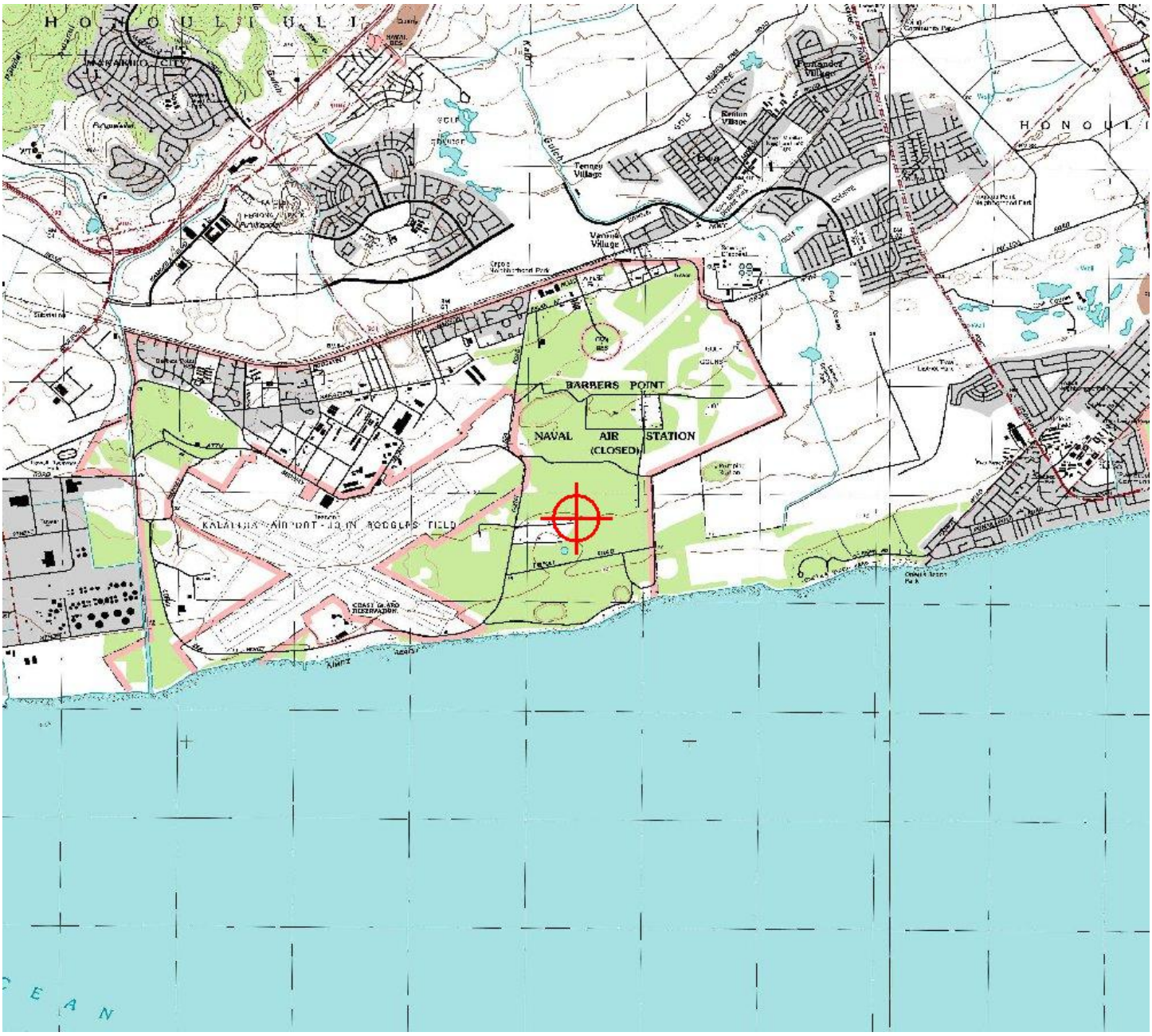
This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

If we can be of further assistance, please contact our office at (907) 271-5863, or robert.van.haastert@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2021-AWP-9927-OE.

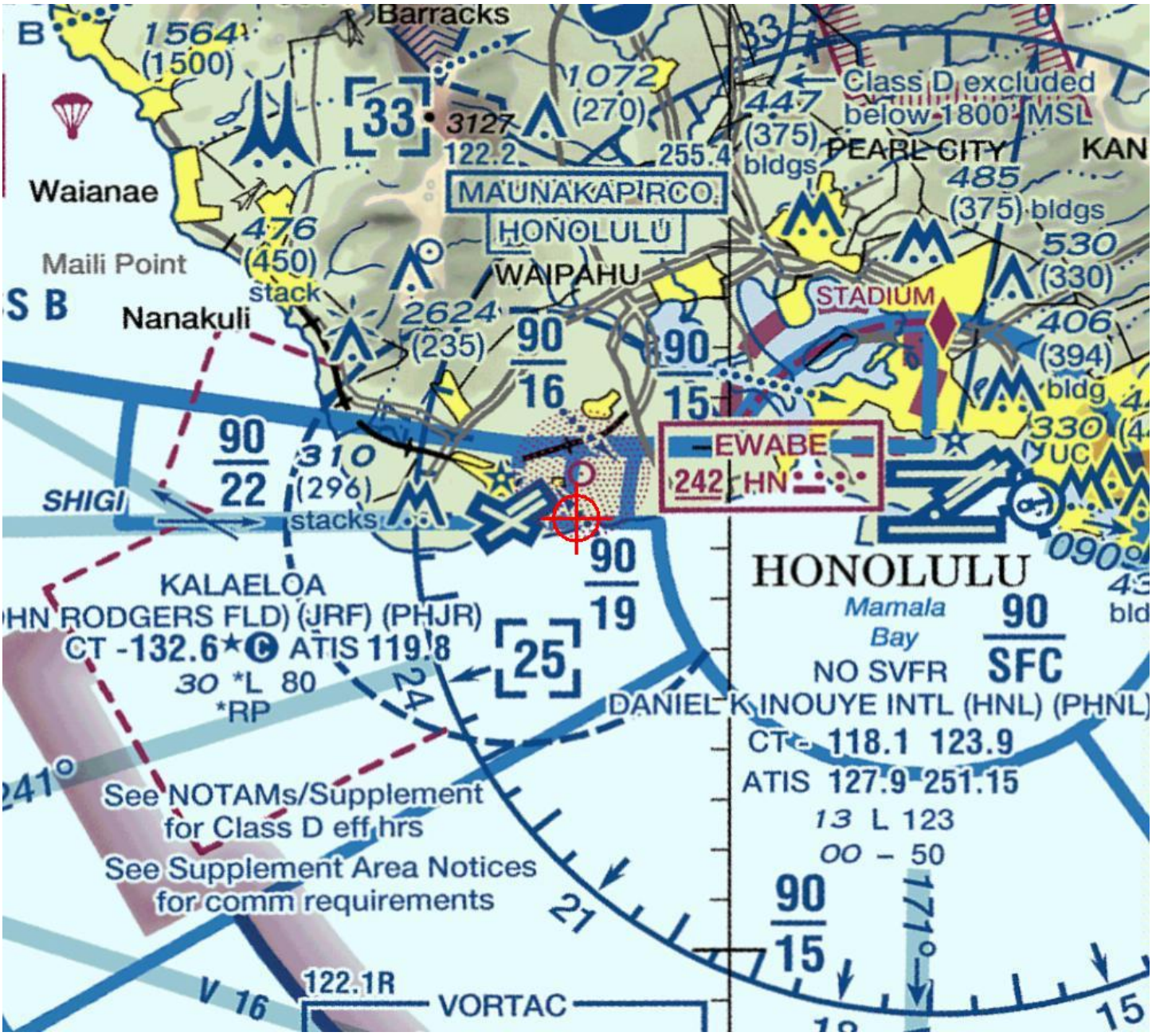
Signature Control No: 486022140-491744855 (DNE)
Robert van Haastert
Supervisor

Attachment(s)
Map(s)

TOPO Map for ASN 2021-AWP-9927-OE



Sectional Map for ASN 2021-AWP-9927-OE



Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2021-AWP-9928-OE

Issued Date: 08/17/2021

Julia Mancinelli
Innergex
888 Dunsmuir Street
Suite 1100
Vancouver, V6C3K4

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Solar Panel BP 3-3
Location:	Kalaeloa, HI
Latitude:	21-18-29.45N NAD 83
Longitude:	158-03-05.85W
Heights:	10 feet site elevation (SE) 15 feet above ground level (AGL) 25 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part 1)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part 2)

Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking/ lighting are accomplished on a voluntary basis, we recommend it be installed in accordance with FAA Advisory circular 70/7460-1 M.

This determination expires on 02/17/2023 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.
(c) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is based, in part, on the foregoing description which includes specific coordinates, heights, frequency(ies) and power. Any changes in coordinates, heights, and frequencies or use of greater power, except those frequencies specified in the Colo Void Clause Coalition; Antenna System Co-Location; Voluntary Best Practices, effective 21 Nov 2007, will void this determination. Any future construction or alteration, including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.This determination includes all previously filed frequencies and power for this structure.

If construction or alteration is dismantled or destroyed, you must submit notice to the FAA within 5 days after the construction or alteration is dismantled or destroyed.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

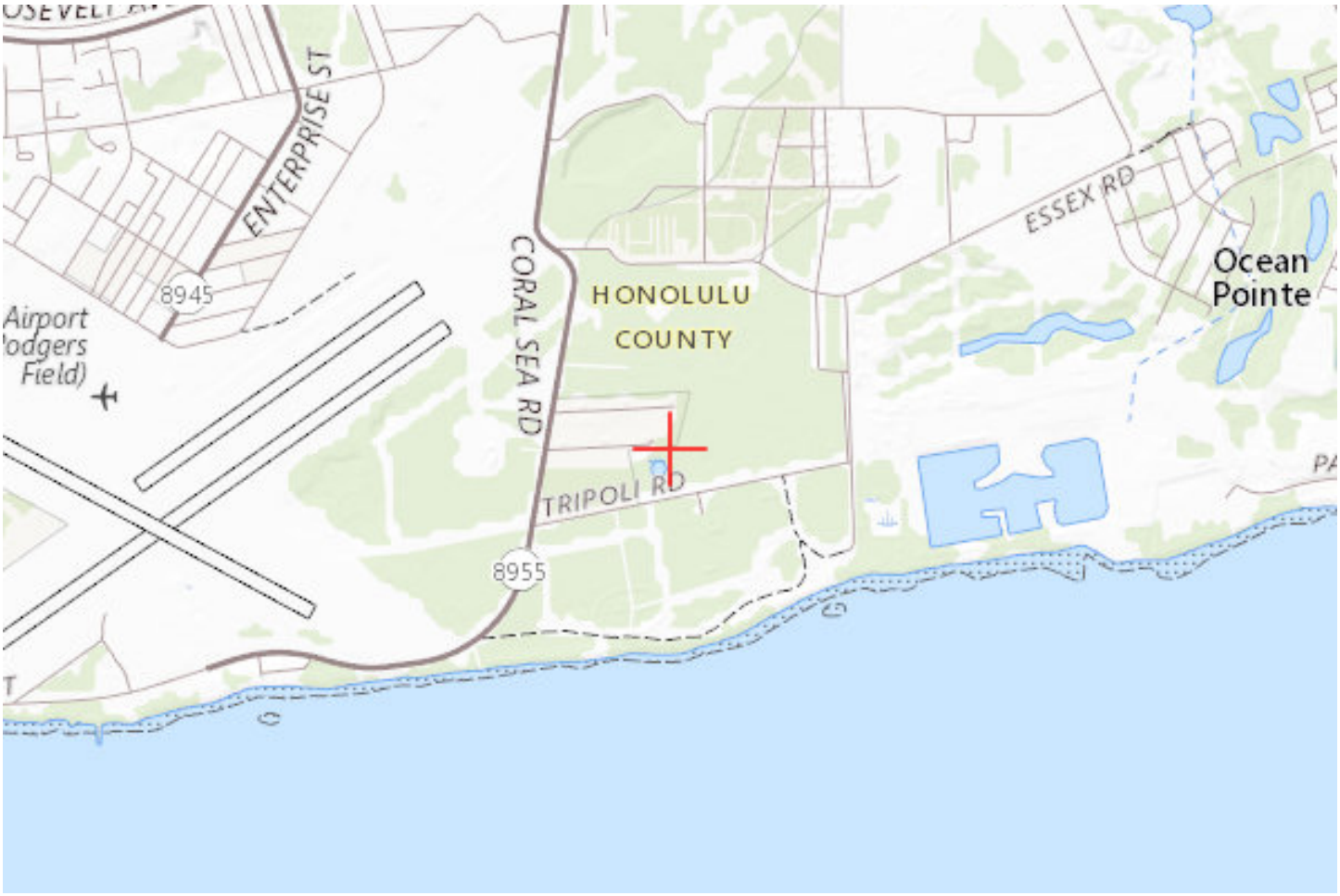
This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

If we can be of further assistance, please contact our office at (907) 271-5863, or robert.van.haastert@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2021-AWP-9928-OE.

Signature Control No: 486022141-491744868 (DNE)
Robert van Haastert
Supervisor

Attachment(s)
Map(s)

TOPO Map for ASN 2021-AWP-9928-OE



Sectional Map for ASN 2021-AWP-9928-OE

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
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10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2021-AWP-9929-OE

Issued Date: 08/17/2021

Julia Mancinelli
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**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Solar Panel BP 3-4
Location:	Kalaeloa, HI
Latitude:	21-18-27.25N NAD 83
Longitude:	158-03-11.56W
Heights:	8 feet site elevation (SE) 15 feet above ground level (AGL) 23 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part 1)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part 2)

Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking/ lighting are accomplished on a voluntary basis, we recommend it be installed in accordance with FAA Advisory circular 70/7460-1 M.

This determination expires on 02/17/2023 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.
(c) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is based, in part, on the foregoing description which includes specific coordinates, heights, frequency(ies) and power. Any changes in coordinates, heights, and frequencies or use of greater power, except those frequencies specified in the Colo Void Clause Coalition; Antenna System Co-Location; Voluntary Best Practices, effective 21 Nov 2007, will void this determination. Any future construction or alteration, including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.This determination includes all previously filed frequencies and power for this structure.

If construction or alteration is dismantled or destroyed, you must submit notice to the FAA within 5 days after the construction or alteration is dismantled or destroyed.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

If we can be of further assistance, please contact our office at (907) 271-5863, or robert.van.haastert@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2021-AWP-9929-OE.

Signature Control No: 486022142-491744866 (DNE)
Robert van Haastert
Supervisor

Attachment(s)
Map(s)

TOPO Map for ASN 2021-AWP-9929-OE

Sectional Map for ASN 2021-AWP-9929-OE

Mail Processing Center
Federal Aviation Administration
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Obstruction Evaluation Group
10101 Hillwood Parkway
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Aeronautical Study No.
2021-AWP-9930-OE

Issued Date: 08/17/2021

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**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Solar Panel BP 3-5
Location:	Kalaeloa, HI
Latitude:	21-18-22.15N NAD 83
Longitude:	158-03-13.51W
Heights:	10 feet site elevation (SE) 15 feet above ground level (AGL) 25 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part 1)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part 2)

Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking/ lighting are accomplished on a voluntary basis, we recommend it be installed in accordance with FAA Advisory circular 70/7460-1 M.

This determination expires on 02/17/2023 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.
(c) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is based, in part, on the foregoing description which includes specific coordinates, heights, frequency(ies) and power. Any changes in coordinates, heights, and frequencies or use of greater power, except those frequencies specified in the Colo Void Clause Coalition; Antenna System Co-Location; Voluntary Best Practices, effective 21 Nov 2007, will void this determination. Any future construction or alteration, including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.This determination includes all previously filed frequencies and power for this structure.

If construction or alteration is dismantled or destroyed, you must submit notice to the FAA within 5 days after the construction or alteration is dismantled or destroyed.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

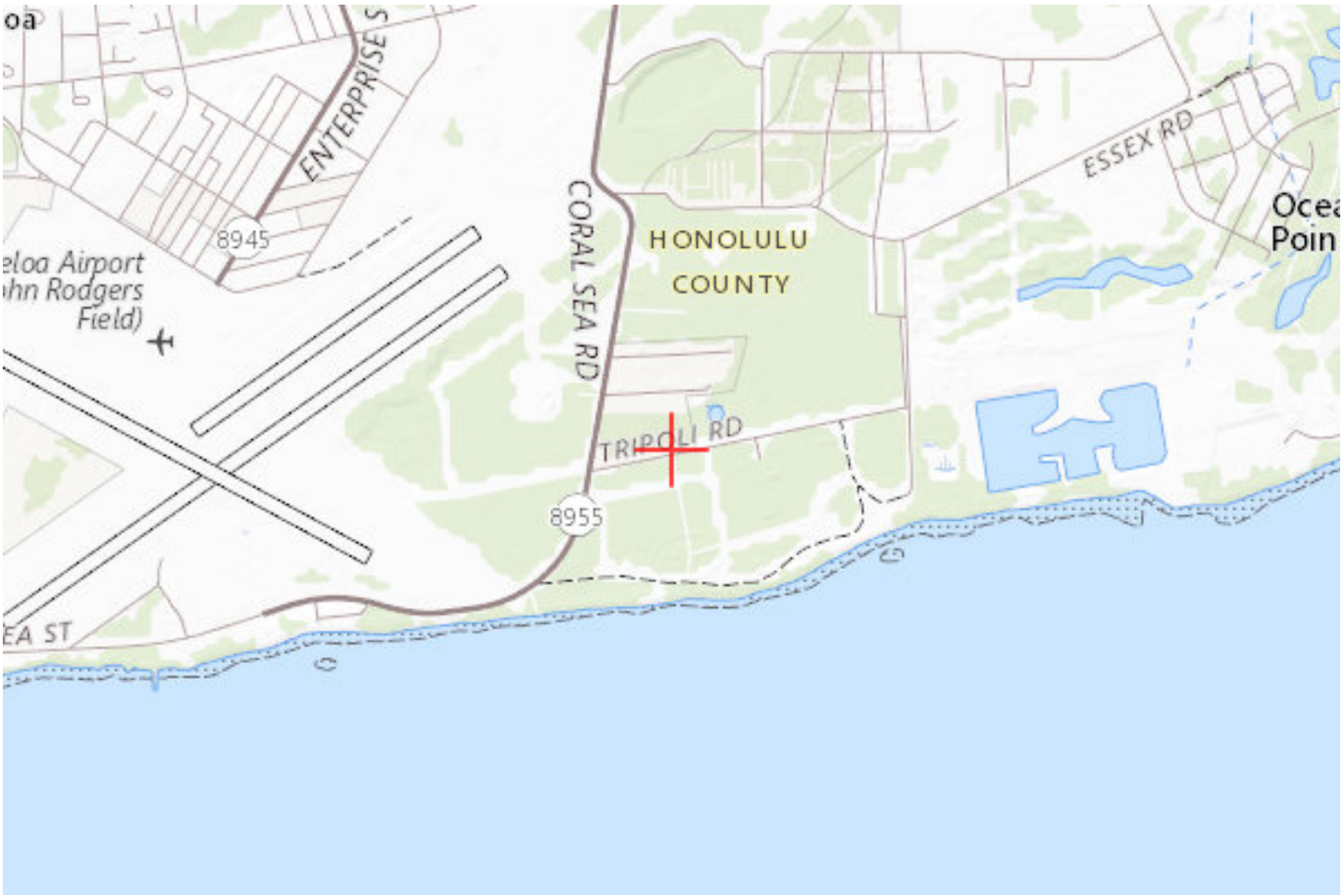
This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

If we can be of further assistance, please contact our office at (907) 271-5863, or robert.van.haastert@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2021-AWP-9930-OE.

Signature Control No: 486022144-491744861 (DNE)
Robert van Haastert
Supervisor

Attachment(s)
Map(s)

TOPO Map for ASN 2021-AWP-9930-OE



Sectional Map for ASN 2021-AWP-9930-OE

Mail Processing Center
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Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2021-AWP-9931-OE

Issued Date: 08/17/2021

Julia Mancinelli
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**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Solar Panel BP 3-6
Location:	Kalaeloa, HI
Latitude:	21-18-20.41N NAD 83
Longitude:	158-03-24.11W
Heights:	14 feet site elevation (SE) 15 feet above ground level (AGL) 29 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part 1)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part 2)

Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking/ lighting are accomplished on a voluntary basis, we recommend it be installed in accordance with FAA Advisory circular 70/7460-1 M.

This determination expires on 02/17/2023 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.
(c) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

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This determination is based, in part, on the foregoing description which includes specific coordinates, heights, frequency(ies) and power. Any changes in coordinates, heights, and frequencies or use of greater power, except those frequencies specified in the Colo Void Clause Coalition; Antenna System Co-Location; Voluntary Best Practices, effective 21 Nov 2007, will void this determination. Any future construction or alteration, including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.This determination includes all previously filed frequencies and power for this structure.

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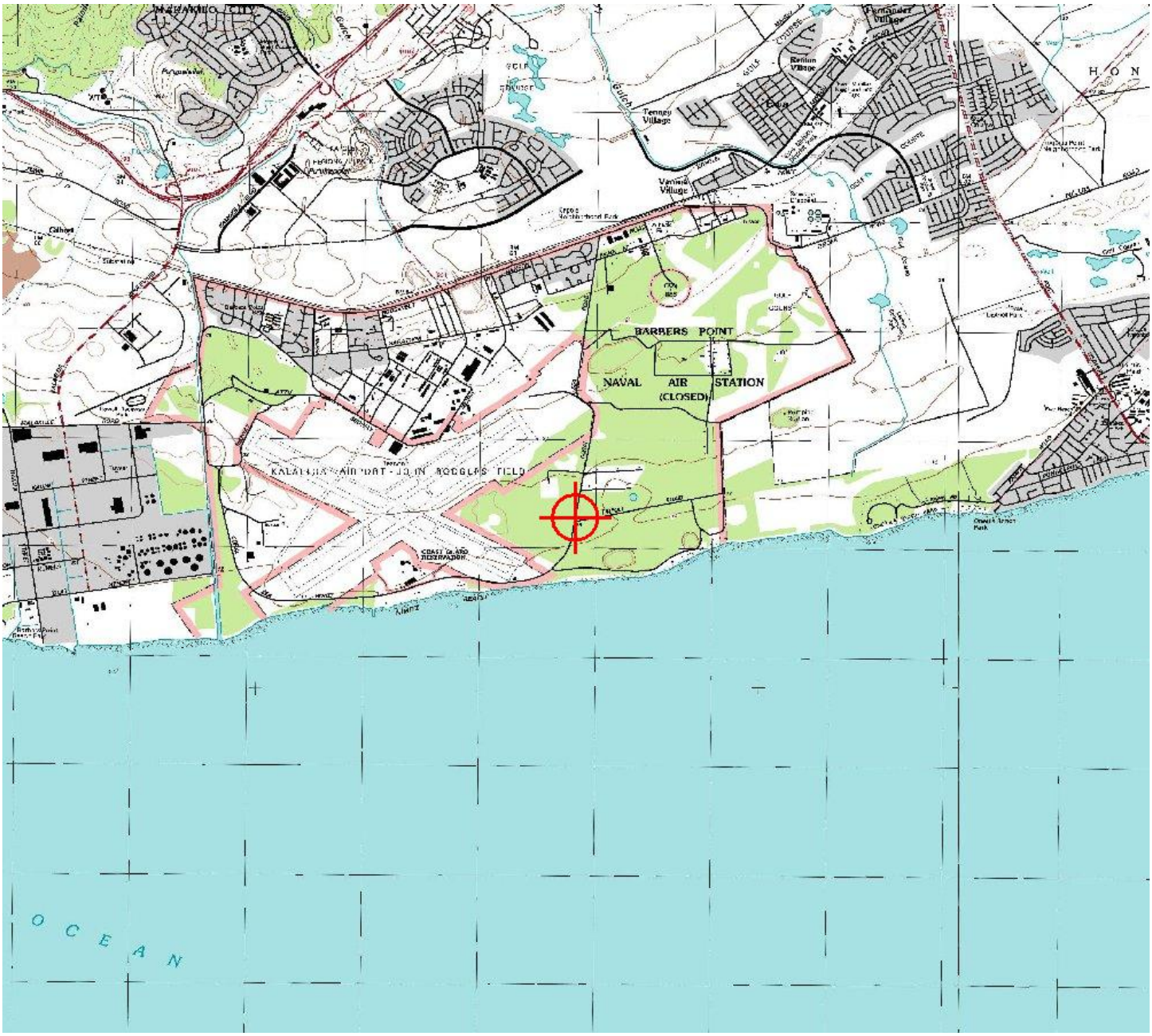
This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

If we can be of further assistance, please contact our office at (907) 271-5863, or robert.van.haastert@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2021-AWP-9931-OE.

Signature Control No: 486022145-491744856 (DNE)
Robert van Haastert
Supervisor

Attachment(s)
Map(s)

TOPO Map for ASN 2021-AWP-9931-OE



Sectional Map for ASN 2021-AWP-9931-OE

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2021-AWP-10673-OE

Issued Date: 08/17/2021

Julia Mancinelli
Innergex
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Vancouver, V6C3K4

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Building BP-Substation-1
Location:	Kalaeloa, HI
Latitude:	21-18-56.72N NAD 83
Longitude:	158-03-16.77W
Heights:	30 feet site elevation (SE)
	40 feet above ground level (AGL)
	70 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part 1)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part 2)

Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking/ lighting are accomplished on a voluntary basis, we recommend it be installed in accordance with FAA Advisory circular 70/7460-1 M.

This determination expires on 02/17/2023 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.
(c) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

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This determination is based, in part, on the foregoing description which includes specific coordinates, heights, frequency(ies) and power. Any changes in coordinates, heights, and frequencies or use of greater power, except those frequencies specified in the Colo Void Clause Coalition; Antenna System Co-Location; Voluntary Best Practices, effective 21 Nov 2007, will void this determination. Any future construction or alteration, including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.This determination includes all previously filed frequencies and power for this structure.

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This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

A copy of this determination will be forwarded to the Federal Communications Commission (FCC) because the structure is subject to their licensing authority.

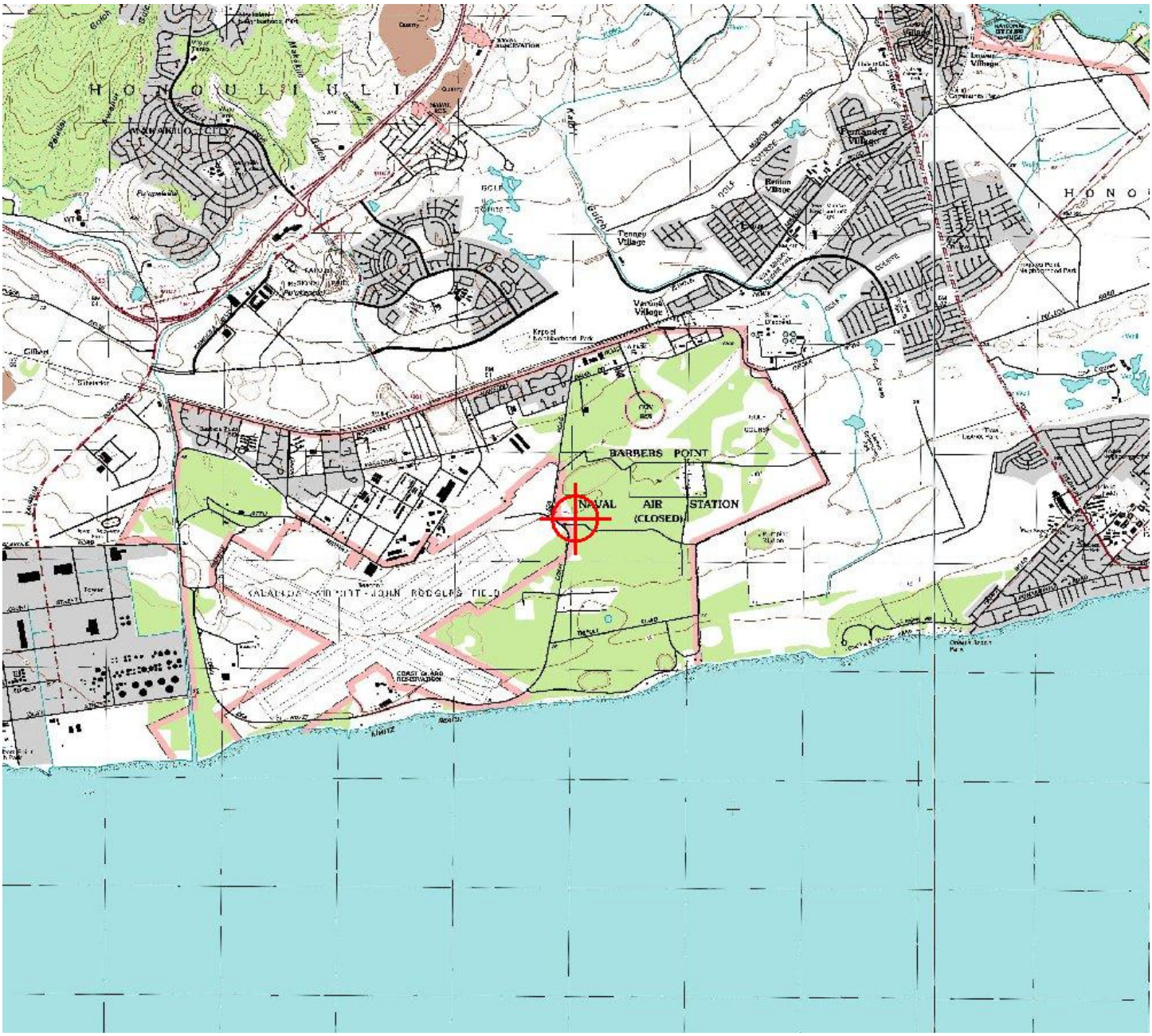
If we can be of further assistance, please contact our office at (907) 271-5863, or robert.van.haastert@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2021-AWP-10673-OE.

Signature Control No: 488314932-491744867 (DNE)
Robert van Haastert
Supervisor

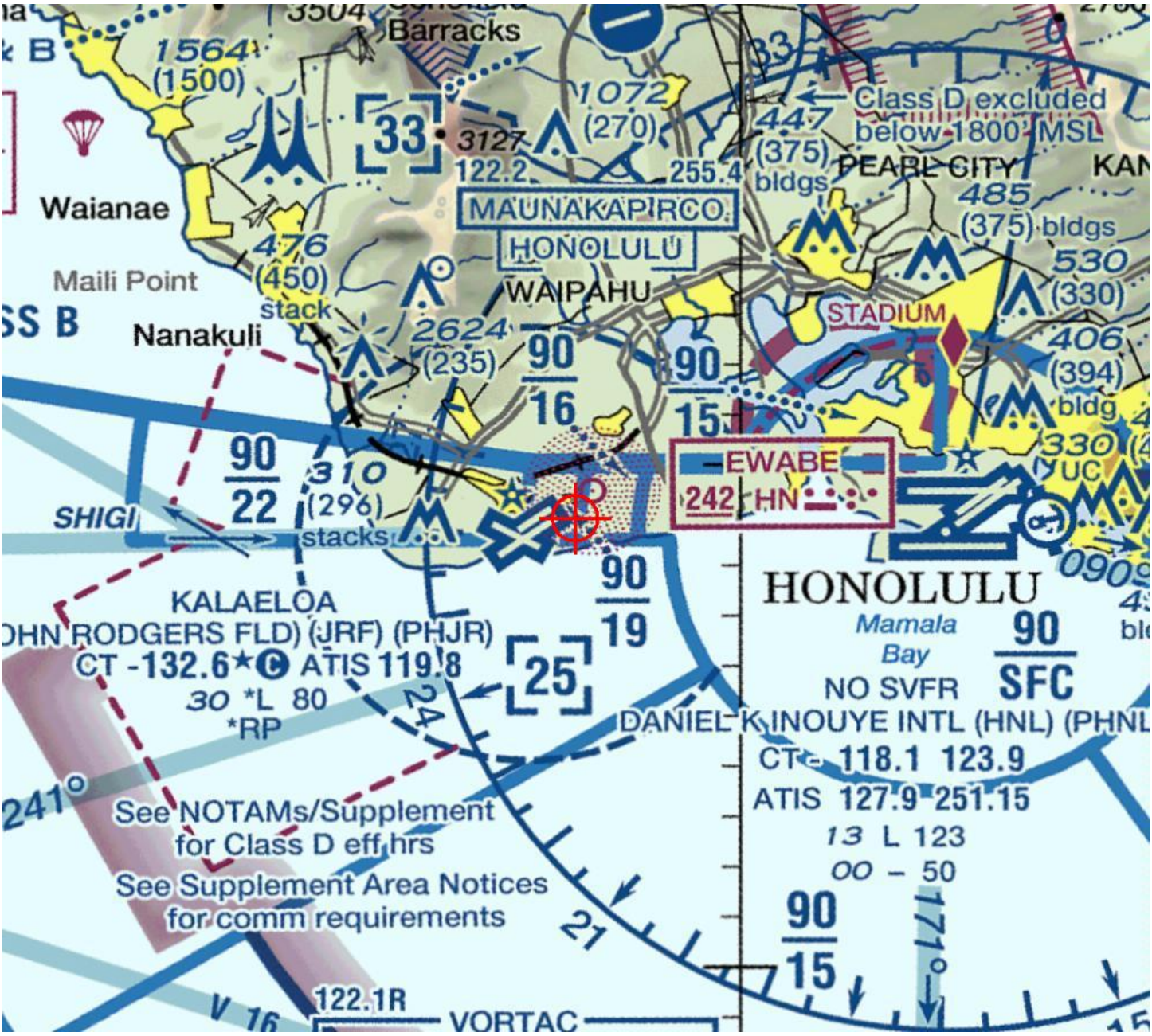
Attachment(s)
Map(s)

cc: FCC

TOPO Map for ASN 2021-AWP-10673-OE



Sectional Map for ASN 2021-AWP-10673-OE



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Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2021-AWP-10674-OE

Issued Date: 08/17/2021

Julia Mancinelli
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888 Dunsmuir Street
Suite 1100
Vancouver, V6C3K4

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Building BP-Substation-2
Location:	Kalaeloa, HI
Latitude:	21-18-55.69N NAD 83
Longitude:	158-03-16.76W
Heights:	30 feet site elevation (SE)
	40 feet above ground level (AGL)
	70 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part 1)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part 2)

Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking/ lighting are accomplished on a voluntary basis, we recommend it be installed in accordance with FAA Advisory circular 70/7460-1 M.

This determination expires on 02/17/2023 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.
(c) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is based, in part, on the foregoing description which includes specific coordinates, heights, frequency(ies) and power. Any changes in coordinates, heights, and frequencies or use of greater power, except those frequencies specified in the Colo Void Clause Coalition; Antenna System Co-Location; Voluntary Best Practices, effective 21 Nov 2007, will void this determination. Any future construction or alteration, including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.This determination includes all previously filed frequencies and power for this structure.

If construction or alteration is dismantled or destroyed, you must submit notice to the FAA within 5 days after the construction or alteration is dismantled or destroyed.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

A copy of this determination will be forwarded to the Federal Communications Commission (FCC) because the structure is subject to their licensing authority.

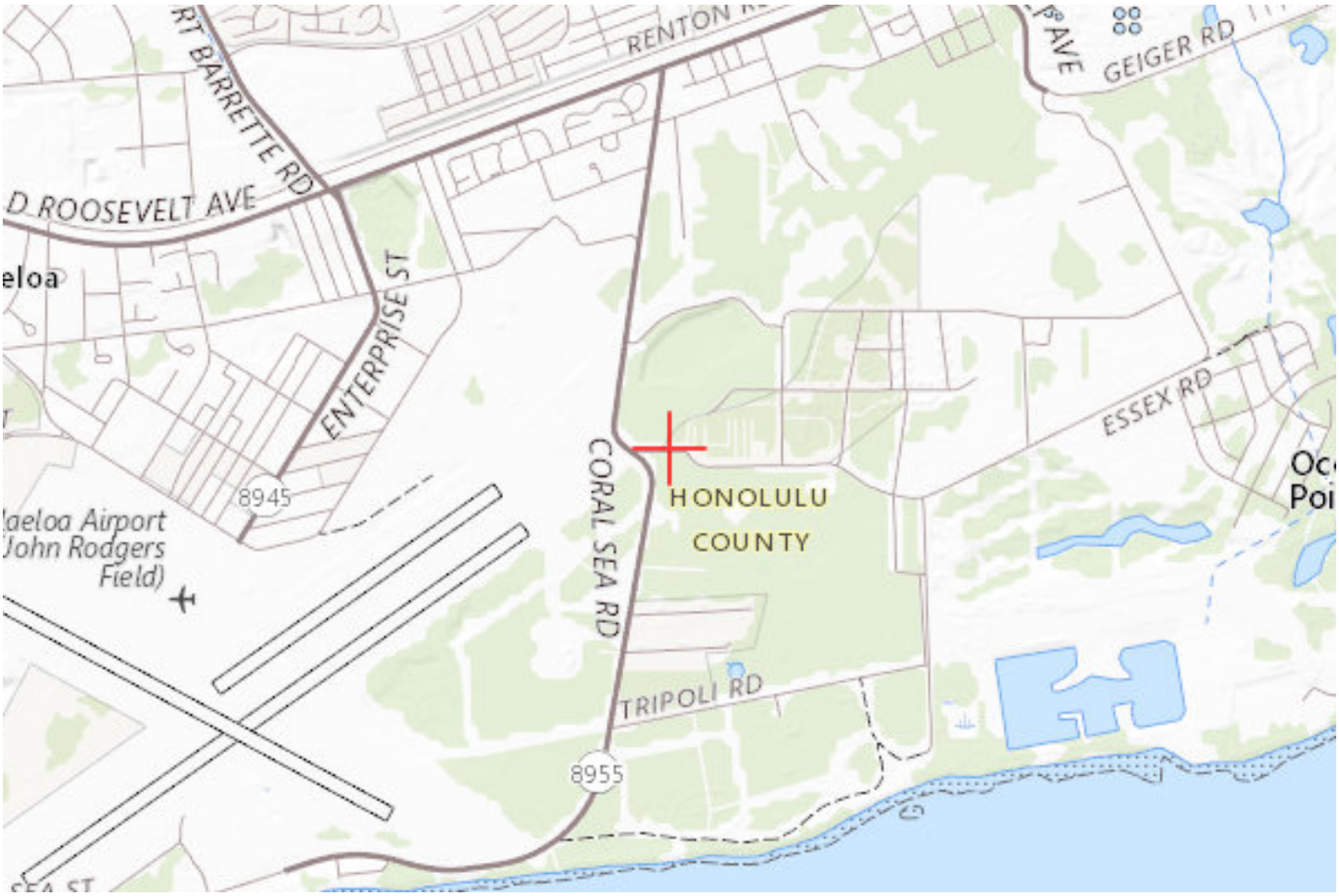
If we can be of further assistance, please contact our office at (907) 271-5863, or robert.van.haastert@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2021-AWP-10674-OE.

Signature Control No: 488314933-491744858 (DNE)
Robert van Haastert
Supervisor

Attachment(s)
Map(s)

cc: FCC

TOPO Map for ASN 2021-AWP-10674-OE



Sectional Map for ASN 2021-AWP-10674-OE

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2021-AWP-10675-OE

Issued Date: 08/17/2021

Julia Mancinelli
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Vancouver, V6C3K4

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Building BP-Substation-3
Location:	Kalaeloa, HI
Latitude:	21-18-55.71N NAD 83
Longitude:	158-03-14.03W
Heights:	28 feet site elevation (SE)
	40 feet above ground level (AGL)
	68 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part 1)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part 2)

Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking/ lighting are accomplished on a voluntary basis, we recommend it be installed in accordance with FAA Advisory circular 70/7460-1 M.

This determination expires on 02/17/2023 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.
(c) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is based, in part, on the foregoing description which includes specific coordinates, heights, frequency(ies) and power. Any changes in coordinates, heights, and frequencies or use of greater power, except those frequencies specified in the Colo Void Clause Coalition; Antenna System Co-Location; Voluntary Best Practices, effective 21 Nov 2007, will void this determination. Any future construction or alteration, including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.This determination includes all previously filed frequencies and power for this structure.

If construction or alteration is dismantled or destroyed, you must submit notice to the FAA within 5 days after the construction or alteration is dismantled or destroyed.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

A copy of this determination will be forwarded to the Federal Communications Commission (FCC) because the structure is subject to their licensing authority.

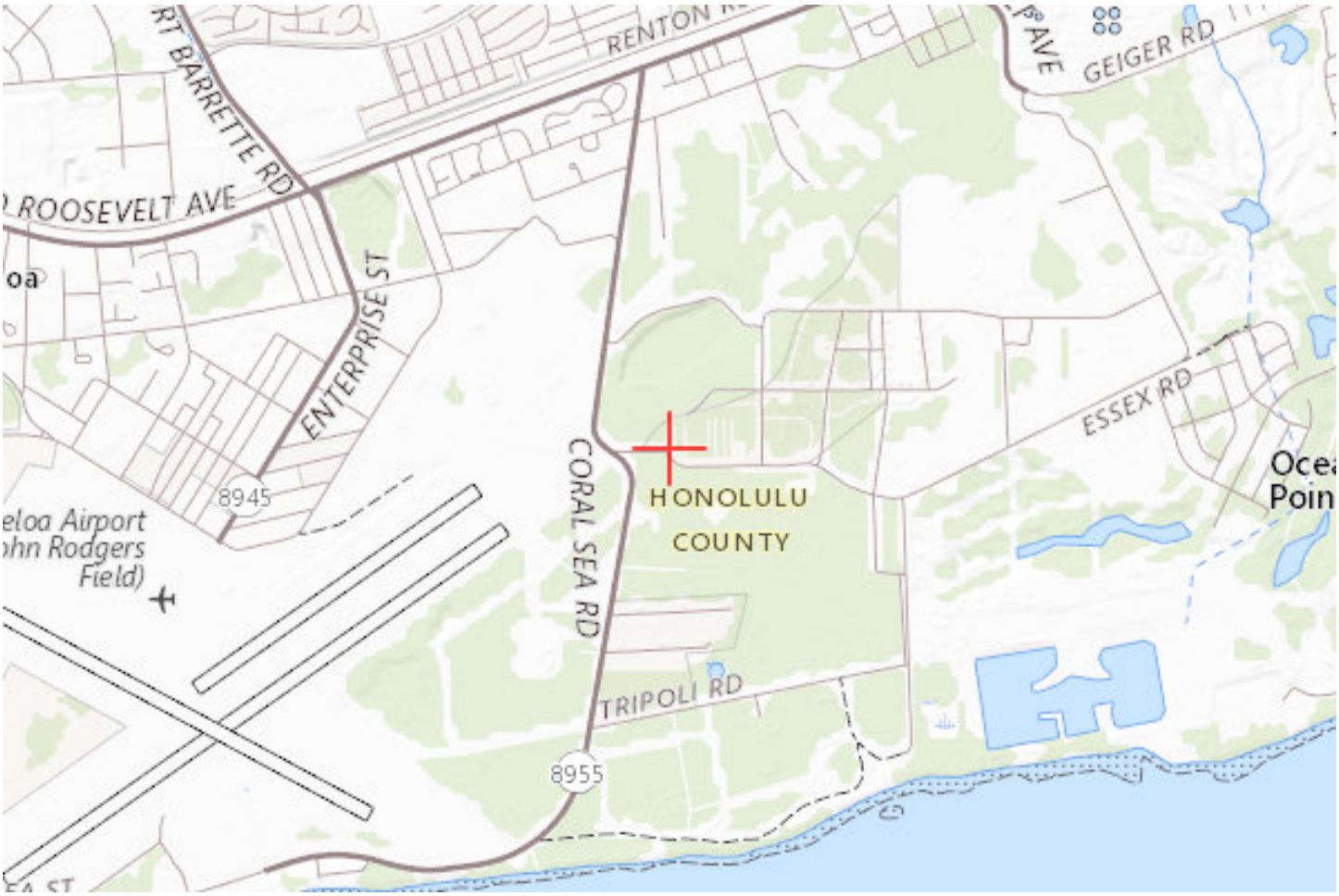
If we can be of further assistance, please contact our office at (907) 271-5863, or robert.van.haastert@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2021-AWP-10675-OE.

Signature Control No: 488314934-491744865 (DNE)
Robert van Haastert
Supervisor

Attachment(s)
Map(s)

cc: FCC

TOPO Map for ASN 2021-AWP-10675-OE



Sectional Map for ASN 2021-AWP-10675-OE

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2021-AWP-10676-OE

Issued Date: 08/17/2021

Julia Mancinelli
Innergex
888 Dunsmuir Street
Suite 1100
Vancouver, V6C3K4

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Building BP-Substation-4
Location:	Kalaeloa, HI
Latitude:	21-18-56.70N NAD 83
Longitude:	158-03-14.02W
Heights:	28 feet site elevation (SE)
	40 feet above ground level (AGL)
	68 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part 1)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part 2)

Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking/ lighting are accomplished on a voluntary basis, we recommend it be installed in accordance with FAA Advisory circular 70/7460-1 M.

This determination expires on 02/17/2023 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.
(c) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is based, in part, on the foregoing description which includes specific coordinates, heights, frequency(ies) and power. Any changes in coordinates, heights, and frequencies or use of greater power, except those frequencies specified in the Colo Void Clause Coalition; Antenna System Co-Location; Voluntary Best Practices, effective 21 Nov 2007, will void this determination. Any future construction or alteration, including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.This determination includes all previously filed frequencies and power for this structure.

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This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

A copy of this determination will be forwarded to the Federal Communications Commission (FCC) because the structure is subject to their licensing authority.

If we can be of further assistance, please contact our office at (907) 271-5863, or robert.van.haastert@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2021-AWP-10676-OE.

Signature Control No: 488314935-491744870 (DNE)
Robert van Haastert
Supervisor

Attachment(s)
Map(s)

cc: FCC

TOPO Map for ASN 2021-AWP-10676-OE

Sectional Map for ASN 2021-AWP-10676-OE

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APPENDIX H. TRAFFIC IMPACT ANALYSIS REPORT

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Barbers Point Solar Project

Traffic Impact Analysis Report

Kapolei, Oahu, Hawaii

July 2021

Prepared for
Barbers Point Solar LLC

Prepared by
SSFM International

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I. PROJECT DESCRIPTION

Barbers Point Solar LLC (Barbers Point Solar) is proposing to build and operate the Barbers Point Solar Project (Project) located in east Kalaeloa, Ewa District, on the Island of Oahu. The Project will consist of a 15-megawatt (MWac) solar photovoltaic (PV) system coupled with a 15-MW, 4-hour (60 MWh) PV coupled battery energy storage system (PV-Coupled ESS) as well as ancillary support infrastructure located within an approximately 168-acre (68 hectares) Study Area (Figure 1). The Project will primarily be located on tax map keys (TMK) 9-1-013:038 and 9-1-013:040, owned by Department of Hawaiian Homelands. Project electrical transmission lines will also be located within rights-of-way owned by Hawaii Department of Transportation (HDOT) (Coral Sea Road and Roosevelt Avenue) and Hawaii Community Development Authority (HCDA) as well as within a portion of TMK 9-1-016:027 (owned by Kapolei Infrastructure, LLC). The Project area is shown in attached Figure 1.

The major infrastructures of the Project will include the following: the solar PV system, a network of AC and DC electrical collector lines, battery energy storage and inverter units, step-up transformers, a collector substation and transformer, a generation-tie line (overhead and underground), internal access roads, and temporary laydown (i.e., staging) areas for construction. The solar arrays and associated infrastructure would primarily be located on TMKs 9-1-013:038 and 9-1-013:040. The collector line connecting the solar arrays on TMK 9-1-013:040 to the collector substation on TMK 9-1-013:038 will run along Coral Sea Road. Portions of this line may need to be overhead depending on final site design and right-of-way constraints.

The 49-kilovolt generation-tie line (combination of overhead and underground) will be approximately 1.5 miles long. It will extend underground from the Project's collector substation, north along Coral Sea Road and transition to overhead at the existing 12 kV Hawaii Electric overhead transmission line. The 46 kV will be overbuilt on top of the 12 kV transmission line and terminate to the existing Hawaiian Electric 46-kV overhead transmission line located on TMK 9-1-016:027 (owned by Kapolei Infrastructure, LLC) near the intersection of Coral Sea Road and Roosevelt Avenue.

There are two main access routes to the project. Access to TMK 9-1-013:038 will be provided by a new driveway off of Coral Sea Road. This driveway will be located within an existing HCDA ROW associated with Roadway Lot 13083. Access to TMK 9-1-013:40 is currently via Coral Sea Road off of Casablanca Street; however, the Project proposes to construct a new driveway on Coral Sea Road to accommodate construction access. Access within the Project's two solar array parcels will be provided through a network of existing (to be improved) and new on-site access roads.

It is anticipated that Project construction and commissioning would require approximately 12-15 11 shmonths, with commercial operations commencing at the end of 2023. The power generated by the Project will be sold to Hawaiian Electric under a 25-year Power Purchase Agreement (PPA). At that point in time, the Project may be repowered under a renegotiated PPA or other contract (with subsequent permits/approvals) or decommissioned. Decommissioning will involve removal

of all equipment associated with the Project and returning the area to substantially the same condition as existed prior to Project development. Decommissioning will include the recycling and reuse of materials demolished or removed from the site to the extent feasible.

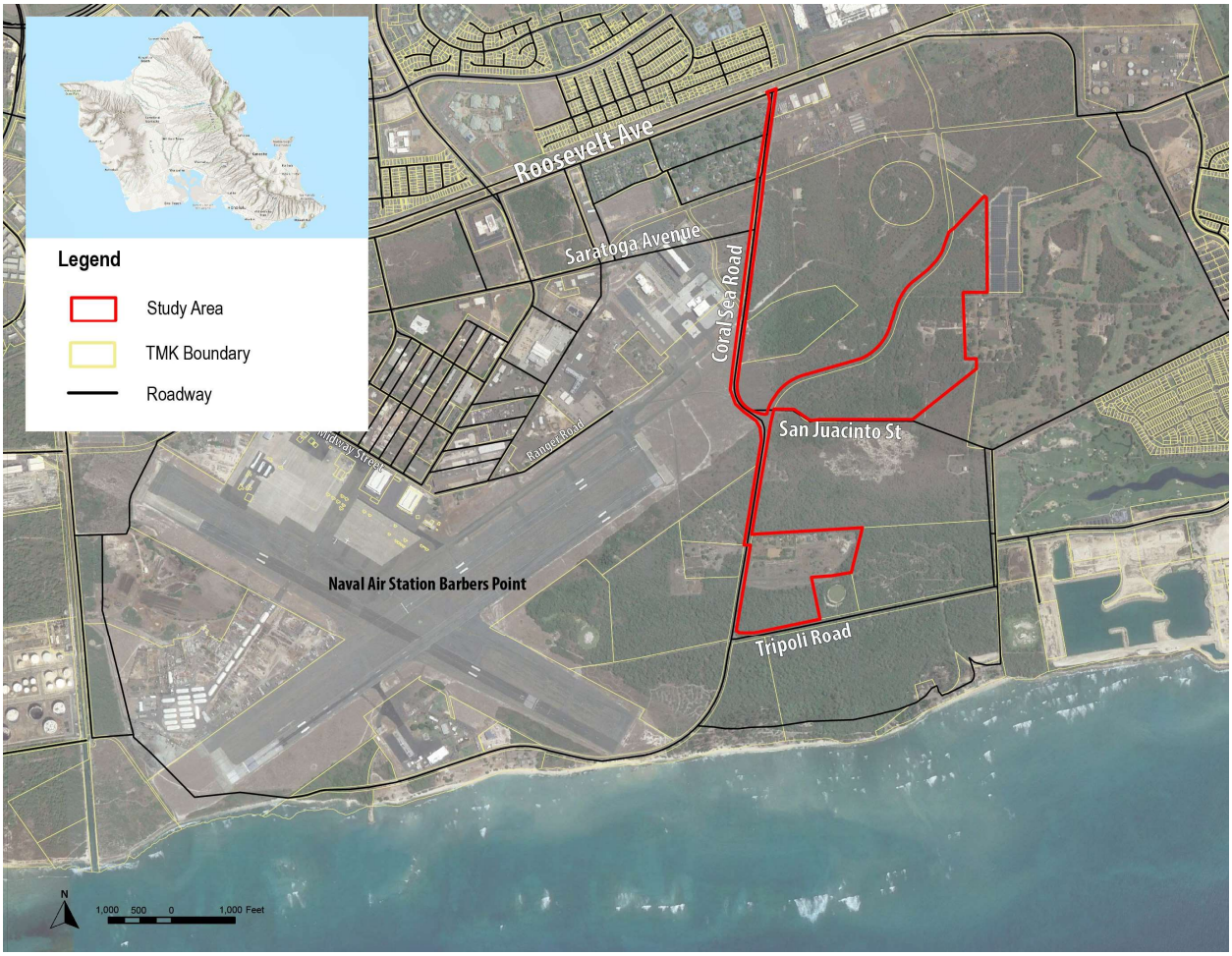

Figure 1: Project Location Map

II. EXISTING CONDITIONS

A. Project Location

The access roads are shown in Figure 2. Access Roads will be off of Coral Sea Road, near San Juacinto Street and Casablanca Street, respectively.

B. Geometric Configuration

Heavy vehicles delivering equipment and materials are expected to travel from the harbor on Sand Island Access Road to the Project Site using the H-1 Freeway and exiting the Makakilo Interchange, then go southbound on Fort Barrette Road, eastbound on Roosevelt Avenue and southbound onto Coral Sea Road. Worker vehicles are expected to take a similar route to the Project.

1. Roadway Network

a) H-1 Freeway

The H-1 Freeway is the major thoroughfare connecting West Oahu to East Oahu. Along the H-1 Freeway are many interchanges and onramps/offramps providing access to the most populated areas on Oahu. The H-1 Freeway will be the major roadway for construction vehicles travelling from Sand Island to and from the Project Site.

b) Fort Barrette Road (State Route 901)

Fort Barrette Road (FBR) is a state-owned roadway extending from Makakilo Drive in the north to Roosevelt Avenue in the south. From Makakilo Drive to Farrington Highway, Fort Barrette Road is a 4-lane undivided roadway with turn lanes at Farrington Highway. South of Farrington Highway, Fort Barrette Road transitions into a two-way, undivided roadway. Fort Barrette Road is signalized at all intersections. Crosswalks are provided at each intersection. Sidewalks are provided from Makakilo Drive to Farrington Highway. Bicycles can use the shoulder lanes provided between Farrington Highway and Roosevelt Avenue. The posted speed limit is 25 MPH near Roosevelt Avenue and 40 MPH near Farrington Highway.

c) Roosevelt Avenue (State Route 8940)

Roosevelt Avenue is a two-way, undivided, state-owned roadway extending from Kamokila Boulevard in the west to Geiger Road in the east. Roosevelt Avenue is a two-lane roadway with turn lanes at intersections. Roosevelt Avenue is signalized at the Ka Makana Alii driveway. All other intersections are stop-controlled. There are sidewalks and crosswalks at spot locations. Bicyclists use the shoulder lane, although it is not marked or signed for a bike lane. The posted speed limit is 25 MPH – 35 MPH.

d) Coral Sea Road (State Route 8955)

Coral Sea Road is a two-way, undivided, state-owned roadway extending from Roosevelt Avenue in the north to just past Kalaeloa Airport in the south. All intersections are stop-controlled. There are no crosswalks or sidewalks provided, with the exception of a crosswalk at Bouganville Avenue. There are no bike facilities provided. The posted speed limit is 25 MPH.

Figure 2: Construction Vehicle Route

e) Nimitz Highway (State Route 92)

According to the State of Hawaii Department of Transportation (HDOT) Straight Line Diagrams, Nimitz Highway (Route 36) is a state-owned principal arterial extending from Pearl Harbor Interchange in the west and transitions into Ala Moana Boulevard (MP 6.52) in the east. Nimitz Highway runs under the H-1 Freeway between the Pearl Harbor Interchange and the Keehi Interchange. Most of the intersections at Nimitz Highway are signalized. Near Sand Island Access Road, Nimitz Highway is a six-lane divided roadway. An eastbound lane is used in the AM peak hour to facilitate a contraflow lane to allow for 4 townbound lanes. The AM contraflow lane uses the inside westbound lane until just past Alakawa Street. Left turns are prohibited in the westbound direction at certain intersections during the AM peak hour.

f) Sand Island Access Road (State Route 64)

Sand Island Access Road is a state-owned, four-lane, divided roadway extending from Nimitz Highway in the north, transitioning to Sand Island parkway south of the bridge to Sand Island. Crosswalks and sidewalks are provided at spot locations. Cyclists can use marked and striped bike lanes. Posted speed limits range from 25 MPH to 35 MPH.

C. Study Intersections

The study intersections and the 24-hour count locations are shown in Figure 3. Existing lane configurations and channelized right turns islands at the study intersections are shown in Figure 4. Crosswalks at the intersections are shown in red. The study intersections include the following:

1. FBR at Farrington Highway (signalized)

Fort Barrette Road is signalized at Farrington Highway. All approaches have dedicated turn lanes. The westbound right, northbound left, and eastbound left turns have dual turning lanes. Channelized right turns are provided for the eastbound, westbound and northbound approaches. The westbound dual right turns are not allowed during a red light. All left turns are protected. Sidewalks and crosswalks are provided for all approaches. There is a bus stop in the northbound direction downstream from the intersection. This intersection is just south of the Makakilo Interchange and adjacent to many businesses.

2. FBR at Kamaaha Avenue (signalized)

Fort Barrette Road is signalized at Kamaaha Avenue. All approaches have dedicated turn lanes, with the northbound left turn having dual lanes. Channelized right turns are provided for the westbound and northbound approaches. All left turns are protected. Crosswalks are provided for the north, east, and west legs. Sidewalks are provided along Kamaaha Avenue. There is a marked bike lane in the southbound approach at this intersection. Residential housing lies to the east of this intersection.

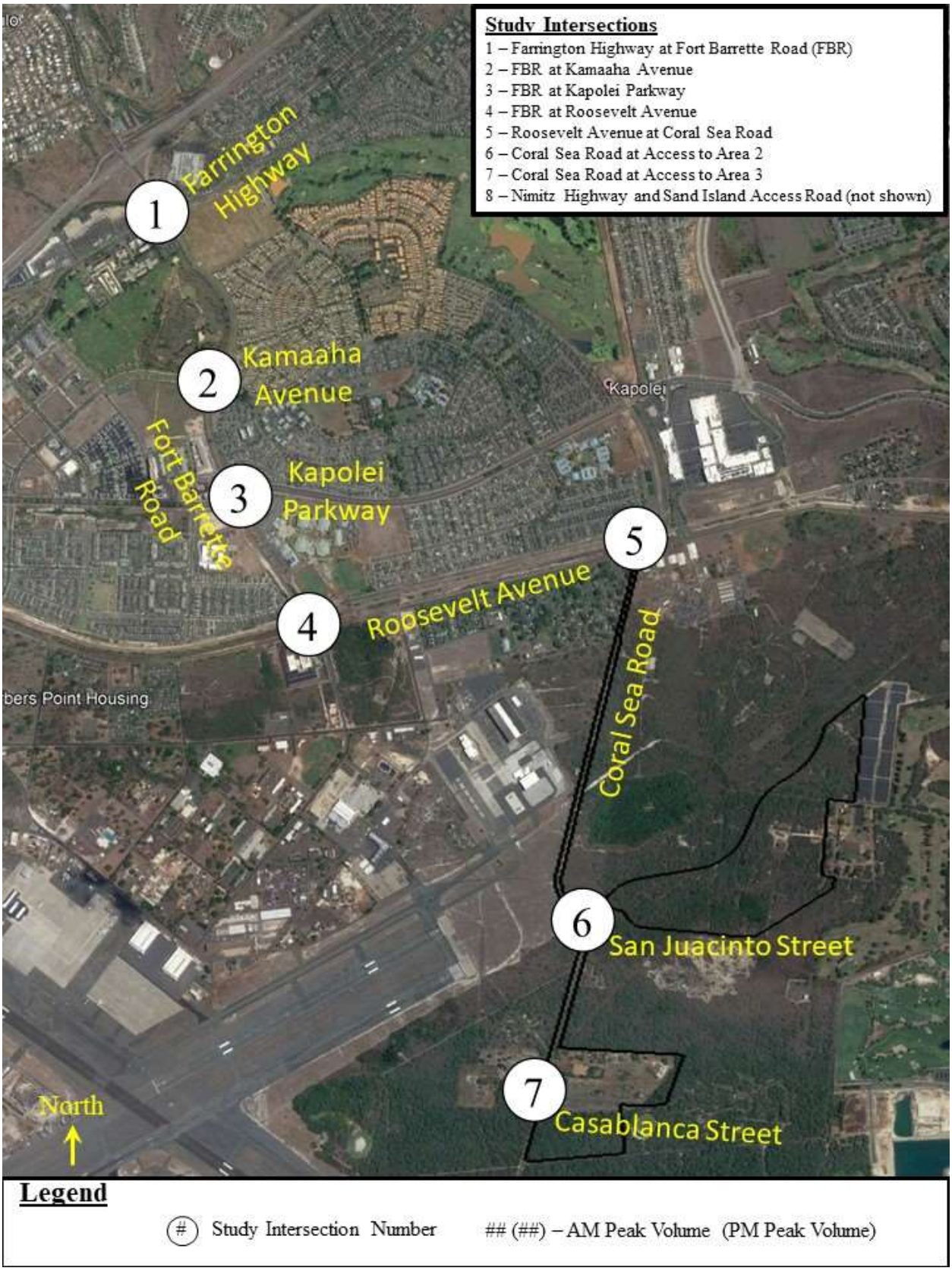

Figure 3: Study Intersections

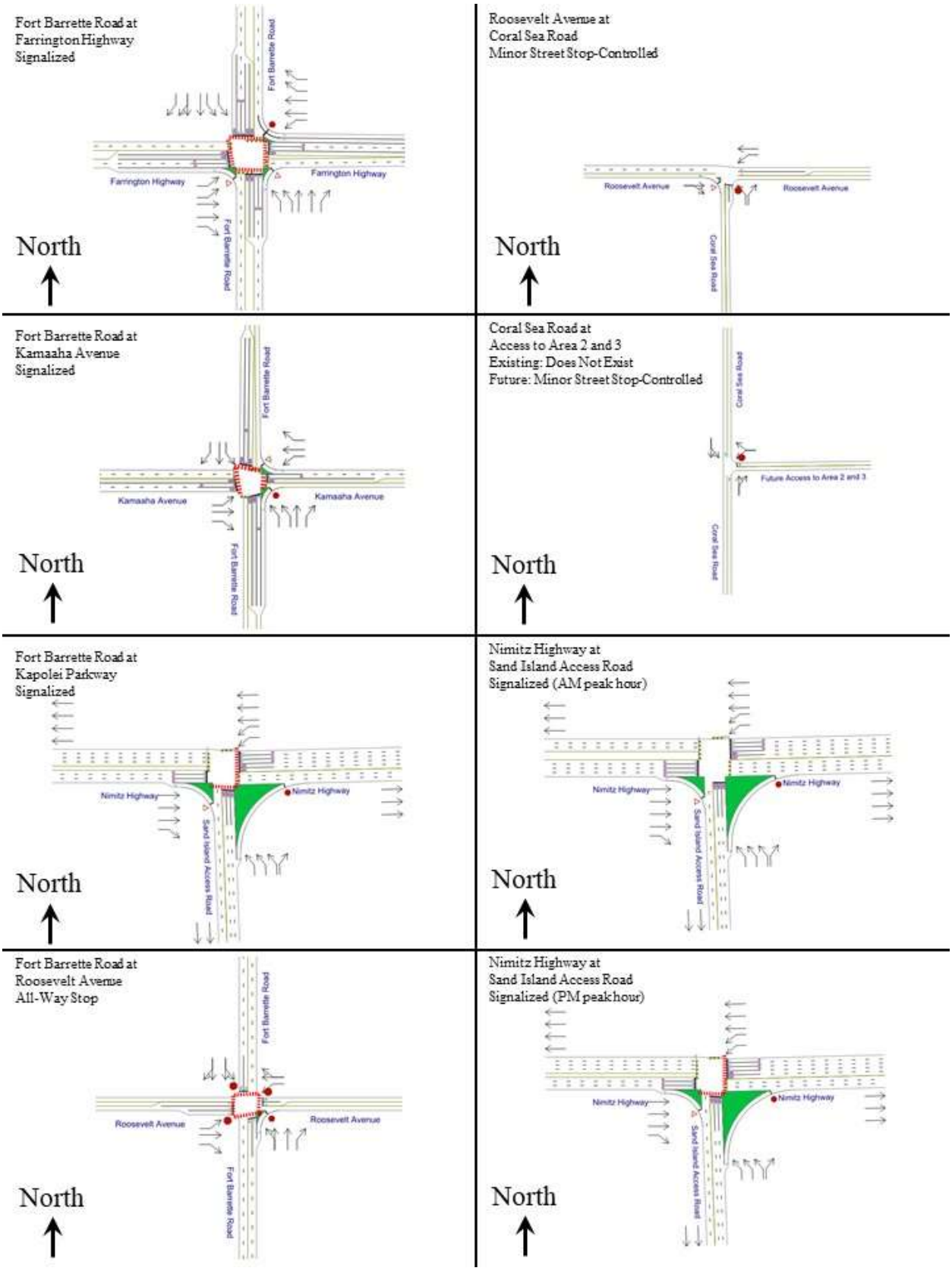

Figure 4: Existing Lane Configuration

3. FBR at Kapolei Parkway (signalized)

Fort Barrette Road is signalized at Kapolei Parkway. There are dedicated left turn lanes for the northbound and southbound FBR approaches. The eastbound and westbound Kapolei Parkway approaches have shared left-through lanes and dedicated right turn lanes. The FBR approaches have protected left turns. Channelized right turns are provided for the northbound and westbound approaches. There are crosswalks on the south and east legs of the intersection. Kapolei High School is southeast of this intersection.

4. FBR at Roosevelt Avenue (all-way stop)

Fort Barrette Road is an all-way stop-controlled intersection at Roosevelt Avenue. There are dedicated left turn lanes for the eastbound left, eastbound right, west bound left, and northbound turn lanes. The northbound and southbound FBR approaches have shared left-through lanes. sidewalks are provided for all approaches. A channelized right turn is provided for the northbound approach. Sidewalks are provided on the southwest corner adjacent to the Federal Bureau of Investigation Honolulu District building. Kapolei High School is northeast of this intersection.

5. Roosevelt Avenue at Coral Sea Road (Coral Sea Road stop-controlled)

Coral Sea Road is stop-controlled at Roosevelt Avenue. A westbound left turn lane and a westbound acceleration lane is provided on Roosevelt Avenue. To the southwest of the intersection is residential housing. Ka Makana Alii Shopping Center is to the east of the intersection.

6. Coral Sea Road at Access Roads near San Juancinto Street

Access Road to the Project will be near San Juancinto Street. Coral Sea Road is a two-lane roadway in this area.

7. Coral Sea Road at Access Roads near Casablanca Street

Access Road to the Project will be near Casablanca Street. Coral Sea Road is a two-lane roadway in this area.

8. Nimitz Highway at Sand Island Access Road (signalized)

Nimitz Highway is signalized at Sand Island Access Road. Nimitz Highway has three through lanes at this intersection. Dual westbound left turn lanes are provided. The westbound left turn is a protected movement. The Sand Island Access Road approach has three left turn lanes and a channelized right turn lane. Crosswalks are provided on the south and east legs of the intersection. During the AM peak hour, there are four eastbound through lanes, with the additional through lane servicing the AM contraflow lane from the H-1 Freeway near Pearl City to Nimitz Highway in Iwilei.

D. Volumes

1. Vehicular Volume

a) Roadway Traffic Volumes

Historical average daily traffic (ADT) for Fort Barrette Road, Roosevelt Avenue, and Sand Island Access Road are shown in Table 1. The ADTs are based on Hawaii DOT traffic counts included in *Historical Traffic Station Maps*. Table 1 shows that the overall volume has not had any significant change over time.

Table 1: ADT at various HDOT Stations

HDOT Station	Year	ADT	Growth Rate
Fort Barrette Road between Kamaaha Avenue and Kapolei Parkway	2013	n/a	0.39%
	2014	12,800	
	2015	11,900	
	2016	12,900	
Roosevelt Avenue between Coral Sea Road and Bouganville Road	2013	11,100	-1.84%
	2014	12,500	
	2015	11,500	
	2016	10,500	
Sand Island Access Road between Pahouni Drive and Hoonee Place	2013	18,900	0.18%
	2014	n/a	
	2015	21,300	
	2016	19,000	

The HDOT historical 24-hour traffic volume distribution along Roosevelt Avenue between Coral Sea Road and Bouganville Road, along with the October 29, 2020 traffic volumes are shown in Figure 5. Historic data has shown a similar pattern, with a shorter AM peak and a longer, higher PM peak.

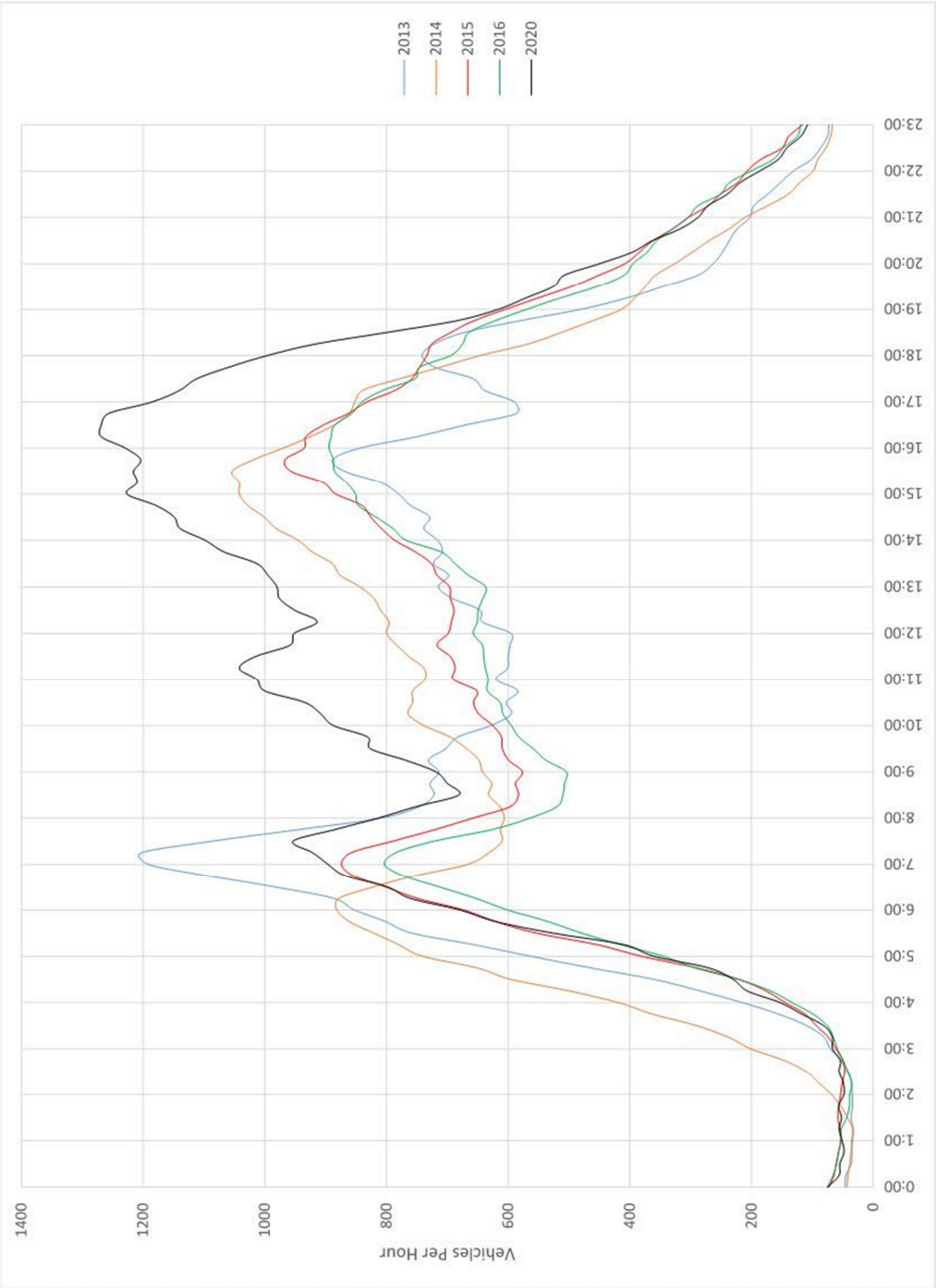

Figure 5: 24-Hour Volume: Roosevelt Avenue between Coral Sea Road and Bouganville Road

2. Intersection Peak Hour Volumes & Adjustments made to account for Covid related traffic

Turning movement counts were collected at the study intersections on Thursday, October 29, 2020 from 6:00 AM – 9:00 AM and from 3:00 PM – 6:00 PM. The AM peak hour was 7:15 AM – 8:15 AM. The PM peak hour was 3:15 PM – 4:15 PM. Raw count data is provided in Appendix A.

The Covid-19 pandemic led to a 14-day quarantine of incoming travelers and the closure of non-essential businesses in the State of Hawaii beginning in March 2020. Towards the end of 2020, businesses began reopening, non-essential employees began going back to work, and schools began to reopen at about 25% student enrollment. Typical traffic conditions are still expected to be lower than normal. To not undercount normal demand, the existing 2020 volumes here were checked against the historic HDOT counts. Tables 2 and 3 show the 2020 counts in comparison to the historic 2016 HDOT counts during the AM and PM peak hours on Roosevelt Avenue and Sand Island Access Road.

Table 2: HDOT volumes compared to 2020 volumes Roosevelt Avenue between Coral Sea Road and Bouganville Road

Year	AM Peak	PM Peak
2013	1204	921
2014	632	1042
2015	859	920
2016	786	866
2020	966	1352

Table 3: HDOT volumes compared to 2020 volumes Sand Island Access Road between Pahounui Drive and Hoonee Place

Year	AM Peak	PM Peak
2013	1418	1110
2014	n/a	n/a
2015	1696	1013
2016	1412	1524
2020	1620	1385

Tables 2 and 3 show that the 2020 traffic volumes are generally higher than the historic HDOT counts. Adjustments to the traffic volumes along Roosevelt Avenue and Sand Island Access Road due to Covid-19 were not made.

The HDOT Highways Disivion has been posting a "Covid-19 Traffic Volume Comparison" on their website comparing the 2019 HDOT counts to monthly traffic counts in 2020. Figure 6 shows the station locations used for comparison on Oahu. Station 1 is located on Kualakai Parkway at the Kualakai Parkway Interchange. Station 1 would likely account for the overall traffic volumes into and out of Kapolei. Figure 7 shows the percent change at these traffic station. Figure 7 shows that the October 2020 volumes are about 15% lower than the 2019 HDOT volumes at Station 1. To account for the decrease in school traffic and other regional traffic due to Covid-19, the October 29, 2020 volumes at the FBR intersections were increased by 15%.

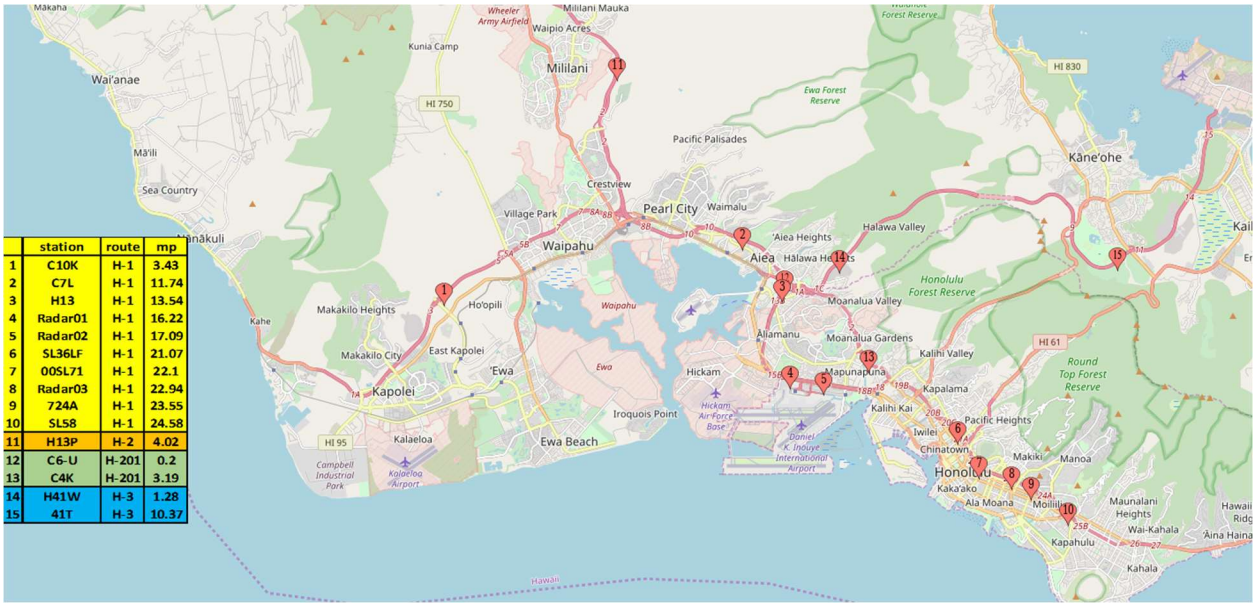

Figure 6: HDOT COVID-19 Traffic Volume Comparison Map

No.	Route	M Marker	2019 AADT	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	12/2	12/9	12/16	12/23	12/30
1	H-1	3.43	99,210	4%	3%	-18%	-34%	-23%	-16%	-14%	-16%	-21%	-15%	-11%	-10%	-12%	-8%	-2%	-6%
2	H-1	11.74	263,152	4%	3%	-18%	-38%	-25%	-17%	-14%	-17%	-22%	-17%	-15%	---	---	-10%	-4%	-11%
3	H-1	13.54	120,008	4%	2%	-21%	-44%	-32%	-24%	-22%	-25%	-29%	-24%	-20%	-20%	-20%	-16%	-11%	-22%
4	H-1	16.22	106,504	6%	2%	-26%	-46%	-36%	-28%	-26%	-30%	-35%	-30%	-26%	-24%	-24%	-23%	-16%	-26%
5	H-1	17.09	96,377	4%	4%	-30%	-51%	-45%	-31%	-26%	-30%	-34%	-30%	-26%	-14%	-24%	-21%	-27%	---
6	H-1	21.07	200,936	0%	0%	-25%	-45%	-33%	-24%	-20%	-23%	-29%	-22%	-39%	---	---	-14%	-8%	-12%
7	H-1	22.1	180,747	4%	5%	-25%	-46%	-34%	-24%	-21%	-23%	-29%	-21%	-16%	-15%	-15%	-13%	-7%	-11%
8	H-1	22.94	196,163	3%	3%	-24%	-45%	-32%	-22%	-19%	-22%	-28%	-20%	-18%	---	-16%	-14%	-8%	-12%
9	H-1	23.55	144,848	4%	5%	-26%	-44%	-31%	-21%	-19%	-22%	-27%	-21%	-17%	-17%	-17%	-15%	-8%	-13%
10	H-1	24.58	114,355	3%	3%	-26%	-43%	-29%	-19%	-15%	-19%	-25%	-19%	-15%	-14%	-13%	-11%	-3%	-11%
11	H-2	4.02	102,551	0%	3%	-21%	-39%	-24%	-16%	-13%	-15%	-22%	-18%	-13%	-10%	-9%	-53%	-2%	-7%
12	H-201	0.2	52,285	5%	6%	-26%	-43%	-29%	-19%	-15%	-19%	-27%	-17%	-12%	-9%	-7%	-5%	4%	-5%
13	H-201	3.19	113,439	0%	3%	-24%	-41%	-26%	-24%	---	---	---	---	---	---	---	---	---	---
14	H-3	1.28	55,524	-3%	-4%	-23%	-37%	-26%	-18%	-17%	-20%	-24%	-20%	-17%	-15%	-16%	-14%	-4%	-11%
15	H-3	10.37	32,627	-7%	-7%	-25%	-38%	-29%	-22%	-20%	-25%	-24%	-23%	-21%	-19%	-18%	-12%	---	-19%

Figure 7: HDOT COVID-19 Traffic Volume Comparison Table

The October 29, 2020 counts were compared to the historic HDOT counts on Kapolei Parkway between Kamaaha Avenue and Kualakai Parkway. This location is to the east of Fort Barrette Road, adjacent to Kapolei Middle School. Table 4 shows the comparison of the counts taken on October 29, 2020 to the HDOT counts in 2016. The 2020 AM count in the eastbound direction towards Kapolei High School and Kapolei Middle School was about 50% (722 trips compared to 360 trips during the AM peak hour) compared the historic HDOT data. The eastbound counts during the PM peak hour, and the westbound counts from Kapolei High School and Kapolei Middle School were comparable. The 2020 counts along FBR will need to be increased in the AM peak hour.

Table 4: HDOT volumes compared to 2020 volumes Kapolei Parkway between Kamaaha Avenue and Kualakai Parkway

Peak Peroid	To Kapolei High/Middle School			From Kapolei High/Middle School		
	HDOT	Year 2020	% Difference	HDOT	Year 2020	% Difference
AM Peak Hour	722	360	-50%	560	540	-4%
PM Peak Hout	890	841	-6%	737	717	-3%

It was assumed that an additional 360 trips would travel from Makakilo, West Kapolei, and Barbers Point to Kapolei High School and Kapolei Middle School. 360 trips were added to the AM Peak Hour at FBR and Kapolei Parkway, with 200 from Makakilo using FBR making a southbound left turn at Kapolei Parkway, 100 vehicles from West Kapolei using Kapolei Parkway making the eastbound through at Kapolei Parkway, and 60 vehicles from Barbers Point using Roosevelt Avenue.

Figure 8 shows the Adjusted 2020 peak hour intersection volumes used for the traffic analysis.

3. Pedestrian and Bicycle Volumes

Table 5 shows a summary of the pedestrian and bicycle counts at the study intersections. Table 5 shows that the pedestrian and bicycle volumes are higher at the FBR & Farrington Highway and Nimitz Highway & Sand Island Access Road intersections. The pedestrian and bicycle volume would likely be higher at the FBR and Kapolei Parkway intersection if Kapolei High School was operating at full student enrollment.

Table 5: Existing Pedestrian and Bicycle Volumes

Intersection	Pedestrians		Bicycles	
	AM Peak	PM Peak	AM Peak	PM Peak
FBR at Farrington Highway	25	19	1	2
FBR at Kamaaha Avenue	2	3	1	1
FBR at Kapolei Parkway	7	5	2	1
FBR at Roosevelt Avenue	1	0	2	0
Roosevelt Avenue at Coral Sea Road	1	1	4	3
Coral Sea Road at San Juacinto Street	0	0	2	0
Nimitz Highway at Sand Island Access Road	35	24	5	2

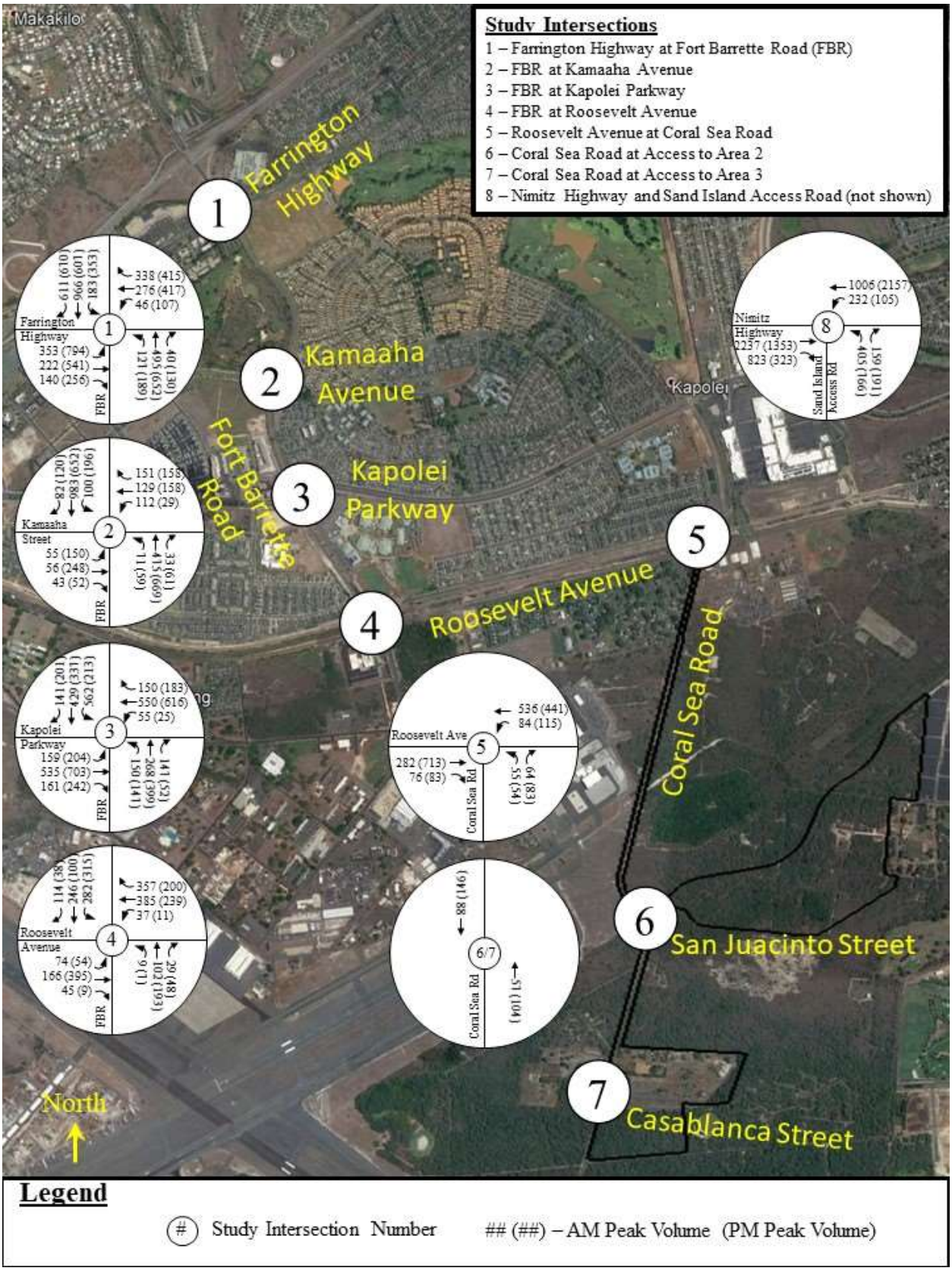

Figure 8: Adjusted 2020 Peak Hour Traffic Volumes

4. Bus Stops and Bus Routes

TheBus is the public bus transit service provided by the City and County of Honolulu. Busses generally have more routes operating during the AM and PM peak hours. Bus locations and Bus Routes along the study roads are located at:

1. Makakilo Drive at Farrington Highway (#40, 94, 411, 414, C, PH1) – Southbound
2. Makakilo Drive at Farrington Highway (#94, 411, 414, C, PH1) – Northbound
3. Enterprise Road at Roosevelt Avenue (#415) – Northbound
4. Roosevelt Avenue at Opposite Nassau Avenue (#41) – Westbound
5. Roosevelt Avenue at Nassau Avenue (#41) – Eastbound
6. Roosevelt Avenue at Opposite Nassau Avenue (#41) – Westbound
7. Roosevelt Avenue at Nassau Avenue (#41) – Eastbound
8. Roosevelt Avenue at Opposite Bouganville Street (#41) – Westbound
9. Roosevelt Avenue at Bouganville Street (#41) – Eastbound
10. Roosevelt Avenue at Opposite Coral Sea Road (#41) – Westbound
11. Roosevelt Avenue at Coral Sea Road (#41) – Eastbound
12. Nimitz Highway at Opposite Sand Island Access Road (#20) – Westbound
13. Nimitz Highway at Sand Island Access Road (#20) – Eastbound

E. Traffic Operation Analysis

1. Level of Service Methodology

Vehicular level of service (LOS) is an operational analysis rating system used in traffic engineering to measure the effectiveness of roadway operating conditions. There are six LOS ranging from A to F. LOS A is defined as being the least interrupted flow conditions with little or no delays, whereas LOS F is defined as conditions where extreme delays exist. Guidelines from the *Statewide Uniform Design Manual for Streets and Highways* (HDOT, 1980) and *A Policy on Geometric Design of Highways and Streets* (AASHTO, 2011) state that an appropriate peak hour LOS for an urban arterial is LOS C or D. Intersection LOS and delay were determined for the AM and PM peak hours using *Synchro 10* traffic analysis software and analyzed using *HCM* 6th Edition (TRB, 2016) methodologies.

As stated in the *Highway Capacity Manual* (*HCM*) 6th Edition (TRB, 2016), LOS for a two-way stop controlled (TWSC) intersection is determined by the measured control delay (see Table 6) and is defined for each minor movement, not for the intersection as a whole. Vehicles traveling along the major, free-flow road, of a TWSC intersection, proceed through with minimal delay or no delay at all. Those vehicles approaching the intersection along the minor movement are controlled by a stop sign and thus experience delay attributable to the volume of vehicles passing along the free-flow road and the gaps available.

Table 6: Unsignalized Intersection LOS Criteria

Average Control Delay (s/veh)	LOS by v/c Ratio	
	<=1.0	>1.0
≤ 10.0	A	F
>10 and ≤15	B	F
>15 and ≤25	C	F
>25 and ≤35	D	F
>35 and ≤50	E	F
>50	F	F

The LOS analysis for signalized intersections is based on average total vehicle delay based on the methodologies of the *HCM* (TRB, 2016), as shown in Table 7. The HCM 6th Edition doesn't support the analysis with both exclusive and shared lanes. In those cases, methodologies from HCM (TRB, 2000) are used. This applies to the Fort Barrette Road at Farrington Highway intersection.

Table 7: Signalized Intersection LOS Criteria

Average Control Delay (s/veh)	LOS by v/c Ratio	
	<=1.0	>=1.0
≤ 10.0	A	F
>10 and ≤20	B	F
>20 and ≤35	C	F
>35 and ≤55	D	F
>55 and ≤80	E	F
>80	F	F

Another measure of intersection delay is the volume to capacity (v/c) ratio. This is the ratio of the volume of traffic utilizing the intersection compared to the maximum volume of vehicles that can be accommodated by the intersection during a specific period. A v/c ratio under 0.85 means the intersection is operating under capacity and excessive delays are not experienced. An intersection is operating near its capacity when v/c ratios range from 0.85 to 0.95. Unstable flows are expected when the v/c ratio is between 0.95 and 1.0. A traffic movement can have a poor LOS but low v/c, which suggests that the traffic volumes along that movement are low but must wait a long time to make the movement. This is common for low volume protected turn movements or side streets that must wait through a long cycle length for their split to come up.

2. Existing Intersection LOS

Existing intersection and movement LOS and average delay (in seconds per vehicle) were determined for the AM and PM peak hours. Table 8 shows the existing vehicular delay and level of service at each intersection. Movements that operate at LOS F are highlighted in yellow. Synchro analysis worksheets can be found in Appendix B. Movements that operate at LOS F are highlighted in yellow.

a) Fort Barrette Road (FBR) at Farrington Highway (2000 HCM)

This intersection operates at LOS C and LOS E during the AM and PM peak hours, respectively. The northbound left turn and southbound left turn operates at LOS F (v/c of 0.81 and 0.88, respectively) during the PM peak hour. These movements operate at LOS F due to the long cycle length at this intersection. Field observations show that these left turns clear the intersection every cycle. All other movements operate at LOS E or better during all peak hours.

b) FBR at Kamaaha Avenue (HCM 6th Edition)

This intersection operates at LOS C during the AM and PM peak hours. The southbound left and eastbound left turns operate at LOS E during both peak hours. Video recordings for the 3 hours in the AM and PM commuter peaks showed that these vehicles clear the intersection every cycle. The delay is caused by the cycle length. All movements operate at LOS D or better during both peak hours.

c) FBR at Kapolei Parkway (HCM 6th Edition)

This intersection operates at LOS B during the AM and PM peak hours. All movements operate at LOS C or better during both peak hours.

d) FBR at Roosevelt Avenue (HCM 6th Edition)

FBR is an all-way stop-controlled intersection at Roosevelt Avenue. During the AM peak hour, the southbound shared left-through lane and the westbound shared through-right lane operates at LOS F (v/c of 1.43 and 1.96, respectively). During the PM peak hour, the southbound shared left-through lane, the eastbound through lane, and westbound shared through-right lanes operate at LOS F (v/c of 1.21, 1.27, and 1.27, respectively).

e) Roosevelt Avenue at Coral Sea Road (HCM 6th Edition)

Coral Sea Road is stop-controlled at Roosevelt Avenue. The westbound approach operates at LOS F (v/c of 0.74) during the PM peak hour. The LOS F is due to the difficulty of northbound left turn vehicles finding gaps in the Roosevelt Avenue traffic. All other movements operate at LOS D or better.

f) Coral Sea Road Access

These intersections do not have any delay as all movements are free movements.

g) Nimitz Highway at Sand Island Access Road (HCM 6th Edition)

This intersection operates at LOS C during the AM and PM peak hours. The westbound left turn from Nimitz Highway operates at LOS F (v/c of 0.89) during the AM peak hour. This is due to the high westbound left turn volume and long cycle length at the intersection. Field observations noted that westbound left turn in the AM peak hour cleared the intersection every cycle.

3. Mitigation for Existing (2020) Condition

All signalized intersections operate at LOS E or better. The left turn movements at the signalized intersections that operate at LOS E or worse are due to the cycle length. Video recordings of these intersections during the 3-hour AM and PM commuter peak show that the left turn queue clears the intersection every cycle.

At FBR and Roosevelt Avenue, a few movements operate at LOS F during the AM and PM peak hours. There is a future roadway improvement project along Fort Barrette Road from Farrington Highway to Roosevelt Avenue including the widening of Fort Barrette Road to 4 lanes, repaving, traffic signal optimization and other improvements. These improvements will improve operations at this intersection.

At Roosevelt Avenue and Coral Sea Road, the northbound left turn operates at LOS F during both peak hours. A four-hour traffic signal warrant analysis was done. This intersection did not warrant a signal during either peak hour.

Although a few movements operate at LOS F at the unsignalized intersections, field observations did not see any significant delay that would require roadway improvements.

Table 8: Existing Intersection LOS and delay

Intersection & Movement	AM Peak			PM Peak		
	LOS	Delay (sec/veh)	v/c	LOS	Delay (sec/veh)	v/c
Fort Barrette Rd at Farrington Hwy	**C**	**30.6**	**-**	**E**	**55.2**	**-**
FBR NB Dual left	D	53.2	0.65	F	81.8	0.81
FBR NB Through	C	20.1	0.35	D	53.1	0.76
FBR NB Right	B	16.8	0.03	D	39.3	0.11
FBR SB Dual Left	D	44.6	0.53	F	80.2	0.88
FBR SB Through-Right	C	24.6	0.73	E	55.3	0.87
FBR SB Right	C	20.0	0.45	D	38.0	0.29
Farrington EB Dual Left	D	49.0	0.76	E	66.8	0.93
Farrington EB Through	C	33.2	0.30	C	34.1	0.44
Farrington EB Right	C	31.6	0.09	C	30.4	0.18
Farrington WB Left	D	48.3	0.44	E	70.7	0.65
Farrington WB Through	D	42.3	0.59	D	53.9	0.61
Farrington WB Dual Right	C	32.7	0.47	E	64.2	0.82
Fort Barrette Rd at Kamaaha Ave	**C**	**30.0**	**-**	**C**	**32.9**	**-**
FBR NB Dual Left	D	51.9	0.53	D	48.3	0.45
FBR NB Through	B	13.2	0.49	C	31.1	0.89
FBR SB Left	E	57.3	0.79	E	55.7	0.86
FBR SB Through	C	23.7	0.90	B	17.8	0.71
FBR SB Right	A	8.4	0.09	B	11.5	0.15
Kamaaha EB Left	E	70.8	0.78	E	57.4	0.84
Kamaaha EB Through	D	47.6	0.50	D	39.3	0.73
Kamaaha EB Right	D	47.4	0.45	C	32.5	0.18
Kamaaha WB Left	E	56.3	0.80	E	58.0	0.60
Kamaaha WB Through	D	51.2	0.78	D	46.6	0.74
Fort Barrette Rd at Kapolei Pkwy	**B**	**19.1**	**-**	**B**	**15.7**	**-**
FBR NB Left	B	14.3	0.34	C	21.7	0.51
FBR NB Through	A	5.8	0.23	B	10.2	0.49
FBR SB Left	C	22.3	0.83	B	18.5	0.53
FBR SB Through-Right	A	7.8	0.54	B	11.8	0.64
Kapolei EB Left-Through	C	26.3	0.67	B	18.1	0.67
Kapolei EB Right	C	24.8	0.46	B	17.1	0.52
Kapolei WB Left-Through	C	26.6	0.69	B	16.7	0.53
Fort Barrette Rd at Roosevelt Ave	**Unsignalized**			**Unsignalized**		
FBR NB Left-Through	C	17.9	0.20	C	18.2	0.27
FBR NB Through	C	19.6	0.32	C	23.0	0.48
FBR NB Right	C	15.9	0.13	C	15.6	0.17
FBR SB Left-Through	F	148.3	1.43	F	121.3	1.21
FBR SB Through-Right	D	29.6	0.79	C	16.1	0.27
Roosevelt EB Left	C	18.7	0.29	C	16.0	0.18
Roosevelt EB Through	D	26.2	0.63	F	138.8	1.27
Roosevelt EB Right	C	15.2	0.16	B	12.7	0.03
Roosevelt WB Left	B	13.8	0.11	B	14.0	0.04
Roosevelt WB Through-Right	F	446.6	1.96	F	147.9	1.27
Roosevelt Ave at Coral Sea Rd	**Unsignalized**			**Unsignalized**		
Roosevelt WB Left	A	8.2	0.07	B	10.3	0.18
Coral Sea NB Left	D	32.0	0.36	F	121.0	0.74
Coral Sea NB Right	B	11.1	0.13	C	8.3	0.26
Nimitz Hwy at Sand Island Access Rd	**C**	**31.4**	**-**	**C**	**32.1**	**-**
Nimitz EB Through	C	33.6	0.83	C	31.8	0.81
Nimitz WB Left	F	84.0	0.89	D	54.5	0.65
Nimitz WB Through	B	15.9	0.39	D	36.9	0.96
Sand Island Access NB Left	C	28.5	0.25	B	18.8	0.41

F. Sight Distance

There is a unique curve at Coral Sea Road and San Juacinto Street. The existing sight distance at this intersection was analyzed.

Sight distance measures the length of roadway that is visible to the driver. Vertical sight distance was not checked since Coral Sea Road is relatively flat in this area. Guidelines from the American Association of State Highway and Transportation Officials (AASHTO) *7th Edition Green Book* (2018) were used for the horizontal sight distance analysis.

The sight distance should be sufficient for a driver to stop comfortably while travelling at the design posted speed limit. The posted speed limit on Coral Sea Road is 25 MPH. The design intersection sight distance can found in Table 9-9 in the AASHTO Green Book. Based on a design speed of 25 MPH, the stopping sight distance is 155 feet.

The intersection sight distance should be sufficient for a driver stopped at San Juacinto Street to comfortably see vehicles approaching while making right turns onto the major roadway. The design intersection sight distance for right turns from minor roads can be calculated in Table 9-9 in the AASHTO Green Book. The design intersection sight distance for a design speed of 25 MPH is 240 feet.

Figure 9 shows the access to the Project on Coral Sea Road near San Juacinto Street.

Figure 10 shows the access to the Project on Coral Sea Road near Casablanca Street.

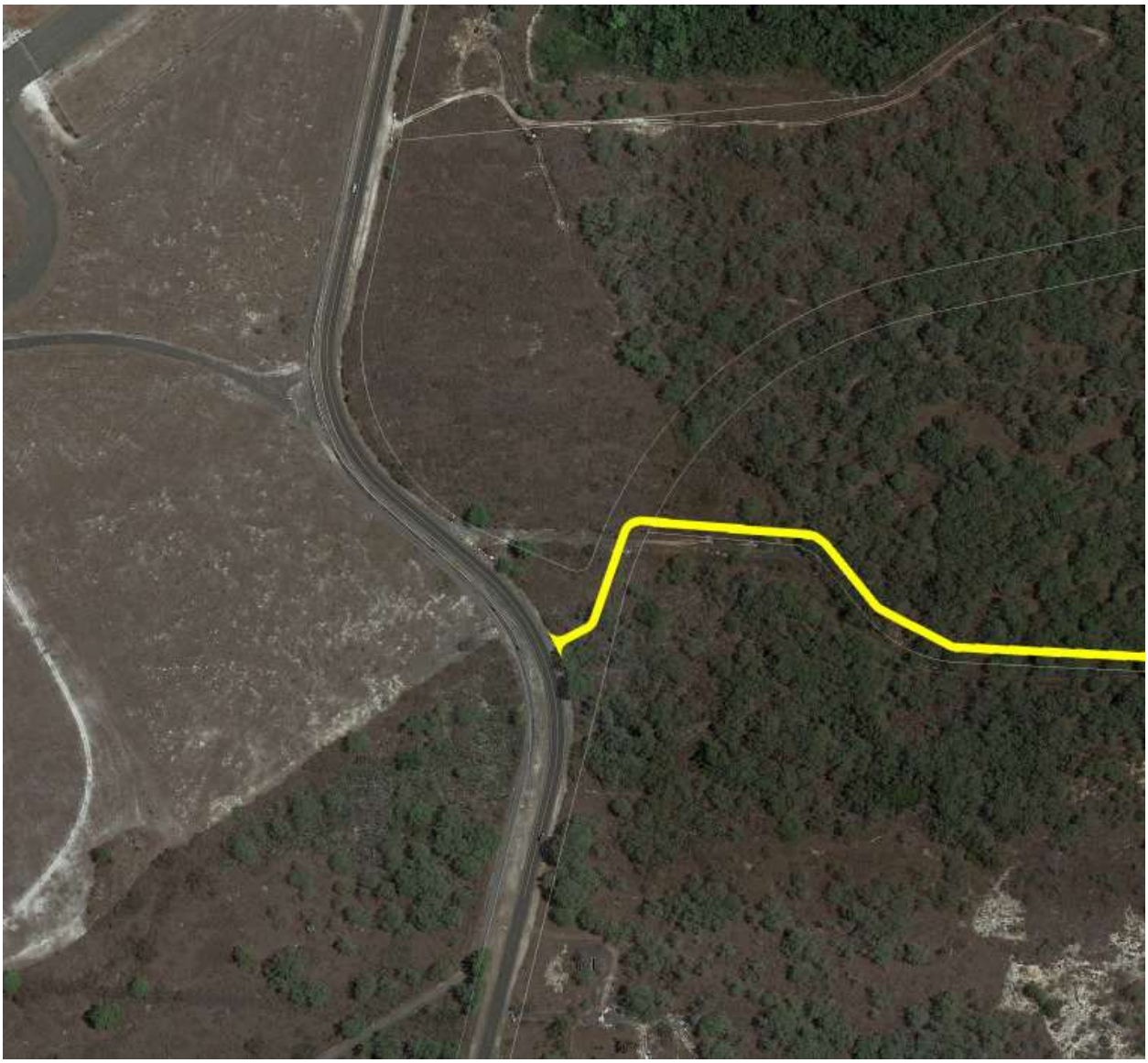

Figure 9: Coral Sea Road Access near San Juacinto Street

Figure 10: Coral Sea Road Access near Casablanca Street

III. Future Without Project Conditions

The Future Without Project conditions were evaluated during the construction phase, which is expected to last up to 12-15 months, starting Q3 2022 and the solar plant operations commencing by the end of 2023. The expected LOS's were evaluated without the Project development. Background growth and future traffic volume Projections were included in the analysis in 2023.

A. Future Roadway Construction and Improvements

Based on research at the State of Hawaii Office of Environmental Quality Control (OEQC) website and the Statewide Transportation Improvement Program (STIP) 2019-2022, there are no expected roadway construction or improvements that will be made before the end of construction.

A project to repave Fort Barrette Road Widening from Farrington Highway to Roosevelt Avenue, along with traffic signal improvements went out for bid in the Spring of 2020. However, this project is not anticipated to begin before construction for Barbers Point Solar is completed.

B. Future Surrounding Area Development

Development within East Kapolei has been ongoing. There are a few surrounding area Projects that may affect the study intersections.

1. *Hoopili*

Hoopili is a master-planned community being built in West Kapolei. These homes are south of Farrington Highway, and east of Kualakai Parkway. The Project consists of 11,750 homes to be built in phases and completed over the next 15-20 years. Construction is ongoing, and new residents are expected to add traffic to West Kapolei. Some of the traffic from this development will be included in the Future (2023) Without Project analysis.

2. *Hawaii Housing Finance and Development Corporation Low Density Apartments*

There are low density apartments (LDA) proposed to be built adjacent to East Kapolei II, which is located just east of Kualakai Parkway and Keahumoa Parkway. LDA 2 is located east of East Kapolei IIA on a 19-acre parcel with approximately 318 multi-family units proposed. LDA 3 is located on 66-acres, west of East Kapolei IIC, IIE and IIF, with approximately 400 multi-family units proposed. There are no current plans or schedule for construction of LDA 2 or LDA 3 and therefore these developments are not included in the Future (2023) Without Project analysis.

C. Future Geometric Configuration

The future roadway configurations Without Project are expected to remain the same as existing conditions. Traffic signal phasing is also expected to remain the same.

D. Future Traffic Volumes

Future traffic volumes were Projected by applying an annual background growth rate. Background growth is associated with regional growth not attributed to a specific Project. This growth also considers traffic associated with minor Projects for which no traffic data or traffic studies are

available. The Barbers Point Solar construction is anticipated to be completed while some of the related Projects are being completed.

1. Background Growth

Growth in West Kapolei is expected to continue, with homes, schools, and new businesses contributing to the overall growth in the area, especially at the intersections along Fort Barrette Road.

Roosevelt Avenue and Coral Sea Road, while in the Kapolei area, are located south of the Projected growth in the area. Historical 24-hour traffic data was collected from the HDOT have shown almost no growth in traffic on Roosevelt Avenue. HDOT data also indicates almost no growth on Sand Island Access Road. A 1% growth rate was applied to volumes at Roosevelt Avenue, Coral Sea Road, and Sand Island Access Road.

2. Future Without Project Volumes

The future Without Project volumes were calculated by applying the background growth to the existing volumes. Future Without Project volumes for the Year 2023 are shown in Figure 11.

E. Future Without Project Intersection Level of Service

The future roadway Without Project lane configuration and signal phasing will remain the same as the existing conditions during the construction phase. Future analysis worksheets Without Project can be found in Appendix C.

1. Future (2023) Without Project Intersection LOS

Future (2023) intersection and movement LOS and average delay (in seconds per vehicle) were determined for the AM and PM peak hours. Table 9 shows the existing vehicular delay and level of service at each intersection. Movements that operate at LOS F are highlighted in yellow. Synchro analysis worksheets can be found in Appendix C.

a) Fort Barrette Road (FBR) at Farrington Highway (2000 HCM)

This intersection operates at LOS C and LOS D during the AM and PM peak hours, respectively. The northbound left turn, southbound left turn, and eastbound left turn operates at LOS F (v/c of 0.91, 0.97, and 1.01 respectively) during the PM peak hour. These movements operate at LOS F due to the long cycle length at this intersection. All other movements operate at LOS E or better during all peak hours.

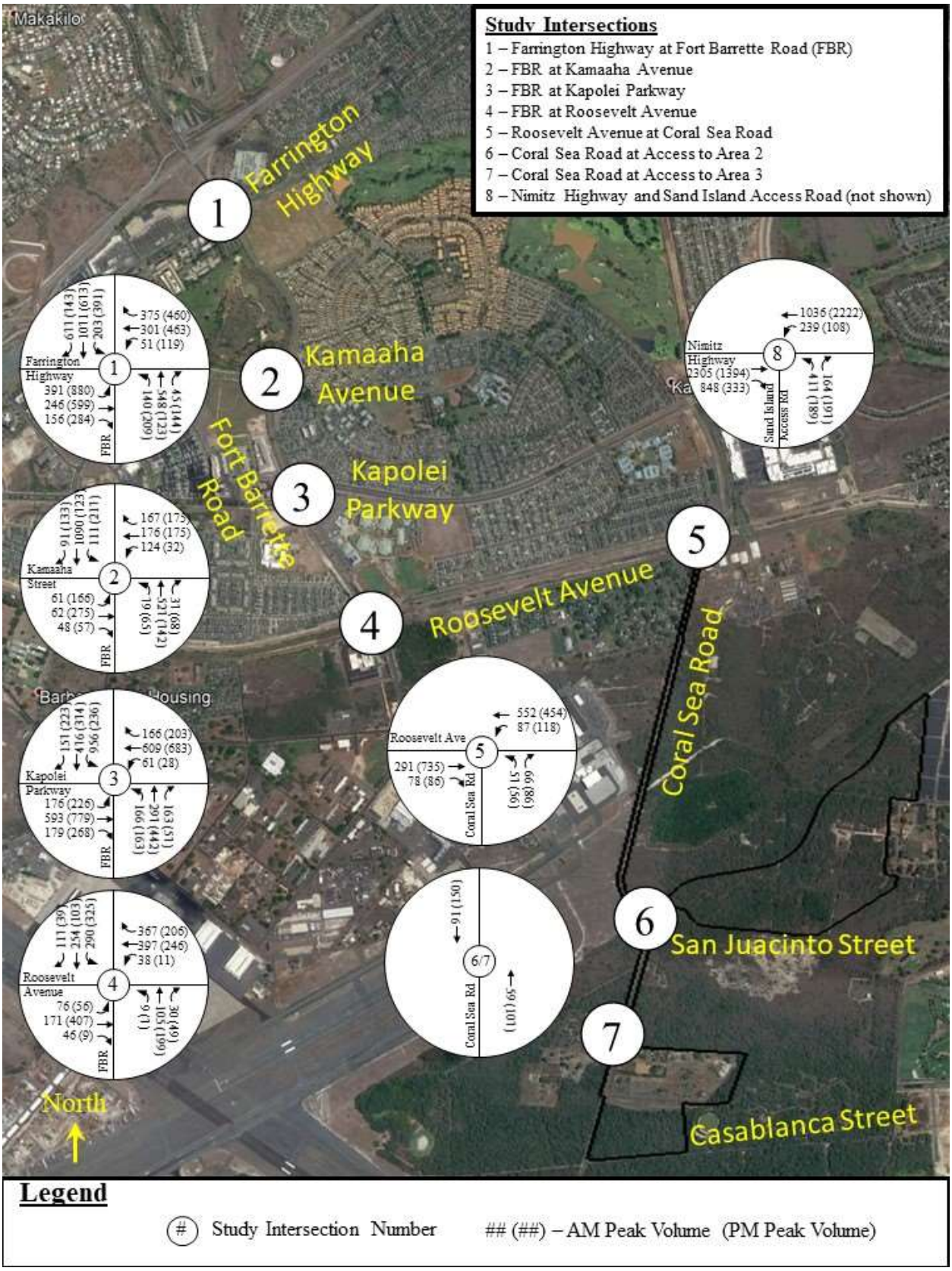

Figure 11: Future (2023) Without Project Peak Hour Volumes

Table 9: Future (2023) Without Project Intersection LOS and delay

Intersection & Movement	AM Peak			PM Peak		
	LOS	Delay (sec/veh)	v/c	LOS	Delay (sec/veh)	v/c
Fort Barrette Rd at Farrington Hwy	**C**	**33.3**	**-**	**E**	**66.3**	**-**
FBR NB Dual left	E	59.2	0.72	F	101.3	0.91
FBR NB Through	C	21.7	0.40	E	63.5	0.88
FBR NB Right	B	17.7	0.03	D	42.4	0.14
FBR SB Dual Left	D	46.0	0.58	F	101.3	0.97
FBR SB Through-Right	C	29.0	0.82	E	77.8	0.99
FBR SB Right	C	23.0	0.55	D	40.8	0.32
Farrington EB Dual Left	D	54.5	0.83	F	84.7	1.01
Farrington EB Through	C	33.0	0.31	C	34.5	0.48
Farrington EB Right	C	31.3	0.10	C	30.9	0.23
Farrington WB Left	D	49.5	0.48	E	75.2	0.69
Farrington WB Through	D	42.7	0.62	E	55.4	0.65
Farrington WB Dual Right	C	32.7	0.50	E	69.5	0.86
Fort Barrette Rd at Kamaaha Ave	**D**	**40.7**	**-**	**D**	**45.6**	**-**
FBR NB Dual Left	E	71.7	0.65	E	63.7	0.56
FBR NB Through	B	15.2	0.52	D	47.0	0.94
FBR SB Left	E	69.0	0.82	F	83.4	0.90
FBR SB Through	D	36.1	0.95	C	21.9	0.74
FBR SB Right	A	8.7	0.09	B	12.5	0.16
Kamaaha EB Left	F	111.0	0.87	F	85.9	0.88
Kamaaha EB Through	E	59.0	0.56	D	50.0	0.77
Kamaaha EB Right	E	58.7	0.51	D	40.6	0.19
Kamaaha WB Left	E	68.2	0.83	E	76.6	0.69
Kamaaha WB Through	E	63.0	0.83	E	60.0	0.80
Fort Barrette Rd at Kapolei Pkwy	**C**	**25.2**	**-**	**B**	**19.4**	**-**
FBR NB Left	B	18.7	0.44	C	31.1	0.64
FBR NB Through	A	6.5	0.26	B	11.7	0.53
FBR SB Left	D	47.6	0.97	C	25.1	0.63
FBR SB Through-Right	A	9.5	0.61	B	14.9	0.69
Kapolei EB Left-Through	C	27.0	0.70	C	22.2	0.74
Kapolei EB Right	C	25.3	0.48	C	20.5	0.57
Kapolei WB Left-Through	C	27.4	0.72	C	20.1	0.58
Fort Barrette Rd at Roosevelt Ave	**Unsignalized**			**Unsignalized**		
FBR NB Left-Through	C	18.3	0.21	C	18.7	0.28
FBR NB Through	C	20.2	0.34	C	23.9	0.50
FBR NB Right	C	16.3	0.14	C	16.0	0.18
FBR SB Left-Through	F	166.0	1.49	F	135.9	1.27
FBR SB Through-Right	D	31.8	0.83	C	16.5	0.29
Roosevelt EB Left	C	19.2	0.31	C	16.4	0.19
Roosevelt EB Through	D	27.5	0.66	F	155.0	1.31
Roosevelt EB Right	C	15.6	0.17	B	13.0	0.03
Roosevelt WB Left	B	14.0	0.12	B	14.2	0.04
Roosevelt WB Through-Right	F	481.4	2.04	F	164.6	1.33
Roosevelt Ave at Coral Sea Rd	**Unsignalized**			**Unsignalized**		
Roosevelt WB Left	A	8.5	0.08	B	10.5	0.19
Coral Sea NB Left	E	35.0	0.40	F	150.8	0.84
Coral Sea NB Right	B	11.3	0.14	C	19.2	0.28
Nimitz Hwy at Sand Island Access Rd	**C**	**32.3**	**-**	**C**	**35.1**	**-**
Nimitz EB Through	C	34.4	0.85	C	33.0	0.84
Nimitz WB Left	F	90.5	0.92	E	55.0	0.65
Nimitz WB Through	B	15.9	0.40	D	42.4	0.99
Sand Island Access NB Left	C	28.8	0.26	B	19.0	0.43

b) FBR at Kamaaha Avenue (HCM 6th Edition)

This intersection operates at LOS D during the AM and PM peak hours. The eastbound left turn operates at LOS F during the AM peak hour (v/c of 0.87). The southbound left and eastbound left turns operate at LOS F during the PM peak hour (v/c of 0.90 and 0.88, respectively). These movements are expected to clear the intersection every cycle. All other movements operate at LOS E or better.

c) FBR at Kapolei Parkway (HCM 6th Edition)

This intersection operates at LOS C and LOS B during the AM and PM peak hours, respectively. All movements operate at LOS D or better during both peak hours.

d) FBR at Roosevelt Avenue (HCM 6th Edition)

During the AM peak hour, the southbound shared left-through lane and the westbound shared through-right lane operates at LOS F (v/c of 1.49 and 2.04, respectively). During the PM peak hour, the southbound shared left-through lane, the eastbound through lane, and westbound shared through-right lanes operate at LOS F (v/c of 1.27, 1.31, and 1.33, respectively).

e) Roosevelt Avenue at Coral Sea Road (HCM 6th Edition)

The westbound approach operates at LOS F (v/c of 0.84) during the PM peak hour. The LOS F is due to the difficulty of northbound left turn vehicles finding gaps in the Roosevelt Avenue traffic.

f) Coral Sea Road Access

These intersections do not have any delay as all movements are free movements.

g) Nimitz Highway at Sand Island Access Road (HCM 6th Edition)

This intersection operates at LOS C during the AM and PM peak hours. The westbound left turn from Nimitz Highway operates at LOS F (v/c of 0.92) during the AM peak hour. This is due to the high westbound left turn volume and long cycle length at the intersection. All other movements operate at LOS E or better during both peak hours.

2. Mitigation for Future (2023) Without Project

All signalized intersections operate at LOS E or better. The left turn movements at the signalized intersections that operate at LOS E or worse are due to the cycle length. Video recordings of these intersections during the 3-hour AM and PM commuter peak show that the left turn queue clears the intersection every cycle. The queues in Future (2023) Without Project will also likely clear the intersection every cycle. There will be a future project that will improve the intersections along Fort Barrette Road from Farrington Highway to Roosevelt Avenue that will likely be implemented after the construction phase.

At Roosevelt Avenue and Coral Sea Road, the northbound left turn operates at LOS F during both peak hours. A four-hour traffic signal warrant analysis was done. This intersection did not warrant a signal during either peak hour.

IV. Future With Project Conditions

The Future With Project conditions were evaluated during the construction phase, which is expected to last approximately 12-15 months, with commercial operations commencing at the end of 2023. The Future With Project conditions will analyze a 3-year future scenario with the construction volumes.

A. Future With Project Generated Volumes

Standard trips resulting from the Project were calculated and added to the road network using the four-step trip generation methodology: trip generation, trip distribution, modal choice, route assignment. However, this Project is unique in that it has two phases, a construction phase and an operational phase. The construction phase is scheduled to last approximately 12-15 months, with approximately 65 vehicles on site during construction hours, which includes delivery trucks arriving just after the AM peak hour. The Project is expected to have an operational life of approximately 25 years. After the initial construction is completed in 2023, approximately 2-4 employees will access the site on a monthly basis for facility maintenance. These trips can likely be made during non-peak hours with minimal impact to the roadway network. For this analysis, the impact of Barbers Point Solar during construction was analyzed, since it represents peak site traffic conditions.

a) Trip Generation

Figure 12 shows the estimated vehicles per day during each month of construction. For the 2023 With Project analysis, the peak construction volume was used as a "worst case scenario". 65 vehicles were added to the AM and PM peak hour volumes, respectively.

b) Trip Distribution

The most direct route from Sand Island to the construction site is northbound on Sand Island Access Road, westbound on Nimitz Highway and the H-1 Freeway, southbound on Fort Barrette Road, eastbound on Roosevelt Avenue. From there, construction vehicles will turn southbound on Coral Sea Road to the Project Site from driveways near San Juacinto Street and Casablanca Street, respectively.

Figure 12 shows the Project related vehicle distribution.

c) Modal Choice

The resulting number of vehicles will likely be personal vehicles or heavy vehicles and trailers. There was no analysis done for bicycle, pedestrian, and transit related volumes.

d) Trip Assignment

Project related trips were anticipated to pass through the study intersections and were not distributed to the minor streets.

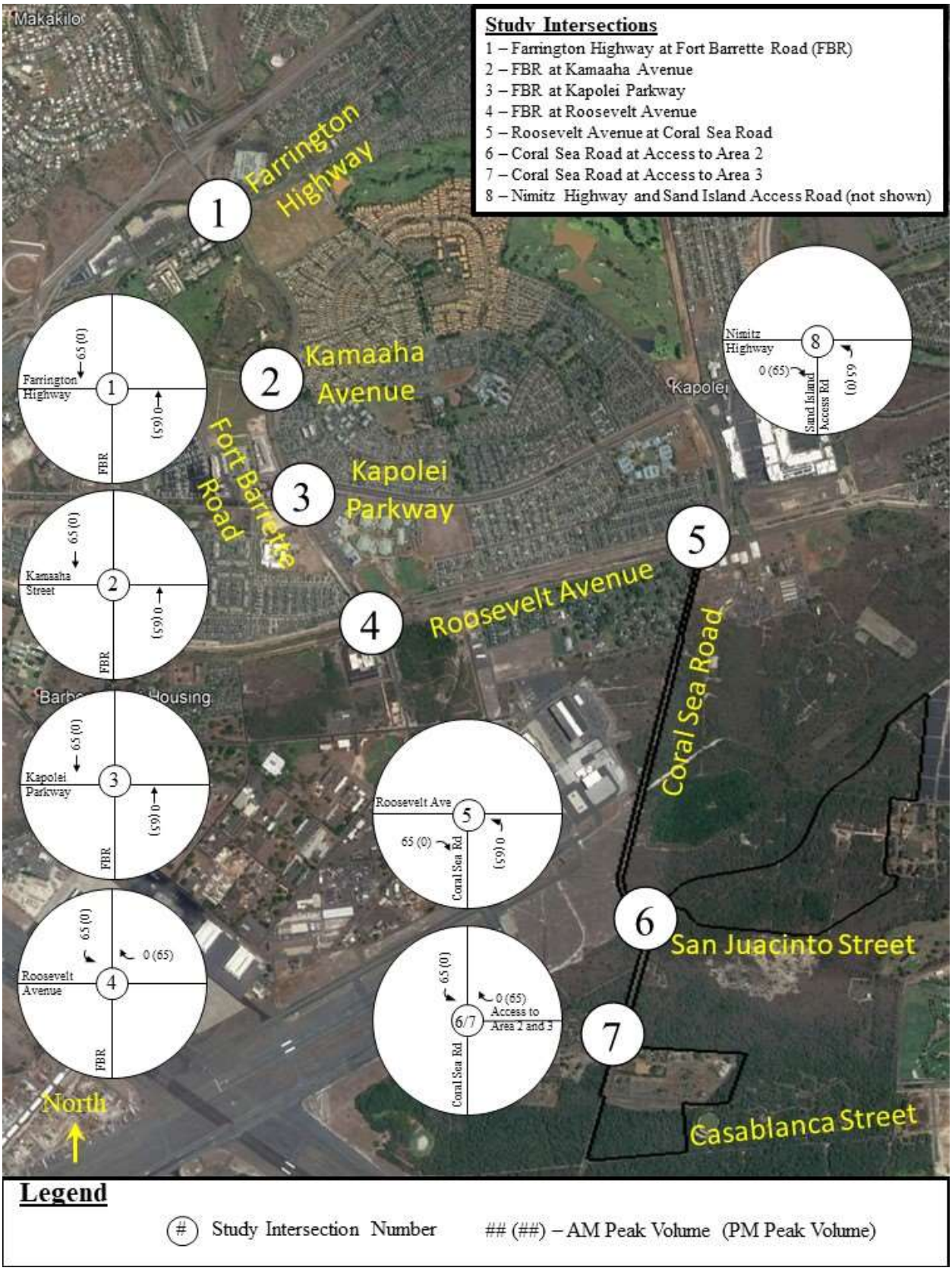

Figure 12: Construction Related Traffic Volumes

2. Future With Project Volumes and Lane Configuration

Future Without Project traffic volumes (see Figure 11) were added to the construction related vehicular volumes (see Figure 12) to determine the Future With Project traffic volumes (see Figure 13).

B. Future With Project Level of Service

The future roadway lane configuration during construction will remain the same as the existing condition with the addition of the driveways to the Project. Signal timings were kept the same as the Without Project scenario in the analysis, so that a direct comparison between the Without Project and With Project delays can be made.

1. Future (2023) With Project Intersection LOS

Future (2023) With Project intersection LOS, delay and v/c ratio for the study intersections were determined for the AM and PM peak hours (see Table 10). Movements that operate at LOS F are highlighted in yellow. Synchro analysis worksheets can be found in Appendix D.

a) Fort Barrette Road (FBR) at Farrington Highway (2000 HCM)

This intersection operates at LOS C and LOS D during the AM and PM peak hours, respectively. The northbound left turn, southbound left turn, and eastbound left turn operates at LOS F (v/c of 0.91, 0.97, and 1.01 respectively) during the PM peak hour. These movements operate at LOS F due to the long cycle length at this intersection. All other movements operate at LOS E or better during all peak hours.

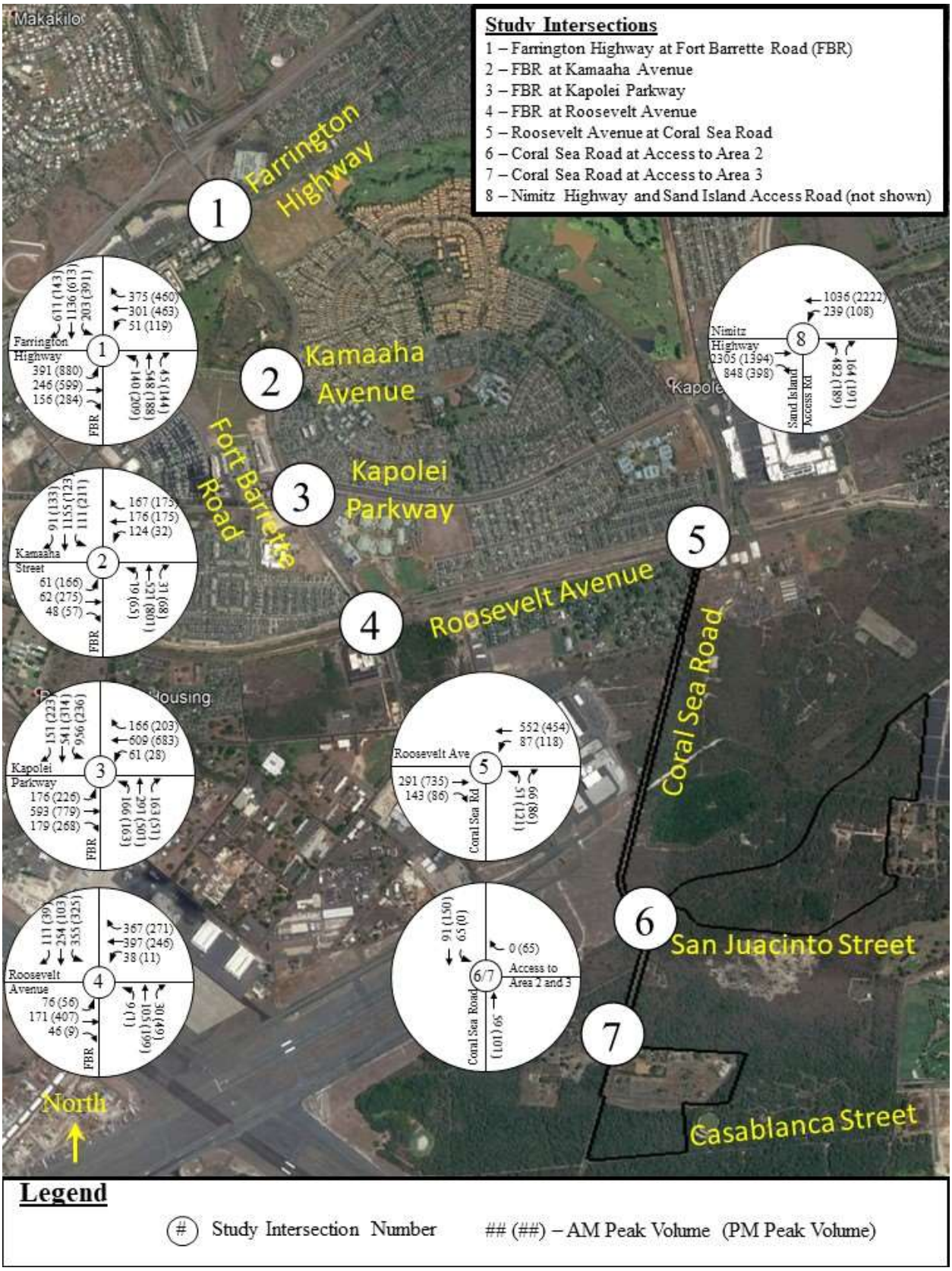

Figure 13: Future (2023) With Project Peak Hour Volumes

Table 10: Future (2023) With Project Volumes Intersection LOS/delay

Intersection & Movement	AM Peak			PM Peak		
	LOS	Delay (sec/veh)	v/c	LOS	Delay (sec/veh)	v/c
Fort Barrette Rd at Farrington Hwy	**C**	**33.7**	**-**	**E**	**67.8**	**-**
FBR NB Dual left	E	59.2	0.72	F	101.3	0.91
FBR NB Through	C	21.7	0.40	E	73.8	0.95
FBR NB Right	B	17.7	0.03	D	42.4	0.14
FBR SB Dual Left	D	46.0	0.58	F	101.3	0.97
FBR SB Through-Right	C	30.6	0.85	E	77.8	0.99
FBR SB Right	C	23.9	0.58	D	40.8	0.32
Farrington EB Dual Left	D	54.5	0.83	F	84.7	1.01
Farrington EB Through	C	33.0	0.31	C	34.5	0.48
Farrington EB Right	C	31.3	0.10	C	30.9	0.23
Farrington WB Left	D	49.5	0.48	E	75.2	0.69
Farrington WB Through	D	42.7	0.62	E	55.4	0.65
Farrington WB Dual Right	C	32.7	0.50	E	69.5	0.86
Fort Barrette Rd at Kamaaha Ave	**D**	**46.9**	**-**	**D**	**51.9**	**-**
FBR NB Dual Left	E	77.3	0.68	E	69.3	0.59
FBR NB Through	B	15.1	0.51	E	58.2	0.98
FBR SB Left	E	71.9	0.82	F	95.2	0.93
FBR SB Through	D	47.2	0.99	C	21.5	0.72
FBR SB Right	A	8.6	0.09	B	12.3	0.16
Kamaaha EB Left	F	125.2	0.91	F	100.7	0.92
Kamaaha EB Through	E	62.0	0.58	E	55.1	0.79
Kamaaha EB Right	E	61.6	0.53	D	43.8	0.20
Kamaaha WB Left	E	72.0	0.84	F	82.4	0.71
Kamaaha WB Through	E	65.9	0.84	E	64.0	0.81
Fort Barrette Rd at Kapolei Pkwy	**C**	**25.3**	**-**	**C**	**20.0**	**-**
FBR NB Left	C	21.8	0.49	C	31.1	0.64
FBR NB Through	A	6.5	0.26	B	13.0	0.61
FBR SB Left	D	47.6	0.97	C	32.9	0.73
FBR SB Through-Right	B	10.6	0.66	B	14.9	0.69
Kapolei EB Left-Through	C	27.0	0.70	C	22.2	0.74
Kapolei EB Right	C	25.3	0.48	C	20.5	0.57
Kapolei WB Left-Through	C	27.4	0.72	C	20.1	0.58
Fort Barrette Rd at Roosevelt Ave	**Unsignalized**			**Unsignalized**		
FBR NB Left-Through	C	18.6	0.22	C	19.1	0.29
FBR NB Through	C	20.6	0.35	C	24.5	0.52
FBR NB Right	C	16.6	0.14	C	16.4	0.18
FBR SB Left-Through	F	246.0	1.72	F	133.8	1.28
FBR SB Through-Right	D	31.8	0.83	C	16.9	0.29
Roosevelt EB Left	C	19.6	0.33	C	16.7	0.20
Roosevelt EB Through	D	28.1	0.67	F	152.1	1.35
Roosevelt EB Right	C	15.9	0.17	B	13.3	0.03
Roosevelt WB Left	B	14.3	0.12	B	14.2	0.04
Roosevelt WB Through-Right	F	482.5	2.13	F	228.0	1.52
Roosevelt Ave at Coral Sea Rd	**Unsignalized**			**Unsignalized**		
Roosevelt WB Left	A	8.2	0.08	B	10.5	0.19
Coral Sea NB Left	E	37.4	0.42	F	496.6	1.80
Coral Sea NB Right	B	11.6	0.14	C	19.2	0.28
Coral Sea Road at Access to Project Site	**Unsignalized**			**Unsignalized**		
Coral Sea SB Left	A	7.5	0.06	A	0.0	0.00
Access Road WB Right	A	0.0	0.00	B	10.7	0.29
Nimitz Hwy at Sand Island Access Rd	**C**	**32.3**	**-**	**C**	**35.1**	**-**
Nimitz EB Through	C	34.4	0.85	C	33.0	0.84
Nimitz WB Left	F	90.5	0.92	E	55.0	0.65
Nimitz WB Through	B	15.9	0.40	D	42.4	0.99
Sand Island Access NB Left	C	29.4	0.30	B	19.0	0.43

b) FBR at Kamaaha Avenue (HCM 6th Edition)

This intersection operates at LOS D during the AM and PM peak hours. All other movements operate at LOS E or better during both peak hours. The eastbound left turn operates at LOS F during the AM peak hour (v/c of 0.91). The southbound left, eastbound left, and westbound left turns operate at LOS F during the PM peak hour (v/c of 0.93, 0.92, and 0.71 respectively). These movements are expected to clear the intersection every cycle. All other movements operate at LOS E or better.

c) FBR at Kapolei Parkway (HCM 6th Edition)

This intersection operates at LOS C during the AM and PM peak hours. All movements operate at LOS D or better during both peak hours.

d) FBR at Roosevelt Avenue (HCM 6th Edition)

During the AM peak hour, the southbound shared left-through lane and the westbound shared through-right lane operates at LOS F (v/c of 1.72 and 2.13, respectively). During the PM peak hour, the southbound shared left-through lane, the eastbound through lane, and westbound shared through-right lanes operate at LOS F (v/c of 1.28, 1.35, and 1.52, respectively).

e) Nimitz Highway at Sand Island Access Road (HCM 6th Edition)

This intersection operates at LOS C during the AM and PM peak hours. The westbound left turn from Nimitz Highway operates at LOS F (v/c of 0.92) during the AM peak hour. This is due to the high westbound left turn volume and long cycle length at the intersection. All other movements operate at LOS E or better during both peak hours.

f) Roosevelt Avenue at Coral Sea Road (HCM 6th Edition)

The northbound left turn will operate at LOS F (v/c of 1.80) during the PM peak hour, when the Access Roads to Area 2 and 3 are open. This movement will still operate at LOS F (v/c of 0.94) without construction volume.

g) Coral Sea Road Access

All movements will operate at LOS B or better during both peak hours.

2. Comparison to Future (2023) Without Project

Table 11 shows the increase in overall intersection delay due to the construction vehicles for the two scenarios. The southbound shared left-through lane and the westbound shared through-right lane at FBR and Roosevelt Avenue will likely see an increase in delay. This is due to the 65 vehicles being added to these movements and the all-way stop control at the intersection. All construction related vehicles are assumed to be inbound during the AM peak hour, and outbound during the PM peak hour to analyze the "worst case scenario".

As shown in Table 10, the Roosevelt Avenue intersections at Coral Sea Road would see a significant increase in the northbound left turn during the PM peak hour as construction vehicles would be making a left turn exit out onto Roosevelt Avenue.

Table 11: Delay Comparison – 2023 With and Without Project delay increase (sec/veh)

Intersection & Movement	AM Peak Difference	PM Peak Difference
Fort Barrette Rd at Farrington Hwy	**0.4**	**1.5**
FBR NB Dual left	0.0	0.0
FBR NB Through	0.0	10.3
FBR NB Right	0.0	0.0
FBR SB Dual Left	0.0	0.0
FBR SB Through-Right	1.6	0.0
FBR SB Right	0.9	0.0
Farrington EB Dual Left	0.0	0.0
Farrington EB Through	0.0	0.0
Farrington EB Right	0.0	0.0
Farrington WB Left	0.0	0.0
Farrington WB Through	0.0	0.0
Farrington WB Dual Right	0.0	0.0
Fort Barrette Rd at Kamaaha Ave	**6.2**	**6.3**
FBR NB Dual Left	5.6	5.6
FBR NB Through	-0.1	11.2
FBR SB Left	2.9	11.8
FBR SB Through	11.1	-0.4
FBR SB Right	-0.1	-0.2
Kamaaha EB Left	14.2	14.8
Kamaaha EB Through	3.0	5.1
Kamaaha EB Right	2.9	3.2
Kamaaha WB Left	3.8	5.8
Kamaaha WB Through	2.9	4.0
Fort Barrette Rd at Kapolei Pkwy	**0.1**	**0.6**
FBR NB Left	3.1	0.0
FBR NB Through	0.0	1.3
FBR SB Left	0.0	7.8
FBR SB Through-Right	1.1	0.0
Kapolei EB Left-Through	0.0	0.0
Kapolei EB Right	0.0	0.0
Kapolei WB Left-Through	0.0	0.0
Fort Barrette Rd at Roosevelt Ave	**Unsignalized**	
FBR NB Left-Through	0.3	0.4
FBR NB Through	0.4	0.6
FBR NB Right	0.3	0.4
FBR SB Left-Through	80.0	-2.1
FBR SB Through-Right	0.0	0.4
Roosevelt EB Left	0.4	0.3
Roosevelt EB Through	0.6	-2.9
Roosevelt EB Right	0.3	0.3
Roosevelt WB Left	0.3	0.0
Roosevelt WB Through-Right	1.1	63.4
Roosevelt Ave at Coral Sea Rd	**Unsignalized**	
Roosevelt WB Left	-0.3	0.0
Coral Sea NB Left	2.4	345.8
Coral Sea NB Right	0.3	0.0

3. Mitigation for Future (2023) With Project

At the Roosevelt Avenue intersections (FBR, Coral Sea Road) the movements that include construction volume will operate at LOS F. During construction, it is recommended that the inbound and outbound times of the construction vehicles be scheduled in a way that not all construction related vehicles would arrive or depart at the same time. Staggering the times of the inbound and outbound construction related vehicles, or having vehicles access the site during off peak hours would benefit from less vehicular delay.

After the construction of this Project, it is estimated that 2-4 operational employees would access the Project Site. The post construction LOS and delay would be nearly identical to the Future (2023) Without Project scenario. The LOS during the operational phase will be minimal. Promoting carpooling and ride sharing is recommended to lower the construction related traffic.

At the Coral Sea Road Access, stop signs and stop bars should be added to the driveway access points.

V. Driveway Design

There are several geometric designs to consider when designing a driveway. Design criteria for pedestrian facilities, bike facilities, and transit facilities will not be considered due to the absence of these facilities.

Driveway designs should conform to the City and County of Honolulu design standards.

Guidelines from the National Cooperative Highway Research Program (NCHRP) *Report 659 Guide for the Geometric Design of Driveways* were used to make recommendations.

A. Number of Lanes

The number of vehicles turning into and out of the project site is low. Guidance from the NCHRP *Report 659* suggests that if a left turn exiting vehicle will block other vehicles in the exit queue from turning right, then separate lanes should be provided. All exiting vehicles are assumed to make right onto from Coral Sea Road from the new Project Accesses. One outbound lane is recommended.

B. Driveway Width

The driveway width is not measured at the driveway intersection to the main road. It is measured further back, basically measuring the width of the travel lanes in the driveway. Driveway speeds are lower than street speeds, resulting in narrower roadway widths. As shown in Figure 13, Exhibit 5-24 from NCHRP *Report 659* recommends a minimum driveway width of 26 feet for two-way industrial driveways.

C. Curb Radius and Turning Radius

A curb radius is the best fit for an industrial driveway. Exhibit 5-24 from NCHRP *Report 659* recommends a minimum curb radius of 40 feet for a lower speed road, as shown in Figure 14.

D. Driveway Median

Exhibit 5-31 from NCHRP *Report 659* recommends medians are not needed for industrial driveways.

Exhibit 5-24. Driveway width and curb radius guidelines.

Category	Description of Common Applications (Note: These descriptions are intended to help the designer form a mental image of some of the more common examples of the category.)	Driveway Width	Driveway Curb Radius (in ft)		
			Higher speed road	Moderate speed road	Lower speed road
STANDARD DRIVEWAYS					
Very high intensity	Urban activity center, with almost constant driveway use during hours of operation.	Many justify two lanes in, two to three lanes out. Refer to street design guides.	30–50	25–40	NA
Higher intensity	Medium-size office or retail (e.g., community shopping center) with frequent driveway use during hours of operation.	One entry lane, 12–13 ft wide Two exit lanes, 11–13 ft wide.	25–40	20–35	NA
Medium intensity	Smaller office or retail, with occasional driveway use during hours of operation. Seldom more than one exiting vehicle at any time.	Two lanes, 24–26 ft total width	20–35	15–30	NA
Lower intensity	Single-family or duplex residential, other types with low use, on lower speed/volume roadways. May not apply to rural residential.	May be related to the width of the garage, or driveway parking. Single lane: 9–12 ft Double: 16–20 ft	15–25	10–15	5–10
SPECIAL SITUATION DRIVEWAYS					
Central business district	Building faces are close to the street.	Varies greatly, depending on use	NA	20–25	10–15
Farm or ranch; Field	A mix of design vehicles; some may be very low volume.	Min. 16 ft, desirable 20 ft. Affected by widths of field machinery.	30–40	20–30	NA
Industrial	Driveways are often used by large vehicles.	Minimum 26 ft	50–75	40–60	40–60

Figure 14: NCHRP 659, Exhibit 5-24 Driveway Width and Curb Radius Guidelines

VI. CONCLUSION

Barbers Point Solar LLC (Barbers Point Solar) is proposing to build and operate the Barbers Point Solar Project (Project) located in east Kalaeloa, Ewa District, on the Island of Oahu (Figure 1). The Project will primarily be located on tax map keys (TMK) 9-1-013:038 and 9-1-013:040, owned by Department of Hawaiian Homelands. Project electrical transmission lines will also be located within rights-of-way owned by Hawaii Department of Transportation (HDOT) (Coral Sea Road and Roosevelt Avenue) and Hawaii Community Development Authority (HCDA) as well as within a portion of TMK 9-1-016:027 (owned by Kapolei Infrastructure, LLC). The Project area is shown in attached Figure 1.

There are two main access routes to the project. Access to TMK 9-1-013:038 will be provided by a new driveway off of Coral Sea Road. This driveway will be located within an existing HCDA ROW associated with Roadway Lot 13083. Access to TMK 9-1-013:40 is currently via Coral Sea Road off of Casablanca Street; however, the Project proposes to construct a new driveway on Coral Sea Road to accommodate construction access. Access within the Project's two solar array parcels will be provided through a network of existing (to be improved) and new on-site access roads.

It is anticipated that Project construction and commissioning would require approximately 12-15 months, with commercial operations commencing at the end of 2023. The power generated by the Project will be sold to Hawaiian Electric under a 25-year Power Purchase Agreement (PPA). At that point in time, the Project may be repowered under a renegotiated PPA or other contract (with subsequent permits/approvals) or decommissioned. Decommissioning will involve removal of all equipment associated with the Project and returning the area to substantially the same condition as existed prior to Project development. Decommissioning will include the recycling and reuse of materials demolished or removed from the site to the extent feasible.

The northbound left turn from Coral Sea Road onto Roosevelt Avenue and the westbound right turn from Roosevelt Avenue onto Fort Barrette Road operates at LOS F during the PM peak hour. This is the anticipated departing route vehicles will take during the construction phase. It is recommended that construction vehicles arrive or depart the Project Area during off peak hours. Staggering the arrival/departure times, ride sharing, and carpooling is recommended to lessen the traffic impact during the construction phase.

The addition of new driveways on Coral Sea Road to access the Project Site will require stop signs and stop bars for the outbound approach. The driveways at both access roads include:

- One inbound lane,
- One outbound lane,
- Driveway width of at least 26 feet, and
- Curb radius of at least 40 feet.

Traffic volumes during the operational phase will include up to 2-4 vehicles per day and is not expected to have an impact on the roadway network.

VII. REFERENCES

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Appendix A – Existing 2020 Data Collection

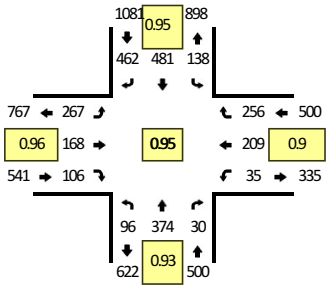
Type of peak hour being reported: System Peak

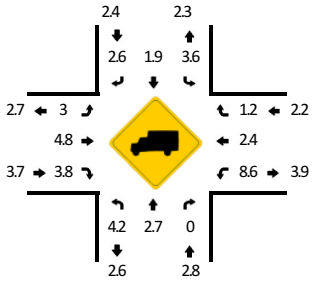
Method for determining peak hour: Total Entering Volume

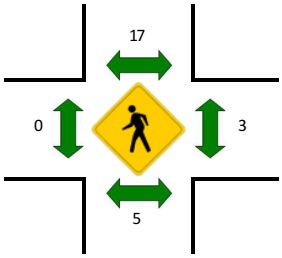
LOCATION: Fort Barrette Rd -- Farrington Hwy
CITY/STATE: Kapolei, HI

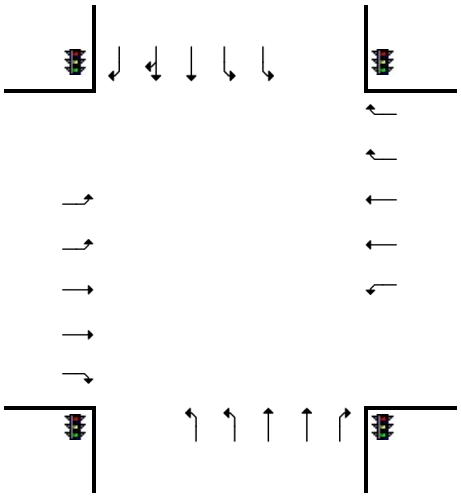
QC JOB #: 15303601
DATE: Thu, Oct 29 2020

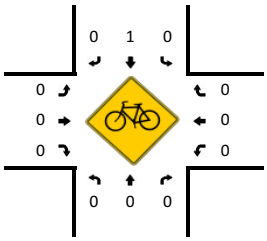
Peak-Hour: 7:15 AM -- 8:15 AM
Peak 15-Min: 7:45 AM -- 8:00 AM

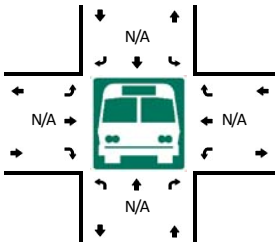


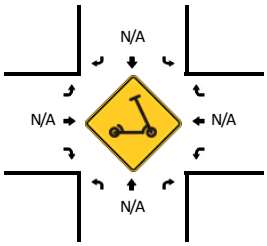












15-Min Count Period Beginning At	Fort Barrette Rd (Northbound)				Fort Barrette Rd (Southbound)				Farrington Hwy (Eastbound)				Farrington Hwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:00 AM	0	74	0	0	26	64	60	0	41	16	11	0	3	30	44	0	369	
6:15 AM	11	86	5	0	18	119	75	0	52	23	14	0	6	30	60	0	499	
6:30 AM	18	94	6	0	23	148	97	0	32	23	22	0	4	40	62	0	569	
6:45 AM	19	91	10	0	35	120	84	0	54	23	14	0	5	35	52	0	542	1979
7:00 AM	14	101	9	0	38	118	110	0	50	32	21	0	10	53	74	0	630	2240
7:15 AM	20	87	7	0	38	120	111	0	58	44	25	0	6	49	76	0	641	2382
7:30 AM	19	102	4	0	36	113	102	0	71	41	25	0	10	53	70	0	646	2459
7:45 AM	33	88	6	0	37	124	122	0	67	48	26	0	10	64	65	0	690	2607
8:00 AM	24	97	13	0	26	124	127	1	71	35	30	0	9	43	45	0	645	2622
8:15 AM	27	90	11	0	21	90	118	0	85	49	23	0	15	45	43	0	617	2598
8:30 AM	36	86	13	0	40	105	91	0	72	42	35	0	9	54	46	0	629	2581
8:45 AM	22	86	14	0	29	83	94	0	76	43	26	0	10	47	49	0	579	2470

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	132	352	24	0	148	496	488	0	268	192	104	0	40	256	260	0	2760
Heavy Trucks	8	4	0		4	12	16		16	8	0		8	8	0		84
Buses																	
Pedestrians		4				0				0				4			8
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 11/24/2020 6:50 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

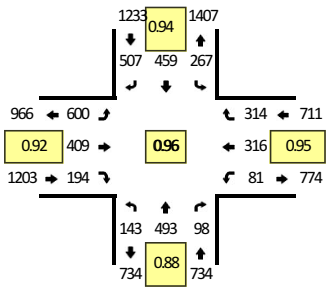
Type of peak hour being reported: System Peak

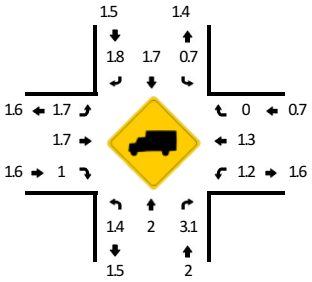
Method for determining peak hour: Total Entering Volume

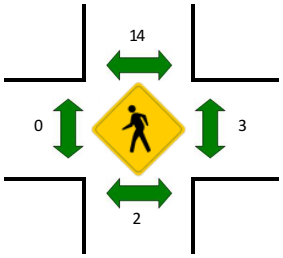
LOCATION: Fort Barrette Rd -- Farrington Hwy
CITY/STATE: Kapolei, HI

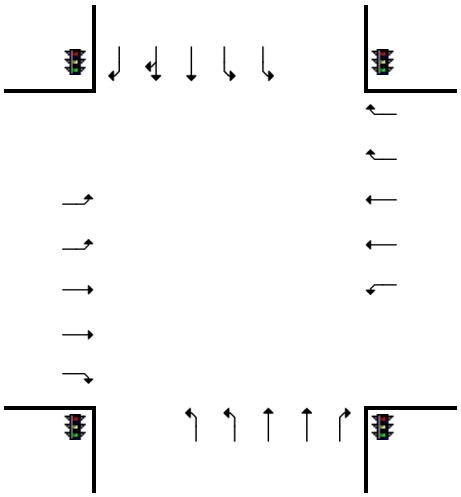
QC JOB #: 15303602
DATE: Thu, Oct 29 2020

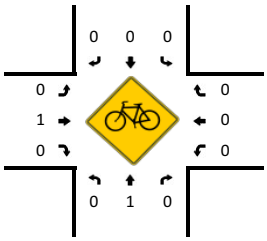
Peak-Hour: 3:15 PM -- 4:15 PM
Peak 15-Min: 4:00 PM -- 4:15 PM

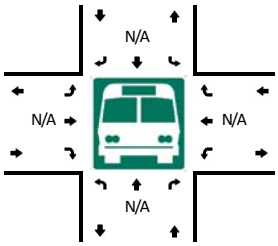


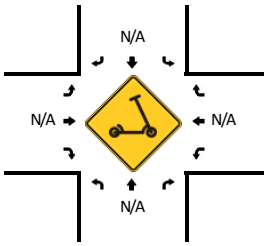












15-Min Count Period Beginning At	Fort Barrette Rd (Northbound)				Fort Barrette Rd (Southbound)				Farrington Hwy (Eastbound)				Farrington Hwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:00 PM	29	120	22	0	48	98	109	1	159	95	51	0	19	77	65	0	893	
3:15 PM	33	100	21	0	69	118	140	0	138	104	41	0	22	68	72	0	926	
3:30 PM	40	113	18	0	76	93	127	0	149	99	56	0	13	93	71	0	948	
3:45 PM	35	145	28	0	60	134	119	0	138	102	50	0	19	77	89	0	996	3763
4:00 PM	35	135	31	0	62	114	121	0	175	104	47	0	27	78	82	0	1011	3881
4:15 PM	31	126	23	0	62	131	92	0	140	113	53	0	21	91	85	0	968	3923
4:30 PM	24	111	37	0	67	92	84	0	194	132	47	0	25	94	86	0	993	3968
4:45 PM	33	139	22	0	53	115	106	0	178	109	54	0	24	82	97	0	1012	3984
5:00 PM	50	142	29	0	70	126	127	0	168	101	49	0	12	85	111	0	1070	4043
5:15 PM	44	132	23	0	92	132	100	0	144	96	65	0	18	93	95	0	1034	4109
5:30 PM	31	98	30	0	59	95	107	0	182	113	61	0	22	81	84	0	963	4079
5:45 PM	38	113	22	0	70	96	94	0	144	88	49	0	20	83	80	0	897	3964

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	140	540	124	0	248	456	484	0	700	416	188	0	108	312	328	0	4044
Heavy Trucks	4	8	0		0	4	12		0	12	0		0	0	0		40
Buses																	
Pedestrians		4				8				0				4			16
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 11/24/2020 6:50 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

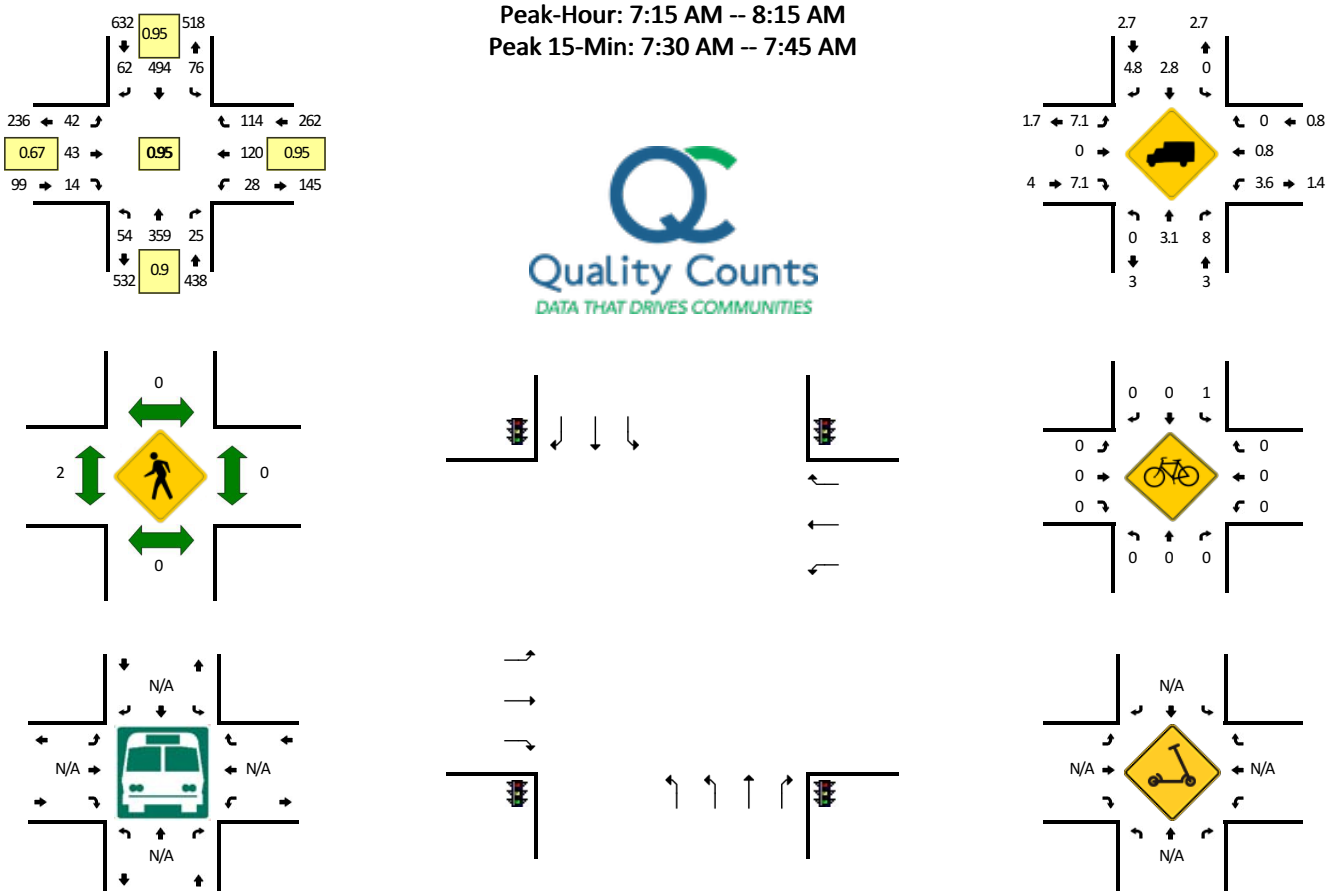
Type of peak hour being reported: System Peak

Method for determining peak hour: Total Entering Volume

LOCATION: Fort Barrette Rd -- Kama'aha Ave
CITY/STATE: Kapolei, HI

QC JOB #: 15303603
DATE: Thu, Oct 29 2020

Peak-Hour: 7:15 AM -- 8:15 AM
Peak 15-Min: 7:30 AM -- 7:45 AM



15-Min Count Period Beginning At	Fort Barrette Rd (Northbound)				Fort Barrette Rd (Southbound)				Kama'aha Ave (Eastbound)				Kama'aha Ave (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:00 AM	4	57	1	0	5	67	5	1	4	4	1	0	6	23	31	0	209	
6:15 AM	9	58	1	0	9	122	11	0	6	12	1	0	4	21	38	0	292	
6:30 AM	6	64	1	0	21	138	16	1	10	7	2	0	2	25	47	1	341	
6:45 AM	3	84	3	0	13	124	6	2	7	11	4	0	10	31	29	1	328	1170
7:00 AM	5	86	6	0	15	117	17	1	14	11	2	0	4	32	38	0	348	1309
7:15 AM	9	69	3	0	15	127	12	0	6	13	2	0	4	31	32	2	325	1342
7:30 AM	16	96	9	0	14	124	20	1	13	11	4	0	8	29	31	0	376	1377
7:45 AM	16	95	8	0	27	122	16	2	6	5	2	0	4	34	26	2	365	1414
8:00 AM	13	99	5	0	17	121	14	0	17	14	6	0	8	26	25	0	365	1431
8:15 AM	12	82	3	0	18	107	14	0	13	18	9	0	5	36	30	0	347	1453
8:30 AM	3	95	2	0	15	121	15	1	17	13	3	0	4	18	31	0	338	1415
8:45 AM	9	87	4	0	21	87	16	0	17	20	8	0	4	30	16	0	319	1369

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	64	384	36	0	56	496	80	4	52	44	16	0	32	116	124	0	1504
Heavy Trucks	0	28	4		0	8	4		4	0	0		0	0	0		48
Buses																	
Pedestrians		0				0				4				0			4
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 11/24/2020 6:50 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

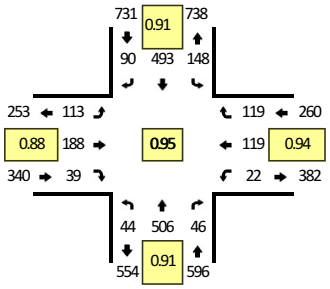
Type of peak hour being reported: System Peak

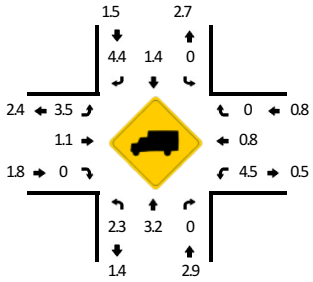
Method for determining peak hour: Total Entering Volume

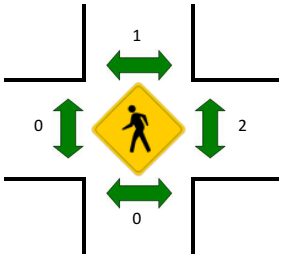
LOCATION: Fort Barrette Rd -- Kama'aha Ave
CITY/STATE: Kapolei, HI

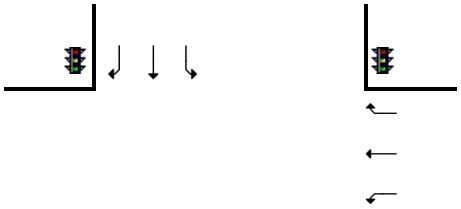
QC JOB #: 15303604
DATE: Thu, Oct 29 2020

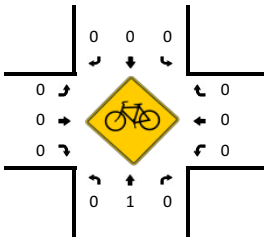
Peak-Hour: 3:15 PM -- 4:15 PM
Peak 15-Min: 3:45 PM -- 4:00 PM

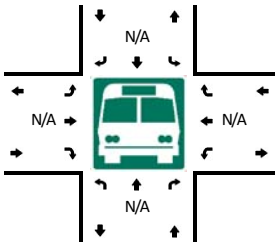


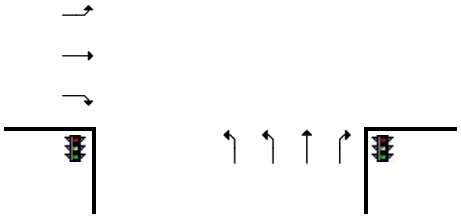


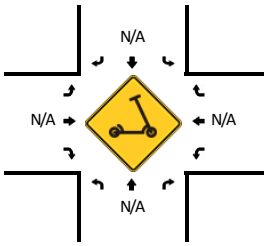












15-Min Count Period Beginning At	Fort Barrette Rd (Northbound)				Fort Barrette Rd (Southbound)				Kama'aha Ave (Eastbound)				Kama'aha Ave (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:00 PM	9	135	5	0	30	117	16	0	23	36	9	0	4	22	14	0	420	
3:15 PM	13	104	15	0	35	111	23	0	28	42	9	0	8	32	20	0	440	
3:30 PM	11	141	8	0	42	124	20	0	28	43	14	0	8	28	33	0	500	
3:45 PM	9	121	10	0	42	128	31	0	32	58	7	0	3	28	37	0	506	1866
4:00 PM	11	140	13	0	29	130	16	0	25	45	9	0	3	31	29	0	481	1927
4:15 PM	8	131	7	0	49	136	25	0	29	43	18	0	1	41	20	0	508	1995
4:30 PM	13	147	9	0	37	129	15	0	33	62	11	0	6	34	35	0	531	2026
4:45 PM	14	136	12	0	39	131	25	0	30	49	12	0	8	31	26	0	513	2033
5:00 PM	8	157	11	0	39	127	21	0	29	46	21	0	3	23	32	0	517	2069
5:15 PM	10	141	10	0	52	127	25	0	29	53	12	0	7	38	26	0	530	2091
5:30 PM	11	119	8	0	54	122	28	0	23	50	9	0	6	23	24	0	477	2037
5:45 PM	8	134	9	0	36	110	22	0	24	41	5	0	4	29	31	0	453	1977

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	36	484	40	0	168	512	124	0	128	232	28	0	12	112	148	0	2024
Heavy Trucks	0	16	0		0	8	8		4	4	0		4	0	0		44
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 11/24/2020 6:50 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

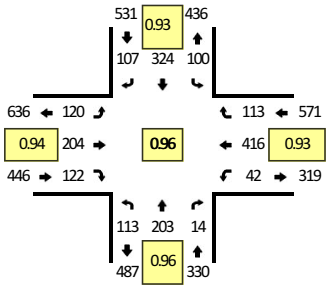
Type of peak hour being reported: System Peak

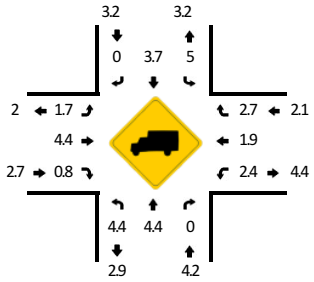
Method for determining peak hour: Total Entering Volume

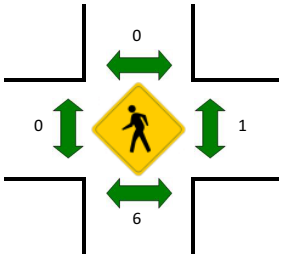
LOCATION: Fort Barrette Rd -- Kapolei Pkwy
CITY/STATE: Kapolei, HI

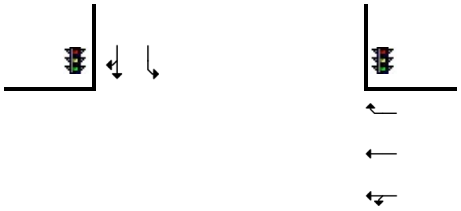
QC JOB #: 15303605
DATE: Thu, Oct 29 2020

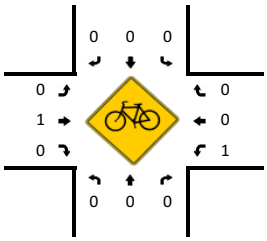
Peak-Hour: 7:15 AM -- 8:15 AM
Peak 15-Min: 7:45 AM -- 8:00 AM

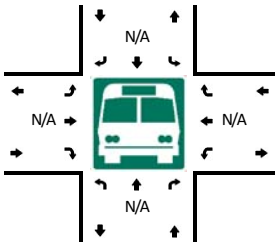


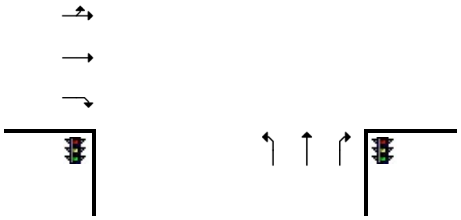


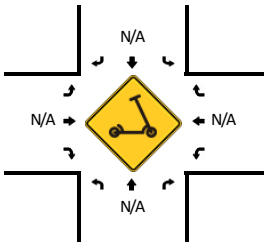












15-Min Count Period Beginning At	Fort Barrette Rd (Northbound)				Fort Barrette Rd (Southbound)				Kapolei Pkwy (Eastbound)				Kapolei Pkwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:00 AM	15	23	2	0	8	59	17	0	28	21	20	0	3	70	11	0	277	
6:15 AM	17	23	1	0	16	89	14	0	29	27	20	0	4	86	13	0	339	
6:30 AM	22	28	1	0	18	82	11	0	25	37	29	0	5	118	18	0	394	
6:45 AM	23	43	1	0	16	98	44	0	37	43	37	0	6	72	15	0	435	1445
7:00 AM	21	29	5	0	17	74	27	0	38	34	38	0	2	93	23	0	401	1569
7:15 AM	37	33	3	0	21	67	33	0	23	44	32	0	7	124	23	0	447	1677
7:30 AM	26	57	2	0	33	82	26	0	34	51	28	0	6	105	31	0	481	1764
7:45 AM	22	61	3	0	20	101	22	0	33	55	30	0	17	95	31	0	490	1819
8:00 AM	28	52	6	0	26	74	26	0	30	54	32	0	11	92	28	1	460	1878
8:15 AM	26	46	8	0	19	82	30	0	30	60	36	0	11	72	29	0	449	1880
8:30 AM	29	43	8	0	13	82	31	0	34	54	29	0	8	77	22	0	430	1829
8:45 AM	28	39	7	0	16	54	17	0	28	42	27	0	8	105	26	0	397	1736

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	88	244	12	0	80	404	88	0	132	220	120	0	68	380	124	0	1960
Heavy Trucks	4	8	0		4	16	0		0	8	0		4	4	4		52
Buses																	
Pedestrians		4				0				0				0			4
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 11/24/2020 6:50 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

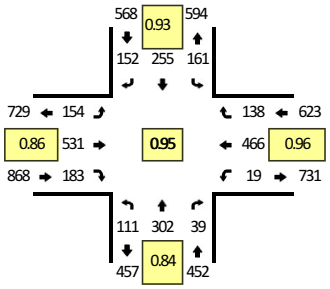
Type of peak hour being reported: System Peak

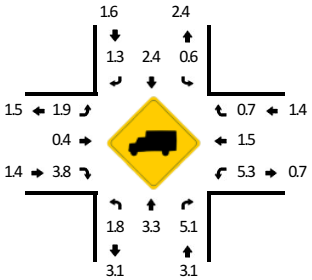
Method for determining peak hour: Total Entering Volume

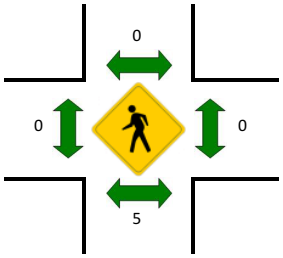
LOCATION: Fort Barrette Rd -- Kapolei Pkwy
CITY/STATE: Kapolei, HI

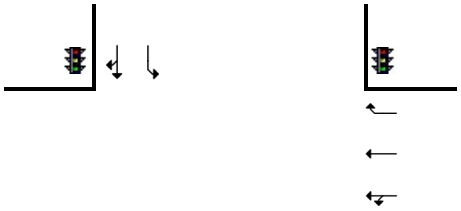
QC JOB #: 15303606
DATE: Thu, Oct 29 2020

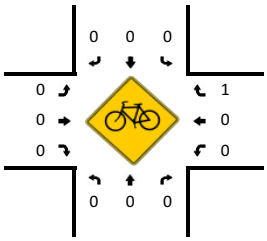
Peak-Hour: 3:15 PM -- 4:15 PM
Peak 15-Min: 3:45 PM -- 4:00 PM

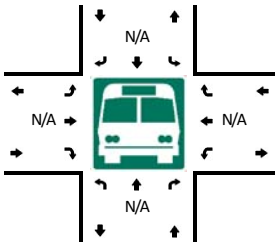


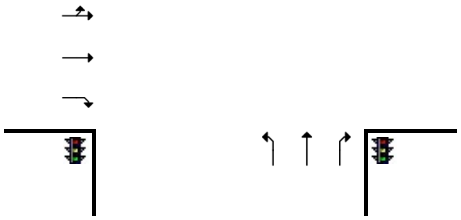


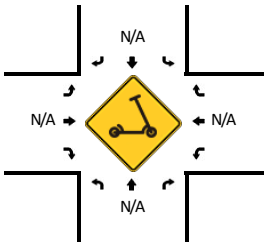












15-Min Count Period Beginning At	Fort Barrette Rd (Northbound)				Fort Barrette Rd (Southbound)				Kapolei Pkwy (Eastbound)				Kapolei Pkwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:00 PM	29	62	4	0	24	59	26	0	42	129	49	0	8	118	47	0	597	
3:15 PM	29	54	5	0	39	66	37	0	31	113	40	0	4	105	37	0	560	
3:30 PM	18	79	14	0	38	57	32	0	48	139	64	0	4	122	36	0	651	
3:45 PM	29	81	9	0	37	72	44	0	35	152	44	0	8	118	32	0	661	2469
4:00 PM	35	88	11	0	47	60	39	0	40	127	35	0	3	121	33	0	639	2511
4:15 PM	23	77	7	0	28	76	41	0	40	169	57	0	5	125	32	0	680	2631
4:30 PM	25	101	12	0	38	71	43	0	45	155	53	0	9	97	25	0	674	2654
4:45 PM	27	80	9	0	38	58	42	0	38	154	75	0	7	136	42	0	706	2699
5:00 PM	30	98	7	0	40	71	45	0	33	133	48	0	9	108	38	0	660	2720
5:15 PM	33	78	14	0	43	74	34	0	40	126	33	0	10	121	39	0	645	2685
5:30 PM	27	63	12	0	41	67	50	0	38	154	40	0	11	111	42	0	656	2667
5:45 PM	23	82	14	0	40	45	32	0	37	145	45	0	5	123	41	0	632	2593

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	116	324	36	0	148	288	176	0	140	608	176	0	32	472	128	0	2644
Heavy Trucks	4	20	4		0	8	4		0	0	0		0	16	0		56
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 11/24/2020 6:50 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

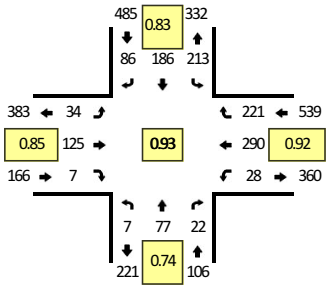
Type of peak hour being reported: System Peak

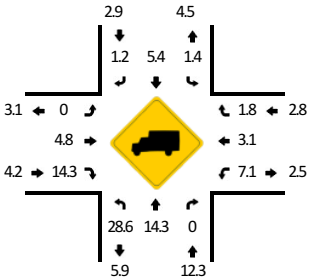
Method for determining peak hour: Total Entering Volume

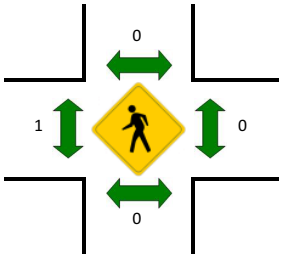
LOCATION: Fort Barrette Rd -- Roosevelt Ave
CITY/STATE: Honolulu County, HI

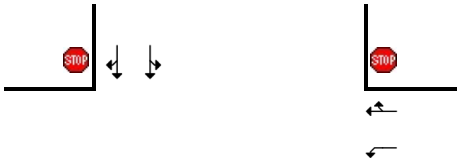
QC JOB #: 15303607
DATE: Thu, Oct 29 2020

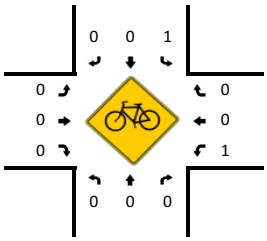
Peak-Hour: 7:15 AM -- 8:15 AM
Peak 15-Min: 7:45 AM -- 8:00 AM

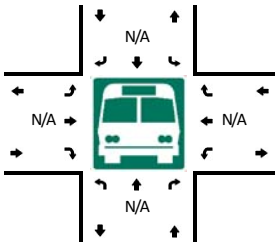


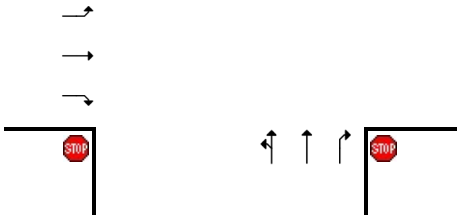


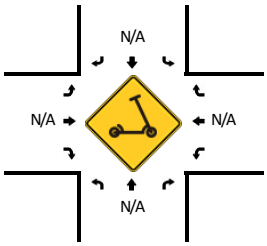












15-Min Count Period Beginning At	Fort Barrette Rd (Northbound)				Fort Barrette Rd (Southbound)				Roosevelt Ave (Eastbound)				Roosevelt Ave (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:00 AM	1	6	0	0	30	45	7	0	8	19	2	0	2	49	25	0	194	
6:15 AM	1	13	2	0	44	60	9	0	6	19	1	0	2	65	23	0	245	
6:30 AM	3	10	5	0	58	49	11	0	11	26	0	0	2	71	35	0	281	
6:45 AM	3	19	2	0	58	66	19	0	5	29	2	0	4	83	35	0	325	1045
7:00 AM	2	18	4	0	61	35	16	0	11	28	3	0	3	61	40	0	282	1133
7:15 AM	2	19	2	0	62	29	15	0	1	33	1	0	3	68	56	0	291	1179
7:30 AM	2	19	3	0	49	49	20	0	7	37	2	0	7	80	59	0	334	1232
7:45 AM	0	17	6	0	51	60	35	0	13	20	3	0	9	82	53	0	349	1256
8:00 AM	3	22	11	0	51	48	16	0	13	35	1	0	9	60	53	0	322	1296
8:15 AM	3	7	5	0	50	52	22	0	16	37	2	0	9	67	50	0	320	1325
8:30 AM	2	29	4	0	51	53	13	0	14	24	2	0	6	49	44	0	291	1282
8:45 AM	2	24	4	0	30	44	11	0	4	24	6	0	7	54	39	0	249	1182

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	68	24	0	204	240	140	0	52	80	12	0	36	328	212	0	1396
Heavy Trucks	0	0	0		4	16	0		0	0	0		0	8	12		40
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 11/24/2020 6:50 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

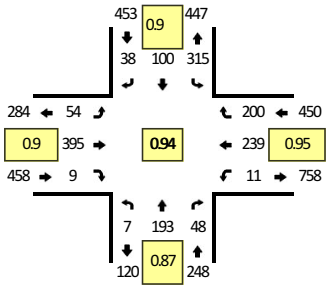
Type of peak hour being reported: System Peak

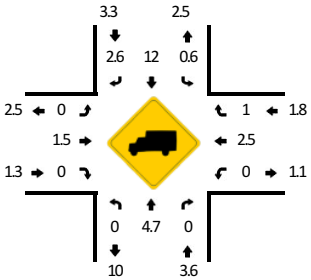
Method for determining peak hour: Total Entering Volume

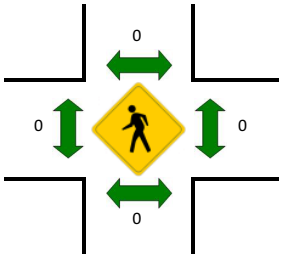
LOCATION: Fort Barrette Rd -- Roosevelt Ave
CITY/STATE: Honolulu County, HI

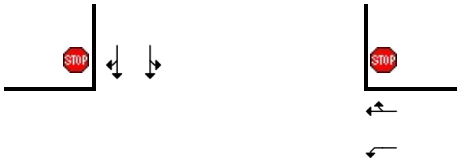
QC JOB #: 15303608
DATE: Thu, Oct 29 2020

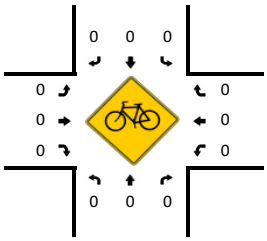
Peak-Hour: 3:15 PM -- 4:15 PM
Peak 15-Min: 3:45 PM -- 4:00 PM

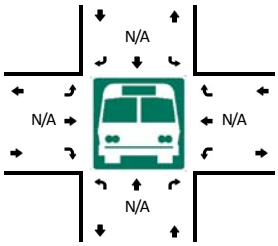


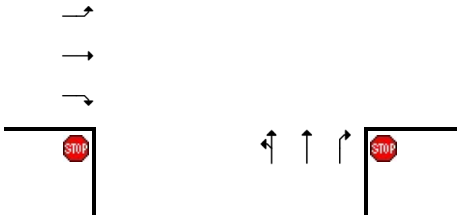


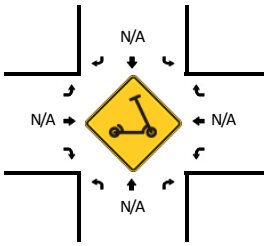












15-Min Count Period Beginning At	Fort Barrette Rd (Northbound)				Fort Barrette Rd (Southbound)				Roosevelt Ave (Eastbound)				Roosevelt Ave (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:00 PM	0	32	14	0	79	27	13	0	14	88	1	0	7	65	43	0	383	
3:15 PM	2	36	12	0	77	22	9	0	11	93	3	0	1	59	43	0	368	
3:30 PM	1	51	11	0	84	26	11	0	14	99	1	0	3	63	47	0	411	
3:45 PM	2	54	15	0	90	24	12	0	8	100	2	0	1	55	63	0	426	1588
4:00 PM	2	52	10	0	64	28	6	0	21	103	3	0	6	62	47	0	404	1609
4:15 PM	1	65	14	0	87	27	21	0	10	98	1	0	2	54	42	0	422	1663
4:30 PM	0	83	25	0	86	25	13	0	14	91	2	0	4	57	44	0	444	1696
4:45 PM	1	63	13	0	92	34	14	0	11	97	7	0	1	67	37	0	437	1707
5:00 PM	1	71	17	0	86	32	7	0	12	88	3	0	4	58	39	0	418	1721
5:15 PM	3	49	14	0	81	20	11	0	16	91	1	0	3	61	54	0	404	1703
5:30 PM	1	44	10	0	92	24	13	0	15	88	0	0	5	61	47	0	400	1659
5:45 PM	2	47	10	0	69	17	11	0	16	67	3	0	3	60	58	0	363	1585

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	8	216	60	0	360	96	48	0	32	400	8	0	4	220	252	0	1704
Heavy Trucks	0	24	0		0	8	0		0	12	0		0	4	0		48
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 11/24/2020 6:50 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

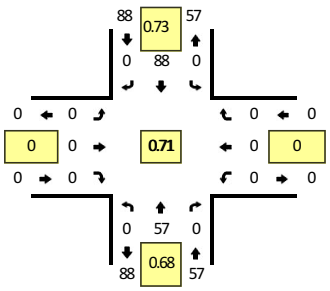
Type of peak hour being reported: System Peak

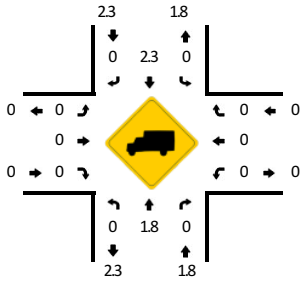
Method for determining peak hour: Total Entering Volume

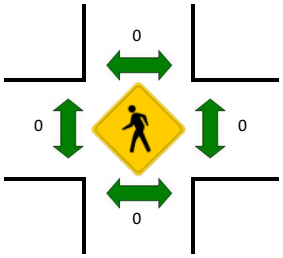
LOCATION: Coral Sea Rd -- San Juacinto St
CITY/STATE: Ewa Beach, HI

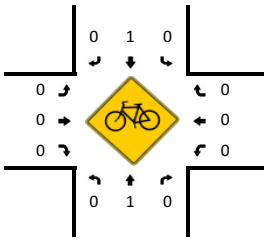
QC JOB #: 15303609
DATE: Thu, Oct 29 2020

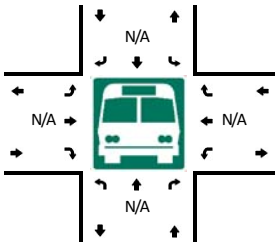
Peak-Hour: 7:15 AM -- 8:15 AM
Peak 15-Min: 7:30 AM -- 7:45 AM

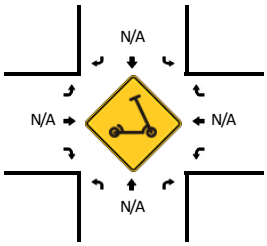












15-Min Count Period Beginning At	Coral Sea Rd (Northbound)				Coral Sea Rd (Southbound)				San Juacinto St (Eastbound)				San Juacinto St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:00 AM	0	8	0	0	0	41	0	0	0	0	0	0	0	0	0	0	49	
6:15 AM	0	13	0	0	0	36	0	0	0	0	0	0	0	0	0	0	49	
6:30 AM	0	26	0	0	0	38	0	0	0	0	0	0	0	0	0	0	64	
6:45 AM	0	21	0	0	0	22	0	0	0	0	0	0	0	0	0	0	43	205
7:00 AM	0	27	0	0	0	30	0	0	0	0	0	0	0	0	0	0	57	213
7:15 AM	0	9	0	0	0	28	0	0	0	0	0	0	0	0	0	0	37	201
7:30 AM	0	21	0	0	0	30	0	0	0	0	0	0	0	0	0	0	51	188
7:45 AM	0	13	0	0	0	13	0	0	0	0	0	0	0	0	0	0	26	171
8:00 AM	0	14	0	0	0	17	0	0	0	0	0	0	0	0	0	0	31	145
8:15 AM	0	32	0	0	0	17	0	0	0	0	0	0	0	0	0	0	49	157
8:30 AM	0	23	0	0	0	14	0	0	0	0	0	0	0	0	0	0	37	143
8:45 AM	0	15	0	0	0	18	0	0	0	0	0	0	0	0	0	0	33	150

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	84	0	0	0	120	0	0	0	0	0	0	0	0	0	0	204
Heavy Trucks	0	4	0		0	0	0		0	0	0		0	0	0		4
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 11/24/2020 6:50 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

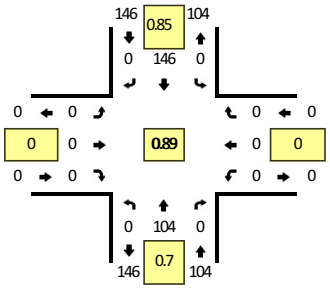
Type of peak hour being reported: System Peak

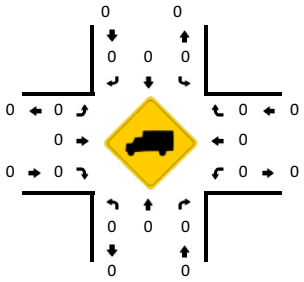
Method for determining peak hour: Total Entering Volume

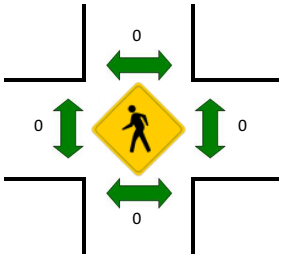
LOCATION: Coral Sea Rd -- San Juacinto St
CITY/STATE: Ewa Beach, HI

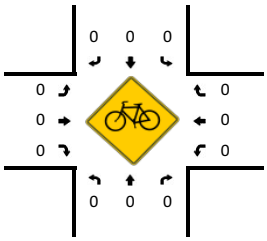
QC JOB #: 15303610
DATE: Thu, Oct 29 2020

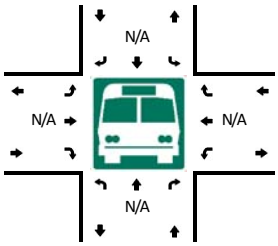
Peak-Hour: 3:15 PM -- 4:15 PM
Peak 15-Min: 4:00 PM -- 4:15 PM

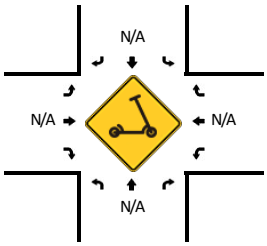












15-Min Count Period Beginning At	Coral Sea Rd (Northbound)				Coral Sea Rd (Southbound)				San Juacinto St (Eastbound)				San Juacinto St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:00 PM	0	12	0	0	0	39	0	0	0	0	0	0	0	0	0	0	51	
3:15 PM	0	24	0	0	0	40	0	0	0	0	0	0	0	0	0	0	64	
3:30 PM	0	20	0	0	0	30	0	0	0	0	0	0	0	0	0	0	50	
3:45 PM	0	23	0	0	0	43	0	0	0	0	0	0	0	0	0	0	66	231
4:00 PM	0	37	0	0	0	33	0	0	0	0	0	0	0	0	0	0	70	250
4:15 PM	0	22	0	0	0	27	0	0	0	0	0	0	0	0	0	0	49	235
4:30 PM	0	25	0	0	0	30	0	0	0	0	0	0	0	0	0	0	55	240
4:45 PM	0	21	0	0	0	34	0	0	0	0	0	0	0	0	0	0	55	229
5:00 PM	0	33	0	0	0	32	0	0	0	0	0	0	0	0	0	0	65	224
5:15 PM	0	22	0	0	0	28	0	0	0	0	0	0	0	0	0	0	50	225
5:30 PM	0	30	0	0	0	22	0	0	0	0	0	0	0	0	0	0	52	222
5:45 PM	0	41	0	0	0	20	0	0	0	0	0	0	0	0	0	0	61	228

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	148	0	0	0	132	0	0	0	0	0	0	0	0	0	0	280
Heavy Trucks	0	0	0		0	0	0		0	0	0		0	0	0		0
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 11/24/2020 6:50 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

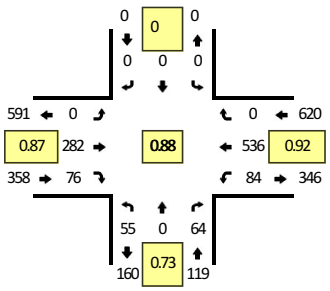
Type of peak hour being reported: System Peak

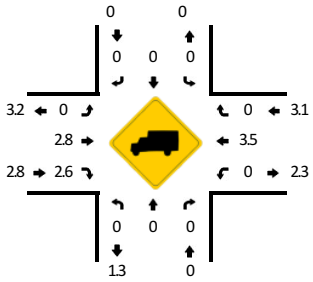
Method for determining peak hour: Total Entering Volume

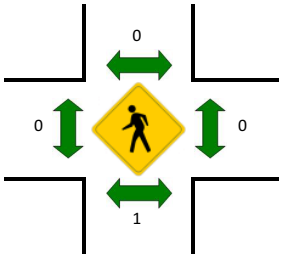
LOCATION: Coral Sea Rd -- Roosevelt Ave
CITY/STATE: Honolulu County, HI

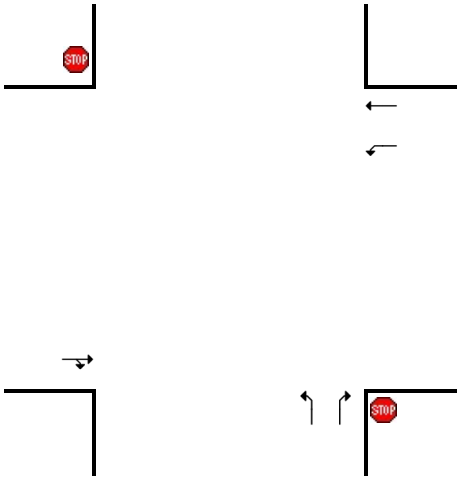
QC JOB #: 15303611
DATE: Thu, Oct 29 2020

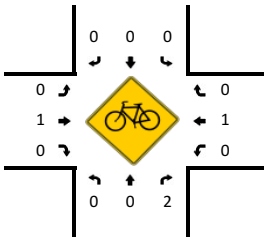
Peak-Hour: 7:15 AM -- 8:15 AM
Peak 15-Min: 7:30 AM -- 7:45 AM

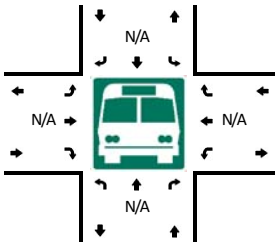


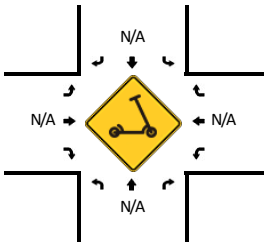












15-Min Count Period Beginning At	Coral Sea Rd (Northbound)				Coral Sea Rd (Southbound)				Roosevelt Ave (Eastbound)				Roosevelt Ave (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:00 AM	7	0	4	0	0	0	0	0	0	34	16	0	12	71	0	0	144	
6:15 AM	5	0	6	0	0	0	0	0	0	40	24	0	16	101	0	0	192	
6:30 AM	9	0	15	0	0	0	0	0	0	59	19	0	19	95	0	0	216	
6:45 AM	7	0	14	0	0	0	0	0	0	63	22	0	35	117	0	0	258	810
7:00 AM	4	0	10	0	0	0	0	0	0	59	33	0	22	109	0	0	237	903
7:15 AM	11	0	10	0	0	0	0	0	0	68	20	0	23	125	0	0	257	968
7:30 AM	17	0	24	0	0	0	0	0	0	78	25	0	23	143	0	0	310	1062
7:45 AM	14	0	17	0	0	0	0	0	0	61	12	0	21	147	0	0	272	1076
8:00 AM	13	0	13	0	0	0	0	0	0	75	19	0	17	121	0	0	258	1097
8:15 AM	14	0	22	0	0	0	0	0	0	82	14	0	22	132	0	0	286	1126
8:30 AM	17	0	18	0	0	0	0	0	0	58	18	0	19	87	0	0	217	1033
8:45 AM	9	0	10	0	0	0	0	0	0	59	10	0	11	99	0	0	198	959

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	68	0	96	0	0	0	0	0	0	312	100	0	92	572	0	0	1240
Heavy Trucks	0	0	0		0	0	0		0	4	0		0	8	0		12
Buses																	
Pedestrians		4				0				0				0			4
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 11/24/2020 6:50 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

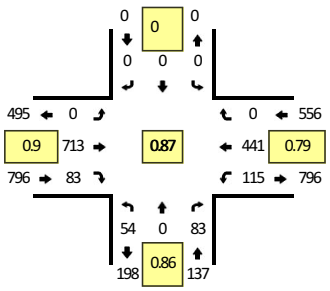
Type of peak hour being reported: System Peak

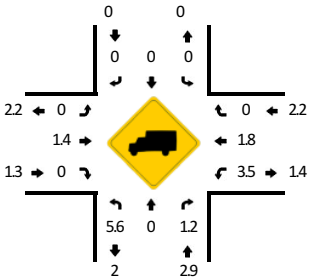
Method for determining peak hour: Total Entering Volume

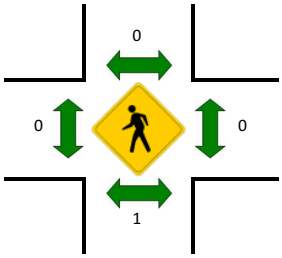
LOCATION: Coral Sea Rd -- Roosevelt Ave
CITY/STATE: Honolulu County, HI

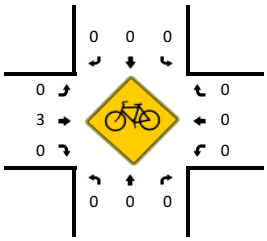
QC JOB #: 15303612
DATE: Thu, Oct 29 2020

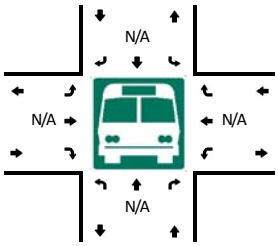
Peak-Hour: 3:15 PM -- 4:15 PM
Peak 15-Min: 3:45 PM -- 4:00 PM

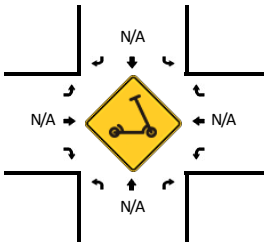












15-Min Count Period Beginning At	Coral Sea Rd (Northbound)				Coral Sea Rd (Southbound)				Roosevelt Ave (Eastbound)				Roosevelt Ave (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:00 PM	12	0	19	0	0	0	0	0	0	146	24	0	30	105	0	0	336	
3:15 PM	17	0	22	0	0	0	0	0	0	165	26	0	26	95	0	0	351	
3:30 PM	11	0	17	0	0	0	0	0	0	166	17	0	27	126	0	0	364	
3:45 PM	10	0	20	0	0	0	0	0	0	196	25	0	33	142	0	0	426	1477
4:00 PM	16	0	24	0	0	0	0	0	0	186	15	0	29	78	0	0	348	1489
4:15 PM	14	0	27	0	0	0	0	0	0	183	15	0	29	93	0	0	361	1499
4:30 PM	13	0	22	0	0	0	0	0	0	193	17	0	34	107	0	0	386	1521
4:45 PM	13	0	17	0	0	0	0	0	0	225	21	0	28	113	0	0	417	1512
5:00 PM	18	0	19	0	0	0	0	0	0	183	22	0	31	96	0	0	369	1533
5:15 PM	21	0	29	0	0	0	0	0	0	181	19	0	26	102	0	0	378	1550
5:30 PM	20	0	27	0	0	0	0	0	0	158	17	0	16	99	0	0	337	1501
5:45 PM	15	0	29	0	0	0	0	0	0	170	15	0	24	91	0	0	344	1428

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	40	0	80	0	0	0	0	0	0	784	100	0	132	568	0	0	1704
Heavy Trucks	0	0	0		0	0	0		0	12	0		12	12	0		36
Buses																	
Pedestrians		4				0				0				0			4
Bicycles	0	0	0		0	0	0		0	4	0		0	0	0		4
Scooters																	

Comments:

Report generated on 11/24/2020 6:50 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

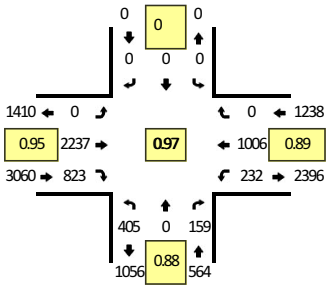
Type of peak hour being reported: System Peak

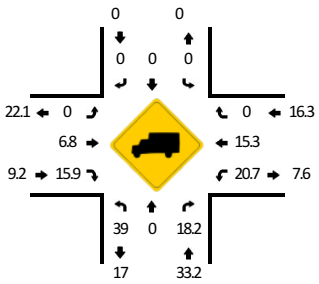
Method for determining peak hour: Total Entering Volume

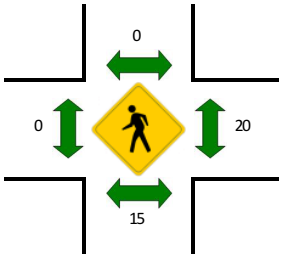
LOCATION: Sand Island Access Rd -- N Nimitz Hwy
CITY/STATE: Urban Honolulu, HI

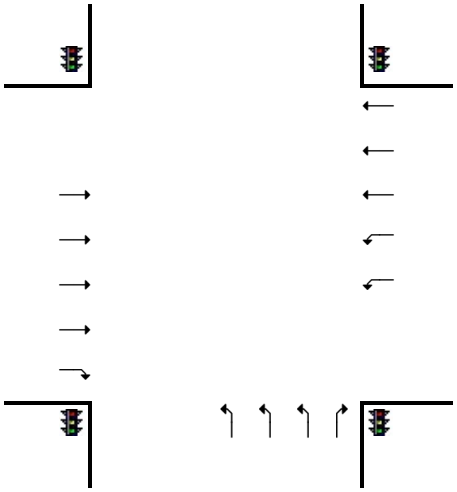
QC JOB #: 15303613
DATE: Wed, Nov 4 2020

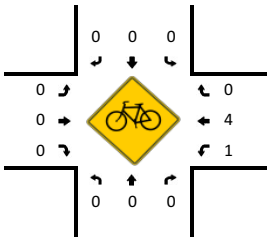
Peak-Hour: 7:15 AM -- 8:15 AM
Peak 15-Min: 7:30 AM -- 7:45 AM

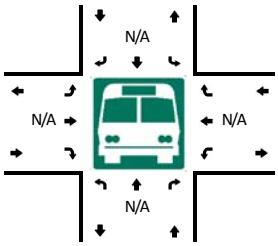


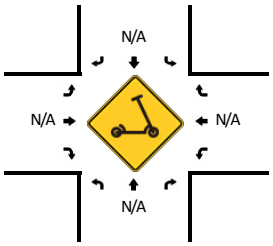












15-Min Count Period Beginning At	Sand Island Access Rd (Northbound)				Sand Island Access Rd (Southbound)				N Nimitz Hwy (Eastbound)				N Nimitz Hwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:00 AM	40	0	14	0	0	0	0	0	0	389	256	0	46	111	0	0	856	
6:15 AM	83	0	17	0	0	0	0	0	0	411	269	0	69	132	0	0	981	
6:30 AM	78	0	28	0	0	0	0	0	0	515	279	0	68	136	0	0	1104	
6:45 AM	54	0	26	0	0	0	0	0	0	578	255	0	79	181	0	0	1173	4114
7:00 AM	86	0	28	0	0	0	0	0	0	490	233	0	45	176	0	0	1058	4316
7:15 AM	93	0	41	0	0	0	0	0	0	594	212	0	56	232	0	0	1228	4563
7:30 AM	114	0	47	0	0	0	0	0	0	596	202	0	63	236	0	0	1258	4717
7:45 AM	105	0	36	1	0	0	0	0	0	542	217	0	50	254	0	0	1205	4749
8:00 AM	92	0	35	0	0	0	0	0	0	505	192	0	63	284	0	0	1171	4862
8:15 AM	94	0	42	1	0	0	0	0	0	399	176	0	53	195	0	0	960	4594
8:30 AM	108	0	45	0	0	0	0	0	0	392	136	0	57	268	0	0	1006	4342
8:45 AM	97	0	38	0	0	0	0	0	0	398	149	0	61	193	0	0	936	4073

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	456	0	188	0	0	0	0	0	0	2384	808	0	252	944	0	0	5032
Heavy Trucks	220	0	28		0	0	0		0	128	96		60	160	0		692
Buses																	
Pedestrians		12				0				0				28			40
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 11/24/2020 6:50 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

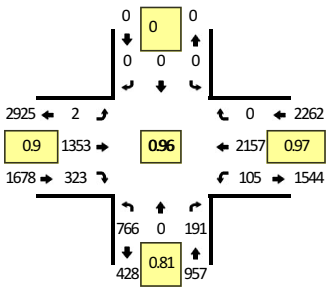
Type of peak hour being reported: System Peak

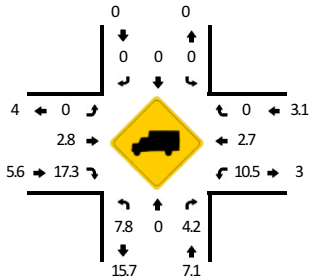
Method for determining peak hour: Total Entering Volume

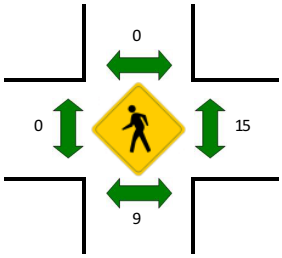
LOCATION: Sand Island Access Rd -- N Nimitz Hwy
CITY/STATE: Urban Honolulu, HI

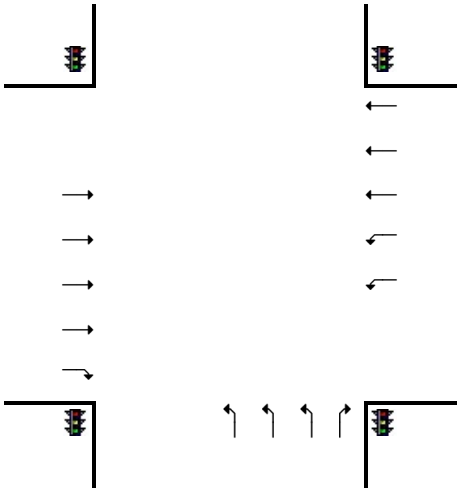
QC JOB #: 15303614
DATE: Wed, Nov 4 2020

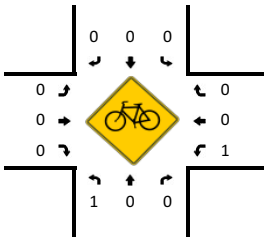
Peak-Hour: 3:15 PM -- 4:15 PM
Peak 15-Min: 3:45 PM -- 4:00 PM

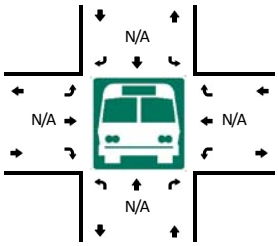


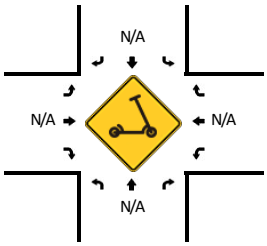












15-Min Count Period Beginning At	Sand Island Access Rd (Northbound)				Sand Island Access Rd (Southbound)				N Nimitz Hwy (Eastbound)				N Nimitz Hwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:00 PM	195	0	61	0	0	0	0	0	0	309	130	1	34	446	0	0	1176	
3:15 PM	189	0	41	0	0	0	0	0	0	378	87	0	22	539	0	0	1256	
3:30 PM	220	0	53	0	0	0	0	0	0	317	76	2	37	525	0	0	1230	
3:45 PM	241	0	54	0	0	0	0	0	0	339	83	0	24	532	0	0	1273	4935
4:00 PM	116	0	43	0	0	0	0	0	0	319	77	0	22	561	0	0	1138	4897
4:15 PM	93	0	28	0	0	0	0	0	0	212	42	0	12	368	0	0	755	4396
4:30 PM	56	0	20	0	0	0	0	0	0	172	32	0	7	401	0	0	688	3854
4:45 PM	72	0	27	0	0	0	0	0	0	181	29	0	8	372	0	0	689	3270
5:00 PM	67	0	21	0	0	0	0	0	0	154	30	0	13	310	0	0	595	2727
5:15 PM	49	0	21	0	0	0	0	0	0	157	26	0	12	272	0	0	537	2509
5:30 PM	42	0	21	0	0	0	0	0	0	113	19	0	18	233	0	1	447	2268
5:45 PM	27	0	13	0	0	0	0	0	0	109	24	0	7	238	0	0	418	1997

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	964	0	216	0	0	0	0	0	0	1356	332	0	96	2128	0	0	5092
Heavy Trucks	84	0	4		0	0	0		0	24	44		12	32	0		200
Buses																	
Pedestrians		16				0				0				24			40
Bicycles	4	0	0		0	0	0		0	0	0		0	0	0		4
Scooters																	

Comments:

Report generated on 11/24/2020 6:50 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

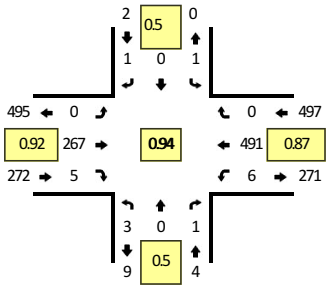
Type of peak hour being reported: System Peak

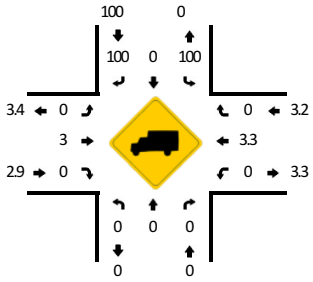
Method for determining peak hour: Total Entering Volume

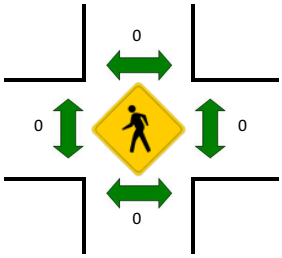
LOCATION: Roosevelt Ave -- Essex Rd
CITY/STATE: Honolulu County, HI

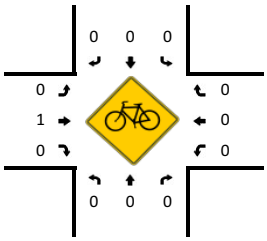
QC JOB #: 15303616
DATE: Thu, Oct 29 2020

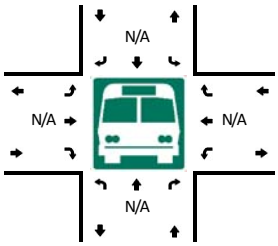
Peak-Hour: 7:15 AM -- 8:15 AM
Peak 15-Min: 7:30 AM -- 7:45 AM

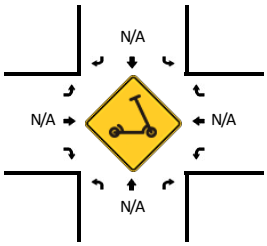












15-Min Count Period Beginning At	Roosevelt Ave (Northbound)				Roosevelt Ave (Southbound)				Essex Rd (Eastbound)				Essex Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:00 AM	1	0	0	0	0	0	0	0	0	43	0	0	1	86	0	0	131	
6:15 AM	0	0	0	0	0	0	0	0	0	46	1	0	0	81	0	0	128	
6:30 AM	1	0	0	0	0	0	0	0	0	76	0	0	0	112	0	0	189	
6:45 AM	1	0	0	0	0	0	0	0	0	64	1	0	0	104	0	0	170	618
7:00 AM	0	0	0	0	0	0	0	0	0	64	0	0	1	118	0	0	183	670
7:15 AM	0	0	0	0	0	0	0	0	0	61	2	0	0	111	0	0	174	716
7:30 AM	2	0	0	0	0	0	0	0	0	74	0	0	0	129	0	1	206	733
7:45 AM	1	0	0	0	1	0	0	0	0	60	1	0	1	142	0	0	206	769
8:00 AM	0	0	1	0	0	0	1	0	0	72	2	0	3	109	0	1	189	775
8:15 AM	0	0	1	0	0	1	0	0	0	74	3	0	2	120	0	0	201	802
8:30 AM	0	0	1	0	0	0	0	0	0	61	1	0	1	83	0	0	147	743
8:45 AM	2	0	1	0	0	0	0	0	0	50	0	0	0	99	0	0	152	689

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	8	0	0	0	0	0	0	0	0	296	0	0	0	516	0	4	824
Heavy Trucks	0	0	0		0	0	0		0	8	0		0	8	0		16
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 11/24/2020 6:50 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

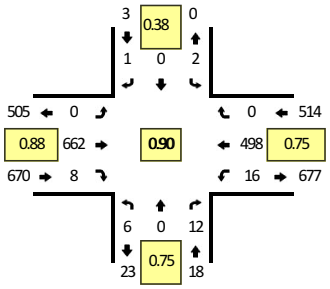
Type of peak hour being reported: System Peak

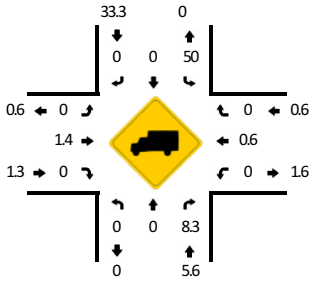
Method for determining peak hour: Total Entering Volume

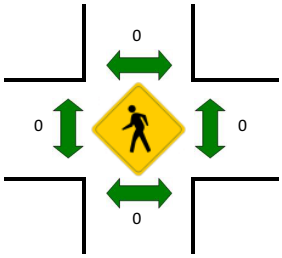
LOCATION: Roosevelt Ave -- Essex Rd
CITY/STATE: Honolulu County, HI

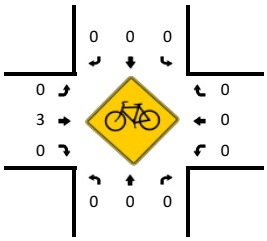
QC JOB #: 15303617
DATE: Thu, Oct 29 2020

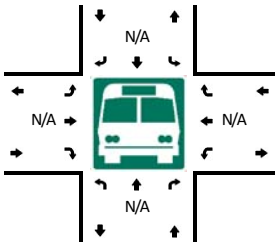
Peak-Hour: 3:15 PM -- 4:15 PM
Peak 15-Min: 3:30 PM -- 3:45 PM

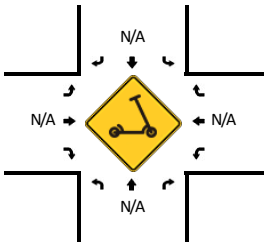












15-Min Count Period Beginning At	Roosevelt Ave (Northbound)				Roosevelt Ave (Southbound)				Essex Rd (Eastbound)				Essex Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:00 PM	1	0	1	0	0	0	0	0	0	143	0	0	6	128	0	0	279	
3:15 PM	1	0	1	0	0	0	0	0	0	145	1	0	2	101	0	0	251	
3:30 PM	3	0	3	0	2	0	0	0	0	155	1	0	4	167	0	1	336	
3:45 PM	1	0	3	0	0	0	0	0	0	178	0	0	2	138	0	0	322	1188
4:00 PM	1	0	5	0	0	0	1	0	0	184	6	0	7	92	0	0	296	1205
4:15 PM	1	0	2	0	0	0	1	0	0	169	3	0	5	103	0	0	284	1238
4:30 PM	2	0	2	0	0	0	0	0	0	188	2	0	2	103	0	0	299	1201
4:45 PM	1	0	1	0	1	0	0	0	0	202	1	0	4	123	0	0	333	1212
5:00 PM	2	0	1	0	0	0	0	0	0	190	4	0	1	100	0	0	298	1214
5:15 PM	1	0	1	0	0	0	0	0	0	180	2	0	2	105	0	0	291	1221
5:30 PM	2	0	3	0	0	0	0	0	0	167	1	0	1	106	0	0	280	1202
5:45 PM	4	0	1	0	0	0	0	0	0	175	3	0	3	100	0	0	286	1155

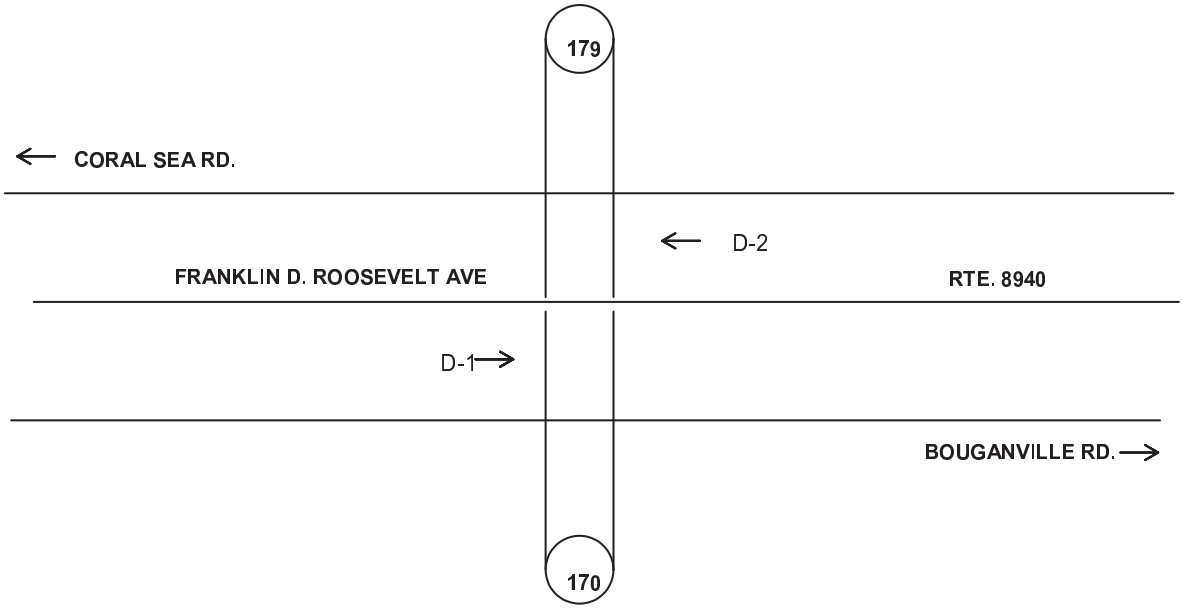
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	12	0	12	0	8	0	0	0	0	620	4	0	16	668	0	4	1344
Heavy Trucks	0	0	0		4	0	0		0	12	0		0	0	0		16
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 11/24/2020 6:50 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

ISLAND: OAHU
AREA: KALAELOA



Station No:	B72894000000

Station Location:			
Franklind D.Roosevelt Ave between Coral Sea Road and Bouganville Road			
Station Mileage:	1.39	GPS Coord (Latitude):	21.32788 N
		GPS Coord (Longitude):	158.05852 W
Begin Survey (Date/Time):	02/06/13	End Survey (Date/Time):	02/08/13
Survey Method: LOOP **HOSE** OTHER		Survey Type: VOL **CLASS** SPEED OTHER	
Survey Crew:	CA CO LT RG	Module No.:	

HPMS DATA

Segment Description:

FRANKLIN D. ROOSEVELT - GEIGER ROAD TO WEST PERIMETER FENCE BDRY

Segment Begin LRS	0.00	Segment End LRS	3.44	Length	3.44

Facility Name	Juris	Func Class	Area Type	Route No.	Route Mile		
						D-1 = Direction to End of Route	
						D-2 = Direction to Beginning of Route	
Franklin D.Roosevelt Ave	S			8940	1.39	D-1	To west fence boundary
						D-2	To Geiger Ave

Sketch By: EPJ Date: 1/13/2012 SLD: 2009

Run Date: 2014/05/08

Hawaii Department of Transportation
Highways Division — Highways Planning Survey Section
2013 Program Count - Summary

Site ID: B72894000000 **Town:** Oahu **DIR 1:** +MP **DIR 2:** -MP **Final AADT:** 11100
Functional Class: RURAL:MAJOR COLLECTOR **Count Type:** CLASS **Counter Type:** Tube **Route No:** 8940
Location: Franklin D Roosevelt Ave btwn Coral Sea Rd and Bougainville Rd

TIME-AM	DIR 1	DIR 2	TOTAL	TIME-AM	DIR 1	DIR 2	TOTAL	TIME-PM	DIR 1	DIR 2	TOTAL	TIME-PM	DIR 1	DIR 2	TOTAL
DATE : 02/06/2013															
12:00-12:15	8	8	16	06:00-06:15	100	85	185	12:00-12:15	82	71	153	06:00-06:15	110	59	169
12:15-12:30	8	2	10	06:15-06:30	115	99	214	12:15-12:30	71	88	159	06:15-06:30	82	101	183
12:30-12:45	8	9	17	06:30-06:45	124	104	228	12:30-12:45	80	93	173	06:30-06:45	121	89	210
12:45-01:00	4	4	8	06:45-07:00	118	112	230	12:45-01:00	91	95	186	06:45-07:00	100	118	218
01:00-01:15	7	2	9	07:00-07:15	106	101	207	01:00-01:15	77	88	165	07:00-07:15	61	69	130
01:15-01:30	3	3	6	07:15-07:30	152	164	316	01:15-01:30	74	99	173	07:15-07:30	72	64	136
01:30-01:45	3	7	10	07:30-07:45	155	154	309	01:30-01:45	89	100	189	07:30-07:45	50	65	115
01:45-02:00	3	5	8	07:45-08:00	189	152	341	01:45-02:00	90	78	168	07:45-08:00	44	44	88
02:00-02:15	4	4	8	08:00-08:15	108	115	223	02:00-02:15	91	29	120	08:00-08:15	34	34	68
02:15-02:30	6	4	10	08:15-08:30	107	80	187	02:15-02:30	94	70	164	08:15-08:30	35	33	68
02:30-02:45	6	2	8	08:30-08:45	85	109	194	02:30-02:45	110	67	177	08:30-08:45	28	37	65
02:45-03:00	4	5	9	08:45-09:00	93	91	184	02:45-03:00	125	62	187	08:45-09:00	23	35	58
03:00-03:15	5	3	8	09:00-09:15	71	81	152	03:00-03:15	104	63	167	09:00-09:15	16	25	41
03:15-03:30	9	6	15	09:15-09:30	86	86	172	03:15-03:30	103	34	137	09:15-09:30	25	31	56
03:30-03:45	6	14	20	09:30-09:45	92	101	193	03:30-03:45	112	113	225	09:30-09:45	29	20	49
03:45-04:00	11	14	25	09:45-10:00	82	92	174	03:45-04:00	107	97	204	09:45-10:00	18	25	43
04:00-04:15	11	9	20	10:00-10:15	100	81	181	04:00-04:15	111	106	217	10:00-10:15	23	30	53
04:15-04:30	25	19	44	10:15-10:30	86	79	165	04:15-04:30	104	118	222	10:15-10:30	15	18	33
04:30-04:45	33	37	70	10:30-10:45	116	61	177	04:30-04:45	115	120	235	10:30-10:45	13	19	32
04:45-05:00	38	38	76	10:45-11:00	83	19	102	04:45-05:00	109	61	170	10:45-11:00	9	10	19
05:00-05:15	52	44	96	11:00-11:15	81	51	132	05:00-05:15	76	36	112	11:00-11:15	6	9	15
05:15-05:30	50	61	111	11:15-11:30	94	51	145	05:15-05:30	95	29	124	11:15-11:30	13	11	24
05:30-05:45	83	91	174	11:30-11:45	93	67	160	05:30-05:45	114	30	144	11:30-11:45	12	5	17
05:45-06:00	89	102	191	11:45-12:00	110	65	175	05:45-06:00	105	95	200	11:45-12:00	8	8	16

AM COMMUTER PERIOD (05:00-09:00)	DIR 1	DIR 2	
TWO DIRECTIONAL PEAK			
AM - PEAK HR TIME	07:15 AM to 08:15 AM		
AM - PEAK HR VOLUME	604	585	1189
AM - K FACTOR (%)			10.08
AM - D (%)	50.80	49.20	100.00
DIRECTIONAL PEAK			
AM - PEAK HR TIME	07:15 AM to 08:15 AM	07:15 AM to 08:15 AM	
AM - PEAK HR VOLUME	604	585	

PM COMMUTER PERIOD (15:00-19:00)	DIR 1	DIR 2	
TWO DIRECTIONAL PEAK			
PM - PEAK HR TIME	03:45 PM to 04:45 PM		
PM - PEAK HR VOLUME	437	441	878
PM - K FACTOR (%)			7.45
PM - D (%)	49.77	50.23	100.00
DIRECTIONAL PEAK			
PM - PEAK HR TIME	04:00 PM to 05:00 PM	03:45 PM to 04:45 PM	
PM - PEAK HR VOLUME	439	441	

AM PERIOD (00:00-12:00)			
TWO DIRECTIONAL PEAK			
AM - PEAK HR TIME	07:15 AM to 08:15 AM		
AM - PEAK HR VOLUME	604	585	1189
AM - K FACTOR (%)			10.08
AM - D (%)	50.80	49.20	100.00

PM PERIOD (12:00-24:00)			
TWO DIRECTIONAL PEAK			
PM - PEAK HR TIME	03:45 PM to 04:45 PM		
PM - PEAK HR VOLUME	437	441	878
PM - K FACTOR (%)			7.45
PM - D (%)	49.77	50.23	100.00

NON-COMMUTER PERIOD (09:00-15:00)			
TWO DIRECTIONAL PEAK			
PEAK HR TIME	09:15 AM to 10:15 AM		
PEAK HR VOLUME	360	360	720
DIRECTIONAL PEAK			
PEAK HR TIME	02:00 PM to 03:00 PM	12:45 PM to 01:45 PM	
PEAK HR VOLUME	420	382	

6-HR, 12-HR, 24-HR PERIODS	DIR 1	DIR 2	Total
AM 6-HR PERIOD (06:00-12:00)	2,546	2,200	4,746
AM 12-HR PERIOD (00:00-12:00)	3,022	2,693	5,715
PM 6-HR PERIOD (12:00-18:00)	2,329	1,842	4,171
PM 12-HR PERIOD (12:00-24:00)	3,276	2,801	6,077
24 HOUR PERIOD	6,298	5,494	11,792
D (%)	53.41	46.59	100.00

Run Date: 2014/05/08

Hawaii Department of Transportation
Highways Division — Highways Planning Survey Section
2013 Program Count - Summary

Site ID: B72894000000 **Town:** Oahu **DIR 1:** +MP **DIR 2:** -MP **Final AADT:** 11100
Functional Class: RURAL:MAJOR COLLECTOR **Count Type:** CLASS **Counter Type:** Tube **Route No:** 8940
Location: Franklin D Roosevelt Ave btwn Coral Sea Rd and Bougainville Rd

TIME-AM	DIR 1	DIR 2	TOTAL	TIME-AM	DIR 1	DIR 2	TOTAL	TIME-PM	DIR 1	DIR 2	TOTAL	TIME-PM	DIR 1	DIR 2	TOTAL
DATE : 02/07/2013															
12:00-12:15	3	7	10	06:00-06:15	98	83	181	12:00-12:15	81	25	106	06:00-06:15	92	70	162
12:15-12:30	11	8	19	06:15-06:30	119	108	227	12:15-12:30	90	67	157	06:15-06:30	96	73	169
12:30-12:45	2	4	6	06:30-06:45	105	94	199	12:30-12:45	80	43	123	06:30-06:45	99	110	209
12:45-01:00	2	4	6	06:45-07:00	121	121	242	12:45-01:00	86	48	134	06:45-07:00	81	82	163
01:00-01:15	10	5	15	07:00-07:15	119	107	226	01:00-01:15	100	88	188	07:00-07:15	79	82	161
01:15-01:30	3	2	5	07:15-07:30	167	154	321	01:15-01:30	83	67	150	07:15-07:30	58	59	117
01:30-01:45	7	4	11	07:30-07:45	175	166	341	01:30-01:45	121	77	198	07:30-07:45	57	66	123
01:45-02:00	2	5	7	07:45-08:00	173	149	322	01:45-02:00	122	77	199	07:45-08:00	45	46	91
02:00-02:15	3	8	11	08:00-08:15	124	110	234	02:00-02:15	116	83	199	08:00-08:15	31	38	69
02:15-02:30	4	4	8	08:15-08:30	112	107	219	02:15-02:30	110	98	208	08:15-08:30	34	34	68
02:30-02:45	4	4	8	08:30-08:45	83	89	172	02:30-02:45	101	80	181	08:30-08:45	35	24	59
02:45-03:00	3	4	7	08:45-09:00	99	107	206	02:45-03:00	110	86	196	08:45-09:00	30	42	72
03:00-03:15	6	8	14	09:00-09:15	92	85	177	03:00-03:15	106	91	197	09:00-09:15	25	39	64
03:15-03:30	7	5	12	09:15-09:30	95	92	187	03:15-03:30	93	123	216	09:15-09:30	27	31	58
03:30-03:45	8	12	20	09:30-09:45	92	94	186	03:30-03:45	118	78	196	09:30-09:45	22	28	50
03:45-04:00	12	15	27	09:45-10:00	112	75	187	03:45-04:00	109	110	219	09:45-10:00	19	25	44
04:00-04:15	8	14	22	10:00-10:15	104	78	182	04:00-04:15	103	102	205	10:00-10:15	15	25	40
04:15-04:30	20	20	40	10:15-10:30	77	60	137	04:15-04:30	116	134	250	10:15-10:30	18	17	35
04:30-04:45	26	36	62	10:30-10:45	102	61	163	04:30-04:45	128	98	226	10:30-10:45	14	11	25
04:45-05:00	45	51	96	10:45-11:00	103	46	149	04:45-05:00	113	51	164	10:45-11:00	10	16	26
05:00-05:15	44	40	84	11:00-11:15	92	73	165	05:00-05:15	93	28	121	11:00-11:15	11	7	18
05:15-05:30	63	62	125	11:15-11:30	90	83	173	05:15-05:30	100	91	191	11:15-11:30	7	7	14
05:30-05:45	89	78	167	11:30-11:45	81	61	142	05:30-05:45	105	43	148	11:30-11:45	6	11	17
05:45-06:00	99	80	179	11:45-12:00	99	49	148	05:45-06:00	98	42	140	11:45-12:00	16	9	25

AM COMMUTER PERIOD (05:00-09:00)	DIR 1	DIR 2	
TWO DIRECTIONAL PEAK			
AM - PEAK HR TIME	07:15 AM to 08:15 AM		
AM - PEAK HR VOLUME	639	579	1218
AM - K FACTOR (%)			10.12
AM - D (%)	52.46	47.54	100.00
DIRECTIONAL PEAK			
AM - PEAK HR TIME	07:15 AM to 08:15 AM	07:15 AM to 08:15 AM	
AM - PEAK HR VOLUME	639	579	

PM COMMUTER PERIOD (15:00-19:00)	DIR 1	DIR 2	
TWO DIRECTIONAL PEAK			
PM - PEAK HR TIME	03:45 PM to 04:45 PM		
PM - PEAK HR VOLUME	456	444	900
PM - K FACTOR (%)			7.48
PM - D (%)	50.67	49.33	100.00
DIRECTIONAL PEAK			
PM - PEAK HR TIME	04:00 PM to 05:00 PM	03:45 PM to 04:45 PM	
PM - PEAK HR VOLUME	460	444	

AM PERIOD (00:00-12:00)			
TWO DIRECTIONAL PEAK			
AM - PEAK HR TIME	07:15 AM to 08:15 AM		
AM - PEAK HR VOLUME	639	579	1218
AM - K FACTOR (%)			10.12
AM - D (%)	52.46	47.54	100.00

PM PERIOD (12:00-24:00)			
TWO DIRECTIONAL PEAK			
PM - PEAK HR TIME	03:45 PM to 04:45 PM		
PM - PEAK HR VOLUME	456	444	900
PM - K FACTOR (%)			7.48
PM - D (%)	50.67	49.33	100.00

NON-COMMUTER PERIOD (09:00-15:00)			
TWO DIRECTIONAL PEAK			
PEAK HR TIME	01:30 PM to 02:30 PM		
PEAK HR VOLUME	469	335	804
DIRECTIONAL PEAK			
PEAK HR TIME	01:30 PM to 02:30 PM	02:00 PM to 03:00 PM	
PEAK HR VOLUME	469	347	

6-HR, 12-HR, 24-HR PERIODS	DIR 1	DIR 2	Total
AM 6-HR PERIOD (06:00-12:00)	2,634	2,252	4,886
AM 12-HR PERIOD (00:00-12:00)	3,115	2,732	5,847
PM 6-HR PERIOD (12:00-18:00)	2,482	1,830	4,312
PM 12-HR PERIOD (12:00-24:00)	3,409	2,782	6,191
24 HOUR PERIOD	6,524	5,514	12,038
D (%)	54.20	45.80	100.00

Run Date: 2014/05/08

Hawaii Department of Transportation
Highways Division
Highways Planning Survey Section

Vehicle Classification Data Summary
2013

Site ID:	**B72894000000**	**Route No:**	**8940**	**Date From:**	2013/02/06 0:00
Town:	**Oahu**	**Direction:**	+MP	**Date To:**	2013/02/07 23:45

Location: **Franklin D Roosevelt Ave btwn Coral Sea Rd and Bougainville Rd**

Functional Classification: **7 RURAL:MAJOR COLLECTOR**

REPORT TOTALS - 48 HOURS RECORDED

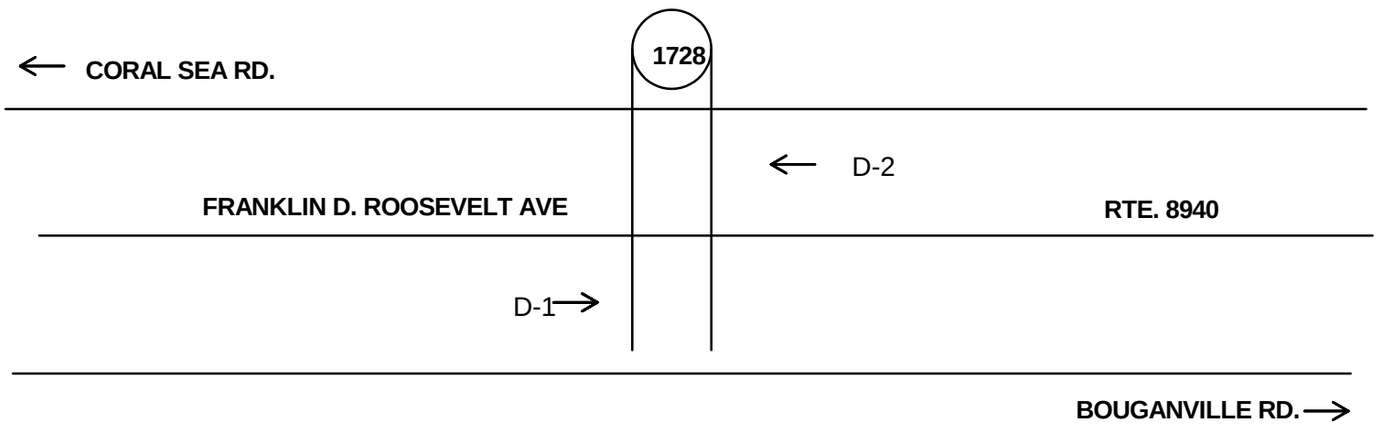
	VOLUME	%	NUMBER OF AXLES
Cycles	164	0.69%	329
PC	19962	83.77%	39923
2A-4T	2890	12.13%	5779
LIGHT VEHICLE TOTALS	23016	96.58%	46032
	HEAVY VEHICLES		
Bus	113	0.47%	282
SINGLE UNIT TRUCK			
2A-6T	344	1.45%	688
3A-SU	199	0.84%	597
4A-SU	1	0.00%	4
SINGLE-TRAILER TRUCKS			
4A-ST	32	0.14%	128
5A-ST	108	0.45%	540
6A-ST	16	0.07%	96
MULTI-TRAILER TRUCKS			
5A-MT	0	0.00%	0
6A-MT	0	0.00%	0
7A-MT	0	0.00%	0
HEAVY VEHICLE TOTALS	814	3.41%	2335
CLASSIFIED VEHICLES TOTALS	23829 (A)	100.00%	48366 (B)
UNCLASSIFIED VEHICLES TOTALS	1	0.00%	

AXLE CORRECTION FACTOR (A/C) = 0.985

ROADTUBE EQUIVALENT(B/2) = 24183 (C)

PEAK HOUR VOLUME : 1210 2013/02/07 07:00	**PEAK HOUR TRUCK VOLUME**	**% TOTAL PEAK HOUR VOLUME**	**24 HOUR TRUCK VOLUME**	**AADT**	**% OF AADT**	**HPMS K-FACTOR (PEAK/AADT) (ITEM 66)**
SINGLE UNIT TRUCKS (TYPE 4-7)	**25**	**(65A-1) 2.08%**	**326**	**11100**	**(65A-2) 2.94%**	**10.90%**
COMBINATION (TYPE 8-13)	**3**	**(65B-1) 0.25%**	**77**		**(65B-2) 0.69%**	**10.90%**

N
ISLAND: OAHU
AREA: KALAELOA



Station No:	B72894000120

Station Location:			
Franklind D.Roosevelt Ave between Coral Sea Road and Bouganville Road			
Station Mileage:	1.39	GPS Coord (Latitude):	21.32788 N
		GPS Coord (Longitude):	158.05852 W
Begin Survey (Date/Time):	9-15-14 0000	End Survey (Date/Time):	9-18-14 0000
Survey Method: LOOP **HOSE** OTHER		Survey Type: VOL **CLASS** SPEED OTHER	
Survey Crew:	FIELD CREW	Module No.:	

HPMS DATA							
Segment Description:							
FRANKLIN D. ROOSEVELT - GEIGER ROAD TO WEST PERIMETER FENCE BDRY							
Segment Begin LRS	1.20	Segment End LRS		1.57		Length	0.37
Facility Name	Juris	Func Class	Area Type	Route No.	Route Mile	D-1 = Direction to End of Route D-2 = Direction to Beginning of Route	
Franklin D.Roosevelt Ave	S			8940	1.39	D-1	To west fence boundary
						D-2	To Geiger Ave

Sketch By: EPJ Date: 1/13/2012 SLD: 2009

Run Date: 2015/06/02

Hawaii Department of Transportation
Highways Division — Highways Planning Survey Section
2014 Program Count - Summary

Site ID: B72894000120 **Town:** Oahu **DIR 1:** +MP **DIR 2:** -MP **Final AADT:** 12500
Functional Class: TEST NEW URBAN: MINOR COLLECTOR **Count Type:** CLASS **Counter Type:** Tube **Route No:** 8940
Location: Franklind D. Roosevelt Ave btwn Coral Sea Rd _Bougainville Rd

TIME-AM	DIR 1	DIR 2	TOTAL	TIME-AM	DIR 1	DIR 2	TOTAL	TIME-PM	DIR 1	DIR 2	TOTAL	TIME-PM	DIR 1	DIR 2	TOTAL
DATE : 09/16/2014															
12:00-12:15	6	6	12	06:00-06:15	85	98	183	12:00-12:15	98	70	168	06:00-06:15	99	97	196
12:15-12:30	7	4	11	06:15-06:30	61	158	219	12:15-12:30	96	96	192	06:15-06:30	79	77	156
12:30-12:45	6	5	11	06:30-06:45	78	158	236	12:30-12:45	128	72	200	06:30-06:45	105	40	145
12:45-01:00	4	10	14	06:45-07:00	80	169	249	12:45-01:00	113	80	193	06:45-07:00	121	28	149
01:00-01:15	2	5	7	07:00-07:15	75	118	193	01:00-01:15	125	74	199	07:00-07:15	68	47	115
01:15-01:30	4	4	8	07:15-07:30	57	95	152	01:15-01:30	132	83	215	07:15-07:30	63	38	101
01:30-01:45	7	1	8	07:30-07:45	55	92	147	01:30-01:45	113	97	210	07:30-07:45	76	23	99
01:45-02:00	4	7	11	07:45-08:00	63	98	161	01:45-02:00	119	122	241	07:45-08:00	76	26	102
02:00-02:15	4	6	10	08:00-08:15	59	99	158	02:00-02:15	140	85	225	08:00-08:15	66	28	94
02:15-02:30	7	10	17	08:15-08:30	77	88	165	02:15-02:30	128	100	228	08:15-08:30	60	30	90
02:30-02:45	3	12	15	08:30-08:45	65	94	159	02:30-02:45	150	98	248	08:30-08:45	51	22	73
02:45-03:00	8	18	26	08:45-09:00	62	82	144	02:45-03:00	178	89	267	08:45-09:00	44	26	70
03:00-03:15	9	22	31	09:00-09:15	56	94	150	03:00-03:15	154	97	251	09:00-09:15	49	17	66
03:15-03:30	13	23	36	09:15-09:30	79	90	169	03:15-03:30	166	78	244	09:15-09:30	53	8	61
03:30-03:45	9	45	54	09:30-09:45	75	87	162	03:30-03:45	206	81	287	09:30-09:45	19	18	37
03:45-04:00	15	68	83	09:45-10:00	90	80	170	03:45-04:00	188	77	265	09:45-10:00	34	12	46
04:00-04:15	14	49	63	10:00-10:15	86	92	178	04:00-04:15	182	70	252	10:00-10:15	18	7	25
04:15-04:30	35	62	97	10:15-10:30	111	87	198	04:15-04:30	188	95	283	10:15-10:30	17	10	27
04:30-04:45	34	96	130	10:30-10:45	107	72	179	04:30-04:45	170	75	245	10:30-10:45	12	16	28
04:45-05:00	52	79	131	10:45-11:00	111	115	226	04:45-05:00	144	94	238	10:45-11:00	9	6	15
05:00-05:15	62	90	152	11:00-11:15	109	74	183	05:00-05:15	139	83	222	11:00-11:15	13	6	19
05:15-05:30	66	122	188	11:15-11:30	93	82	175	05:15-05:30	140	120	260	11:15-11:30	8	3	11
05:30-05:45	89	127	216	11:30-11:45	98	78	176	05:30-05:45	112	105	217	11:30-11:45	13	7	20
05:45-06:00	102	125	227	11:45-12:00	98	87	185	05:45-06:00	126	92	218	11:45-12:00	8	7	15

AM COMMUTER PERIOD (05:00-09:00)	DIR 1	DIR 2	
TWO DIRECTIONAL PEAK			
AM - PEAK HR TIME	06:15 AM to 07:15 AM		
AM - PEAK HR VOLUME	294	603	897
AM - K FACTOR (%)			6.79
AM - D (%)	32.78	67.22	100.00
DIRECTIONAL PEAK			
AM - PEAK HR TIME	05:15 AM to 06:15 AM	06:15 AM to 07:15 AM	
AM - PEAK HR VOLUME	342	603	

PM COMMUTER PERIOD (15:00-19:00)	DIR 1	DIR 2	
TWO DIRECTIONAL PEAK			
PM - PEAK HR TIME	03:30 PM to 04:30 PM		
PM - PEAK HR VOLUME	764	323	1087
PM - K FACTOR (%)			8.23
PM - D (%)	70.29	29.71	100.00
DIRECTIONAL PEAK			
PM - PEAK HR TIME	03:30 PM to 04:30 PM	05:15 PM to 06:15 PM	
PM - PEAK HR VOLUME	764	414	

AM PERIOD (00:00-12:00)			
TWO DIRECTIONAL PEAK			
AM - PEAK HR TIME	06:15 AM to 07:15 AM		
AM - PEAK HR VOLUME	294	603	897
AM - K FACTOR (%)			6.79
AM - D (%)	32.78	67.22	100.00

PM PERIOD (12:00-24:00)			
TWO DIRECTIONAL PEAK			
PM - PEAK HR TIME	03:30 PM to 04:30 PM		
PM - PEAK HR VOLUME	764	323	1087
PM - K FACTOR (%)			8.23
PM - D (%)	70.29	29.71	100.00

NON-COMMUTER PERIOD (09:00-15:00)			
TWO DIRECTIONAL PEAK			
PEAK HR TIME	02:00 PM to 03:00 PM		
PEAK HR VOLUME	596	372	968
DIRECTIONAL PEAK			
PEAK HR TIME	02:00 PM to 03:00 PM	01:45 PM to 02:45 PM	
PEAK HR VOLUME	596	405	

6-HR, 12-HR, 24-HR PERIODS	DIR 1	DIR 2	Total
AM 6-HR PERIOD (06:00-12:00)	1,930	2,387	4,317
AM 12-HR PERIOD (00:00-12:00)	2,492	3,383	5,875
PM 6-HR PERIOD (12:00-18:00)	3,435	2,133	5,568
PM 12-HR PERIOD (12:00-24:00)	4,596	2,732	7,328
24 HOUR PERIOD	7,088	6,115	13,203
D (%)	53.68	46.32	100.00

Run Date: 2015/06/02

Hawaii Department of Transportation
Highways Division — Highways Planning Survey Section
2014 Program Count - Summary

Site ID: B72894000120 **Town:** Oahu **DIR 1:** +MP **DIR 2:** -MP **Final AADT:** 12500
Functional Class: TEST NEW URBAN: MINOR COLLECTOR **Count Type:** CLASS **Counter Type:** Tube **Route No:** 8940
Location: Franklind D. Roosevelt Ave btwn Coral Sea Rd _Bougainville Rd

TIME-AM	DIR 1	DIR 2	TOTAL	TIME-AM	DIR 1	DIR 2	TOTAL	TIME-PM	DIR 1	DIR 2	TOTAL	TIME-PM	DIR 1	DIR 2	TOTAL
DATE : 09/17/2014															
12:00-12:15	6	5	11	06:00-06:15	91	100	191	12:00-12:15	108	102	210	06:00-06:15	116	80	196
12:15-12:30	6	2	8	06:15-06:30	85	145	230	12:15-12:30	116	92	208	06:15-06:30	102	60	162
12:30-12:45	4	3	7	06:30-06:45	76	137	213	12:30-12:45	95	109	204	06:30-06:45	87	59	146
12:45-01:00	6	6	12	06:45-07:00	74	169	243	12:45-01:00	122	102	224	06:45-07:00	91	52	143
01:00-01:15	5	8	13	07:00-07:15	62	112	174	01:00-01:15	89	83	172	07:00-07:15	74	44	118
01:15-01:30	1	4	5	07:15-07:30	76	105	181	01:15-01:30	124	89	213	07:15-07:30	72	36	108
01:30-01:45	2	4	6	07:30-07:45	80	86	166	01:30-01:45	129	86	215	07:30-07:45	60	30	90
01:45-02:00	7	3	10	07:45-08:00	63	96	159	01:45-02:00	141	81	222	07:45-08:00	62	33	95
02:00-02:15	5	4	9	08:00-08:15	61	79	140	02:00-02:15	142	70	212	08:00-08:15	66	28	94
02:15-02:30	2	12	14	08:15-08:30	55	69	124	02:15-02:30	132	93	225	08:15-08:30	51	34	85
02:30-02:45	7	14	21	08:30-08:45	50	110	160	02:30-02:45	144	99	243	08:30-08:45	57	26	83
02:45-03:00	6	19	25	08:45-09:00	62	101	163	02:45-03:00	160	82	242	08:45-09:00	40	24	64
03:00-03:15	14	16	30	09:00-09:15	74	89	163	03:00-03:15	159	99	258	09:00-09:15	49	14	63
03:15-03:30	12	23	35	09:15-09:30	70	86	156	03:15-03:30	163	86	249	09:15-09:30	47	13	60
03:30-03:45	9	47	56	09:30-09:45	57	90	147	03:30-03:45	158	100	258	09:30-09:45	38	15	53
03:45-04:00	18	59	77	09:45-10:00	87	81	168	03:45-04:00	197	75	272	09:45-10:00	20	16	36
04:00-04:15	17	54	71	10:00-10:15	64	82	146	04:00-04:15	191	66	257	10:00-10:15	18	12	30
04:15-04:30	21	57	78	10:15-10:30	96	72	168	04:15-04:30	153	81	234	10:15-10:30	17	8	25
04:30-04:45	28	98	126	10:30-10:45	88	96	184	04:30-04:45	158	72	230	10:30-10:45	17	8	25
04:45-05:00	38	103	141	10:45-11:00	116	83	199	04:45-05:00	130	72	202	10:45-11:00	14	9	23
05:00-05:15	60	84	144	11:00-11:15	99	93	192	05:00-05:15	117	79	196	11:00-11:15	11	9	20
05:15-05:30	64	115	179	11:15-11:30	102	74	176	05:15-05:30	109	70	179	11:15-11:30	9	5	14
05:30-05:45	60	92	152	11:30-11:45	113	74	187	05:30-05:45	107	101	208	11:30-11:45	15	3	18
05:45-06:00	99	125	224	11:45-12:00	110	90	200	05:45-06:00	121	83	204	11:45-12:00	10	7	17

AM COMMUTER PERIOD (05:00-09:00)	DIR 1	DIR 2	
TWO DIRECTIONAL PEAK			
AM - PEAK HR TIME	06:00 AM to 07:00 AM		
AM - PEAK HR VOLUME	326	551	877
AM - K FACTOR (%)			6.86
AM - D (%)	37.17	62.83	100.00
DIRECTIONAL PEAK			
AM - PEAK HR TIME	05:45 AM to 06:45 AM	06:15 AM to 07:15 AM	
AM - PEAK HR VOLUME	351	563	

PM COMMUTER PERIOD (15:00-19:00)	DIR 1	DIR 2	
TWO DIRECTIONAL PEAK			
PM - PEAK HR TIME	03:00 PM to 04:00 PM		
PM - PEAK HR VOLUME	677	360	1037
PM - K FACTOR (%)			8.11
PM - D (%)	65.28	34.72	100.00
DIRECTIONAL PEAK			
PM - PEAK HR TIME	03:15 PM to 04:15 PM	03:00 PM to 04:00 PM	
PM - PEAK HR VOLUME	709	360	

AM PERIOD (00:00-12:00)			
TWO DIRECTIONAL PEAK			
AM - PEAK HR TIME	06:00 AM to 07:00 AM		
AM - PEAK HR VOLUME	326	551	877
AM - K FACTOR (%)			6.86
AM - D (%)	37.17	62.83	100.00

PM PERIOD (12:00-24:00)			
TWO DIRECTIONAL PEAK			
PM - PEAK HR TIME	03:00 PM to 04:00 PM		
PM - PEAK HR VOLUME	677	360	1037
PM - K FACTOR (%)			8.11
PM - D (%)	65.28	34.72	100.00

NON-COMMUTER PERIOD (09:00-15:00)			
TWO DIRECTIONAL PEAK			
PEAK HR TIME	02:00 PM to 03:00 PM		
PEAK HR VOLUME	578	344	922
DIRECTIONAL PEAK			
PEAK HR TIME	02:00 PM to 03:00 PM	12:00 PM to 01:00 PM	
PEAK HR VOLUME	578	405	

6-HR, 12-HR, 24-HR PERIODS	DIR 1	DIR 2	Total
AM 6-HR PERIOD (06:00-12:00)	1,911	2,319	4,230
AM 12-HR PERIOD (00:00-12:00)	2,408	3,276	5,684
PM 6-HR PERIOD (12:00-18:00)	3,265	2,072	5,337
PM 12-HR PERIOD (12:00-24:00)	4,408	2,697	7,105
24 HOUR PERIOD	6,816	5,973	12,789
D (%)	53.30	46.70	100.00

Run Date: 2015/06/02

Hawaii Department of Transportation
Highways Division
Highways Planning Survey Section

Vehicle Classification Data Summary
2014

Site ID:	**B72894000120**	**Route No:**	**8940**	**Date From:**	2014/09/16 0:00
Town:	**Oahu**	**Direction:**	+MP	**Date To:**	2014/09/17 23:45
Location:	**Franklind D. Roosevelt Ave btwn Coral Sea Rd _Bougainville Rd**				

Functional Classification: 18 TEST NEW URBAN: MINOR COLLECTOR

REPORT TOTALS - 48 HOURS RECORDED

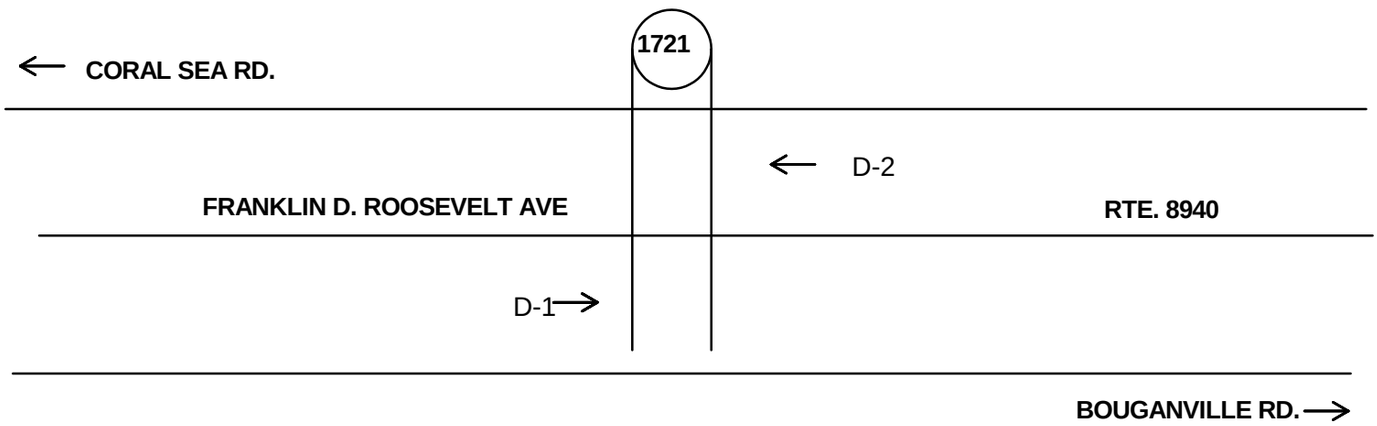
	VOLUME	%	NUMBER OF AXLES
Cycles	268	1.03%	535
PC	19166	73.74%	38332
2A-4T	4746	18.26%	9492
LIGHT VEHICLE TOTALS	24180	93.03%	48359
	HEAVY VEHICLES		
Bus	716	2.75%	1790
SINGLE UNIT TRUCK			
2A-6T	689	2.65%	1378
3A-SU	144	0.55%	432
4A-SU	3	0.01%	12
SINGLE-TRAILER TRUCKS			
4A-ST	155	0.60%	620
5A-ST	62	0.24%	310
6A-ST	9	0.03%	54
MULTI-TRAILER TRUCKS			
5A-MT	33	0.13%	165
6A-MT	0	0.00%	0
7A-MT	2	0.01%	14
HEAVY VEHICLE TOTALS	1813	6.98%	4775
CLASSIFIED VEHICLES TOTALS	25993 (A)	100.00%	53134 (B)
UNCLASSIFIED VEHICLES TOTALS	-1	-0.00%	

AXLE CORRECTION FACTOR (A/C) = 0.978

ROADTUBE EQUIVALENT(B/2) = 26567 (C)

PEAK HOUR VOLUME : 1047 **2014/09/16 15:00**	**PEAK HOUR TRUCK VOLUME**	**% TOTAL PEAK HOUR VOLUME**	**24 HOUR TRUCK VOLUME**	**AADT**	**% OF AADT**	**HPMS K-FACTOR (PEAK/AADT) (ITEM 66)**
SINGLE UNIT TRUCKS (TYPE 4-7)	**62**	**(65A-1) 5.92%**	**776**	**12500**	**(65A-2) 6.21%**	**8.38%**
COMBINATION (TYPE 8-13)	**19**	**(65B-1) 1.81%**	**130**		**(65B-2) 1.04%**	**8.38%**

N
ISLAND: OAHU
AREA: KALAELOA



Station No:	B72894000120

Station Location:			
Franklind D.Roosevelt Ave between Coral Sea Road and Bouganville Road			
Station Mileage:	1.39	GPS Coord (Latitude):	21.32788 N
		GPS Coord (Longitude):	158.05852 W
Begin Survey (Date/Time):	8-17-15 0000	End Survey (Date/Time):	8-20-15 0000
Survey Method: LOOP **HOSE** OTHER		Survey Type: VOL **CLASS** SPEED OTHER	
Survey Crew:	FIELD CREW	Module No.:	

HPMS DATA							
Segment Description:							
FRANKLIN D. ROOSEVELT - GEIGER ROAD TO WEST PERIMETER FENCE BDRY							
Segment Begin LRS	1.20	Segment End LRS		1.57		Length	0.37
Facility Name	Juris	Func Class	Area Type	Route No.	Route Mile	D-1 = Direction to End of Route D-2 = Direction to Beginning of Route	
Franklin D.Roosevelt Ave	S			8940	1.39	D-1	To west fence boundary
						D-2	To Geiger Ave

Sketch By: EPJ Date: 1/13/2012 SLD: 2009

Run Date: 2016/06/07

Hawaii Department of Transportation
Highways Division — Highways Planning Survey Section
2015 Program Count - Summary

Site ID: B72894000120 **Town:** Oahu **DIR 1:** +MP **DIR 2:** -MP **Final AADT:** 11500
Functional Class: TEST NEW URBAN: MINOR COLLECTOR **Count Type:** CLASS **Counter Type:** Tube **Route No:** 8940
Location: Franklind D. Roosevelt Ave btwn Coral Sea Rd _Bougainville Rd

TIME-AM	DIR 1	DIR 2	TOTAL	TIME-AM	DIR 1	DIR 2	TOTAL	TIME-PM	DIR 1	DIR 2	TOTAL	TIME-PM	DIR 1	DIR 2	TOTAL
DATE : 08/18/2015															
12:00-12:15	12	11	23	06:00-06:15	55	72	127	12:00-12:15	99	60	159	06:00-06:15	110	77	187
12:15-12:30	7	3	10	06:15-06:30	62	122	184	12:15-12:30	100	84	184	06:15-06:30	106	97	203
12:30-12:45	11	4	15	06:30-06:45	51	123	174	12:30-12:45	106	79	185	06:30-06:45	117	88	205
12:45-01:00	8	9	17	06:45-07:00	83	118	201	12:45-01:00	91	84	175	06:45-07:00	101	94	195
01:00-01:15	8	5	13	07:00-07:15	90	109	199	01:00-01:15	89	81	170	07:00-07:15	90	67	157
01:15-01:30	2	8	10	07:15-07:30	78	152	230	01:15-01:30	94	67	161	07:15-07:30	76	80	156
01:30-01:45	9	4	13	07:30-07:45	67	146	213	01:30-01:45	107	81	188	07:30-07:45	87	58	145
01:45-02:00	8	6	14	07:45-08:00	76	143	219	01:45-02:00	115	75	190	07:45-08:00	96	42	138
02:00-02:15	7	8	15	08:00-08:15	60	134	194	02:00-02:15	103	85	188	08:00-08:15	89	46	135
02:15-02:30	4	9	13	08:15-08:30	71	87	158	02:15-02:30	106	65	171	08:15-08:30	77	33	110
02:30-02:45	8	9	17	08:30-08:45	56	93	149	02:30-02:45	113	98	211	08:30-08:45	60	34	94
02:45-03:00	11	0	11	08:45-09:00	64	86	150	02:45-03:00	125	110	235	08:45-09:00	53	44	97
03:00-03:15	6	5	11	09:00-09:15	50	71	121	03:00-03:15	141	73	214	09:00-09:15	54	31	85
03:15-03:30	4	2	6	09:15-09:30	57	94	151	03:15-03:30	109	79	188	09:15-09:30	54	33	87
03:30-03:45	7	8	15	09:30-09:45	65	75	140	03:30-03:45	143	72	215	09:30-09:45	45	19	64
03:45-04:00	3	15	18	09:45-10:00	59	62	121	03:45-04:00	145	105	250	09:45-10:00	39	20	59
04:00-04:15	9	16	25	10:00-10:15	73	91	164	04:00-04:15	169	79	248	10:00-10:15	45	27	72
04:15-04:30	12	20	32	10:15-10:30	68	89	157	04:15-04:30	147	102	249	10:15-10:30	28	25	53
04:30-04:45	7	31	38	10:30-10:45	88	78	166	04:30-04:45	162	80	242	10:30-10:45	29	10	39
04:45-05:00	15	39	54	10:45-11:00	80	75	155	04:45-05:00	163	63	226	10:45-11:00	30	14	44
05:00-05:15	9	41	50	11:00-11:15	74	86	160	05:00-05:15	154	66	220	11:00-11:15	30	15	45
05:15-05:30	19	56	75	11:15-11:30	93	82	175	05:15-05:30	161	61	222	11:15-11:30	18	9	27
05:30-05:45	21	80	101	11:30-11:45	85	76	161	05:30-05:45	103	85	188	11:30-11:45	18	10	28
05:45-06:00	45	97	142	11:45-12:00	104	92	196	05:45-06:00	117	86	203	11:45-12:00	11	8	19

AM COMMUTER PERIOD (05:00-09:00)	DIR 1	DIR 2	
TWO DIRECTIONAL PEAK			
AM - PEAK HR TIME	07:00 AM to 08:00 AM		
AM - PEAK HR VOLUME	311	550	861
AM - K FACTOR (%)			7.10
AM - D (%)	36.12	63.88	100.00
DIRECTIONAL PEAK			
AM - PEAK HR TIME	06:45 AM to 07:45 AM	07:15 AM to 08:15 AM	
AM - PEAK HR VOLUME	318	575	

PM COMMUTER PERIOD (15:00-19:00)	DIR 1	DIR 2	
TWO DIRECTIONAL PEAK			
PM - PEAK HR TIME	03:45 PM to 04:45 PM		
PM - PEAK HR VOLUME	623	366	989
PM - K FACTOR (%)			8.15
PM - D (%)	62.99	37.01	100.00
DIRECTIONAL PEAK			
PM - PEAK HR TIME	04:00 PM to 05:00 PM	03:45 PM to 04:45 PM	
PM - PEAK HR VOLUME	641	366	

AM PERIOD (00:00-12:00)			
TWO DIRECTIONAL PEAK			
AM - PEAK HR TIME	07:00 AM to 08:00 AM		
AM - PEAK HR VOLUME	311	550	861
AM - K FACTOR (%)			7.10
AM - D (%)	36.12	63.88	100.00

PM PERIOD (12:00-24:00)			
TWO DIRECTIONAL PEAK			
PM - PEAK HR TIME	03:45 PM to 04:45 PM		
PM - PEAK HR VOLUME	623	366	989
PM - K FACTOR (%)			8.15
PM - D (%)	62.99	37.01	100.00

NON-COMMUTER PERIOD (09:00-15:00)			
TWO DIRECTIONAL PEAK			
PEAK HR TIME	02:00 PM to 03:00 PM		
PEAK HR VOLUME	447	358	805
DIRECTIONAL PEAK			
PEAK HR TIME	02:00 PM to 03:00 PM	02:00 PM to 03:00 PM	
PEAK HR VOLUME	447	358	

6-HR, 12-HR, 24-HR PERIODS	DIR 1	DIR 2	Total
AM 6-HR PERIOD (06:00-12:00)	1,709	2,356	4,065
AM 12-HR PERIOD (00:00-12:00)	1,961	2,842	4,803
PM 6-HR PERIOD (12:00-18:00)	2,962	1,920	4,882
PM 12-HR PERIOD (12:00-24:00)	4,425	2,901	7,326
24 HOUR PERIOD	6,386	5,743	12,129
D (%)	52.65	47.35	100.00

Run Date: 2016/06/07

Hawaii Department of Transportation
Highways Division — Highways Planning Survey Section
2015 Program Count - Summary

Site ID: B72894000120 **Town:** Oahu **DIR 1:** +MP **DIR 2:** -MP **Final AADT:** 11500
Functional Class: TEST NEW URBAN: MINOR COLLECTOR **Count Type:** CLASS **Counter Type:** Tube **Route No:** 8940
Location: Franklind D. Roosevelt Ave btwn Coral Sea Rd _Bougainville Rd

TIME-AM	DIR 1	DIR 2	TOTAL	TIME-AM	DIR 1	DIR 2	TOTAL	TIME-PM	DIR 1	DIR 2	TOTAL	TIME-PM	DIR 1	DIR 2	TOTAL
DATE : 08/19/2015															
12:00-12:15	16	5	21	06:00-06:15	63	70	133	12:00-12:15	91	95	186	06:00-06:15	102	72	174
12:15-12:30	14	3	17	06:15-06:30	61	103	164	12:15-12:30	96	62	158	06:15-06:30	92	86	178
12:30-12:45	13	9	22	06:30-06:45	81	88	169	12:30-12:45	99	72	171	06:30-06:45	87	69	156
12:45-01:00	7	13	20	06:45-07:00	100	95	195	12:45-01:00	108	71	179	06:45-07:00	92	77	169
01:00-01:15	10	5	15	07:00-07:15	89	124	213	01:00-01:15	97	68	165	07:00-07:15	98	90	188
01:15-01:30	6	4	10	07:15-07:30	82	141	223	01:15-01:30	100	72	172	07:15-07:30	69	93	162
01:30-01:45	12	4	16	07:30-07:45	87	149	236	01:30-01:45	85	95	180	07:30-07:45	80	61	141
01:45-02:00	3	12	15	07:45-08:00	77	138	215	01:45-02:00	68	99	167	07:45-08:00	82	40	122
02:00-02:15	9	7	16	08:00-08:15	84	104	188	02:00-02:15	105	83	188	08:00-08:15	62	38	100
02:15-02:30	6	8	14	08:15-08:30	72	86	158	02:15-02:30	101	79	180	08:15-08:30	71	28	99
02:30-02:45	6	3	9	08:30-08:45	65	96	161	02:30-02:45	111	99	210	08:30-08:45	73	31	104
02:45-03:00	8	4	12	08:45-09:00	72	86	158	02:45-03:00	121	69	190	08:45-09:00	49	28	77
03:00-03:15	9	6	15	09:00-09:15	50	88	138	03:00-03:15	120	85	205	09:00-09:15	67	36	103
03:15-03:30	9	4	13	09:15-09:30	63	75	138	03:15-03:30	132	67	199	09:15-09:30	58	19	77
03:30-03:45	5	13	18	09:30-09:45	68	112	180	03:30-03:45	146	89	235	09:30-09:45	40	30	70
03:45-04:00	7	19	26	09:45-10:00	60	104	164	03:45-04:00	180	82	262	09:45-10:00	38	25	63
04:00-04:15	8	18	26	10:00-10:15	69	72	141	04:00-04:15	129	83	212	10:00-10:15	36	15	51
04:15-04:30	8	19	27	10:15-10:30	72	80	152	04:15-04:30	179	65	244	10:15-10:30	40	30	70
04:30-04:45	6	25	31	10:30-10:45	76	81	157	04:30-04:45	152	75	227	10:30-10:45	26	13	39
04:45-05:00	14	42	56	10:45-11:00	89	70	159	04:45-05:00	165	58	223	10:45-11:00	35	12	47
05:00-05:15	15	49	64	11:00-11:15	92	99	191	05:00-05:15	169	65	234	11:00-11:15	19	14	33
05:15-05:30	20	53	73	11:15-11:30	86	65	151	05:15-05:30	130	84	214	11:15-11:30	16	10	26
05:30-05:45	31	77	108	11:30-11:45	84	67	151	05:30-05:45	121	77	198	11:30-11:45	14	14	28
05:45-06:00	61	88	149	11:45-12:00	102	93	195	05:45-06:00	108	78	186	11:45-12:00	17	9	26

AM COMMUTER PERIOD (05:00-09:00)	DIR 1	DIR 2	
TWO DIRECTIONAL PEAK			
AM - PEAK HR TIME	07:00 AM to 08:00 AM		
AM - PEAK HR VOLUME	335	552	887
AM - K FACTOR (%)			7.38
AM - D (%)	37.77	62.23	100.00
DIRECTIONAL PEAK			
AM - PEAK HR TIME	06:45 AM to 07:45 AM	07:00 AM to 08:00 AM	
AM - PEAK HR VOLUME	358	552	

PM COMMUTER PERIOD (15:00-19:00)	DIR 1	DIR 2	
TWO DIRECTIONAL PEAK			
PM - PEAK HR TIME	03:30 PM to 04:30 PM		
PM - PEAK HR VOLUME	634	319	953
PM - K FACTOR (%)			7.93
PM - D (%)	66.53	33.47	100.00
DIRECTIONAL PEAK			
PM - PEAK HR TIME	04:15 PM to 05:15 PM	03:00 PM to 04:00 PM	
PM - PEAK HR VOLUME	665	323	

AM PERIOD (00:00-12:00)	DIR 1	DIR 2	
TWO DIRECTIONAL PEAK			
AM - PEAK HR TIME	07:00 AM to 08:00 AM		
AM - PEAK HR VOLUME	335	552	887
AM - K FACTOR (%)			7.38
AM - D (%)	37.77	62.23	100.00

PM PERIOD (12:00-24:00)	DIR 1	DIR 2	
TWO DIRECTIONAL PEAK			
PM - PEAK HR TIME	03:30 PM to 04:30 PM		
PM - PEAK HR VOLUME	634	319	953
PM - K FACTOR (%)			7.93
PM - D (%)	66.53	33.47	100.00

NON-COMMUTER PERIOD (09:00-15:00)	DIR 1	DIR 2	
TWO DIRECTIONAL PEAK			
PEAK HR TIME	02:00 PM to 03:00 PM		
PEAK HR VOLUME	438	330	768
DIRECTIONAL PEAK			
PEAK HR TIME	02:00 PM to 03:00 PM	09:00 AM to 10:00 AM	
PEAK HR VOLUME	438	379	

6-HR, 12-HR, 24-HR PERIODS	DIR 1	DIR 2	Total
AM 6-HR PERIOD (06:00-12:00)	1,844	2,286	4,130
AM 12-HR PERIOD (00:00-12:00)	2,147	2,776	4,923
PM 6-HR PERIOD (12:00-18:00)	2,913	1,872	4,785
PM 12-HR PERIOD (12:00-24:00)	4,276	2,812	7,088
24 HOUR PERIOD	6,423	5,588	12,011
D (%)	53.48	46.52	100.00

Run Date: 2016/06/07

Hawaii Department of Transportation
Highways Division
Highways Planning Survey Section

Vehicle Classification Data Summary
2015

Site ID:	**B72894000120**	**Route No:**	**8940**	**Date From:**	2015/08/18 0:00
Town:	**Oahu**	**Direction:**	+MP	**Date To:**	2015/08/19 23:45
Location:	**Franklind D. Roosevelt Ave btwn Coral Sea Rd _Bougainville Rd**				

Functional Classification: 18 TEST NEW URBAN: MINOR COLLECTOR

REPORT TOTALS - 48 HOURS RECORDED

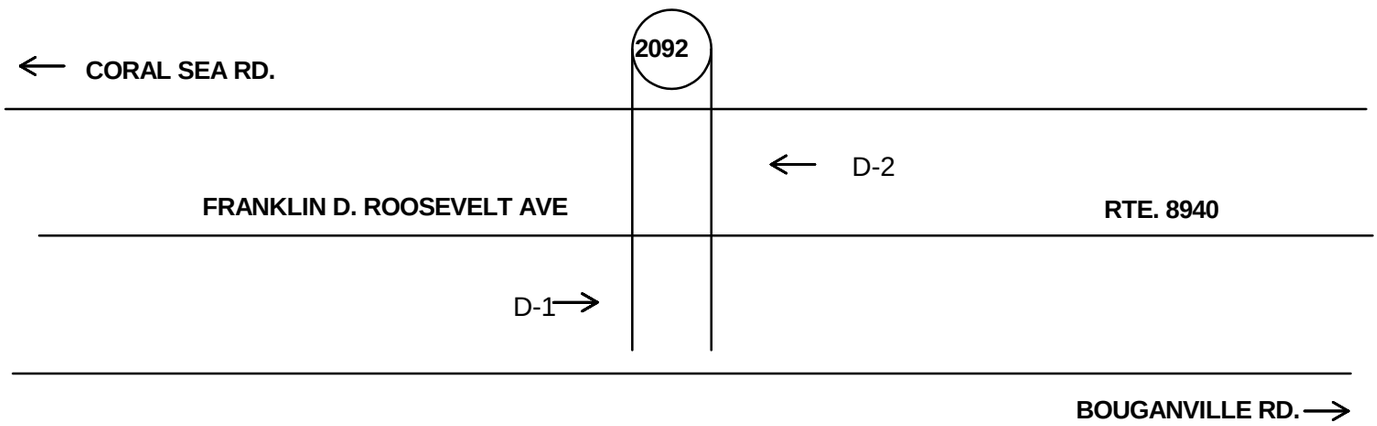
	VOLUME	%	NUMBER OF AXLES
Cycles	186	0.77%	372
PC	20121	83.35%	40242
2A-4T	2243	9.29%	4486
LIGHT VEHICLE TOTALS	22550	93.41%	45100
	HEAVY VEHICLES		
Bus	615	2.55%	1537
SINGLE UNIT TRUCK			
2A-6T	506	2.10%	1012
3A-SU	220	0.91%	660
4A-SU	13	0.05%	52
SINGLE-TRAILER TRUCKS			
4A-ST	138	0.57%	552
5A-ST	59	0.24%	295
6A-ST	11	0.05%	66
MULTI-TRAILER TRUCKS			
5A-MT	27	0.11%	135
6A-MT	1	0.00%	6
7A-MT	1	0.00%	7
HEAVY VEHICLE TOTALS	1591	6.59%	4322
CLASSIFIED VEHICLES TOTALS	24141 (A)	100.00%	49422 (B)
UNCLASSIFIED VEHICLES TOTALS	-1	-0.00%	

AXLE CORRECTION FACTOR (A/C) = 0.977

ROADTUBE EQUIVALENT(B/2) = 24711 (C)

PEAK HOUR VOLUME : 965 2015/08/18 16:00	**PEAK HOUR TRUCK VOLUME**	**% TOTAL PEAK HOUR VOLUME**	**24 HOUR TRUCK VOLUME**	**AADT**	**% OF AADT**	**HPMS K-FACTOR (PEAK/AADT) (ITEM 66)**
SINGLE UNIT TRUCKS (TYPE 4-7)	**69**	**(65A-1) 7.15%**	**677**	**11500**	**(65A-2) 5.89%**	**8.39%**
COMBINATION (TYPE 8-13)	**12**	**(65B-1) 1.24%**	**118**		**(65B-2) 1.03%**	**8.39%**

N
ISLAND: OAHU
AREA: KALAELOA



Station No:	B72894000120

Station Location:			
Franklind D.Roosevelt Ave between Coral Sea Road and Bouganville Road			
Station Mileage:	1.39	GPS Coord (Latitude):	21.32788 N
		GPS Coord (Longitude):	158.05852 W
Begin Survey (Date/Time):	8-8-16 0000	End Survey (Date/Time):	8-11-16 0000
Survey Method: LOOP **HOSE** OTHER		Survey Type: VOL **CLASS** SPEED OTHER	
Survey Crew:	FIELD CREW	Module No.:	

HPMS DATA							
Segment Description:							
FRANKLIN D. ROOSEVELT - GEIGER ROAD TO WEST PERIMETER FENCE BDRY							
Segment Begin LRS	1.20	Segment End LRS		1.57		Length	0.37
Facility Name	Juris	Func Class	Area Type	Route No.	Route Mile	D-1 = Direction to End of Route D-2 = Direction to Beginning of Route	
Franklin D.Roosevelt Ave	S			8940	1.39	D-1	To west fence boundary
						D-2	To Geiger Ave

Sketch By: EPJ Date: 1/13/2012 SLD: 2009

Run Date: 2017/07/27

Hawaii Department of Transportation
Highways Division — Highways Planning Survey Section
2016 Program Count - Summary

Site ID: B72894000120 **Town:** Oahu **DIR 1:** +MP **DIR 2:** -MP **Final AADT:** 10500
Functional Class: TEST NEW URBAN: MINOR COLLECTOR **Count Type:** CLASS **Counter Type:** Tube **Route No:** 8940
Location: Franklind D. Roosevelt Ave btwn Coral Sea Rd _Bougainville Rd

TIME-AM	DIR 1	DIR 2	TOTAL	TIME-AM	DIR 1	DIR 2	TOTAL	TIME-PM	DIR 1	DIR 2	TOTAL	TIME-PM	DIR 1	DIR 2	TOTAL
DATE : 08/09/2016															
12:00-12:15	21	9	30	06:00-06:15	49	68	117	12:00-12:15	80	92	172	06:00-06:15	121	68	189
12:15-12:30	10	14	24	06:15-06:30	61	79	140	12:15-12:30	89	67	156	06:15-06:30	92	75	167
12:30-12:45	11	5	16	06:30-06:45	76	79	155	12:30-12:45	100	72	172	06:30-06:45	85	90	175
12:45-01:00	8	4	12	06:45-07:00	69	90	159	12:45-01:00	112	52	164	06:45-07:00	84	73	157
01:00-01:15	13	5	18	07:00-07:15	90	95	185	01:00-01:15	70	69	139	07:00-07:15	89	70	159
01:15-01:30	6	10	16	07:15-07:30	84	119	203	01:15-01:30	67	75	142	07:15-07:30	99	65	164
01:30-01:45	6	5	11	07:30-07:45	60	159	219	01:30-01:45	80	72	152	07:30-07:45	71	59	130
01:45-02:00	5	5	10	07:45-08:00	76	129	205	01:45-02:00	90	77	167	07:45-08:00	66	35	101
02:00-02:15	9	2	11	08:00-08:15	55	91	146	02:00-02:15	138	60	198	08:00-08:15	64	34	98
02:15-02:30	4	3	7	08:15-08:30	51	90	141	02:15-02:30	128	74	202	08:15-08:30	61	32	93
02:30-02:45	3	6	9	08:30-08:45	57	70	127	02:30-02:45	98	98	196	08:30-08:45	69	24	93
02:45-03:00	6	4	10	08:45-09:00	66	86	152	02:45-03:00	129	102	231	08:45-09:00	62	24	86
03:00-03:15	9	5	14	09:00-09:15	54	73	127	03:00-03:15	125	71	196	09:00-09:15	47	40	87
03:15-03:30	4	7	11	09:15-09:30	58	79	137	03:15-03:30	124	93	217	09:15-09:30	67	21	88
03:30-03:45	4	7	11	09:30-09:45	44	62	106	03:30-03:45	119	86	205	09:30-09:45	40	24	64
03:45-04:00	5	16	21	09:45-10:00	69	66	135	03:45-04:00	148	87	235	09:45-10:00	50	23	73
04:00-04:15	6	15	21	10:00-10:15	63	80	143	04:00-04:15	153	74	227	10:00-10:15	43	13	56
04:15-04:30	5	20	25	10:15-10:30	58	107	165	04:15-04:30	153	75	228	10:15-10:30	24	14	38
04:30-04:45	8	28	36	10:30-10:45	72	89	161	04:30-04:45	157	73	230	10:30-10:45	33	20	53
04:45-05:00	14	40	54	10:45-11:00	48	77	125	04:45-05:00	152	73	225	10:45-11:00	23	15	38
05:00-05:15	15	38	53	11:00-11:15	79	69	148	05:00-05:15	159	66	225	11:00-11:15	19	6	25
05:15-05:30	21	61	82	11:15-11:30	86	66	152	05:15-05:30	165	79	244	11:15-11:30	29	7	36
05:30-05:45	20	82	102	11:30-11:45	98	73	171	05:30-05:45	152	44	196	11:30-11:45	22	10	32
05:45-06:00	36	60	96	11:45-12:00	98	62	160	05:45-06:00	127	83	210	11:45-12:00	15	11	26

AM COMMUTER PERIOD (05:00-09:00)	DIR 1	DIR 2	
TWO DIRECTIONAL PEAK			
AM - PEAK HR TIME	07:00 AM to 08:00 AM		
AM - PEAK HR VOLUME	310	502	812
AM - K FACTOR (%)			7.16
AM - D (%)	38.18	61.82	100.00
DIRECTIONAL PEAK			
AM - PEAK HR TIME	06:30 AM to 07:30 AM	07:00 AM to 08:00 AM	
AM - PEAK HR VOLUME	319	502	

PM COMMUTER PERIOD (15:00-19:00)	DIR 1	DIR 2	
TWO DIRECTIONAL PEAK			
PM - PEAK HR TIME	04:30 PM to 05:30 PM		
PM - PEAK HR VOLUME	633	291	924
PM - K FACTOR (%)			8.15
PM - D (%)	68.51	31.49	100.00
DIRECTIONAL PEAK			
PM - PEAK HR TIME	04:30 PM to 05:30 PM	03:15 PM to 04:15 PM	
PM - PEAK HR VOLUME	633	340	

AM PERIOD (00:00-12:00)			
TWO DIRECTIONAL PEAK			
AM - PEAK HR TIME	07:00 AM to 08:00 AM		
AM - PEAK HR VOLUME	310	502	812
AM - K FACTOR (%)			7.16
AM - D (%)	38.18	61.82	100.00

PM PERIOD (12:00-24:00)			
TWO DIRECTIONAL PEAK			
PM - PEAK HR TIME	04:30 PM to 05:30 PM		
PM - PEAK HR VOLUME	633	291	924
PM - K FACTOR (%)			8.15
PM - D (%)	68.51	31.49	100.00

NON-COMMUTER PERIOD (09:00-15:00)			
TWO DIRECTIONAL PEAK			
PEAK HR TIME	02:00 PM to 03:00 PM		
PEAK HR VOLUME	493	334	827
DIRECTIONAL PEAK			
PEAK HR TIME	02:00 PM to 03:00 PM	10:00 AM to 11:00 AM	
PEAK HR VOLUME	493	353	

6-HR, 12-HR, 24-HR PERIODS	DIR 1	DIR 2	Total
AM 6-HR PERIOD (06:00-12:00)	1,621	2,058	3,679
AM 12-HR PERIOD (00:00-12:00)	1,870	2,509	4,379
PM 6-HR PERIOD (12:00-18:00)	2,915	1,814	4,729
PM 12-HR PERIOD (12:00-24:00)	4,290	2,667	6,957
24 HOUR PERIOD	6,160	5,176	11,336
D (%)	54.34	45.66	100.00

Run Date: 2017/07/27

Hawaii Department of Transportation
Highways Division — Highways Planning Survey Section
2016 Program Count - Summary

Site ID: B72894000120 **Town:** Oahu **DIR 1:** +MP **DIR 2:** -MP **Final AADT:** 10500
Functional Class: TEST NEW URBAN: MINOR COLLECTOR **Count Type:** CLASS **Counter Type:** Tube **Route No:** 8940
Location: Franklind D. Roosevelt Ave btwn Coral Sea Rd _Bougainville Rd

TIME-AM	DIR 1	DIR 2	TOTAL	TIME-AM	DIR 1	DIR 2	TOTAL	TIME-PM	DIR 1	DIR 2	TOTAL	TIME-PM	DIR 1	DIR 2	TOTAL
DATE : 08/10/2016															
12:00-12:15	14	7	21	06:00-06:15	50	80	130	12:00-12:15	92	63	155	06:00-06:15	104	74	178
12:15-12:30	13	8	21	06:15-06:30	67	77	144	12:15-12:30	100	63	163	06:15-06:30	111	62	173
12:30-12:45	9	5	14	06:30-06:45	85	88	173	12:30-12:45	95	77	172	06:30-06:45	91	96	187
12:45-01:00	9	4	13	06:45-07:00	81	104	185	12:45-01:00	90	71	161	06:45-07:00	105	58	163
01:00-01:15	8	6	14	07:00-07:15	79	86	165	01:00-01:15	107	67	174	07:00-07:15	95	74	169
01:15-01:30	8	9	17	07:15-07:30	80	123	203	01:15-01:30	101	74	175	07:15-07:30	86	69	155
01:30-01:45	8	5	13	07:30-07:45	59	168	227	01:30-01:45	70	106	176	07:30-07:45	80	66	146
01:45-02:00	2	6	8	07:45-08:00	61	139	200	01:45-02:00	80	69	149	07:45-08:00	70	45	115
02:00-02:15	7	12	19	08:00-08:15	66	102	168	02:00-02:15	91	81	172	08:00-08:15	72	45	117
02:15-02:30	5	3	8	08:15-08:30	67	73	140	02:15-02:30	107	52	159	08:15-08:30	65	41	106
02:30-02:45	4	2	6	08:30-08:45	39	89	128	02:30-02:45	112	65	177	08:30-08:45	62	34	96
02:45-03:00	7	0	7	08:45-09:00	46	81	127	02:45-03:00	137	63	200	08:45-09:00	64	37	101
03:00-03:15	4	5	9	09:00-09:15	46	51	97	03:00-03:15	134	83	217	09:00-09:15	64	17	81
03:15-03:30	8	11	19	09:15-09:30	47	78	125	03:15-03:30	124	77	201	09:15-09:30	60	20	80
03:30-03:45	8	9	17	09:30-09:45	61	83	144	03:30-03:45	117	109	226	09:30-09:45	51	22	73
03:45-04:00	4	12	16	09:45-10:00	63	75	138	03:45-04:00	127	78	205	09:45-10:00	40	22	62
04:00-04:15	4	11	15	10:00-10:15	54	94	148	04:00-04:15	138	78	216	10:00-10:15	51	30	81
04:15-04:30	6	19	25	10:15-10:30	66	73	139	04:15-04:30	167	62	229	10:15-10:30	33	23	56
04:30-04:45	7	31	38	10:30-10:45	71	65	136	04:30-04:45	131	73	204	10:30-10:45	38	16	54
04:45-05:00	11	42	53	10:45-11:00	73	100	173	04:45-05:00	168	62	230	10:45-11:00	18	9	27
05:00-05:15	17	36	53	11:00-11:15	83	87	170	05:00-05:15	149	62	211	11:00-11:15	28	10	38
05:15-05:30	27	47	74	11:15-11:30	88	74	162	05:15-05:30	142	60	202	11:15-11:30	17	8	25
05:30-05:45	29	86	115	11:30-11:45	102	66	168	05:30-05:45	116	65	181	11:30-11:45	19	9	28
05:45-06:00	32	83	115	11:45-12:00	76	59	135	05:45-06:00	119	93	212	11:45-12:00	16	13	29

AM COMMUTER PERIOD (05:00-09:00)	DIR 1	DIR 2	
TWO DIRECTIONAL PEAK			
AM - PEAK HR TIME	07:15 AM to 08:15 AM		
AM - PEAK HR VOLUME	266	532	798
AM - K FACTOR (%)			7.04
AM - D (%)	33.33	66.67	100.00
DIRECTIONAL PEAK			
AM - PEAK HR TIME	06:30 AM to 07:30 AM	07:15 AM to 08:15 AM	
AM - PEAK HR VOLUME	325	532	

PM COMMUTER PERIOD (15:00-19:00)	DIR 1	DIR 2	
TWO DIRECTIONAL PEAK			
PM - PEAK HR TIME	04:00 PM to 05:00 PM		
PM - PEAK HR VOLUME	604	275	879
PM - K FACTOR (%)			7.75
PM - D (%)	68.71	31.29	100.00
DIRECTIONAL PEAK			
PM - PEAK HR TIME	04:15 PM to 05:15 PM	03:00 PM to 04:00 PM	
PM - PEAK HR VOLUME	615	347	

AM PERIOD (00:00-12:00)			
TWO DIRECTIONAL PEAK			
AM - PEAK HR TIME	07:15 AM to 08:15 AM		
AM - PEAK HR VOLUME	266	532	798
AM - K FACTOR (%)			7.04
AM - D (%)	33.33	66.67	100.00

PM PERIOD (12:00-24:00)			
TWO DIRECTIONAL PEAK			
PM - PEAK HR TIME	04:00 PM to 05:00 PM		
PM - PEAK HR VOLUME	604	275	879
PM - K FACTOR (%)			7.75
PM - D (%)	68.71	31.29	100.00

NON-COMMUTER PERIOD (09:00-15:00)			
TWO DIRECTIONAL PEAK			
PEAK HR TIME	02:00 PM to 03:00 PM		
PEAK HR VOLUME	447	261	708
DIRECTIONAL PEAK			
PEAK HR TIME	02:00 PM to 03:00 PM	10:00 AM to 11:00 AM	
PEAK HR VOLUME	447	332	

6-HR, 12-HR, 24-HR PERIODS	DIR 1	DIR 2	Total
AM 6-HR PERIOD (06:00-12:00)	1,610	2,115	3,725
AM 12-HR PERIOD (00:00-12:00)	1,861	2,574	4,435
PM 6-HR PERIOD (12:00-18:00)	2,814	1,753	4,567
PM 12-HR PERIOD (12:00-24:00)	4,254	2,653	6,907
24 HOUR PERIOD	6,115	5,227	11,342
D (%)	53.91	46.09	100.00

Run Date: 2017/07/27

Hawaii Department of Transportation
Highways Division
Highways Planning Survey Section

Vehicle Classification Data Summary
2016

Site ID:	**B72894000120**	**Route No:**	**8940**	**Date From:**	2016/08/09 0:00
Town:	**Oahu**	**Direction:**	+MP	**Date To:**	2016/08/10 23:45
Location:	**Franklind D. Roosevelt Ave btwn Coral Sea Rd _Bougainville Rd**				

Functional Classification: 18 TEST NEW URBAN: MINOR COLLECTOR

REPORT TOTALS - 48 HOURS RECORDED

	VOLUME	%	NUMBER OF AXLES
Cycles	2272	10.02%	4545
PC	18818	82.98%	37636
2A-4T	264	1.16%	528
LIGHT VEHICLE TOTALS	21354	94.16%	42709
	HEAVY VEHICLES		
Bus	624	2.75%	1560
SINGLE UNIT TRUCK			
2A-6T	499	2.20%	998
3A-SU	10	0.04%	30
4A-SU	1	0.00%	4
SINGLE-TRAILER TRUCKS			
4A-ST	166	0.73%	664
5A-ST	6	0.03%	30
6A-ST	1	0.00%	6
MULTI-TRAILER TRUCKS			
5A-MT	16	0.07%	80
6A-MT	0	0.00%	0
7A-MT	1	0.00%	7
HEAVY VEHICLE TOTALS	1324	5.84%	3379
CLASSIFIED VEHICLES TOTALS	22678 (A)	100.00%	46088 (B)
UNCLASSIFIED VEHICLES TOTALS	-0	-0.00%	

AXLE CORRECTION FACTOR (A/C) = 0.984

ROADTUBE EQUIVALENT(B/2) = 23044 (C)

PEAK HOUR VOLUME : 910 2016/08/09 16:00	**PEAK HOUR TRUCK VOLUME**	**% TOTAL PEAK HOUR VOLUME**	**24 HOUR TRUCK VOLUME**	**AADT**	**% OF AADT**	**HPMS K-FACTOR (PEAK/AADT) (ITEM 66)**
SINGLE UNIT TRUCKS (TYPE 4-7)	**65**	**(65A-1) 7.14%**	**567**	**10500**	**(65A-2) 5.40%**	**8.67%**
COMBINATION (TYPE 8-13)	**19**	**(65B-1) 2.09%**	**94**		**(65B-2) 0.90%**	**8.67%**

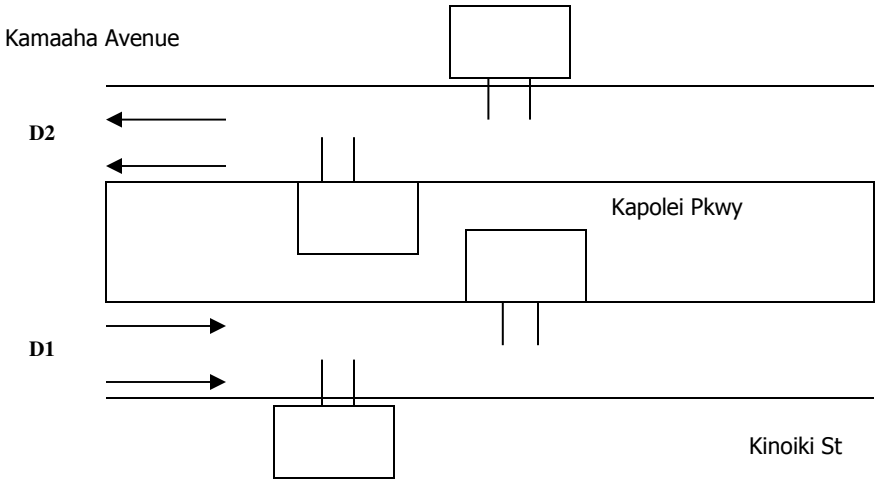
Traffic Data Service

Traffic Station Sketch

N

Island: Oahu
Area: Kapolei

Section ID/Station: B72892000376



Meter #	File Name	GPS
1. BW65	D0413017_B72892000376	21.33437, -158.05657
2. BT42	D0413018_B72892000376	

Station Description: Kapolei Pkwy: Kamaaha Avenue to Kinoiki St			
Survey Beginning Date/Time: 4/13/16 @ 0000		Survey Ending Date/Time: 4/14/16 @ 2400	
Survey Method:	Road Tube	Data Type:	Vol
Survey Crew:	LM		C4
Sketch Updated:		By:	SR
Remarks:	1381		

FACILITY NAME	JURI	FUNC CLASS	AREA TYPE	ROUTE NO.	ROUTE MILE
Kapolei Pkwy		16		8920	

D1= Direction to End D2= Direction to Begin	D1: Kinoiki St/ Papipi Road D2: Kamaaha Avenue / Alii Nui Drive

Run Date: 2017/07/24

Hawaii Department of Transportation
Highways Division — Highways Planning Survey Section
2016 Program Count - Summary

Site ID: B72892000376 **Town:** Oahu **DIR 1:** +MP **DIR 2:** -MP **Final AADT:** 20000
Functional Class: URBAN:MINOR ARTERIAL **Count Type:** VOLUME **Counter Type:** Tube **Route No:** 8920
Location: Kapolei Pkwy - Kamaaha Ave to Kinoiki St

TIME-AM	DIR 1	DIR 2	TOTAL	TIME-AM	DIR 1	DIR 2	TOTAL	TIME-PM	DIR 1	DIR 2	TOTAL	TIME-PM	DIR 1	DIR 2	TOTAL
DATE : 04/13/2016															
12:00-12:15	21	14	35	06:00-06:15	86	164	250	12:00-12:15	122	127	249	06:00-06:15	200	163	363
12:15-12:30	8	23	31	06:15-06:30	117	162	279	12:15-12:30	136	115	251	06:15-06:30	152	175	327
12:30-12:45	12	15	27	06:30-06:45	126	184	310	12:30-12:45	145	138	283	06:30-06:45	193	153	346
12:45-01:00	10	12	22	06:45-07:00	186	158	344	12:45-01:00	147	140	287	06:45-07:00	158	135	293
01:00-01:15	4	8	12	07:00-07:15	179	198	377	01:00-01:15	140	123	263	07:00-07:15	145	142	287
01:15-01:30	13	10	23	07:15-07:30	241	199	440	01:15-01:30	134	154	288	07:15-07:30	140	133	273
01:30-01:45	10	4	14	07:30-07:45	295	209	504	01:30-01:45	170	145	315	07:30-07:45	140	109	249
01:45-02:00	13	3	16	07:45-08:00	269	233	502	01:45-02:00	168	138	306	07:45-08:00	117	106	223
02:00-02:15	4	8	12	08:00-08:15	178	175	353	02:00-02:15	206	212	418	08:00-08:15	114	124	238
02:15-02:30	6	4	10	08:15-08:30	151	128	279	02:15-02:30	170	246	416	08:15-08:30	90	106	196
02:30-02:45	5	2	7	08:30-08:45	135	106	241	02:30-02:45	170	163	333	08:30-08:45	98	103	201
02:45-03:00	5	6	11	08:45-09:00	119	96	215	02:45-03:00	173	151	324	08:45-09:00	92	97	189
03:00-03:15	5	10	15	09:00-09:15	103	93	196	03:00-03:15	199	240	439	09:00-09:15	88	102	190
03:15-03:30	15	7	22	09:15-09:30	119	96	215	03:15-03:30	205	252	457	09:15-09:30	98	94	192
03:30-03:45	10	14	24	09:30-09:45	119	104	223	03:30-03:45	172	248	420	09:30-09:45	77	71	148
03:45-04:00	13	23	36	09:45-10:00	119	98	217	03:45-04:00	238	218	456	09:45-10:00	68	60	128
04:00-04:15	18	19	37	10:00-10:15	121	74	195	04:00-04:15	207	217	424	10:00-10:15	50	88	138
04:15-04:30	23	39	62	10:15-10:30	113	90	203	04:15-04:30	233	220	453	10:15-10:30	52	51	103
04:30-04:45	27	62	89	10:30-10:45	111	112	223	04:30-04:45	217	245	462	10:30-10:45	43	60	103
04:45-05:00	39	67	106	10:45-11:00	116	84	200	04:45-05:00	171	227	398	10:45-11:00	38	53	91
05:00-05:15	46	101	147	11:00-11:15	127	110	237	05:00-05:15	162	233	395	11:00-11:15	35	29	64
05:15-05:30	48	110	158	11:15-11:30	112	114	226	05:15-05:30	192	223	415	11:15-11:30	29	25	54
05:30-05:45	85	108	193	11:30-11:45	131	134	265	05:30-05:45	159	195	354	11:30-11:45	25	17	42
05:45-06:00	112	147	259	11:45-12:00	124	109	233	05:45-06:00	197	179	376	11:45-12:00	17	19	36

AM COMMUTER PERIOD (05:00-09:00)	DIR 1	DIR 2	
TWO DIRECTIONAL PEAK			
AM - PEAK HR TIME	07:00 AM to 08:00 AM		
AM - PEAK HR VOLUME	984	839	1823
AM - K FACTOR (%)			8.54
AM - D (%)	53.98	46.02	100.00
DIRECTIONAL PEAK			
AM - PEAK HR TIME	07:00 AM to 08:00 AM	07:00 AM to 08:00 AM	
AM - PEAK HR VOLUME	984	839	

PM COMMUTER PERIOD (15:00-19:00)	DIR 1	DIR 2	
TWO DIRECTIONAL PEAK			
PM - PEAK HR TIME	03:45 PM to 04:45 PM		
PM - PEAK HR VOLUME	895	900	1795
PM - K FACTOR (%)			8.41
PM - D (%)	49.86	50.14	100.00
DIRECTIONAL PEAK			
PM - PEAK HR TIME	03:45 PM to 04:45 PM	03:00 PM to 04:00 PM	
PM - PEAK HR VOLUME	895	958	

AM PERIOD (00:00-12:00)			
TWO DIRECTIONAL PEAK			
AM - PEAK HR TIME	07:00 AM to 08:00 AM		
AM - PEAK HR VOLUME	984	839	1823
AM - K FACTOR (%)			8.54
AM - D (%)	53.98	46.02	100.00

PM PERIOD (12:00-24:00)			
TWO DIRECTIONAL PEAK			
PM - PEAK HR TIME	03:45 PM to 04:45 PM		
PM - PEAK HR VOLUME	895	900	1795
PM - K FACTOR (%)			8.41
PM - D (%)	49.86	50.14	100.00

NON-COMMUTER PERIOD (09:00-15:00)			
TWO DIRECTIONAL PEAK			
PEAK HR TIME	02:00 PM to 03:00 PM		
PEAK HR VOLUME	719	772	1491
DIRECTIONAL PEAK			
PEAK HR TIME	02:00 PM to 03:00 PM	02:00 PM to 03:00 PM	
PEAK HR VOLUME	719	772	

6-HR, 12-HR, 24-HR PERIODS	DIR 1	DIR 2	Total
AM 6-HR PERIOD (06:00-12:00)	3,497	3,230	6,727
AM 12-HR PERIOD (00:00-12:00)	4,049	4,046	8,095
PM 6-HR PERIOD (12:00-18:00)	4,233	4,549	8,782
PM 12-HR PERIOD (12:00-24:00)	6,492	6,764	13,256
24 HOUR PERIOD	10,541	10,810	21,351
D (%)	49.37	50.63	100.00

Run Date: 2017/07/24

Hawaii Department of Transportation
Highways Division — Highways Planning Survey Section
2016 Program Count - Summary

Site ID: B72892000376 **Town:** Oahu **DIR 1:** +MP **DIR 2:** -MP **Final AADT:** 20000
Functional Class: URBAN:MINOR ARTERIAL **Count Type:** VOLUME **Counter Type:** Tube **Route No:** 8920
Location: Kapolei Pkwy - Kamaaha Ave to Kinoiki St

TIME-AM	DIR 1	DIR 2	TOTAL	TIME-AM	DIR 1	DIR 2	TOTAL	TIME-PM	DIR 1	DIR 2	TOTAL	TIME-PM	DIR 1	DIR 2	TOTAL
DATE : 04/14/2016															
12:00-12:15	15	12	27	06:00-06:15	90	155	245	12:00-12:15	134	120	254	06:00-06:15	177	205	382
12:15-12:30	8	9	17	06:15-06:30	124	147	271	12:15-12:30	149	131	280	06:15-06:30	207	151	358
12:30-12:45	11	9	20	06:30-06:45	123	167	290	12:30-12:45	119	127	246	06:30-06:45	186	156	342
12:45-01:00	19	10	29	06:45-07:00	181	176	357	12:45-01:00	137	129	266	06:45-07:00	174	177	351
01:00-01:15	15	11	26	07:00-07:15	205	215	420	01:00-01:15	133	120	253	07:00-07:15	163	175	338
01:15-01:30	10	5	15	07:15-07:30	247	198	445	01:15-01:30	151	130	281	07:15-07:30	128	166	294
01:30-01:45	13	6	19	07:30-07:45	262	215	477	01:30-01:45	131	131	262	07:30-07:45	144	162	306
01:45-02:00	10	7	17	07:45-08:00	274	256	530	01:45-02:00	138	158	296	07:45-08:00	193	185	378
02:00-02:15	9	7	16	08:00-08:15	189	177	366	02:00-02:15	160	167	327	08:00-08:15	153	170	323
02:15-02:30	5	5	10	08:15-08:30	121	142	263	02:15-02:30	173	183	356	08:15-08:30	108	125	233
02:30-02:45	7	5	12	08:30-08:45	146	117	263	02:30-02:45	224	253	477	08:30-08:45	113	112	225
02:45-03:00	15	7	22	08:45-09:00	113	105	218	02:45-03:00	232	176	408	08:45-09:00	81	145	226
03:00-03:15	10	9	19	09:00-09:15	108	103	211	03:00-03:15	189	196	385	09:00-09:15	103	106	209
03:15-03:30	11	11	22	09:15-09:30	111	102	213	03:15-03:30	197	189	386	09:15-09:30	83	102	185
03:30-03:45	3	20	23	09:30-09:45	115	97	212	03:30-03:45	227	216	443	09:30-09:45	91	90	181
03:45-04:00	12	16	28	09:45-10:00	116	92	208	03:45-04:00	248	272	520	09:45-10:00	75	82	157
04:00-04:15	19	28	47	10:00-10:15	108	91	199	04:00-04:15	211	190	401	10:00-10:15	64	79	143
04:15-04:30	27	48	75	10:15-10:30	102	90	192	04:15-04:30	205	226	431	10:15-10:30	45	49	94
04:30-04:45	25	45	70	10:30-10:45	127	91	218	04:30-04:45	247	259	506	10:30-10:45	51	41	92
04:45-05:00	39	75	114	10:45-11:00	115	110	225	04:45-05:00	205	253	458	10:45-11:00	31	36	67
05:00-05:15	39	94	133	11:00-11:15	135	118	253	05:00-05:15	204	259	463	11:00-11:15	32	28	60
05:15-05:30	53	118	171	11:15-11:30	127	114	241	05:15-05:30	192	212	404	11:15-11:30	20	33	53
05:30-05:45	71	125	196	11:30-11:45	130	133	263	05:30-05:45	210	198	408	11:30-11:45	16	18	34
05:45-06:00	98	132	230	11:45-12:00	132	136	268	05:45-06:00	198	164	362	11:45-12:00	15	16	31

AM COMMUTER PERIOD (05:00-09:00)	DIR 1	DIR 2	
TWO DIRECTIONAL PEAK			
AM - PEAK HR TIME	07:00 AM to 08:00 AM		
AM - PEAK HR VOLUME	988	884	1872
AM - K FACTOR (%)			8.45
AM - D (%)	52.78	47.22	100.00
DIRECTIONAL PEAK			
AM - PEAK HR TIME	07:00 AM to 08:00 AM	07:00 AM to 08:00 AM	
AM - PEAK HR VOLUME	988	884	

PM COMMUTER PERIOD (15:00-19:00)	DIR 1	DIR 2	
TWO DIRECTIONAL PEAK			
PM - PEAK HR TIME	03:45 PM to 04:45 PM		
PM - PEAK HR VOLUME	911	947	1858
PM - K FACTOR (%)			8.39
PM - D (%)	49.03	50.97	100.00
DIRECTIONAL PEAK			
PM - PEAK HR TIME	03:45 PM to 04:45 PM	04:15 PM to 05:15 PM	
PM - PEAK HR VOLUME	911	997	

AM PERIOD (00:00-12:00)			
TWO DIRECTIONAL PEAK			
AM - PEAK HR TIME	07:00 AM to 08:00 AM		
AM - PEAK HR VOLUME	988	884	1872
AM - K FACTOR (%)			8.45
AM - D (%)	52.78	47.22	100.00

PM PERIOD (12:00-24:00)			
TWO DIRECTIONAL PEAK			
PM - PEAK HR TIME	03:45 PM to 04:45 PM		
PM - PEAK HR VOLUME	911	947	1858
PM - K FACTOR (%)			8.39
PM - D (%)	49.03	50.97	100.00

NON-COMMUTER PERIOD (09:00-15:00)			
TWO DIRECTIONAL PEAK			
PEAK HR TIME	02:00 PM to 03:00 PM		
PEAK HR VOLUME	789	779	1568
DIRECTIONAL PEAK			
PEAK HR TIME	02:00 PM to 03:00 PM	02:00 PM to 03:00 PM	
PEAK HR VOLUME	789	779	

6-HR, 12-HR, 24-HR PERIODS	DIR 1	DIR 2	Total
AM 6-HR PERIOD (06:00-12:00)	3,501	3,347	6,848
AM 12-HR PERIOD (00:00-12:00)	4,045	4,161	8,206
PM 6-HR PERIOD (12:00-18:00)	4,414	4,459	8,873
PM 12-HR PERIOD (12:00-24:00)	6,867	7,068	13,935
24 HOUR PERIOD	10,912	11,229	22,141
D (%)	49.28	50.72	100.00

Appendix B – Analysis Reports Existing (2020) Conditions

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	307	193	122	40	240	294	110	430	35	159	753	531
Future Volume (vph)	307	193	122	40	240	294	110	430	35	159	753	531
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	0.88	0.97	0.95	1.00	0.97	0.91	0.91
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.97	1.00	1.00	0.99	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1558	1770	3539	2697	3433	3539	1561	3433	3312	1441
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1558	1770	3539	2697	3433	3539	1561	3433	3312	1441
Peak-hour factor, PHF	0.96	0.96	0.96	0.90	0.90	0.90	0.93	0.93	0.93	0.95	0.95	0.95
Adj. Flow (vph)	320	201	127	44	267	327	118	462	38	167	793	559
RTOR Reduction (vph)	0	0	102	0	0	0	0	0	20	0	11	217
Lane Group Flow (vph)	320	201	25	44	267	327	118	462	18	167	927	197
Confl. Peds. (#/hr)	17		5	5		17			3	3		
Confl. Bikes (#/hr)			1			5						
Turn Type	Prot	NA	Perm	Prot	NA	pm+ov	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8	1	5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	5.5	15.3	15.3	3.1	12.9	17.9	5.0	37.5	37.5	5.0	37.5	37.5
Effective Green, g (s)	5.5	15.3	15.3	3.1	12.9	17.9	5.0	37.5	37.5	5.0	37.5	37.5
Actuated g/C Ratio	0.07	0.19	0.19	0.04	0.16	0.23	0.06	0.48	0.48	0.06	0.48	0.48
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	239	686	302	69	578	765	217	1682	741	217	1574	684
v/s Ratio Prot	c0.09	0.06		0.02	0.08	c0.03	0.03	0.13		c0.05	c0.28	
v/s Ratio Perm			0.02			0.09			0.01			0.14
v/c Ratio	1.34	0.29	0.08	0.64	0.46	0.43	0.54	0.27	0.02	0.77	0.59	0.29
Uniform Delay, d1	36.7	27.2	26.0	37.3	29.9	26.1	35.8	12.5	11.0	36.4	15.1	12.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	178.0	0.2	0.1	17.7	0.6	0.4	2.8	0.4	0.1	15.1	1.6	1.1
Delay (s)	214.7	27.4	26.2	55.1	30.4	26.5	38.6	12.9	11.0	51.5	16.7	13.6
Level of Service	F	C	C	E	C	C	D	B	B	D	B	B
Approach Delay (s)		119.7			30.1			17.7			19.7	
Approach LOS		F			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	40.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	78.9	Sum of lost time (s)	18.0
Intersection Capacity Utilization	77.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	48	49	16	32	138	131	62	413	29	87	768	71
Future Volume (veh/h)	48	49	16	32	138	131	62	413	29	87	768	71
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	72	73	24	34	145	0	69	459	0	92	808	75
Peak Hour Factor	0.67	0.67	0.67	0.95	0.95	0.95	0.90	0.90	0.90	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	97	251	213	62	214		185	932		120	958	811
Arrive On Green	0.05	0.13	0.13	0.03	0.11	0.00	0.05	0.50	0.00	0.07	0.51	0.51
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	3456	1870	1585	1781	1870	1583
Grp Volume(v), veh/h	72	73	24	34	145	0	69	459	0	92	808	75
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1728	1870	1585	1781	1870	1583
Q Serve(g_s), s	2.7	2.4	0.9	1.3	5.0	0.0	1.3	11.1	0.0	3.4	25.2	1.6
Cycle Q Clear(g_c), s	2.7	2.4	0.9	1.3	5.0	0.0	1.3	11.1	0.0	3.4	25.2	1.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	97	251	213	62	214		185	932		120	958	811
V/C Ratio(X)	0.74	0.29	0.11	0.55	0.68		0.37	0.49		0.77	0.84	0.09
Avail Cap(c_a), veh/h	163	866	734	179	882		255	1387		355	1621	1372
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	31.6	26.5	25.8	32.2	28.8	0.0	31.0	11.3	0.0	31.1	14.2	8.5
Incr Delay (d2), s/veh	10.4	0.6	0.2	7.3	3.7	0.0	1.2	0.4	0.0	9.7	2.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	1.1	0.3	0.7	2.4	0.0	0.6	4.1	0.0	1.7	9.6	0.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	41.9	27.1	26.0	39.5	32.6	0.0	32.2	11.7	0.0	40.8	16.4	8.5
LnGrp LOS	D	C	C	D	C		C	B		D	B	A
Approach Vol, veh/h		169			179	A		528	A		975	
Approach Delay, s/veh		33.3			33.9			14.4			18.1	
Approach LOS		C			C			B			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.1	38.3	6.9	13.6	8.1	39.2	8.2	12.3
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	13.5	50.3	6.8	31.4	5.0	58.8	6.2	32.0
Max Q Clear Time (g_c+I1), s	5.4	13.1	3.3	4.4	3.3	27.2	4.7	7.0
Green Ext Time (p_c), s	0.1	3.2	0.0	0.4	0.0	7.3	0.0	0.8

Intersection Summary	
HCM 6th Ctrl Delay	19.9
HCM 6th LOS	B

Notes

Unsignalized Delay for [NBR, WBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	138	335	140	48	478	130	130	233	76	315	373	123
Future Volume (veh/h)	138	335	140	48	478	130	130	233	76	315	373	123
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	147	356	149	52	514	0	135	243	0	339	401	132
Peak Hour Factor	0.94	0.94	0.94	0.93	0.93	0.93	0.96	0.96	0.96	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	0	955	421	0	955		437	942		670	678	223
Arrive On Green	0.00	0.27	0.27	0.00	0.27	0.00	0.50	0.50	0.00	0.50	0.50	0.50
Sat Flow, veh/h	0	3554	1567	0	3554	1585	871	1870	1585	1137	1347	443
Grp Volume(v), veh/h	0	356	149	0	514	0	135	243	0	339	0	533
Grp Sat Flow(s),veh/h/ln	0	1777	1567	0	1777	1585	871	1870	1585	1137	0	1790
Q Serve(g_s), s	0.0	3.2	3.0	0.0	4.9	0.0	5.1	2.9	0.0	9.6	0.0	8.3
Cycle Q Clear(g_c), s	0.0	3.2	3.0	0.0	4.9	0.0	13.4	2.9	0.0	12.5	0.0	8.3
Prop In Lane	0.00		1.00	0.00		1.00	1.00		1.00	1.00		0.25
Lane Grp Cap(c), veh/h	0	955	421	0	955		437	942		670	0	901
V/C Ratio(X)	0.00	0.37	0.35	0.00	0.54		0.31	0.26		0.51	0.00	0.59
Avail Cap(c_a), veh/h	0	3282	1448	0	3238		847	1822		1205	0	1744
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	11.7	11.7	0.0	12.4	0.0	11.7	5.6	0.0	9.2	0.0	6.9
Incr Delay (d2), s/veh	0.0	0.2	0.5	0.0	0.5	0.0	0.4	0.1	0.0	0.6	0.0	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.0	0.9	0.0	1.6	0.0	0.8	0.8	0.0	1.7	0.0	2.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	12.0	12.2	0.0	12.8	0.0	12.1	5.7	0.0	9.8	0.0	7.6
LnGrp LOS	A	B	B	A	B		B	A		A	A	A
Approach Vol, veh/h		505			514	A		378	A		872	
Approach Delay, s/veh		12.0			12.8			8.0			8.4	
Approach LOS		B			B			A			A	

Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		24.4	0.0	15.1		24.4	0.0	15.1				
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5				
Max Green Setting (Gmax), s		38.5	6.5	36.5		38.5	7.0	36.0				
Max Q Clear Time (g_c+I1), s		15.4	0.0	5.2		14.5	0.0	6.9				
Green Ext Time (p_c), s		2.2	0.0	3.0		5.4	0.0	3.7				

Intersection Summary	
HCM 6th Ctrl Delay	10.2
HCM 6th LOS	B

Notes

Unsignalized Delay for [NBR, WBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Intersection Delay, s/veh	130.9
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	38	144	39	32	335	284	8	89	25	245	214	99
Future Vol, veh/h	38	144	39	32	335	284	8	89	25	245	214	99
Peak Hour Factor	0.85	0.85	0.85	0.92	0.92	0.92	0.74	0.74	0.74	0.83	0.83	0.83
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	45	169	46	35	364	309	11	120	34	295	258	119
Number of Lanes	1	1	1	1	1	0	0	2	1	0	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	3	2	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	3	3	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	2	2	3
HCM Control Delay	18.8	267.4	15.9	58.8
HCM LOS	C	F	C	F

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	21%	0%	0%	100%	0%	0%	100%	0%	70%	0%
Vol Thru, %	79%	100%	0%	0%	100%	0%	0%	54%	30%	52%
Vol Right, %	0%	0%	100%	0%	0%	100%	0%	46%	0%	48%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	38	59	25	38	144	39	32	619	352	206
LT Vol	8	0	0	38	0	0	32	0	245	0
Through Vol	30	59	0	0	144	0	0	335	107	107
RT Vol	0	0	25	0	0	39	0	284	0	99
Lane Flow Rate	51	80	34	45	169	46	35	673	424	248
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.139	0.216	0.085	0.122	0.439	0.11	0.088	1.551	1.008	0.543
Departure Headway (Hd)	11.2	11.088	10.352	10.988	10.464	9.731	9.139	8.299	9.663	8.958
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	322	326	348	328	347	371	392	444	377	405
Service Time	8.9	8.788	8.052	8.688	8.164	7.431	6.884	6.044	7.363	6.658
HCM Lane V/C Ratio	0.158	0.245	0.098	0.137	0.487	0.124	0.089	1.516	1.125	0.612
HCM Control Delay	15.7	16.8	14	15.2	21.1	13.6	12.8	280.6	80.4	21.8
HCM Lane LOS	C	C	B	C	C	B	B	F	F	C
HCM 95th-tile Q	0.5	0.8	0.3	0.4	2.2	0.4	0.3	36.6	12.1	3.1

Intersection	
Int Delay, s/veh	3.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	282	76	84	536	55	64
Future Vol, veh/h	282	76	84	536	55	64
Conflicting Peds, #/hr	0	1	1	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	Yield	-	None	-	None
Storage Length	-	-	200	-	0	50
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	87	87	92	92	73	73
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	324	87	91	583	75	88

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	325	0	1134	369
Stage 1	-	-	-	-	369	-
Stage 2	-	-	-	-	765	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1235	-	224	677
Stage 1	-	-	-	-	699	-
Stage 2	-	-	-	-	459	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1234	-	207	676
Mov Cap-2 Maneuver	-	-	-	-	207	-
Stage 1	-	-	-	-	698	-
Stage 2	-	-	-	-	425	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.1	20.8
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	207	676	-	-	1234	-
HCM Lane V/C Ratio	0.364	0.13	-	-	0.074	-
HCM Control Delay (s)	32	11.1	-	-	8.2	-
HCM Lane LOS	D	B	-	-	A	-
HCM 95th %tile Q(veh)	1.6	0.4	-	-	0.2	-

Intersection	
Int Delay, s/veh	0

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	0	57	0	0	88
Future Vol, veh/h	0	0	57	0	0	88
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	25	25	68	68	73	73
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	84	0	0	121

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	205	84	0	0	84	0
Stage 1	84	-	-	-	-	-
Stage 2	121	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	783	975	-	-	1513	-
Stage 1	939	-	-	-	-	-
Stage 2	904	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	783	975	-	-	1513	-
Mov Cap-2 Maneuver	783	-	-	-	-	-
Stage 1	939	-	-	-	-	-
Stage 2	904	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	-	1513	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	-	-	0	0	-
HCM Lane LOS	-	-	A	A	-
HCM 95th %tile Q(veh)	-	-	-	0	-

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	2237	823	232	1006	405	159
Future Volume (veh/h)	2237	823	232	1006	405	159
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	2355	0	261	1130	460	0
Peak Hour Factor	0.95	0.95	0.89	0.89	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	3134		308	3105	1650	
Arrive On Green	0.49	0.00	0.09	0.61	0.33	0.00
Sat Flow, veh/h	6696	1585	3456	5274	5023	1585
Grp Volume(v), veh/h	2355	0	261	1130	460	0
Grp Sat Flow(s),veh/h/ln	1609	1585	1728	1702	1674	1585
Q Serve(g_s), s	41.9	0.0	10.5	15.8	9.6	0.0
Cycle Q Clear(g_c), s	41.9	0.0	10.5	15.8	9.6	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	3134		308	3105	1650	
V/C Ratio(X)	0.75		0.85	0.36	0.28	
Avail Cap(c_a), veh/h	3476		329	3408	1650	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	29.4	0.0	63.5	14.0	35.2	0.0
Incr Delay (d2), s/veh	0.9	0.0	17.4	0.1	0.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	16.2	0.0	5.4	6.1	4.0	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	30.2	0.0	80.9	14.0	35.6	0.0
LnGrp LOS	C		F	B	D	
Approach Vol, veh/h	2355	A		1391	460	A
Approach Delay, s/veh	30.2			26.6	35.6	
Approach LOS	C			C	D	

Timer - Assigned Phs		2	3	4			8
Phs Duration (G+Y+Rc), s		51.0	17.1	73.5			90.6
Change Period (Y+Rc), s		4.5	4.5	4.5			4.5
Max Green Setting (Gmax), s		46.5	13.5	76.5			94.5
Max Q Clear Time (g_c+I1), s		11.6	12.5	43.9			17.8
Green Ext Time (p_c), s		1.8	0.1	25.0			11.3

Intersection Summary	
HCM 6th Ctrl Delay	29.6
HCM 6th LOS	C

Notes

Unsignalized Delay for [NBR, EBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	690	470	223	93	363	361	164	567	113	307	528	583
Future Volume (vph)	690	470	223	93	363	361	164	567	113	307	528	583
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	0.88	0.97	0.95	1.00	0.97	0.91	0.91
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00	0.96	1.00	1.00	0.98	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1561	1770	3539	2662	3433	3539	1558	3433	3232	1441
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1561	1770	3539	2662	3433	3539	1558	3433	3232	1441
Peak-hour factor, PHF	0.92	0.92	0.92	0.95	0.95	0.95	0.88	0.88	0.88	0.94	0.94	0.94
Adj. Flow (vph)	750	511	242	98	382	380	186	644	128	327	562	620
RTOR Reduction (vph)	0	0	156	0	0	0	0	0	90	0	31	243
Lane Group Flow (vph)	750	511	86	98	382	380	186	644	38	327	785	123
Confl. Peds. (#/hr)	14		2	2		14			3	3		
Confl. Bikes (#/hr)						1			1			
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	32.1	45.9	45.9	12.2	26.0	26.0	9.9	38.4	38.4	15.2	43.7	43.7
Effective Green, g (s)	32.1	45.9	45.9	12.2	26.0	26.0	9.9	38.4	38.4	15.2	43.7	43.7
Actuated g/C Ratio	0.25	0.35	0.35	0.09	0.20	0.20	0.08	0.30	0.30	0.12	0.34	0.34
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	849	1252	552	166	709	533	262	1047	461	402	1088	485
v/s Ratio Prot	c0.22	0.14		0.06	0.11		0.05	0.18		c0.10	c0.24	
v/s Ratio Perm			0.05			c0.14			0.02			0.09
v/c Ratio	0.88	0.41	0.16	0.59	0.54	0.71	0.71	0.62	0.08	0.81	0.72	0.25
Uniform Delay, d1	47.0	31.6	28.6	56.4	46.5	48.4	58.5	39.3	32.9	55.9	37.7	31.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	10.8	0.2	0.1	5.5	0.8	4.5	8.5	2.7	0.3	11.9	4.2	1.3
Delay (s)	57.8	31.9	28.8	61.9	47.3	52.9	67.0	42.0	33.3	67.8	41.8	32.4
Level of Service	E	C	C	E	D	D	E	D	C	E	D	C
Approach Delay (s)		44.3			51.4			45.7			45.2	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	46.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	129.7	Sum of lost time (s)	18.0
Intersection Capacity Utilization	92.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	130	216	45	25	137	137	51	582	53	170	567	104
Future Volume (veh/h)	130	216	45	25	137	137	51	582	53	170	567	104
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	148	245	51	27	146	0	56	640	0	187	623	114
Peak Hour Factor	0.88	0.88	0.88	0.94	0.94	0.94	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	187	363	307	51	220		159	762		231	919	778
Arrive On Green	0.10	0.19	0.19	0.03	0.12	0.00	0.05	0.41	0.00	0.13	0.49	0.49
Sat Flow, veh/h	1781	1870	1581	1781	1870	1585	3456	1870	1585	1781	1870	1583
Grp Volume(v), veh/h	148	245	51	27	146	0	56	640	0	187	623	114
Grp Sat Flow(s),veh/h/ln	1781	1870	1581	1781	1870	1585	1728	1870	1585	1781	1870	1583
Q Serve(g_s), s	6.1	9.1	2.0	1.1	5.6	0.0	1.2	23.1	0.0	7.7	19.0	3.0
Cycle Q Clear(g_c), s	6.1	9.1	2.0	1.1	5.6	0.0	1.2	23.1	0.0	7.7	19.0	3.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	187	363	307	51	220		159	762		231	919	778
V/C Ratio(X)	0.79	0.68	0.17	0.53	0.66		0.35	0.84		0.81	0.68	0.15
Avail Cap(c_a), veh/h	321	971	821	157	799		235	1495		395	1782	1508
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.7	28.0	25.2	35.9	31.6	0.0	34.7	20.0	0.0	31.7	14.5	10.5
Incr Delay (d2), s/veh	7.3	2.2	0.3	8.2	3.4	0.0	1.3	2.6	0.0	6.6	0.9	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.9	4.1	0.8	0.6	2.7	0.0	0.5	9.8	0.0	3.6	7.4	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	40.1	30.2	25.4	44.1	35.0	0.0	36.0	22.6	0.0	38.3	15.4	10.5
LnGrp LOS	D	C	C	D	D		D	C		D	B	B
Approach Vol, veh/h		444			173	A		696	A		924	
Approach Delay, s/veh		32.9			36.4			23.7			19.5	
Approach LOS		C			D			C			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.2	35.0	6.6	19.0	7.9	41.3	12.4	13.3
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	16.6	59.9	6.6	38.9	5.1	71.4	13.5	32.0
Max Q Clear Time (g_c+I1), s	9.7	25.1	3.1	11.1	3.2	21.0	8.1	7.6
Green Ext Time (p_c), s	0.3	5.0	0.0	1.6	0.0	5.4	0.2	0.8

Intersection Summary	
HCM 6th Ctrl Delay	24.8
HCM 6th LOS	C

Notes

Unsignalized Delay for [NBR, WBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	177	611	210	22	536	159	128	347	45	185	293	175
Future Volume (veh/h)	177	611	210	22	536	159	128	347	45	185	293	175
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	206	710	244	23	558	0	152	413	0	199	315	188
Peak Hour Factor	0.86	0.86	0.86	0.96	0.96	0.96	0.84	0.84	0.84	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	0	1224	542	0	1224		380	885		461	519	310
Arrive On Green	0.00	0.34	0.34	0.00	0.34	0.00	0.47	0.47	0.00	0.47	0.47	0.47
Sat Flow, veh/h	0	3554	1574	0	3554	1585	896	1870	1585	973	1097	655
Grp Volume(v), veh/h	0	710	244	0	558	0	152	413	0	199	0	503
Grp Sat Flow(s),veh/h/ln	0	1777	1574	0	1777	1585	896	1870	1585	973	0	1752
Q Serve(g_s), s	0.0	8.1	5.9	0.0	6.0	0.0	7.5	7.4	0.0	8.6	0.0	10.5
Cycle Q Clear(g_c), s	0.0	8.1	5.9	0.0	6.0	0.0	17.9	7.4	0.0	16.0	0.0	10.5
Prop In Lane	0.00		1.00	0.00		1.00	1.00		1.00	1.00		0.37
Lane Grp Cap(c), veh/h	0	1224	542	0	1224		380	885		461	0	829
V/C Ratio(X)	0.00	0.58	0.45	0.00	0.46		0.40	0.47		0.43	0.00	0.61
Avail Cap(c_a), veh/h	0	3058	1354	0	2914		690	1534		798	0	1437
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	13.3	12.6	0.0	12.6	0.0	16.2	8.8	0.0	14.2	0.0	9.6
Incr Delay (d2), s/veh	0.0	0.4	0.6	0.0	0.3	0.0	0.7	0.4	0.0	0.6	0.0	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	2.8	1.9	0.0	2.1	0.0	1.4	2.4	0.0	1.7	0.0	3.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	13.7	13.1	0.0	12.9	0.0	16.9	9.2	0.0	14.8	0.0	10.3
LnGrp LOS	A	B	B	A	B		B	A		B	A	B
Approach Vol, veh/h		954			558	A		565	A		702	
Approach Delay, s/veh		13.6			12.9			11.3			11.6	
Approach LOS		B			B			B			B	

Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		27.9	0.0	21.5		27.9	0.0	21.5				
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5				
Max Green Setting (Gmax), s		40.5	8.5	42.5		40.5	10.5	40.5				
Max Q Clear Time (g_c+I1), s		19.9	0.0	10.1		18.0	0.0	8.0				
Green Ext Time (p_c), s		3.4	0.0	6.6		4.6	0.0	4.2				

Intersection Summary	
HCM 6th Ctrl Delay	12.5
HCM 6th LOS	B

Notes

Unsignalized Delay for [NBR, WBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Intersection Delay, s/veh	105.6
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	54	395	9	11	239	200	7	193	48	315	100	38
Future Vol, veh/h	54	395	9	11	239	200	7	193	48	315	100	38
Peak Hour Factor	0.90	0.90	0.90	0.95	0.95	0.95	0.87	0.87	0.87	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	60	439	10	12	252	211	8	222	55	350	111	42
Number of Lanes	1	1	1	1	1	0	0	2	1	0	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	3	2	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	3	3	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	2	2	3
HCM Control Delay	121.8	144.6	20.2	100.9
HCM LOS	F	F	C	F

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	10%	0%	0%	100%	0%	0%	100%	0%	86%	0%
Vol Thru, %	90%	100%	0%	0%	100%	0%	0%	54%	14%	57%
Vol Right, %	0%	0%	100%	0%	0%	100%	0%	46%	0%	43%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	71	129	48	54	395	9	11	439	365	88
LT Vol	7	0	0	54	0	0	11	0	315	0
Through Vol	64	129	0	0	395	0	0	239	50	50
RT Vol	0	0	48	0	0	9	0	200	0	38
Lane Flow Rate	82	148	55	60	439	10	12	462	406	98
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.238	0.428	0.149	0.17	1.18	0.025	0.033	1.21	1.126	0.252
Departure Headway (Hd)	11.809	11.756	11.011	11.053	10.528	9.793	10.946	10.091	10.848	10.081
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	306	309	328	326	347	368	329	365	337	359
Service Time	9.509	9.456	8.711	8.753	8.228	7.493	8.646	7.791	8.548	7.781
HCM Lane V/C Ratio	0.268	0.479	0.168	0.184	1.265	0.027	0.036	1.266	1.205	0.273
HCM Control Delay	18.2	23	15.6	16	138.8	12.7	14	147.9	121.3	16.1
HCM Lane LOS	C	C	C	C	F	B	B	F	F	C
HCM 95th-tile Q	0.9	2.1	0.5	0.6	16.7	0.1	0.1	18.2	14.7	1

Intersection	
Int Delay, s/veh	6.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	713	83	115	441	54	83
Future Vol, veh/h	713	83	115	441	54	83
Conflicting Peds, #/hr	0	1	1	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	Yield	-	None	-	None
Storage Length	-	-	200	-	0	50
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	79	79	86	86
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	792	92	146	558	63	97

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	793	0	1689	839
Stage 1	-	-	-	-	839	-
Stage 2	-	-	-	-	850	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	828	-	103	366
Stage 1	-	-	-	-	424	-
Stage 2	-	-	-	-	419	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	827	-	85	366
Mov Cap-2 Maneuver	-	-	-	-	85	-
Stage 1	-	-	-	-	424	-
Stage 2	-	-	-	-	345	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.1	58.8
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	85	366	-	-	827	-
HCM Lane V/C Ratio	0.739	0.264	-	-	0.176	-
HCM Control Delay (s)	121	18.3	-	-	10.3	-
HCM Lane LOS	F	C	-	-	B	-
HCM 95th %tile Q(veh)	3.7	1	-	-	0.6	-

Intersection	
Int Delay, s/veh	0

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	0	104	0	0	146
Future Vol, veh/h	0	0	104	0	0	146
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	25	25	70	70	85	85
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	149	0	0	172

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	321	149	0	0	149	0
Stage 1	149	-	-	-	-	-
Stage 2	172	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	673	898	-	-	1432	-
Stage 1	879	-	-	-	-	-
Stage 2	858	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	673	898	-	-	1432	-
Mov Cap-2 Maneuver	673	-	-	-	-	-
Stage 1	879	-	-	-	-	-
Stage 2	858	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	-	1432	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	-	-	0	0	-
HCM Lane LOS	-	-	A	A	-
HCM 95th %tile Q(veh)	-	-	-	0	-

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1353	323	105	2157	766	191
Future Volume (veh/h)	1353	323	105	2157	766	191
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	1503	0	108	2224	946	0
Peak Hour Factor	0.90	0.90	0.97	0.97	0.81	0.81
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1845		167	2321	2287	
Arrive On Green	0.36	0.00	0.05	0.45	0.46	0.00
Sat Flow, veh/h	5274	1585	3456	5274	5023	1585
Grp Volume(v), veh/h	1503	0	108	2224	946	0
Grp Sat Flow(s),veh/h/ln	1702	1585	1728	1702	1674	1585
Q Serve(g_s), s	26.6	0.0	3.1	42.1	12.6	0.0
Cycle Q Clear(g_c), s	26.6	0.0	3.1	42.1	12.6	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1845		167	2321	2287	
V/C Ratio(X)	0.81		0.65	0.96	0.41	
Avail Cap(c_a), veh/h	1845		173	2325	2287	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	28.9	0.0	46.7	26.3	18.3	0.0
Incr Delay (d2), s/veh	2.9	0.0	7.8	10.6	0.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.1	0.0	1.5	18.4	4.9	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	31.8	0.0	54.5	36.9	18.8	0.0
LnGrp LOS	C		D	D	B	
Approach Vol, veh/h	1503	A		2332	946	A
Approach Delay, s/veh	31.8			37.7	18.8	
Approach LOS	C			D	B	

Timer - Assigned Phs		2	3	4			8
Phs Duration (G+Y+Rc), s		50.0	9.3	40.6			49.9
Change Period (Y+Rc), s		4.5	4.5	4.5			4.5
Max Green Setting (Gmax), s		45.5	5.0	36.0			45.5
Max Q Clear Time (g_c+I1), s		14.6	5.1	28.6			44.1
Green Ext Time (p_c), s		4.1	0.0	5.3			1.4

Intersection Summary	
HCM 6th Ctrl Delay	32.1
HCM 6th LOS	C

Notes

Unsignalized Delay for [NBR, EBR] is excluded from calculations of the approach delay and intersection delay.

Appendix C – Analysis Reports Future Without Project Conditions

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	340	214	135	45	266	326	122	477	38	176	835	589
Future Volume (vph)	340	214	135	45	266	326	122	477	38	176	835	589
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	0.88	0.97	0.95	1.00	0.97	0.91	0.91
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.97	1.00	1.00	0.99	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1558	1770	3539	2695	3433	3539	1561	3433	3311	1441
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1558	1770	3539	2695	3433	3539	1561	3433	3311	1441
Peak-hour factor, PHF	0.96	0.96	0.96	0.90	0.90	0.90	0.93	0.93	0.93	0.95	0.95	0.95
Adj. Flow (vph)	354	223	141	50	296	362	131	513	41	185	879	620
RTOR Reduction (vph)	0	0	113	0	0	0	0	0	22	0	11	207
Lane Group Flow (vph)	354	223	28	50	296	362	131	513	19	185	1029	252
Confl. Peds. (#/hr)	17		5	5		17			3	3		
Confl. Bikes (#/hr)			1			5						
Turn Type	Prot	NA	Perm	Prot	NA	pm+ov	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8	1	5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	5.5	16.0	16.0	3.1	13.6	18.6	5.0	37.5	37.5	5.0	37.5	37.5
Effective Green, g (s)	5.5	16.0	16.0	3.1	13.6	18.6	5.0	37.5	37.5	5.0	37.5	37.5
Actuated g/C Ratio	0.07	0.20	0.20	0.04	0.17	0.23	0.06	0.47	0.47	0.06	0.47	0.47
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	237	711	313	68	604	782	215	1667	735	215	1559	678
v/s Ratio Prot	c0.10	0.06		0.03	0.08	c0.03	0.04	0.14		c0.05	c0.31	
v/s Ratio Perm			0.02			0.11			0.01			0.18
v/c Ratio	1.49	0.31	0.09	0.74	0.49	0.46	0.61	0.31	0.03	0.86	0.66	0.37
Uniform Delay, d1	37.0	27.1	25.9	37.8	29.9	26.2	36.3	13.0	11.3	37.0	16.2	13.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	243.1	0.3	0.1	33.4	0.6	0.4	4.8	0.5	0.1	27.8	2.2	1.6
Delay (s)	280.2	27.4	26.0	71.3	30.5	26.6	41.2	13.5	11.3	64.7	18.4	15.1
Level of Service	F	C	C	E	C	C	D	B	B	E	B	B
Approach Delay (s)		151.8			31.4			18.7			22.6	
Approach LOS		F			C			B			C	

Intersection Summary			
HCM 2000 Control Delay	47.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	79.6	Sum of lost time (s)	18.0
Intersection Capacity Utilization	78.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	54	55	18	36	153	145	69	458	32	97	852	79
Future Volume (veh/h)	54	55	18	36	153	145	69	458	32	97	852	79
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	81	82	27	38	161	0	77	509	0	102	897	83
Peak Hour Factor	0.67	0.67	0.67	0.95	0.95	0.95	0.90	0.90	0.90	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	104	264	224	64	222		178	976		132	1019	862
Arrive On Green	0.06	0.14	0.14	0.04	0.12	0.00	0.05	0.52	0.00	0.07	0.54	0.54
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	3456	1870	1585	1781	1870	1583
Grp Volume(v), veh/h	81	82	27	38	161	0	77	509	0	102	897	83
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1728	1870	1585	1781	1870	1583
Q Serve(g_s), s	3.6	3.1	1.2	1.7	6.6	0.0	1.7	14.2	0.0	4.5	33.3	2.0
Cycle Q Clear(g_c), s	3.6	3.1	1.2	1.7	6.6	0.0	1.7	14.2	0.0	4.5	33.3	2.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	104	264	224	64	222		178	976		132	1019	862
V/C Ratio(X)	0.78	0.31	0.12	0.60	0.73		0.43	0.52		0.77	0.88	0.10
Avail Cap(c_a), veh/h	139	740	627	153	755		218	1186		303	1386	1174
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.8	30.6	29.8	37.7	33.7	0.0	36.5	12.5	0.0	36.1	15.8	8.7
Incr Delay (d2), s/veh	17.8	0.7	0.2	8.6	4.5	0.0	1.7	0.4	0.0	9.2	5.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	1.4	0.5	0.9	3.2	0.0	0.7	5.5	0.0	2.2	13.8	0.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	54.6	31.2	30.0	46.3	38.2	0.0	38.2	12.9	0.0	45.2	21.1	8.7
LnGrp LOS	D	C	C	D	D		D	B		D	C	A
Approach Vol, veh/h		190			199	A		586	A		1082	
Approach Delay, s/veh		41.0			39.7			16.2			22.4	
Approach LOS		D			D			B			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.4	45.9	7.3	15.7	8.6	47.7	9.1	13.9
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	13.5	50.3	6.8	31.4	5.0	58.8	6.2	32.0
Max Q Clear Time (g_c+I1), s	6.5	16.2	3.7	5.1	3.7	35.3	5.6	8.6
Green Ext Time (p_c), s	0.1	3.7	0.0	0.5	0.0	7.9	0.0	0.8

Intersection Summary	
HCM 6th Ctrl Delay	24.1
HCM 6th LOS	C

Notes

Unsignalized Delay for [NBR, WBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	153	371	156	54	530	144	144	259	84	349	413	136
Future Volume (veh/h)	153	371	156	54	530	144	144	259	84	349	413	136
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	163	395	166	58	570	0	150	270	0	375	444	146
Peak Hour Factor	0.94	0.94	0.94	0.93	0.93	0.93	0.96	0.96	0.96	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	0	971	428	0	971		405	993		658	715	235
Arrive On Green	0.00	0.27	0.27	0.00	0.27	0.00	0.53	0.53	0.00	0.53	0.53	0.53
Sat Flow, veh/h	0	3554	1568	0	3554	1585	826	1870	1585	1109	1347	443
Grp Volume(v), veh/h	0	395	166	0	570	0	150	270	0	375	0	590
Grp Sat Flow(s),veh/h/ln	0	1777	1568	0	1777	1585	826	1870	1585	1109	0	1790
Q Serve(g_s), s	0.0	4.2	4.0	0.0	6.4	0.0	7.1	3.6	0.0	12.9	0.0	10.6
Cycle Q Clear(g_c), s	0.0	4.2	4.0	0.0	6.4	0.0	17.7	3.6	0.0	16.5	0.0	10.6
Prop In Lane	0.00		1.00	0.00		1.00	1.00		1.00	1.00		0.25
Lane Grp Cap(c), veh/h	0	971	428	0	971		405	993		658	0	950
V/C Ratio(X)	0.00	0.41	0.39	0.00	0.59		0.37	0.27		0.57	0.00	0.62
Avail Cap(c_a), veh/h	0	2826	1247	0	2788		659	1569		999	0	1502
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	13.6	13.6	0.0	14.4	0.0	13.7	5.9	0.0	10.4	0.0	7.5
Incr Delay (d2), s/veh	0.0	0.3	0.6	0.0	0.6	0.0	0.6	0.1	0.0	0.8	0.0	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.5	1.3	0.0	2.2	0.0	1.2	1.0	0.0	2.5	0.0	2.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	13.9	14.1	0.0	15.0	0.0	14.3	6.1	0.0	11.2	0.0	8.2
LnGrp LOS	A	B	B	A	B		B	A		B	A	A
Approach Vol, veh/h		561			570	A		420	A		965	
Approach Delay, s/veh		14.0			15.0			9.0			9.4	
Approach LOS		B			B			A			A	

Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		28.9	0.0	17.0		28.9	0.0	17.0				
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5				
Max Green Setting (Gmax), s		38.5	6.5	36.5		38.5	7.0	36.0				
Max Q Clear Time (g_c+I1), s		19.7	0.0	6.2		18.5	0.0	8.4				
Green Ext Time (p_c), s		2.4	0.0	3.4		5.9	0.0	4.2				

Intersection Summary	
HCM 6th Ctrl Delay	11.6
HCM 6th LOS	B

Notes

Unsignalized Delay for [NBR, WBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Intersection Delay, s/veh	139.3
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	39	148	40	33	345	293	8	91	26	252	220	102
Future Vol, veh/h	39	148	40	33	345	293	8	91	26	252	220	102
Peak Hour Factor	0.85	0.85	0.85	0.92	0.92	0.92	0.74	0.74	0.74	0.83	0.83	0.83
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	46	174	47	36	375	318	11	123	35	304	265	123
Number of Lanes	1	1	1	1	1	0	0	2	1	0	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	3	2	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	3	3	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	2	2	3
HCM Control Delay	19.2	284.1	16.1	63.1
HCM LOS	C	F	C	F

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	21%	0%	0%	100%	0%	0%	100%	0%	70%	0%
Vol Thru, %	79%	100%	0%	0%	100%	0%	0%	54%	30%	52%
Vol Right, %	0%	0%	100%	0%	0%	100%	0%	46%	0%	48%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	38	61	26	39	148	40	33	638	362	212
LT Vol	8	0	0	39	0	0	33	0	252	0
Through Vol	30	61	0	0	148	0	0	345	110	110
RT Vol	0	0	26	0	0	40	0	293	0	102
Lane Flow Rate	52	82	35	46	174	47	36	693	436	255
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.143	0.223	0.089	0.125	0.449	0.112	0.091	1.591	1.03	0.555
Departure Headway (Hd)	11.349	11.239	10.501	11.132	10.608	9.873	9.267	8.426	9.779	9.073
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	318	321	343	324	341	365	389	437	375	401
Service Time	9.049	8.939	8.201	8.832	8.308	7.573	6.967	6.126	7.479	6.773
HCM Lane V/C Ratio	0.164	0.255	0.102	0.142	0.51	0.129	0.093	1.586	1.163	0.636
HCM Control Delay	15.9	17.1	14.2	15.4	21.7	13.8	12.9	298.1	86.9	22.5
HCM Lane LOS	C	C	B	C	C	B	B	F	F	C
HCM 95th-tile Q	0.5	0.8	0.3	0.4	2.2	0.4	0.3	38.2	12.6	3.3

Intersection	
Int Delay, s/veh	5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	334	90	100	635	65	76
Future Vol, veh/h	334	90	100	635	65	76
Conflicting Peds, #/hr	0	1	1	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	Yield	-	None	-	None
Storage Length	-	-	200	-	0	50
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	87	87	92	92	73	73
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	384	103	109	690	89	104

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	385	0	1345	437
Stage 1	-	-	-	-	437	-
Stage 2	-	-	-	-	908	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1173	-	167	620
Stage 1	-	-	-	-	651	-
Stage 2	-	-	-	-	393	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1172	-	151	619
Mov Cap-2 Maneuver	-	-	-	-	151	-
Stage 1	-	-	-	-	650	-
Stage 2	-	-	-	-	356	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.1	33.4
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	151	619	-	-	1172	-
HCM Lane V/C Ratio	0.59	0.168	-	-	0.093	-
HCM Control Delay (s)	58.4	12	-	-	8.4	-
HCM Lane LOS	F	B	-	-	A	-
HCM 95th %tile Q(veh)	3.1	0.6	-	-	0.3	-

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	410	0	0	735	0	0
Future Vol, veh/h	410	0	0	735	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	446	0	0	799	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	1245	-
Stage 1	-	-	-	-	446	-
Stage 2	-	-	-	-	799	-
Critical Hdwy	-	-	-	-	6.42	-
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	-	-	3.518	-
Pot Cap-1 Maneuver	-	-	0	-	192	0
Stage 1	-	-	0	-	645	0
Stage 2	-	-	0	-	443	0
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	192	-
Mov Cap-2 Maneuver	-	-	-	-	192	-
Stage 1	-	-	-	-	645	-
Stage 2	-	-	-	-	443	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	0	-	-	-
HCM Lane LOS	A	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-

Intersection	
Int Delay, s/veh	0

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	0	68	0	0	104
Future Vol, veh/h	0	0	68	0	0	104
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	25	25	68	68	73	73
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	100	0	0	142

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	242	100	0	0	100	0
Stage 1	100	-	-	-	-	-
Stage 2	142	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	746	956	-	-	1493	-
Stage 1	924	-	-	-	-	-
Stage 2	885	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	746	956	-	-	1493	-
Mov Cap-2 Maneuver	746	-	-	-	-	-
Stage 1	924	-	-	-	-	-
Stage 2	885	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	-	1493	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	-	-	0	0	-
HCM Lane LOS	-	-	A	A	-
HCM 95th %tile Q(veh)	-	-	-	0	-

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	2651	975	275	1192	480	188
Future Volume (veh/h)	2651	975	275	1192	480	188
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	2791	0	309	1339	545	0
Peak Hour Factor	0.95	0.95	0.89	0.89	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	3253		314	3200	1571	
Arrive On Green	0.51	0.00	0.09	0.63	0.31	0.00
Sat Flow, veh/h	6696	1585	3456	5274	5023	1585
Grp Volume(v), veh/h	2791	0	309	1339	545	0
Grp Sat Flow(s),veh/h/ln	1609	1585	1728	1702	1674	1585
Q Serve(g_s), s	56.3	0.0	13.3	19.7	12.4	0.0
Cycle Q Clear(g_c), s	56.3	0.0	13.3	19.7	12.4	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	3253		314	3200	1571	
V/C Ratio(X)	0.86		0.98	0.42	0.35	
Avail Cap(c_a), veh/h	3311		314	3246	1571	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	32.1	0.0	67.5	14.0	39.4	0.0
Incr Delay (d2), s/veh	2.4	0.0	46.5	0.1	0.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	22.1	0.0	7.9	7.6	5.3	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	34.5	0.0	113.9	14.1	40.0	0.0
LnGrp LOS	C		F	B	D	
Approach Vol, veh/h	2791	A		1648	545	A
Approach Delay, s/veh	34.5			32.8	40.0	
Approach LOS	C			C	D	

Timer - Assigned Phs		2	3	4		8
Phs Duration (G+Y+Rc), s		51.0	18.0	79.7		97.7
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s		46.5	13.5	76.5		94.5
Max Q Clear Time (g_c+I1), s		14.4	15.3	58.3		21.7
Green Ext Time (p_c), s		2.2	0.0	16.8		14.8

Intersection Summary	
HCM 6th Ctrl Delay	34.6
HCM 6th LOS	C

Notes

Unsignalized Delay for [NBR, EBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	765	521	247	103	403	400	182	629	125	340	585	646
Future Volume (vph)	765	521	247	103	403	400	182	629	125	340	585	646
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	0.88	0.97	0.95	1.00	0.97	0.91	0.91
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00	0.95	1.00	1.00	0.98	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1561	1770	3539	2660	3433	3539	1558	3433	3232	1441
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1561	1770	3539	2660	3433	3539	1558	3433	3232	1441
Peak-hour factor, PHF	0.92	0.92	0.92	0.95	0.95	0.95	0.88	0.88	0.88	0.94	0.94	0.94
Adj. Flow (vph)	832	566	268	108	424	421	207	715	142	362	622	687
RTOR Reduction (vph)	0	0	168	0	0	0	0	0	102	0	32	274
Lane Group Flow (vph)	832	566	100	108	424	421	207	715	40	362	872	131
Confl. Peds. (#/hr)	14		2	2		14			3	3		
Confl. Bikes (#/hr)						1			1			
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	34.6	50.5	50.5	13.0	28.9	28.9	10.0	38.1	38.1	15.5	43.6	43.6
Effective Green, g (s)	34.6	50.5	50.5	13.0	28.9	28.9	10.0	38.1	38.1	15.5	43.6	43.6
Actuated g/C Ratio	0.26	0.37	0.37	0.10	0.21	0.21	0.07	0.28	0.28	0.11	0.32	0.32
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	879	1322	583	170	757	569	254	998	439	393	1043	465
v/s Ratio Prot	c0.24	0.16		0.06	0.12		0.06	0.20		c0.11	c0.27	
v/s Ratio Perm			0.06			c0.16			0.03			0.09
v/c Ratio	0.95	0.43	0.17	0.64	0.56	0.74	0.81	0.72	0.09	0.92	0.84	0.28
Uniform Delay, d1	49.3	31.5	28.3	58.8	47.4	49.6	61.6	43.6	35.7	59.2	42.4	34.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	18.5	0.2	0.1	7.5	1.0	5.0	17.9	4.4	0.4	26.6	8.0	1.5
Delay (s)	67.9	31.8	28.4	66.3	48.4	54.6	79.5	48.0	36.2	85.8	50.4	35.6
Level of Service	E	C	C	E	D	D	E	D	D	F	D	D
Approach Delay (s)		49.3			53.2			52.6			54.5	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	52.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	135.1	Sum of lost time (s)	18.0
Intersection Capacity Utilization	96.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	144	240	50	28	152	152	56	645	59	189	629	115
Future Volume (veh/h)	144	240	50	28	152	152	56	645	59	189	629	115
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	164	273	57	30	162	0	62	709	0	208	691	126
Peak Hour Factor	0.88	0.88	0.88	0.94	0.94	0.94	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	199	381	322	53	227		154	791		245	965	817
Arrive On Green	0.11	0.20	0.20	0.03	0.12	0.00	0.04	0.42	0.00	0.14	0.52	0.52
Sat Flow, veh/h	1781	1870	1581	1781	1870	1585	3456	1870	1585	1781	1870	1583
Grp Volume(v), veh/h	164	273	57	30	162	0	62	709	0	208	691	126
Grp Sat Flow(s),veh/h/ln	1781	1870	1581	1781	1870	1585	1728	1870	1585	1781	1870	1583
Q Serve(g_s), s	7.9	11.9	2.6	1.4	7.3	0.0	1.5	30.7	0.0	9.9	24.7	3.6
Cycle Q Clear(g_c), s	7.9	11.9	2.6	1.4	7.3	0.0	1.5	30.7	0.0	9.9	24.7	3.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	199	381	322	53	227		154	791		245	965	817
V/C Ratio(X)	0.83	0.72	0.18	0.57	0.71		0.40	0.90		0.85	0.72	0.15
Avail Cap(c_a), veh/h	227	790	667	129	687		198	970		280	1156	979
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.9	32.4	28.7	41.7	36.8	0.0	40.5	23.4	0.0	36.7	16.2	11.1
Incr Delay (d2), s/veh	19.5	2.5	0.3	9.3	4.1	0.0	1.7	9.4	0.0	19.4	1.7	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.4	5.5	1.0	0.8	3.5	0.0	0.7	14.7	0.0	5.6	10.2	1.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	57.4	34.9	28.9	51.0	40.9	0.0	42.2	32.8	0.0	56.1	17.9	11.2
LnGrp LOS	E	C	C	D	D		D	C		E	B	B
Approach Vol, veh/h		494			192	A		771	A		1025	
Approach Delay, s/veh		41.7			42.5			33.5			24.8	
Approach LOS		D			D			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	16.5	41.4	7.1	22.2	8.4	49.5	14.2	15.1
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	13.7	45.2	6.3	36.8	5.0	53.9	11.1	32.0
Max Q Clear Time (g_c+I1), s	11.9	32.7	3.4	13.9	3.5	26.7	9.9	9.3
Green Ext Time (p_c), s	0.1	4.0	0.0	1.8	0.0	5.8	0.1	0.8

Intersection Summary	
HCM 6th Ctrl Delay	32.3
HCM 6th LOS	C

Notes

Unsignalized Delay for [NBR, WBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	196	677	233	24	594	176	142	385	50	205	325	194
Future Volume (veh/h)	196	677	233	24	594	176	142	385	50	205	325	194
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	228	787	271	25	619	0	169	458	0	220	349	209
Peak Hour Factor	0.86	0.86	0.86	0.96	0.96	0.96	0.84	0.84	0.84	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	0	1229	544	0	1229		352	941		440	551	330
Arrive On Green	0.00	0.35	0.35	0.00	0.35	0.00	0.50	0.50	0.00	0.50	0.50	0.50
Sat Flow, veh/h	0	3554	1574	0	3554	1585	851	1870	1585	934	1096	656
Grp Volume(v), veh/h	0	787	271	0	619	0	169	458	0	220	0	558
Grp Sat Flow(s),veh/h/ln	0	1777	1574	0	1777	1585	851	1870	1585	934	0	1752
Q Serve(g_s), s	0.0	11.1	8.1	0.0	8.2	0.0	10.8	9.6	0.0	12.1	0.0	13.8
Cycle Q Clear(g_c), s	0.0	11.1	8.1	0.0	8.2	0.0	24.6	9.6	0.0	21.7	0.0	13.8
Prop In Lane	0.00		1.00	0.00		1.00	1.00		1.00	1.00		0.37
Lane Grp Cap(c), veh/h	0	1229	544	0	1229		352	941		440	0	882
V/C Ratio(X)	0.00	0.64	0.50	0.00	0.50		0.48	0.49		0.50	0.00	0.63
Avail Cap(c_a), veh/h	0	2593	1148	0	2521		501	1271		605	0	1190
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	16.4	15.4	0.0	15.4	0.0	19.8	9.7	0.0	16.9	0.0	10.8
Incr Delay (d2), s/veh	0.0	0.6	0.7	0.0	0.3	0.0	1.0	0.4	0.0	0.9	0.0	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	4.1	2.7	0.0	3.0	0.0	2.0	3.3	0.0	2.4	0.0	4.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	16.9	16.1	0.0	15.8	0.0	20.8	10.1	0.0	17.8	0.0	11.6
LnGrp LOS	A	B	B	A	B		C	B		B	A	B
Approach Vol, veh/h		1058			619	A		627	A		778	
Approach Delay, s/veh		16.7			15.8			13.0			13.3	
Approach LOS		B			B			B			B	

Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		34.5	0.0	25.1		34.5	0.0	25.1				
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5				
Max Green Setting (Gmax), s		40.5	7.5	43.5		40.5	8.7	42.3				
Max Q Clear Time (g_c+I1), s		26.6	0.0	13.1		23.7	0.0	10.2				
Green Ext Time (p_c), s		3.4	0.0	7.5		4.8	0.0	4.7				

Intersection Summary	
HCM 6th Ctrl Delay	14.9
HCM 6th LOS	B

Notes

Unsignalized Delay for [NBR, WBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Intersection Delay, s/veh	117.5
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	56	407	9	11	246	206	7	199	49	325	103	39
Future Vol, veh/h	56	407	9	11	246	206	7	199	49	325	103	39
Peak Hour Factor	0.90	0.90	0.90	0.95	0.95	0.95	0.87	0.87	0.87	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	62	452	10	12	259	217	8	229	56	361	114	43
Number of Lanes	1	1	1	1	1	0	0	2	1	0	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	3	2	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	3	3	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	2	2	3
HCM Control Delay	135.8	161	20.9	112.8
HCM LOS	F	F	C	F

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	10%	0%	0%	100%	0%	0%	100%	0%	86%	0%
Vol Thru, %	90%	100%	0%	0%	100%	0%	0%	54%	14%	57%
Vol Right, %	0%	0%	100%	0%	0%	100%	0%	46%	0%	43%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	73	133	49	56	407	9	11	452	377	91
LT Vol	7	0	0	56	0	0	11	0	325	0
Through Vol	66	133	0	0	407	0	0	246	52	52
RT Vol	0	0	49	0	0	9	0	206	0	39
Lane Flow Rate	84	152	56	62	452	10	12	476	418	101
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.245	0.442	0.152	0.177	1.222	0.025	0.033	1.252	1.166	0.26
Departure Headway (Hd)	12.08	12.029	11.281	11.258	10.732	9.996	11.14	10.284	11.04	10.272
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	299	302	320	320	344	360	323	357	330	352
Service Time	9.78	9.729	8.981	8.958	8.432	7.696	8.84	7.984	8.74	7.972
HCM Lane V/C Ratio	0.281	0.503	0.175	0.194	1.314	0.028	0.037	1.333	1.267	0.287
HCM Control Delay	18.7	23.9	16	16.4	155	13	14.2	164.6	135.9	16.5
HCM Lane LOS	C	C	C	C	F	B	B	F	F	C
HCM 95th-tile Q	0.9	2.2	0.5	0.6	17.9	0.1	0.1	19.5	15.8	1

Intersection	
Int Delay, s/veh	7.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	735	86	118	454	56	86
Future Vol, veh/h	735	86	118	454	56	86
Conflicting Peds, #/hr	0	1	1	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	Yield	-	None	-	None
Storage Length	-	-	200	-	0	50
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	79	79	86	86
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	817	96	149	575	65	100

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	818	0	1739	866
Stage 1	-	-	-	-	866	-
Stage 2	-	-	-	-	873	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	810	-	96	353
Stage 1	-	-	-	-	412	-
Stage 2	-	-	-	-	409	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	809	-	78	353
Mov Cap-2 Maneuver	-	-	-	-	78	-
Stage 1	-	-	-	-	412	-
Stage 2	-	-	-	-	334	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.2	71.1
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	78	353	-	-	809	-
HCM Lane V/C Ratio	0.835	0.283	-	-	0.185	-
HCM Control Delay (s)	150.8	19.2	-	-	10.5	-
HCM Lane LOS	F	C	-	-	B	-
HCM 95th %tile Q(veh)	4.2	1.1	-	-	0.7	-

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	820	0	0	573	0	0
Future Vol, veh/h	820	0	0	573	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	891	0	0	623	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	1514	-
Stage 1	-	-	-	-	891	-
Stage 2	-	-	-	-	623	-
Critical Hdwy	-	-	-	-	6.42	-
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	-	-	3.518	-
Pot Cap-1 Maneuver	-	-	0	-	132	0
Stage 1	-	-	0	-	401	0
Stage 2	-	-	0	-	535	0
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	132	-
Mov Cap-2 Maneuver	-	-	-	-	132	-
Stage 1	-	-	-	-	401	-
Stage 2	-	-	-	-	535	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	0	-	-	-
HCM Lane LOS	A	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-

Intersection	
Int Delay, s/veh	0

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	0	107	0	0	150
Future Vol, veh/h	0	0	107	0	0	150
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	25	25	70	70	85	85
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	153	0	0	176

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	329	153	0	0	153	0
Stage 1	153	-	-	-	-	-
Stage 2	176	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	665	893	-	-	1428	-
Stage 1	875	-	-	-	-	-
Stage 2	855	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	665	893	-	-	1428	-
Mov Cap-2 Maneuver	665	-	-	-	-	-
Stage 1	875	-	-	-	-	-
Stage 2	855	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	-	1428	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	-	-	0	0	-
HCM Lane LOS	-	-	A	A	-
HCM 95th %tile Q(veh)	-	-	-	0	-

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1394	333	108	2222	789	197
Future Volume (veh/h)	1394	333	108	2222	789	197
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	1549	0	111	2291	974	0
Peak Hour Factor	0.90	0.90	0.97	0.97	0.81	0.81
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1842		170	2323	2286	
Arrive On Green	0.36	0.00	0.05	0.46	0.46	0.00
Sat Flow, veh/h	5274	1585	3456	5274	5023	1585
Grp Volume(v), veh/h	1549	0	111	2291	974	0
Grp Sat Flow(s),veh/h/ln	1702	1585	1728	1702	1674	1585
Q Serve(g_s), s	27.8	0.0	3.2	44.4	13.1	0.0
Cycle Q Clear(g_c), s	27.8	0.0	3.2	44.4	13.1	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1842		170	2323	2286	
V/C Ratio(X)	0.84		0.65	0.99	0.43	
Avail Cap(c_a), veh/h	1842		173	2323	2286	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	29.3	0.0	46.7	26.9	18.4	0.0
Incr Delay (d2), s/veh	3.7	0.0	8.3	15.5	0.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.7	0.0	1.5	20.3	5.1	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	33.0	0.0	55.0	42.4	19.0	0.0
LnGrp LOS	C		E	D	B	
Approach Vol, veh/h	1549	A		2402	974	A
Approach Delay, s/veh	33.0			43.0	19.0	
Approach LOS	C			D	B	

Timer - Assigned Phs		2	3	4			8
Phs Duration (G+Y+Rc), s		50.0	9.4	40.6			50.0
Change Period (Y+Rc), s		4.5	4.5	4.5			4.5
Max Green Setting (Gmax), s		45.5	5.0	36.0			45.5
Max Q Clear Time (g_c+I1), s		15.1	5.2	29.8			46.4
Green Ext Time (p_c), s		4.2	0.0	4.7			0.0

Intersection Summary	
HCM 6th Ctrl Delay	35.1
HCM 6th LOS	D

Notes

Unsignalized Delay for [NBR, EBR] is excluded from calculations of the approach delay and intersection delay.

Appendix D – Analysis Reports Future With Project Conditions

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	340	214	135	45	266	326	122	477	38	176	900	589
Future Volume (vph)	340	214	135	45	266	326	122	477	38	176	900	589
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	0.88	0.97	0.95	1.00	0.97	0.91	0.91
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.97	1.00	1.00	0.99	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1558	1770	3539	2695	3433	3539	1561	3433	3323	1441
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1558	1770	3539	2695	3433	3539	1561	3433	3323	1441
Peak-hour factor, PHF	0.96	0.96	0.96	0.90	0.90	0.90	0.93	0.93	0.93	0.95	0.95	0.95
Adj. Flow (vph)	354	223	141	50	296	362	131	513	41	185	947	620
RTOR Reduction (vph)	0	0	113	0	0	0	0	0	22	0	9	207
Lane Group Flow (vph)	354	223	28	50	296	362	131	513	19	185	1081	270
Confl. Peds. (#/hr)	17		5	5		17			3	3		
Confl. Bikes (#/hr)			1			5						
Turn Type	Prot	NA	Perm	Prot	NA	pm+ov	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8	1	5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	5.5	16.0	16.0	3.1	13.6	18.6	5.0	37.5	37.5	5.0	37.5	37.5
Effective Green, g (s)	5.5	16.0	16.0	3.1	13.6	18.6	5.0	37.5	37.5	5.0	37.5	37.5
Actuated g/C Ratio	0.07	0.20	0.20	0.04	0.17	0.23	0.06	0.47	0.47	0.06	0.47	0.47
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	237	711	313	68	604	782	215	1667	735	215	1565	678
v/s Ratio Prot	c0.10	0.06		0.03	0.08	c0.03	0.04	0.14		c0.05	c0.33	
v/s Ratio Perm			0.02			0.11			0.01			0.19
v/c Ratio	1.49	0.31	0.09	0.74	0.49	0.46	0.61	0.31	0.03	0.86	0.69	0.40
Uniform Delay, d1	37.0	27.1	25.9	37.8	29.9	26.2	36.3	13.0	11.3	37.0	16.5	13.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	243.1	0.3	0.1	33.4	0.6	0.4	4.8	0.5	0.1	27.8	2.5	1.7
Delay (s)	280.2	27.4	26.0	71.3	30.5	26.6	41.2	13.5	11.3	64.7	19.0	15.5
Level of Service	F	C	C	E	C	C	D	B	B	E	B	B
Approach Delay (s)		151.8			31.4			18.7			22.9	
Approach LOS		F			C			B			C	

Intersection Summary			
HCM 2000 Control Delay	47.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	79.6	Sum of lost time (s)	18.0
Intersection Capacity Utilization	78.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	54	55	18	36	153	145	69	458	32	97	917	79
Future Volume (veh/h)	54	55	18	36	153	145	69	458	32	97	917	79
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	81	82	27	38	161	0	77	509	0	102	965	83
Peak Hour Factor	0.67	0.67	0.67	0.95	0.95	0.95	0.90	0.90	0.90	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	104	261	221	62	217		168	1018		131	1065	901
Arrive On Green	0.06	0.14	0.14	0.03	0.12	0.00	0.05	0.54	0.00	0.07	0.57	0.57
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	3456	1870	1585	1781	1870	1583
Grp Volume(v), veh/h	81	82	27	38	161	0	77	509	0	102	965	83
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1728	1870	1585	1781	1870	1583
Q Serve(g_s), s	3.9	3.4	1.3	1.8	7.2	0.0	1.9	14.8	0.0	4.9	39.8	2.1
Cycle Q Clear(g_c), s	3.9	3.4	1.3	1.8	7.2	0.0	1.9	14.8	0.0	4.9	39.8	2.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	104	261	221	62	217		168	1018		131	1065	901
V/C Ratio(X)	0.78	0.31	0.12	0.62	0.74		0.46	0.50		0.78	0.91	0.09
Avail Cap(c_a), veh/h	128	678	575	140	691		200	1086		278	1270	1075
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	40.2	33.5	32.6	41.2	37.0	0.0	40.1	12.4	0.0	39.4	16.6	8.5
Incr Delay (d2), s/veh	21.6	0.7	0.2	9.6	5.0	0.0	1.9	0.4	0.0	9.4	8.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	1.6	0.5	1.0	3.5	0.0	0.8	5.7	0.0	2.4	17.4	0.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	61.8	34.2	32.9	50.9	42.0	0.0	42.0	12.7	0.0	48.8	25.1	8.5
LnGrp LOS	E	C	C	D	D		D	B		D	C	A
Approach Vol, veh/h		190			199	A		586	A		1150	
Approach Delay, s/veh		45.8			43.7			16.6			26.0	
Approach LOS		D			D			B			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.9	51.6	7.5	16.6	8.7	53.8	9.6	14.5
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	13.5	50.3	6.8	31.4	5.0	58.8	6.2	32.0
Max Q Clear Time (g_c+I1), s	6.9	16.8	3.8	5.4	3.9	41.8	5.9	9.2
Green Ext Time (p_c), s	0.1	3.6	0.0	0.5	0.0	7.6	0.0	0.8

Intersection Summary	
HCM 6th Ctrl Delay	26.8
HCM 6th LOS	C

Notes

Unsignalized Delay for [NBR, WBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	153	371	156	54	530	144	144	259	84	349	478	136
Future Volume (veh/h)	153	371	156	54	530	144	144	259	84	349	478	136
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	163	395	166	58	570	0	150	270	0	375	514	146
Peak Hour Factor	0.94	0.94	0.94	0.93	0.93	0.93	0.96	0.96	0.96	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	0	961	424	0	961		362	1006		663	753	214
Arrive On Green	0.00	0.27	0.27	0.00	0.27	0.00	0.54	0.54	0.00	0.54	0.54	0.54
Sat Flow, veh/h	0	3554	1567	0	3554	1585	774	1870	1585	1109	1401	398
Grp Volume(v), veh/h	0	395	166	0	570	0	150	270	0	375	0	660
Grp Sat Flow(s),veh/h/ln	0	1777	1567	0	1777	1585	774	1870	1585	1109	0	1798
Q Serve(g_s), s	0.0	4.3	4.1	0.0	6.5	0.0	8.2	3.7	0.0	13.0	0.0	12.6
Cycle Q Clear(g_c), s	0.0	4.3	4.1	0.0	6.5	0.0	20.8	3.7	0.0	16.6	0.0	12.6
Prop In Lane	0.00		1.00	0.00		1.00	1.00		1.00	1.00		0.22
Lane Grp Cap(c), veh/h	0	961	424	0	961		362	1006		663	0	967
V/C Ratio(X)	0.00	0.41	0.39	0.00	0.59		0.41	0.27		0.57	0.00	0.68
Avail Cap(c_a), veh/h	0	2763	1219	0	2725		581	1534		976	0	1475
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	14.1	14.0	0.0	14.9	0.0	15.5	5.9	0.0	10.4	0.0	7.9
Incr Delay (d2), s/veh	0.0	0.3	0.6	0.0	0.6	0.0	0.8	0.1	0.0	0.8	0.0	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.5	1.3	0.0	2.3	0.0	1.3	1.0	0.0	2.5	0.0	3.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	14.3	14.6	0.0	15.5	0.0	16.3	6.0	0.0	11.1	0.0	8.8
LnGrp LOS	A	B	B	A	B		B	A		B	A	A
Approach Vol, veh/h		561			570	A		420	A		1035	
Approach Delay, s/veh		14.4			15.5			9.7			9.6	
Approach LOS		B			B			A			A	

Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		29.7	0.0	17.2		29.7	0.0	17.2				
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5				
Max Green Setting (Gmax), s		38.5	6.5	36.5		38.5	7.0	36.0				
Max Q Clear Time (g_c+I1), s		22.8	0.0	6.3		18.6	0.0	8.5				
Green Ext Time (p_c), s		2.4	0.0	3.4		6.5	0.0	4.2				

Intersection Summary	
HCM 6th Ctrl Delay	12.0
HCM 6th LOS	B

Notes

Unsignalized Delay for [NBR, WBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Intersection Delay, s/veh	153.3
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	39	148	40	33	345	293	8	91	26	317	220	102
Future Vol, veh/h	39	148	40	33	345	293	8	91	26	317	220	102
Peak Hour Factor	0.85	0.85	0.85	0.92	0.92	0.92	0.74	0.74	0.74	0.83	0.83	0.83
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	46	174	47	36	375	318	11	123	35	382	265	123
Number of Lanes	1	1	1	1	1	0	0	2	1	0	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	3	2	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	3	3	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	2	2	3
HCM Control Delay	19.7	280.8	16.4	109
HCM LOS	C	F	C	F

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	21%	0%	0%	100%	0%	0%	100%	0%	74%	0%
Vol Thru, %	79%	100%	0%	0%	100%	0%	0%	54%	26%	52%
Vol Right, %	0%	0%	100%	0%	0%	100%	0%	46%	0%	48%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	38	61	26	39	148	40	33	638	427	212
LT Vol	8	0	0	39	0	0	33	0	317	0
Through Vol	30	61	0	0	148	0	0	345	110	110
RT Vol	0	0	26	0	0	40	0	293	0	102
Lane Flow Rate	52	82	35	46	174	47	36	693	514	255
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.142	0.222	0.088	0.125	0.451	0.113	0.09	1.581	1.224	0.558
Departure Headway (Hd)	11.607	11.497	10.757	11.39	10.865	10.129	9.518	8.676	9.784	9.054
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	311	314	335	317	334	356	379	423	376	401
Service Time	9.307	9.197	8.457	9.09	8.565	7.829	7.218	6.376	7.484	6.754
HCM Lane V/C Ratio	0.167	0.261	0.104	0.145	0.521	0.132	0.095	1.638	1.367	0.636
HCM Control Delay	16.2	17.4	14.5	15.7	22.2	14.1	13.2	294.6	151.9	22.6
HCM Lane LOS	C	C	B	C	C	B	B	F	F	C
HCM 95th-tile Q	0.5	0.8	0.3	0.4	2.2	0.4	0.3	36.8	19.1	3.3

Intersection	
Int Delay, s/veh	5.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	334	155	100	635	65	76
Future Vol, veh/h	334	155	100	635	65	76
Conflicting Peds, #/hr	0	1	1	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	Yield	-	None	-	None
Storage Length	-	-	200	-	0	50
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	87	87	92	92	73	73
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	384	178	109	690	89	104

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	385	0	1382	474
Stage 1	-	-	-	-	474	-
Stage 2	-	-	-	-	908	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1173	-	159	590
Stage 1	-	-	-	-	626	-
Stage 2	-	-	-	-	393	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1172	-	144	589
Mov Cap-2 Maneuver	-	-	-	-	144	-
Stage 1	-	-	-	-	625	-
Stage 2	-	-	-	-	356	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.1	36.1
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	144	589	-	-	1172	-
HCM Lane V/C Ratio	0.618	0.177	-	-	0.093	-
HCM Control Delay (s)	63.8	12.4	-	-	8.4	-
HCM Lane LOS	F	B	-	-	A	-
HCM 95th %tile Q(veh)	3.3	0.6	-	-	0.3	-

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	410	0	0	735	0	0
Future Vol, veh/h	410	0	0	735	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	446	0	0	799	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	1245	-
Stage 1	-	-	-	-	446	-
Stage 2	-	-	-	-	799	-
Critical Hdwy	-	-	-	-	6.42	-
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	-	-	3.518	-
Pot Cap-1 Maneuver	-	-	0	-	192	0
Stage 1	-	-	0	-	645	0
Stage 2	-	-	0	-	443	0
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	192	-
Mov Cap-2 Maneuver	-	-	-	-	192	-
Stage 1	-	-	-	-	645	-
Stage 2	-	-	-	-	443	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	0	-	-	-
HCM Lane LOS	A	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-

Intersection	
Int Delay, s/veh	2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	0	68	0	65	104
Future Vol, veh/h	0	0	68	0	65	104
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	25	25	68	68	73	73
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	100	0	89	142

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	420	100	0	0	100	0
Stage 1	100	-	-	-	-	-
Stage 2	320	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	590	956	-	-	1493	-
Stage 1	924	-	-	-	-	-
Stage 2	736	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	552	956	-	-	1493	-
Mov Cap-2 Maneuver	552	-	-	-	-	-
Stage 1	924	-	-	-	-	-
Stage 2	688	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	0	0	2.9
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	-	1493	-
HCM Lane V/C Ratio	-	-	-	0.06	-
HCM Control Delay (s)	-	-	0	7.6	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	-	0.2	-

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	2651	975	275	1192	545	188
Future Volume (veh/h)	2651	975	275	1192	545	188
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	2791	0	309	1339	619	0
Peak Hour Factor	0.95	0.95	0.89	0.89	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	3253		314	3200	1571	
Arrive On Green	0.51	0.00	0.09	0.63	0.31	0.00
Sat Flow, veh/h	6696	1585	3456	5274	5023	1585
Grp Volume(v), veh/h	2791	0	309	1339	619	0
Grp Sat Flow(s),veh/h/ln	1609	1585	1728	1702	1674	1585
Q Serve(g_s), s	56.3	0.0	13.3	19.7	14.4	0.0
Cycle Q Clear(g_c), s	56.3	0.0	13.3	19.7	14.4	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	3253		314	3200	1571	
V/C Ratio(X)	0.86		0.98	0.42	0.39	
Avail Cap(c_a), veh/h	3311		314	3246	1571	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	32.1	0.0	67.5	14.0	40.0	0.0
Incr Delay (d2), s/veh	2.4	0.0	46.5	0.1	0.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	22.1	0.0	7.9	7.6	6.1	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	34.5	0.0	113.9	14.1	40.8	0.0
LnGrp LOS	C		F	B	D	
Approach Vol, veh/h	2791	A		1648	619	A
Approach Delay, s/veh	34.5			32.8	40.8	
Approach LOS	C			C	D	

Timer - Assigned Phs		2	3	4			8
Phs Duration (G+Y+Rc), s		51.0	18.0	79.7			97.7
Change Period (Y+Rc), s		4.5	4.5	4.5			4.5
Max Green Setting (Gmax), s		46.5	13.5	76.5			94.5
Max Q Clear Time (g_c+I1), s		16.4	15.3	58.3			21.7
Green Ext Time (p_c), s		2.5	0.0	16.8			14.8

Intersection Summary	
HCM 6th Ctrl Delay	34.7
HCM 6th LOS	C

Notes

Unsignalized Delay for [NBR, EBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	765	521	247	103	403	400	182	694	125	340	585	646
Future Volume (vph)	765	521	247	103	403	400	182	694	125	340	585	646
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	0.88	0.97	0.95	1.00	0.97	0.91	0.91
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00	0.95	1.00	1.00	0.98	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1561	1770	3539	2660	3433	3539	1558	3433	3232	1441
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1561	1770	3539	2660	3433	3539	1558	3433	3232	1441
Peak-hour factor, PHF	0.92	0.92	0.92	0.95	0.95	0.95	0.88	0.88	0.88	0.94	0.94	0.94
Adj. Flow (vph)	832	566	268	108	424	421	207	789	142	362	622	687
RTOR Reduction (vph)	0	0	168	0	0	0	0	0	102	0	32	274
Lane Group Flow (vph)	832	566	100	108	424	421	207	789	40	362	872	131
Confl. Peds. (#/hr)	14		2	2		14			3	3		
Confl. Bikes (#/hr)						1			1			
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	34.6	50.5	50.5	13.0	28.9	28.9	10.0	38.1	38.1	15.5	43.6	43.6
Effective Green, g (s)	34.6	50.5	50.5	13.0	28.9	28.9	10.0	38.1	38.1	15.5	43.6	43.6
Actuated g/C Ratio	0.26	0.37	0.37	0.10	0.21	0.21	0.07	0.28	0.28	0.11	0.32	0.32
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	879	1322	583	170	757	569	254	998	439	393	1043	465
v/s Ratio Prot	c0.24	0.16		0.06	0.12		0.06	0.22		c0.11	c0.27	
v/s Ratio Perm			0.06			c0.16			0.03			0.09
v/c Ratio	0.95	0.43	0.17	0.64	0.56	0.74	0.81	0.79	0.09	0.92	0.84	0.28
Uniform Delay, d1	49.3	31.5	28.3	58.8	47.4	49.6	61.6	44.8	35.7	59.2	42.4	34.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	18.5	0.2	0.1	7.5	1.0	5.0	17.9	6.4	0.4	26.6	8.0	1.5
Delay (s)	67.9	31.8	28.4	66.3	48.4	54.6	79.5	51.2	36.2	85.8	50.4	35.6
Level of Service	E	C	C	E	D	D	E	D	D	F	D	D
Approach Delay (s)		49.3			53.2			54.5			54.5	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	52.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	135.1	Sum of lost time (s)	18.0
Intersection Capacity Utilization	96.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	144	240	50	28	152	152	56	710	59	189	629	115
Future Volume (veh/h)	144	240	50	28	152	152	56	710	59	189	629	115
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	164	273	57	30	162	0	62	780	0	208	691	126
Peak Hour Factor	0.88	0.88	0.88	0.94	0.94	0.94	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	196	375	317	51	223		147	833		241	1007	852
Arrive On Green	0.11	0.20	0.20	0.03	0.12	0.00	0.04	0.45	0.00	0.14	0.54	0.54
Sat Flow, veh/h	1781	1870	1581	1781	1870	1585	3456	1870	1585	1781	1870	1583
Grp Volume(v), veh/h	164	273	57	30	162	0	62	780	0	208	691	126
Grp Sat Flow(s),veh/h/ln	1781	1870	1581	1781	1870	1585	1728	1870	1585	1781	1870	1583
Q Serve(g_s), s	8.5	12.9	2.8	1.6	7.9	0.0	1.7	37.6	0.0	10.8	25.6	3.8
Cycle Q Clear(g_c), s	8.5	12.9	2.8	1.6	7.9	0.0	1.7	37.6	0.0	10.8	25.6	3.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	196	375	317	51	223		147	833		241	1007	852
V/C Ratio(X)	0.84	0.73	0.18	0.58	0.73		0.42	0.94		0.86	0.69	0.15
Avail Cap(c_a), veh/h	209	727	614	118	632		182	893		258	1064	901
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.3	35.5	31.4	45.4	40.2	0.0	44.2	25.0	0.0	40.1	16.0	11.0
Incr Delay (d2), s/veh	23.5	2.7	0.3	10.1	4.5	0.0	1.9	16.3	0.0	23.6	1.7	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.0	6.1	1.1	0.8	3.9	0.0	0.7	19.4	0.0	6.3	10.6	1.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	64.9	38.2	31.7	55.5	44.7	0.0	46.1	41.2	0.0	63.7	17.7	11.0
LnGrp LOS	E	D	C	E	D		D	D		E	B	B
Approach Vol, veh/h		494			192	A		842	A		1025	
Approach Delay, s/veh		46.3			46.4			41.6			26.2	
Approach LOS		D			D			D			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	17.3	46.7	7.2	23.5	8.5	55.5	14.9	15.8
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	13.7	45.2	6.3	36.8	5.0	53.9	11.1	32.0
Max Q Clear Time (g_c+I1), s	12.8	39.6	3.6	14.9	3.7	27.6	10.5	9.9
Green Ext Time (p_c), s	0.1	2.6	0.0	1.7	0.0	5.8	0.0	0.8

Intersection Summary	
HCM 6th Ctrl Delay	36.7
HCM 6th LOS	D

Notes

Unsignalized Delay for [NBR, WBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	196	677	233	24	594	176	142	450	50	205	325	194
Future Volume (veh/h)	196	677	233	24	594	176	142	450	50	205	325	194
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	228	787	271	25	619	0	169	536	0	220	349	209
Peak Hour Factor	0.86	0.86	0.86	0.96	0.96	0.96	0.84	0.84	0.84	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	0	1202	532	0	1202		365	971		397	569	341
Arrive On Green	0.00	0.34	0.34	0.00	0.34	0.00	0.52	0.52	0.00	0.52	0.52	0.52
Sat Flow, veh/h	0	3554	1573	0	3554	1585	851	1870	1585	869	1096	656
Grp Volume(v), veh/h	0	787	271	0	619	0	169	536	0	220	0	558
Grp Sat Flow(s),veh/h/ln	0	1777	1573	0	1777	1585	851	1870	1585	869	0	1752
Q Serve(g_s), s	0.0	11.9	8.7	0.0	8.8	0.0	11.0	12.2	0.0	14.4	0.0	14.2
Cycle Q Clear(g_c), s	0.0	11.9	8.7	0.0	8.8	0.0	25.2	12.2	0.0	26.6	0.0	14.2
Prop In Lane	0.00		1.00	0.00		1.00	1.00		1.00	1.00		0.37
Lane Grp Cap(c), veh/h	0	1202	532	0	1202		365	971		397	0	909
V/C Ratio(X)	0.00	0.65	0.51	0.00	0.52		0.46	0.55		0.55	0.00	0.61
Avail Cap(c_a), veh/h	0	2454	1086	0	2386		470	1203		505	0	1127
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	17.7	16.7	0.0	16.7	0.0	19.6	10.2	0.0	19.2	0.0	10.7
Incr Delay (d2), s/veh	0.0	0.6	0.8	0.0	0.3	0.0	0.9	0.5	0.0	1.2	0.0	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	4.5	3.0	0.0	3.3	0.0	2.1	4.3	0.0	2.8	0.0	4.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	18.3	17.4	0.0	17.0	0.0	20.5	10.7	0.0	20.4	0.0	11.4
LnGrp LOS	A	B	B	A	B		C	B		C	A	B
Approach Vol, veh/h		1058			619	A		705	A		778	
Approach Delay, s/veh		18.1			17.0			13.1			13.9	
Approach LOS		B			B			B			B	

Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		37.2	0.0	25.8		37.2	0.0	25.8				
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5				
Max Green Setting (Gmax), s		40.5	7.5	43.5		40.5	8.7	42.3				
Max Q Clear Time (g_c+I1), s		27.2	0.0	13.9		28.6	0.0	10.8				
Green Ext Time (p_c), s		3.8	0.0	7.4		4.1	0.0	4.7				

Intersection Summary	
HCM 6th Ctrl Delay	15.7
HCM 6th LOS	B

Notes

Unsignalized Delay for [NBR, WBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Intersection Delay, s/veh	136.4
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	56	407	9	11	246	271	7	199	49	325	103	39
Future Vol, veh/h	56	407	9	11	246	271	7	199	49	325	103	39
Peak Hour Factor	0.90	0.90	0.90	0.95	0.95	0.95	0.87	0.87	0.87	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	62	452	10	12	259	285	8	229	56	361	114	43
Number of Lanes	1	1	1	1	1	0	0	2	1	0	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	3	2	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	3	3	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	2	2	3
HCM Control Delay	133.4	223.5	21.4	111.1
HCM LOS	F	F	C	F

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	10%	0%	0%	100%	0%	0%	100%	0%	86%	0%
Vol Thru, %	90%	100%	0%	0%	100%	0%	0%	48%	14%	57%
Vol Right, %	0%	0%	100%	0%	0%	100%	0%	52%	0%	43%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	73	133	49	56	407	9	11	517	377	91
LT Vol	7	0	0	56	0	0	11	0	325	0
Through Vol	66	133	0	0	407	0	0	246	52	52
RT Vol	0	0	49	0	0	9	0	271	0	39
Lane Flow Rate	84	152	56	62	452	10	12	544	418	101
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.246	0.442	0.152	0.175	1.211	0.025	0.033	1.411	1.157	0.258
Departure Headway (Hd)	12.396	12.345	11.595	11.559	11.031	10.292	11.104	10.198	11.312	10.542
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	292	294	311	312	335	350	324	359	326	343
Service Time	10.096	10.045	9.295	9.259	8.731	7.992	8.804	7.898	9.012	8.242
HCM Lane V/C Ratio	0.288	0.517	0.18	0.199	1.349	0.029	0.037	1.515	1.282	0.294
HCM Control Delay	19.1	24.5	16.4	16.7	152.1	13.3	14.2	228	133.8	16.9
HCM Lane LOS	C	C	C	C	F	B	B	F	F	C
HCM 95th-tile Q	0.9	2.1	0.5	0.6	17.2	0.1	0.1	25.5	15.3	1

Intersection	
Int Delay, s/veh	39.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	735	86	118	454	121	86
Future Vol, veh/h	735	86	118	454	121	86
Conflicting Peds, #/hr	0	1	1	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	Yield	-	None	-	None
Storage Length	-	-	200	-	0	50
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	79	79	86	86
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	817	96	149	575	141	100

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	818	0	1739	866
Stage 1	-	-	-	-	866	-
Stage 2	-	-	-	-	873	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	810	-	~ 96	353
Stage 1	-	-	-	-	412	-
Stage 2	-	-	-	-	409	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	809	-	~ 78	353
Mov Cap-2 Maneuver	-	-	-	-	~ 78	-
Stage 1	-	-	-	-	412	-
Stage 2	-	-	-	-	334	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.2	298.4
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	78	353	-	-	809	-
HCM Lane V/C Ratio	1.804	0.283	-	-	0.185	-
HCM Control Delay (s)	$ 496.9	19.2	-	-	10.5	-
HCM Lane LOS	F	C	-	-	B	-
HCM 95th %tile Q(veh)	12.2	1.1	-	-	0.7	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	820	0	0	573	0	0
Future Vol, veh/h	820	0	0	573	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	891	0	0	623	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	1514	-
Stage 1	-	-	-	-	891	-
Stage 2	-	-	-	-	623	-
Critical Hdwy	-	-	-	-	6.42	-
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	-	-	3.518	-
Pot Cap-1 Maneuver	-	-	0	-	132	0
Stage 1	-	-	0	-	401	0
Stage 2	-	-	0	-	535	0
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	132	-
Mov Cap-2 Maneuver	-	-	-	-	132	-
Stage 1	-	-	-	-	401	-
Stage 2	-	-	-	-	535	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	0	-	-	-
HCM Lane LOS	A	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-

Intersection	
Int Delay, s/veh	4.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	65	107	0	0	150
Future Vol, veh/h	0	65	107	0	0	150
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	25	25	70	70	85	85
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	260	153	0	0	176

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	329	153	0	0	153	0
Stage 1	153	-	-	-	-	-
Stage 2	176	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	665	893	-	-	1428	-
Stage 1	875	-	-	-	-	-
Stage 2	855	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	665	893	-	-	1428	-
Mov Cap-2 Maneuver	665	-	-	-	-	-
Stage 1	875	-	-	-	-	-
Stage 2	855	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.7	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	893	1428	-
HCM Lane V/C Ratio	-	-	0.291	-	-
HCM Control Delay (s)	-	-	10.7	0	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	1.2	0	-

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1394	398	108	2222	789	197
Future Volume (veh/h)	1394	398	108	2222	789	197
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	1549	0	111	2291	974	0
Peak Hour Factor	0.90	0.90	0.97	0.97	0.81	0.81
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1842		170	2323	2286	
Arrive On Green	0.36	0.00	0.05	0.46	0.46	0.00
Sat Flow, veh/h	5274	1585	3456	5274	5023	1585
Grp Volume(v), veh/h	1549	0	111	2291	974	0
Grp Sat Flow(s),veh/h/ln	1702	1585	1728	1702	1674	1585
Q Serve(g_s), s	27.8	0.0	3.2	44.4	13.1	0.0
Cycle Q Clear(g_c), s	27.8	0.0	3.2	44.4	13.1	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1842		170	2323	2286	
V/C Ratio(X)	0.84		0.65	0.99	0.43	
Avail Cap(c_a), veh/h	1842		173	2323	2286	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	29.3	0.0	46.7	26.9	18.4	0.0
Incr Delay (d2), s/veh	3.7	0.0	8.3	15.5	0.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.7	0.0	1.5	20.3	5.1	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	33.0	0.0	55.0	42.4	19.0	0.0
LnGrp LOS	C		E	D	B	
Approach Vol, veh/h	1549	A		2402	974	A
Approach Delay, s/veh	33.0			43.0	19.0	
Approach LOS	C			D	B	

Timer - Assigned Phs		2	3	4			8
Phs Duration (G+Y+Rc), s		50.0	9.4	40.6			50.0
Change Period (Y+Rc), s		4.5	4.5	4.5			4.5
Max Green Setting (Gmax), s		45.5	5.0	36.0			45.5
Max Q Clear Time (g_c+I1), s		15.1	5.2	29.8			46.4
Green Ext Time (p_c), s		4.2	0.0	4.7			0.0

Intersection Summary	
HCM 6th Ctrl Delay	35.1
HCM 6th LOS	D

Notes

Unsignalized Delay for [NBR, EBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	340	214	135	45	266	326	122	477	38	176	900	589
Future Volume (vph)	340	214	135	45	266	326	122	477	38	176	900	589
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	0.88	0.97	0.95	1.00	0.97	0.91	0.91
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.97	1.00	1.00	0.99	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1558	1770	3539	2695	3433	3539	1561	3433	3323	1441
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1558	1770	3539	2695	3433	3539	1561	3433	3323	1441
Peak-hour factor, PHF	0.96	0.96	0.96	0.90	0.90	0.90	0.93	0.93	0.93	0.95	0.95	0.95
Adj. Flow (vph)	354	223	141	50	296	362	131	513	41	185	947	620
RTOR Reduction (vph)	0	0	113	0	0	0	0	0	22	0	9	207
Lane Group Flow (vph)	354	223	28	50	296	362	131	513	19	185	1081	270
Confl. Peds. (#/hr)	17		5	5		17			3	3		
Confl. Bikes (#/hr)			1			5						
Turn Type	Prot	NA	Perm	Prot	NA	pm+ov	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8	1	5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	5.5	16.0	16.0	3.1	13.6	18.6	5.0	37.5	37.5	5.0	37.5	37.5
Effective Green, g (s)	5.5	16.0	16.0	3.1	13.6	18.6	5.0	37.5	37.5	5.0	37.5	37.5
Actuated g/C Ratio	0.07	0.20	0.20	0.04	0.17	0.23	0.06	0.47	0.47	0.06	0.47	0.47
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	237	711	313	68	604	782	215	1667	735	215	1565	678
v/s Ratio Prot	c0.10	0.06		0.03	0.08	c0.03	0.04	0.14		c0.05	c0.33	
v/s Ratio Perm			0.02			0.11			0.01			0.19
v/c Ratio	1.49	0.31	0.09	0.74	0.49	0.46	0.61	0.31	0.03	0.86	0.69	0.40
Uniform Delay, d1	37.0	27.1	25.9	37.8	29.9	26.2	36.3	13.0	11.3	37.0	16.5	13.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	243.1	0.3	0.1	33.4	0.6	0.4	4.8	0.5	0.1	27.8	2.5	1.7
Delay (s)	280.2	27.4	26.0	71.3	30.5	26.6	41.2	13.5	11.3	64.7	19.0	15.5
Level of Service	F	C	C	E	C	C	D	B	B	E	B	B
Approach Delay (s)		151.8			31.4			18.7			22.9	
Approach LOS		F			C			B			C	

Intersection Summary			
HCM 2000 Control Delay	47.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	79.6	Sum of lost time (s)	18.0
Intersection Capacity Utilization	78.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	54	55	18	36	153	145	69	458	32	97	917	79
Future Volume (veh/h)	54	55	18	36	153	145	69	458	32	97	917	79
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	81	82	27	38	161	0	77	509	0	102	965	83
Peak Hour Factor	0.67	0.67	0.67	0.95	0.95	0.95	0.90	0.90	0.90	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	104	261	221	62	217		168	1018		131	1065	901
Arrive On Green	0.06	0.14	0.14	0.03	0.12	0.00	0.05	0.54	0.00	0.07	0.57	0.57
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	3456	1870	1585	1781	1870	1583
Grp Volume(v), veh/h	81	82	27	38	161	0	77	509	0	102	965	83
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1728	1870	1585	1781	1870	1583
Q Serve(g_s), s	3.9	3.4	1.3	1.8	7.2	0.0	1.9	14.8	0.0	4.9	39.8	2.1
Cycle Q Clear(g_c), s	3.9	3.4	1.3	1.8	7.2	0.0	1.9	14.8	0.0	4.9	39.8	2.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	104	261	221	62	217		168	1018		131	1065	901
V/C Ratio(X)	0.78	0.31	0.12	0.62	0.74		0.46	0.50		0.78	0.91	0.09
Avail Cap(c_a), veh/h	128	678	575	140	691		200	1086		278	1270	1075
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	40.2	33.5	32.6	41.2	37.0	0.0	40.1	12.4	0.0	39.4	16.6	8.5
Incr Delay (d2), s/veh	21.6	0.7	0.2	9.6	5.0	0.0	1.9	0.4	0.0	9.4	8.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	1.6	0.5	1.0	3.5	0.0	0.8	5.7	0.0	2.4	17.4	0.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	61.8	34.2	32.9	50.9	42.0	0.0	42.0	12.7	0.0	48.8	25.1	8.5
LnGrp LOS	E	C	C	D	D		D	B		D	C	A
Approach Vol, veh/h		190			199	A		586	A		1150	
Approach Delay, s/veh		45.8			43.7			16.6			26.0	
Approach LOS		D			D			B			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.9	51.6	7.5	16.6	8.7	53.8	9.6	14.5
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	13.5	50.3	6.8	31.4	5.0	58.8	6.2	32.0
Max Q Clear Time (g_c+I1), s	6.9	16.8	3.8	5.4	3.9	41.8	5.9	9.2
Green Ext Time (p_c), s	0.1	3.6	0.0	0.5	0.0	7.6	0.0	0.8

Intersection Summary	
HCM 6th Ctrl Delay	26.8
HCM 6th LOS	C

Notes

Unsignalized Delay for [NBR, WBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	153	371	156	54	530	144	144	259	84	349	478	136
Future Volume (veh/h)	153	371	156	54	530	144	144	259	84	349	478	136
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	163	395	166	58	570	0	150	270	0	375	514	146
Peak Hour Factor	0.94	0.94	0.94	0.93	0.93	0.93	0.96	0.96	0.96	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	0	961	424	0	961		362	1006		663	753	214
Arrive On Green	0.00	0.27	0.27	0.00	0.27	0.00	0.54	0.54	0.00	0.54	0.54	0.54
Sat Flow, veh/h	0	3554	1567	0	3554	1585	774	1870	1585	1109	1401	398
Grp Volume(v), veh/h	0	395	166	0	570	0	150	270	0	375	0	660
Grp Sat Flow(s),veh/h/ln	0	1777	1567	0	1777	1585	774	1870	1585	1109	0	1798
Q Serve(g_s), s	0.0	4.3	4.1	0.0	6.5	0.0	8.2	3.7	0.0	13.0	0.0	12.6
Cycle Q Clear(g_c), s	0.0	4.3	4.1	0.0	6.5	0.0	20.8	3.7	0.0	16.6	0.0	12.6
Prop In Lane	0.00		1.00	0.00		1.00	1.00		1.00	1.00		0.22
Lane Grp Cap(c), veh/h	0	961	424	0	961		362	1006		663	0	967
V/C Ratio(X)	0.00	0.41	0.39	0.00	0.59		0.41	0.27		0.57	0.00	0.68
Avail Cap(c_a), veh/h	0	2763	1219	0	2725		581	1534		976	0	1475
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	14.1	14.0	0.0	14.9	0.0	15.5	5.9	0.0	10.4	0.0	7.9
Incr Delay (d2), s/veh	0.0	0.3	0.6	0.0	0.6	0.0	0.8	0.1	0.0	0.8	0.0	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.5	1.3	0.0	2.3	0.0	1.3	1.0	0.0	2.5	0.0	3.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	14.3	14.6	0.0	15.5	0.0	16.3	6.0	0.0	11.1	0.0	8.8
LnGrp LOS	A	B	B	A	B		B	A		B	A	A
Approach Vol, veh/h		561			570	A		420	A		1035	
Approach Delay, s/veh		14.4			15.5			9.7			9.6	
Approach LOS		B			B			A			A	

Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		29.7	0.0	17.2		29.7	0.0	17.2				
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5				
Max Green Setting (Gmax), s		38.5	6.5	36.5		38.5	7.0	36.0				
Max Q Clear Time (g_c+I1), s		22.8	0.0	6.3		18.6	0.0	8.5				
Green Ext Time (p_c), s		2.4	0.0	3.4		6.5	0.0	4.2				

Intersection Summary	
HCM 6th Ctrl Delay	12.0
HCM 6th LOS	B

Notes

Unsignalized Delay for [NBR, WBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Intersection Delay, s/veh	153.3
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	39	148	40	33	345	293	8	91	26	317	220	102
Future Vol, veh/h	39	148	40	33	345	293	8	91	26	317	220	102
Peak Hour Factor	0.85	0.85	0.85	0.92	0.92	0.92	0.74	0.74	0.74	0.83	0.83	0.83
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	46	174	47	36	375	318	11	123	35	382	265	123
Number of Lanes	1	1	1	1	1	0	0	2	1	0	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	3	2	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	3	3	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	2	2	3
HCM Control Delay	19.7	280.8	16.4	109
HCM LOS	C	F	C	F

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	21%	0%	0%	100%	0%	0%	100%	0%	74%	0%
Vol Thru, %	79%	100%	0%	0%	100%	0%	0%	54%	26%	52%
Vol Right, %	0%	0%	100%	0%	0%	100%	0%	46%	0%	48%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	38	61	26	39	148	40	33	638	427	212
LT Vol	8	0	0	39	0	0	33	0	317	0
Through Vol	30	61	0	0	148	0	0	345	110	110
RT Vol	0	0	26	0	0	40	0	293	0	102
Lane Flow Rate	52	82	35	46	174	47	36	693	514	255
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.142	0.222	0.088	0.125	0.451	0.113	0.09	1.581	1.224	0.558
Departure Headway (Hd)	11.607	11.497	10.757	11.39	10.865	10.129	9.518	8.676	9.784	9.054
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	311	314	335	317	334	356	379	423	376	401
Service Time	9.307	9.197	8.457	9.09	8.565	7.829	7.218	6.376	7.484	6.754
HCM Lane V/C Ratio	0.167	0.261	0.104	0.145	0.521	0.132	0.095	1.638	1.367	0.636
HCM Control Delay	16.2	17.4	14.5	15.7	22.2	14.1	13.2	294.6	151.9	22.6
HCM Lane LOS	C	C	B	C	C	B	B	F	F	C
HCM 95th-tile Q	0.5	0.8	0.3	0.4	2.2	0.4	0.3	36.8	19.1	3.3

Intersection	
Int Delay, s/veh	5.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	399	90	100	635	65	76
Future Vol, veh/h	399	90	100	635	65	76
Conflicting Peds, #/hr	0	1	1	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	Yield	-	None	-	None
Storage Length	-	-	200	-	0	50
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	87	87	92	92	73	73
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	459	103	109	690	89	104

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	460	0	1420	512
Stage 1	-	-	-	-	512	-
Stage 2	-	-	-	-	908	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1101	-	150	562
Stage 1	-	-	-	-	602	-
Stage 2	-	-	-	-	393	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1100	-	135	561
Mov Cap-2 Maneuver	-	-	-	-	135	-
Stage 1	-	-	-	-	601	-
Stage 2	-	-	-	-	354	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.2	40.4
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	135	561	-	-	1100	-
HCM Lane V/C Ratio	0.66	0.186	-	-	0.099	-
HCM Control Delay (s)	72.5	12.9	-	-	8.6	-
HCM Lane LOS	F	B	-	-	A	-
HCM 95th %tile Q(veh)	3.6	0.7	-	-	0.3	-

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	410	65	0	735	0	0
Future Vol, veh/h	410	65	0	735	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	446	71	0	799	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	1281	-
Stage 1	-	-	-	-	482	-
Stage 2	-	-	-	-	799	-
Critical Hdwy	-	-	-	-	6.42	-
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	-	-	3.518	-
Pot Cap-1 Maneuver	-	-	0	-	183	0
Stage 1	-	-	0	-	621	0
Stage 2	-	-	0	-	443	0
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	183	-
Mov Cap-2 Maneuver	-	-	-	-	183	-
Stage 1	-	-	-	-	621	-
Stage 2	-	-	-	-	443	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	0	-	-	-
HCM Lane LOS	A	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-

Intersection	
Int Delay, s/veh	0

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	0	68	0	0	104
Future Vol, veh/h	0	0	68	0	0	104
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	25	25	68	68	73	73
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	100	0	0	142

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	242	100	0	0	100	0
Stage 1	100	-	-	-	-	-
Stage 2	142	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	746	956	-	-	1493	-
Stage 1	924	-	-	-	-	-
Stage 2	885	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	746	956	-	-	1493	-
Mov Cap-2 Maneuver	746	-	-	-	-	-
Stage 1	924	-	-	-	-	-
Stage 2	885	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	-	1493	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	-	-	0	0	-
HCM Lane LOS	-	-	A	A	-
HCM 95th %tile Q(veh)	-	-	-	0	-

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	2651	975	275	1192	545	188
Future Volume (veh/h)	2651	975	275	1192	545	188
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	2791	0	309	1339	619	0
Peak Hour Factor	0.95	0.95	0.89	0.89	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	3253		314	3200	1571	
Arrive On Green	0.51	0.00	0.09	0.63	0.31	0.00
Sat Flow, veh/h	6696	1585	3456	5274	5023	1585
Grp Volume(v), veh/h	2791	0	309	1339	619	0
Grp Sat Flow(s),veh/h/ln	1609	1585	1728	1702	1674	1585
Q Serve(g_s), s	56.3	0.0	13.3	19.7	14.4	0.0
Cycle Q Clear(g_c), s	56.3	0.0	13.3	19.7	14.4	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	3253		314	3200	1571	
V/C Ratio(X)	0.86		0.98	0.42	0.39	
Avail Cap(c_a), veh/h	3311		314	3246	1571	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	32.1	0.0	67.5	14.0	40.0	0.0
Incr Delay (d2), s/veh	2.4	0.0	46.5	0.1	0.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	22.1	0.0	7.9	7.6	6.1	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	34.5	0.0	113.9	14.1	40.8	0.0
LnGrp LOS	C		F	B	D	
Approach Vol, veh/h	2791	A		1648	619	A
Approach Delay, s/veh	34.5			32.8	40.8	
Approach LOS	C			C	D	

Timer - Assigned Phs		2	3	4		8
Phs Duration (G+Y+Rc), s		51.0	18.0	79.7		97.7
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s		46.5	13.5	76.5		94.5
Max Q Clear Time (g_c+I1), s		16.4	15.3	58.3		21.7
Green Ext Time (p_c), s		2.5	0.0	16.8		14.8

Intersection Summary	
HCM 6th Ctrl Delay	34.7
HCM 6th LOS	C

Notes

Unsignalized Delay for [NBR, EBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	765	521	247	103	403	400	182	694	125	340	585	646
Future Volume (vph)	765	521	247	103	403	400	182	694	125	340	585	646
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	0.88	0.97	0.95	1.00	0.97	0.91	0.91
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00	0.95	1.00	1.00	0.98	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1561	1770	3539	2660	3433	3539	1558	3433	3232	1441
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1561	1770	3539	2660	3433	3539	1558	3433	3232	1441
Peak-hour factor, PHF	0.92	0.92	0.92	0.95	0.95	0.95	0.88	0.88	0.88	0.94	0.94	0.94
Adj. Flow (vph)	832	566	268	108	424	421	207	789	142	362	622	687
RTOR Reduction (vph)	0	0	168	0	0	0	0	0	102	0	32	274
Lane Group Flow (vph)	832	566	100	108	424	421	207	789	40	362	872	131
Confl. Peds. (#/hr)	14		2	2		14			3	3		
Confl. Bikes (#/hr)						1			1			
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	34.6	50.5	50.5	13.0	28.9	28.9	10.0	38.1	38.1	15.5	43.6	43.6
Effective Green, g (s)	34.6	50.5	50.5	13.0	28.9	28.9	10.0	38.1	38.1	15.5	43.6	43.6
Actuated g/C Ratio	0.26	0.37	0.37	0.10	0.21	0.21	0.07	0.28	0.28	0.11	0.32	0.32
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	879	1322	583	170	757	569	254	998	439	393	1043	465
v/s Ratio Prot	c0.24	0.16		0.06	0.12		0.06	0.22		c0.11	c0.27	
v/s Ratio Perm			0.06			c0.16			0.03			0.09
v/c Ratio	0.95	0.43	0.17	0.64	0.56	0.74	0.81	0.79	0.09	0.92	0.84	0.28
Uniform Delay, d1	49.3	31.5	28.3	58.8	47.4	49.6	61.6	44.8	35.7	59.2	42.4	34.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	18.5	0.2	0.1	7.5	1.0	5.0	17.9	6.4	0.4	26.6	8.0	1.5
Delay (s)	67.9	31.8	28.4	66.3	48.4	54.6	79.5	51.2	36.2	85.8	50.4	35.6
Level of Service	E	C	C	E	D	D	E	D	D	F	D	D
Approach Delay (s)		49.3			53.2			54.5			54.5	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	52.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	135.1	Sum of lost time (s)	18.0
Intersection Capacity Utilization	96.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	144	240	50	28	152	152	56	710	59	189	629	115
Future Volume (veh/h)	144	240	50	28	152	152	56	710	59	189	629	115
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	164	273	57	30	162	0	62	780	0	208	691	126
Peak Hour Factor	0.88	0.88	0.88	0.94	0.94	0.94	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	196	375	317	51	223		147	833		241	1007	852
Arrive On Green	0.11	0.20	0.20	0.03	0.12	0.00	0.04	0.45	0.00	0.14	0.54	0.54
Sat Flow, veh/h	1781	1870	1581	1781	1870	1585	3456	1870	1585	1781	1870	1583
Grp Volume(v), veh/h	164	273	57	30	162	0	62	780	0	208	691	126
Grp Sat Flow(s),veh/h/ln	1781	1870	1581	1781	1870	1585	1728	1870	1585	1781	1870	1583
Q Serve(g_s), s	8.5	12.9	2.8	1.6	7.9	0.0	1.7	37.6	0.0	10.8	25.6	3.8
Cycle Q Clear(g_c), s	8.5	12.9	2.8	1.6	7.9	0.0	1.7	37.6	0.0	10.8	25.6	3.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	196	375	317	51	223		147	833		241	1007	852
V/C Ratio(X)	0.84	0.73	0.18	0.58	0.73		0.42	0.94		0.86	0.69	0.15
Avail Cap(c_a), veh/h	209	727	614	118	632		182	893		258	1064	901
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.3	35.5	31.4	45.4	40.2	0.0	44.2	25.0	0.0	40.1	16.0	11.0
Incr Delay (d2), s/veh	23.5	2.7	0.3	10.1	4.5	0.0	1.9	16.3	0.0	23.6	1.7	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.0	6.1	1.1	0.8	3.9	0.0	0.7	19.4	0.0	6.3	10.6	1.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	64.9	38.2	31.7	55.5	44.7	0.0	46.1	41.2	0.0	63.7	17.7	11.0
LnGrp LOS	E	D	C	E	D		D	D		E	B	B
Approach Vol, veh/h		494			192	A		842	A		1025	
Approach Delay, s/veh		46.3			46.4			41.6			26.2	
Approach LOS		D			D			D			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	17.3	46.7	7.2	23.5	8.5	55.5	14.9	15.8
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	13.7	45.2	6.3	36.8	5.0	53.9	11.1	32.0
Max Q Clear Time (g_c+I1), s	12.8	39.6	3.6	14.9	3.7	27.6	10.5	9.9
Green Ext Time (p_c), s	0.1	2.6	0.0	1.7	0.0	5.8	0.0	0.8

Intersection Summary	
HCM 6th Ctrl Delay	36.7
HCM 6th LOS	D

Notes

Unsignalized Delay for [NBR, WBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	196	677	233	24	594	176	142	450	50	205	325	194
Future Volume (veh/h)	196	677	233	24	594	176	142	450	50	205	325	194
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	228	787	271	25	619	0	169	536	0	220	349	209
Peak Hour Factor	0.86	0.86	0.86	0.96	0.96	0.96	0.84	0.84	0.84	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	0	1202	532	0	1202		365	971		397	569	341
Arrive On Green	0.00	0.34	0.34	0.00	0.34	0.00	0.52	0.52	0.00	0.52	0.52	0.52
Sat Flow, veh/h	0	3554	1573	0	3554	1585	851	1870	1585	869	1096	656
Grp Volume(v), veh/h	0	787	271	0	619	0	169	536	0	220	0	558
Grp Sat Flow(s),veh/h/ln	0	1777	1573	0	1777	1585	851	1870	1585	869	0	1752
Q Serve(g_s), s	0.0	11.9	8.7	0.0	8.8	0.0	11.0	12.2	0.0	14.4	0.0	14.2
Cycle Q Clear(g_c), s	0.0	11.9	8.7	0.0	8.8	0.0	25.2	12.2	0.0	26.6	0.0	14.2
Prop In Lane	0.00		1.00	0.00		1.00	1.00		1.00	1.00		0.37
Lane Grp Cap(c), veh/h	0	1202	532	0	1202		365	971		397	0	909
V/C Ratio(X)	0.00	0.65	0.51	0.00	0.52		0.46	0.55		0.55	0.00	0.61
Avail Cap(c_a), veh/h	0	2454	1086	0	2386		470	1203		505	0	1127
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	17.7	16.7	0.0	16.7	0.0	19.6	10.2	0.0	19.2	0.0	10.7
Incr Delay (d2), s/veh	0.0	0.6	0.8	0.0	0.3	0.0	0.9	0.5	0.0	1.2	0.0	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	4.5	3.0	0.0	3.3	0.0	2.1	4.3	0.0	2.8	0.0	4.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	18.3	17.4	0.0	17.0	0.0	20.5	10.7	0.0	20.4	0.0	11.4
LnGrp LOS	A	B	B	A	B		C	B		C	A	B
Approach Vol, veh/h		1058			619	A		705	A		778	
Approach Delay, s/veh		18.1			17.0			13.1			13.9	
Approach LOS		B			B			B			B	

Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		37.2	0.0	25.8		37.2	0.0	25.8				
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5				
Max Green Setting (Gmax), s		40.5	7.5	43.5		40.5	8.7	42.3				
Max Q Clear Time (g_c+I1), s		27.2	0.0	13.9		28.6	0.0	10.8				
Green Ext Time (p_c), s		3.8	0.0	7.4		4.1	0.0	4.7				

Intersection Summary	
HCM 6th Ctrl Delay	15.7
HCM 6th LOS	B

Notes

Unsignalized Delay for [NBR, WBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Intersection Delay, s/veh	136.4
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	56	407	9	11	246	271	7	199	49	325	103	39
Future Vol, veh/h	56	407	9	11	246	271	7	199	49	325	103	39
Peak Hour Factor	0.90	0.90	0.90	0.95	0.95	0.95	0.87	0.87	0.87	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	62	452	10	12	259	285	8	229	56	361	114	43
Number of Lanes	1	1	1	1	1	0	0	2	1	0	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	3	2	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	3	3	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	2	2	3
HCM Control Delay	133.4	223.5	21.4	111.1
HCM LOS	F	F	C	F

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	10%	0%	0%	100%	0%	0%	100%	0%	86%	0%
Vol Thru, %	90%	100%	0%	0%	100%	0%	0%	48%	14%	57%
Vol Right, %	0%	0%	100%	0%	0%	100%	0%	52%	0%	43%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	73	133	49	56	407	9	11	517	377	91
LT Vol	7	0	0	56	0	0	11	0	325	0
Through Vol	66	133	0	0	407	0	0	246	52	52
RT Vol	0	0	49	0	0	9	0	271	0	39
Lane Flow Rate	84	152	56	62	452	10	12	544	418	101
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.246	0.442	0.152	0.175	1.211	0.025	0.033	1.411	1.157	0.258
Departure Headway (Hd)	12.396	12.345	11.595	11.559	11.031	10.292	11.104	10.198	11.312	10.542
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	292	294	311	312	335	350	324	359	326	343
Service Time	10.096	10.045	9.295	9.259	8.731	7.992	8.804	7.898	9.012	8.242
HCM Lane V/C Ratio	0.288	0.517	0.18	0.199	1.349	0.029	0.037	1.515	1.282	0.294
HCM Control Delay	19.1	24.5	16.4	16.7	152.1	13.3	14.2	228	133.8	16.9
HCM Lane LOS	C	C	C	C	F	B	B	F	F	C
HCM 95th-tile Q	0.9	2.1	0.5	0.6	17.2	0.1	0.1	25.5	15.3	1

Intersection	
Int Delay, s/veh	8.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	735	86	118	519	56	86
Future Vol, veh/h	735	86	118	519	56	86
Conflicting Peds, #/hr	0	1	1	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	Yield	-	None	-	None
Storage Length	-	-	200	-	0	50
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	79	79	86	86
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	817	96	149	657	65	100

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	818	0	1821	866
Stage 1	-	-	-	-	866	-
Stage 2	-	-	-	-	955	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	810	-	85	353
Stage 1	-	-	-	-	412	-
Stage 2	-	-	-	-	374	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	809	-	69	353
Mov Cap-2 Maneuver	-	-	-	-	69	-
Stage 1	-	-	-	-	412	-
Stage 2	-	-	-	-	305	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.9	88.1
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	69	353	-	-	809	-
HCM Lane V/C Ratio	0.944	0.283	-	-	0.185	-
HCM Control Delay (s)	193.9	19.2	-	-	10.5	-
HCM Lane LOS	F	C	-	-	B	-
HCM 95th %tile Q(veh)	4.7	1.1	-	-	0.7	-

Intersection	
Int Delay, s/veh	2.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	820	0	0	573	65	0
Future Vol, veh/h	820	0	0	573	65	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	891	0	0	623	71	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	1514	-
Stage 1	-	-	-	-	891	-
Stage 2	-	-	-	-	623	-
Critical Hdwy	-	-	-	-	6.42	-
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	-	-	3.518	-
Pot Cap-1 Maneuver	-	-	0	-	132	0
Stage 1	-	-	0	-	401	0
Stage 2	-	-	0	-	535	0
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	132	-
Mov Cap-2 Maneuver	-	-	-	-	132	-
Stage 1	-	-	-	-	401	-
Stage 2	-	-	-	-	535	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	60
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	132	-	-	-
HCM Lane V/C Ratio	0.535	-	-	-
HCM Control Delay (s)	60	-	-	-
HCM Lane LOS	F	-	-	-
HCM 95th %tile Q(veh)	2.6	-	-	-

Intersection	
Int Delay, s/veh	0

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	0	107	0	0	150
Future Vol, veh/h	0	0	107	0	0	150
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	25	25	70	70	85	85
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	153	0	0	176

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	329	153	0	0	153	0
Stage 1	153	-	-	-	-	-
Stage 2	176	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	665	893	-	-	1428	-
Stage 1	875	-	-	-	-	-
Stage 2	855	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	665	893	-	-	1428	-
Mov Cap-2 Maneuver	665	-	-	-	-	-
Stage 1	875	-	-	-	-	-
Stage 2	855	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	-	1428	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	-	-	0	0	-
HCM Lane LOS	-	-	A	A	-
HCM 95th %tile Q(veh)	-	-	-	0	-

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1394	398	108	2222	789	197
Future Volume (veh/h)	1394	398	108	2222	789	197
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	1549	0	111	2291	974	0
Peak Hour Factor	0.90	0.90	0.97	0.97	0.81	0.81
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1842		170	2323	2286	
Arrive On Green	0.36	0.00	0.05	0.46	0.46	0.00
Sat Flow, veh/h	5274	1585	3456	5274	5023	1585
Grp Volume(v), veh/h	1549	0	111	2291	974	0
Grp Sat Flow(s),veh/h/ln	1702	1585	1728	1702	1674	1585
Q Serve(g_s), s	27.8	0.0	3.2	44.4	13.1	0.0
Cycle Q Clear(g_c), s	27.8	0.0	3.2	44.4	13.1	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1842		170	2323	2286	
V/C Ratio(X)	0.84		0.65	0.99	0.43	
Avail Cap(c_a), veh/h	1842		173	2323	2286	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	29.3	0.0	46.7	26.9	18.4	0.0
Incr Delay (d2), s/veh	3.7	0.0	8.3	15.5	0.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.7	0.0	1.5	20.3	5.1	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	33.0	0.0	55.0	42.4	19.0	0.0
LnGrp LOS	C		E	D	B	
Approach Vol, veh/h	1549	A		2402	974	A
Approach Delay, s/veh	33.0			43.0	19.0	
Approach LOS	C			D	B	

Timer - Assigned Phs		2	3	4			8
Phs Duration (G+Y+Rc), s		50.0	9.4	40.6			50.0
Change Period (Y+Rc), s		4.5	4.5	4.5			4.5
Max Green Setting (Gmax), s		45.5	5.0	36.0			45.5
Max Q Clear Time (g_c+I1), s		15.1	5.2	29.8			46.4
Green Ext Time (p_c), s		4.2	0.0	4.7			0.0

Intersection Summary	
HCM 6th Ctrl Delay	35.1
HCM 6th LOS	D

Notes

Unsignalized Delay for [NBR, EBR] is excluded from calculations of the approach delay and intersection delay.

APPENDIX I. COMMUNITY OUTREACH AND ENGAGEMENT REPORT

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COMMUNITY OUTREACH & ENGAGEMENT REPORT

BARBERS POINT SOLAR PROJECT

July 2021

Abstract

2018 – 2021 Community outreach and engagement efforts on the Barbers Point Solar Project

INNERGEX

Renewable Energy.
Sustainable Development.

Barbers Point Solar LLC
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1. Introduction

Barbers Point Solar LLC (Barbers Point Solar) is proposing to construct and operate the Barbers Point Solar Project (Project) located in east Kalaeloa, ʻEwa District, on the island of Oʻahu. The Project will consist of a 15-megawatt (MW) solar photovoltaic (PV) system coupled with a 15 MW, 4-hour (60 MW-hour) photovoltaic coupled battery energy storage system (PV-Coupled ESS) as well as ancillary support infrastructure.

The Project is to be sited on two non-contiguous lots (tab map keys (TMKs) 9-1-013:038 and 9-1-013:040) owned by Department of Hawaiian Home Lands (DHHL); together they total 163 acres but an estimated 47 acres on Parcel 38 are not usable due to the location of historical structures related to WWII. The Right of Entry for the site was secured via a competitive request for proposal process from DHHL in August 2019. Project electrical transmission lines will also be located on portions of TMK 9-1-016:027 (owned by Kapolei Infrastructure, LLC) and within rights-of-way (ROW) owned by Hawaiʻi Department of Transportation (HDOT) and Hawaiʻi Community Development Authority (HCDA). The Project will be access via Coral Sea Road.

Since the beginning of the Project's development process, extensive community engagement and public consultation has been conducted and will continue throughout the Project's development process. As further explained in this document, Barbers Point Solar's community outreach and engagement approach is designed to build trust—in Barbers Point Solar and its parent company Innergex, and the in the Project. Our approach supports proactively learning from homestead community members, beneficiaries and Oahu residents, fostering understanding of the Project, and inviting their ongoing input on the Project. The purpose of this document is to describe the Project's community outreach approach and to detail the public consultation activities completed to date. The below sub-sections of this introduction provide a more detailed background on the need for the Project, the Project's proponent and its landowner, and a brief description of the Project's components and location.

1.1. State Energy Goals & Request for Proposal Process

In 2015, Hawaii passed legislation (http://energy.hawaii.gov/renewable-energy) directing the state's utilities to generate 100% of their electricity sales from renewable energy resources by 2045 but the state needs to reach the following milestones first: 30% by 2020, 40% by 2030, 70% by 2040, and 100% by 2045. This is a very challenging but realistic achievement. Hawaii cannot wait until the last minute to "get there". The State's renewable energy mandate is founded in mitigating reliance on fossil fuels, price volatility, the export of funds for fuel imports, fuel supply reliability risk, and greenhouse gas emissions. Hawaiian Electric's energy plan for 100% renewable energy assumes all homes and some commercial customers will have solar PV on their rooftops. However, even with the forecasted level of distributed roof-top solar PV, Hawaiian Electric's energy plan identifies the need for utility scale solar PV projects to reach the 100% renewable energy mandate. Therefore, projects like the Barbers Point Solar Project, will be needed to help Oahu and the State of Hawaii reach its 100% renewable energy goal.

In August 2019, the Hawaiian Electric Company, Inc., Maui Electric Company Ltd., and Hawaiʻi Electric Light Company, Inc., (Hawaiian Electric or Company) launched a request for proposal (RFP) process for clean, renewable energy projects for Oahu, Maui, and Hawaiʻi Island that would help the state meet its goal of 100% renewable energy by 2045, bringing more stable electricity costs to consumers and reduce its dependency on imported sources of energy.

On May 8, 2020, Hawaiian Electric advised Barbers Point Solar that it had completed a Detailed Evaluation of all short-listed Proposals in accordance with Section 4.7 of the 2019 Hawaiian Electric RFP for variable renewable dispatchable generation on Oahu island and that its proposal for the Project dated November 5, 2019 had been selected for the Final Award Group.

The Company and Barbers Point Solar have executed a Power Purchase Agreement (PPA) and was filed with the Public Utilities Commission in September 2020.

Pursuant to the terms of the RFP, Barbers Point Solar was required, at a minimum, to conduct a public meeting in the community where the proposed project is located, provide adequate public notice of the meeting of two (2) weeks or more, and inform the Company of the meeting. Following the public meeting, the public will be allowed thirty (30) days to submit comments to the Company. The public meeting was held on July 8, 2020, and the public comment period ended on August 8, 2020. The Application for Regulatory Approval of the PPA (the Application) contained an attachment including those comments.

The purpose of this document is to detail the public consultation activities completed during the 2019 Variable Renewables Dispatchable Request for Proposal process and the development efforts as of to date.

1.2. Proponent - Barbers Point Solar LLC

Barbers Point Solar LLC is a Delaware limited liability company registered to do business in Hawaiʻi and organized for the purposes of developing, financing, constructing, owning, and operating the Barbers Point Solar Project. It is a wholly owned subsidiary of Innergex Renewable Development USA LLC, which in turn is a wholly owned subsidiary of Innergex Renewable Energy Inc. (Innergex).

Innergex is a Canadian independent renewable power producer that develops, acquires, owns and operates hydroelectric facilities, wind farms, and solar farms. Innergex is a publicly traded corporation on the Toronto Stock Exchange (TSX) under the symbol INE. Innergex conducts operations in Canada, the United States, France and Chile and manages a large portfolio of high-quality assets currently consisting of interests in 76 operating facilities with an aggregate net installed capacity of 3701 MW , including 37 hydroelectric facilities, 33 wind farms and six solar farms.

Innergex has created a Sustainable Development Policy that articulates its commitment to integrating sustainable development considerations in all aspects of its business. For over 30 years, Innergex and its employees (collectively, Innergex) have built strong, long-term relationships with the communities that hosts its projects and have seen firsthand how renewable energy projects can make positive, long-term impacts on society, economics and the environment. Innergex achieves these positive community relationships through its commitment to conducting itself with integrity, transparency and respect. Beginning with extensive pre-development consultations and community outreach, Innergex takes the time to engage the local community to learn about their needs and incorporates community input that is commercially reasonable and possible to design the best possible project. Innergex remains driven by the belief that the three pillars of sustainability – environmental protection, social development and economic development – are mutually reinforcing.

1.3. Department of Hawaiian Homeland

The Department of Hawaiian Home Lands (DHHL) is governed by the Hawaiian Homes Commission Act of 1920, enacted by the U.S. Congress to protect and improve the lives of native Hawaiians. The act created a Hawaiian Homes Commission to administer certain public lands, called Hawaiian home lands, for homesteads. The primary responsibilities of the DHHL are to serve its beneficiaries and to manage its extensive land trust. In addition, to administering the homesteading program, DHHL leases trust lands not in homestead use and the income from these enterprises is used to supplement DHHL's programs, including continued homestead development.

The DHHL and Hawaiian Electric entered into an Energy Partnership Charter in August 2009 agreeing to work together to achieve energy self-sufficiency and sustainability, specifically including the leasing of lands owned by DHHL for renewable energy projects.

The DHHL 2014 Oahu Island Plan is a comprehensive development plan for DHHL lands that required extensive beneficiary consultations and public meetings. The plan designated several sites for renewable energy development primarily on industrial zoned land including these parcels in Kalaeloa. DHHL has four residential developments mauka of these sites in Kapolei that will be the largest Hawaiian beneficiary community in the state.

DHHL lands in Kalaeloa were deemed not suitable for homesteading due to their proximity to a nearby airport as well as their remote locations, physical characteristics, and lack of infrastructure for residential development. While all DHHL lands in Kalaeloa are zoned for Industrial use, several parcels were designated for renewable energy production in 2014 through the Department's beneficiary consultation process and in accordance with DHHL's 2009 Hoʻomaluō *energy policy.*

In 2018 and in 2019, DHHL ran consecutive competitive solicitation processes for the disposition of these sites by general leases for renewable energy projects. The DHHL RFP was widely advertised and all qualified applicants were welcomed to bid. Innergex was selected by DHHL as the final applicant for the proposed project site and to continue with the leasing process that included consultation meetings with DHHL's beneficiaries and public hearings. A non-exclusive Right-of-Entry was issued on August 1, 2019 for an initial period of two years with the option to extend for three additional one-year periods to conduct due diligence activities and investigation related to the development of a solar project. Innergex sought a 25-year term lease to match the power purchase agreement. At the end of the PPA, Innergex is committed to remove the solar equipment and return the site to its previous condition. See Section 4.1 for further details on the beneficiary consultation associated with the Right-of-Entry.

1.4. Proposed Barbers Point Solar Project

The proposed Barbers Point Solar Project (the Project) would involve developing, constructing and operating a 15 MW solar photovoltaic system coupled with a 60 MWh battery energy storage system, located in east Kalaeloa, ʻEwa District, on the Island of Oʻahu. The proposed Project would power about 6,200 Oahu households with clean, renewable energy. The Project will be primarily located on tax map keys (TMK) 9-1-013:038 and 9-1- 013:040, which are owned by Department of Hawaiian Home Lands (DHHL). Project electrical transmission lines will also be located within rights-of-way owned by Hawaiʻi Department of Transportation (HDOT) (Coral Sea Road and Roosevelt Avenue) and Hawaiʻi Community Development Authority (HCDA), as well as within a portion of TMK 9-1-016:027 (owned by Kapolei Infrastructure, LLC).

This project siting is in the development phase. At the start of the development process, Barbers Point Solar performs various critical issues analyses to identify archaeological, cultural, environmental, social, technical and regulatory issues that help in assessing the feasibility of successfully developing, permitting, constructing and operating a project. These preliminary desktop assessments are based on readily available, existing information, including review of current relevant literature, geographic information system (GIS) data, other desktop information, as well as discussions with consultants with professional experience with energy projects in Hawaii, and drawing up Innergex's extensive experience and knowledge of developing and operating renewable energy projects around the world. A Preliminary Environmental Assessment (EA) is also completed and includes the conceptual project layout. The Preliminary EA provides a high-level review of the pre-existing environmental conditions, and potential short- and long-term impacts associated with, or resulting from proposed Project, and describes proposed avoidance and minimization measures for each of the major environmental areas. "Avoidance and minimization" of impacts to archaeological, cultural or environmental features is used to help develop the conceptual project layout (Figure 1). The above information and the conceptual project layout are used for early

community outreach and engagement where it is presented to the local community for feedback. The community feedback received is then used along with the follow-on technical field studies, which are used to identify avoidance and minimization measures, to shape the updated design layout (Figure 2).

2. Community Outreach & Engagement Overview

2.1. Objectives & Approach

Based on Innergex's numerous years of undertaking large/grid-scale renewable energy projects, Innergex understands that as "newcomers" into the community, learning and honoring the values and priorities of the community are foundational to a project's success.

Barbers Point Solar's community outreach approach is designed to build trust—in Innergex, and in the Project. Barbers Point Solar's approach supports proactively learning from homestead community members, beneficiaries, and Oahu residents, fostering understanding of the Project, and inviting ongoing community input. Meetings and other consultations with local resources and leaders have already occurred and will continue throughout the planning, development, construction, and operational phases. See Appendix A – Community Outreach and Engagement Plan.

The aim is to achieve open, two-way communication. The engagement process continues to help Barbers Point Solar share information with the local communities, understand local values, and discover areas of mutual interest. It also provides an opportunity to work through an iterative process with local communities to identify opportunities and concerns and take measures to address them in a cooperative way where commercially reasonable and possible.

To support the development of the Project, Barbers Point Solar will work closely with local partners to:

1. Listen and learn from residents about their views, concerns and interests as well as glean local insights about the project site.
2. Develop solutions that are commercially feasible and possible to address the issues or to capitalize on opportunities.
3. Be transparent in providing information about the proposal and describing its implications for the community, including any trade-offs.
4. Establish an open line of communication and practice of timely response to questions with the community throughout the life of the project.
5. Engage, keep informed, and learn from elected officials to ensure area policymakers are aligned with project goals.
6. Where changes cannot be made to address such issues, Innergex is committed to being transparent about the limitations that prevent the changes from being made.

2.2. Identifying the Local Communities

In order to gain an understanding of the local area that surrounds the proposed Project site, a process was undertaken in 2019 to identify and group the local stakeholders into several different "Local Communities" that are differentiated based on the anticipated level of interest (stake) that they have in, and impact that the proposed Project may have on them. Throughout the engagement process, and as Barber Solar's understanding of the local community and potential Project evolves, the approach to engaging the identified Local Communities has and will continue to evolve.

The following is a list of the Local Communities that were identified throughout the consultation process to date. The Project team has reached out to the stakeholders identified as well as those involved with the Archaeological Inventory Survey and Cultural Impact Assessment. We have actively engaged with those individuals or organizations that wished to learn more and be involved in the development process for our Barbers Point Solar Project.

Local Community Type	Key Stakeholders
Government Agencies	Department of Hawaiian Home Lands Hawaii Community Development Authority State Historic Preservation Division Department of Land & Natural Resources City and County of Honolulu Department of Planning and Permitting City and County of Honolulu Office of Economic Development Hawaii Department of Transportation Neighborhood Board #34 (Makakilo, Kapolei, Honokai Hale) Neighborhood Board #23 (Ewa) Hawaii State Energy Office - Department of Business, Economic Development & Tourism
Elected Officials	Mayor of Honolulu County Kirk Caldwell Honolulu County Councilmember Kymberly Marcos Pine , District 1, and Honolulu County Councilmember Augie Tulba (Fiscal Year 2020-2021), District 9. State Senators Kurt Fevella, Mike Gabbard, Maile Shimabukuro State Representatives Sharon Har, Bob McDermott, Stacelynn Eli, Rida Cabanilla Arakawa
Neighboring and Adjacent Property Owners/Lessees	Kapolei Community Development Corporation DHHL Current Site Lessees Barbers Point Riding Club Kanehili Community Association Kaupe'a Community Association Malu'ohai Community Association Ka'uluokaha'i Community Association Sovereign Council of Hawaiian Homestead Associations Ocean Pointe Residential Community Association Ewa by Gentry Community Association Ewa Beach Community Association Ewa Beach Community Based Development Organization Barbers Point Golf Course US Navy/ NAVFAC US Coast Guard Kalaeloa Airport/ FAA Hunt Company Kalaeloa Heritage Park (HCDA)
Environmental and Conservation Groups	Sierra Club Earth Justice

Local Community Type	Key Stakeholders
Other Community and Business Organizations	Council for Native Hawaiian Advancement (CNHA) ‘Ahahui Siwila Hawai‘i O Kapolei (Kapolei Hawaiian Civic Club) Prince Kuhio Hawaiian Civic Club Native Hawaiian Chamber of Commerce Hoakalei Country Club Wai Kai Hale Club Coral Creek Golf Course Hawaii Prince Golf Course Ewa Villages Golf Course Kapolei Golf Club Rotary Club of Kapolei Rotary Club of Kapolei SunsetOahu Economic Development BoardWai’anae Gold ‘Āina Bars Ka Makana Ali‘i Mall
Cultural Groups and Leaders	Aha Moku ‘Ewe Representative Shad Kane Oahu Island Burial Council Office of Hawaiian Affairs Cultural Consultants
Historical Groups	Naval Air Museum Barbers Point Hawaiian Railway Society Historic Hawaii Foundation Kanehili Cultural Hui (Save Ewa Field) Hawaiian Cultural Consultants Pacific War Memorial Association Hoakalei Cultural Foundation
Education & Schools	Kalaeloa School District Kapolei Charter School Kapolei High School & Intermediate School University of Hawaii - West O‘ahu
Local Media	Civil Beat Hawaii New Now Honolulu Star Advertiser KHON2 News KITV4 News Pacific Business News

2.3. Access to Information, Awareness Raising & Accessible Feedback Channels

Throughout the early engagement process, Barbers Point Solar continually worked to increase the awareness of the project and provide information and channels to have discussions with the Project team. The below list outlines the key steps to achieve accessibility of information and transparency in the development process.

No	Type of Access	Description
1	Contact Details	A contact name, phone number, email, website and mailing address has been provided in our communication materials.
2	Project Website	A website (barberspointsolar.com) is publicly available and provides an overview of the Project, project updates, project timelines, project contact information, project handouts, open house presentation (including visual simulations and preliminary project layout), recording of the public open house (including presentation and Q&A), Preliminary Environmental Assessment, and the Community Outreach and Engagement Plan. The website invites commentary or questions from visitors to the site and a link to the Project's email address (barberspointsolar@innergex.com). A Hawaii newsletter, Ka Puni Uila, was also launched in April 2021 and available on the project website.
3	Project Handout	Information handouts have been produced for the project. They have been made available at all meetings (as they get developed and updated) and are available on the Project website. • Project Overview Brochure • Fast Facts Sheet • Frequently Asked Questions • Project Summary & Community Outreach Refer to Appendix B for copies of the Project Handouts.
4	Media (TV/Newspaper/Radio)	The Virtual Public Open House held on July 8, 2020 was advertised in the local newspapers. • Notice of Public Open House, published in the Honolulu Star Advertiser on June 2, 2020 • Notice of Public Open House, published in Pacific Business News on June 5, 2020 A Media Advisory was sent to the following news outlets: • Civil Beat • Hawaii New Now • Honolulu Star Advertiser • KHON2 News • KITV4 News • Pacific Business News In addition, DHHL posted a notice of the public open house and a link to the Project's website on their website.

No	Type of Access	Description
		Refer to Appendix C for a copy of Advertising and the Media Advisory.
5	Project Presentation	Project PowerPoint presentation was prepared for the July 2020 Public Open House to communicate details about Renewable Energy in Hawai`i, RFP Process, and the proposed Project, and is available on the Project website.[1] • Project Team • Innergex Renewable Energy Inc. and our Values • Renewable Energy in Hawaii • The Project • Timelines • Studies to be Completed • How will the Project Work & Equipment Overview • Visual Simulations • Decommissioning • Project and Community Benefits A recording of the Virtual Public Open House can be viewed on the Project's website.[2] Project PowerPoint presentation was prepared for the November 2020 Community Update meeting to communicate a project update, including preliminary survey results, and is available on the Project's website.[3] A recording of the Community Update meeting can be viewed on the Project's website.[4] Refer to Appendix D for a copy of the Public Open House and Community Update presentations.
6	Feedback Forms/ Emails	Comments and questions were received at the Project's email address, as well as "live" during the at the Public Open House. The feedback provided via email submissions from the public comment period has been included in this consultation report.

[1] https://www.innergex.com/hawaii/wp-content/uploads/2020/10/BP_PRESENTATION_FINAL.pdf
[2] https://www.innergex.com/wp-content/uploads/2020/07/Barbers-Point-Solar-Project-Virtual-Public-Open-House-20200709-0334-1.mp4
[3] https://www.innergex.com/hawaii/wp-content/uploads/2020/11/BP_PRESENTATION_COMMUNITY_UPDATE_FINAL_COMBINED.pdf
[4] https://www.innergex.com/hawaii/wp-content/uploads/2020/11/Barbers-Point-Solar-Project-Virtual-Update-20201111-0432-1.mp4

No	Type of Access	Description
		Refer to Appendix E for written feedback provided. *Note: Personal contact information has been redacted from the feedback received for the purposes of this report*.
7	Email / Mail Invites	Ideal for invitations (e.g. public open house) or other project communications. • Invite to Virtual Public Open House on July 8, 2020. • Invite to the Community Update Meeting on November 10, 2020 • Pre-Assessment Consultation Scoping Consultation Letter on May 28,2021 • Project Update – Notice of Pre-Assessment Consultation for HRS Chapter 343 Environmental Assessment on June 7, 2021 Refer to Appendix C for a copy of the letter invite to the area homesteaders (~1,500 mailouts). A copy of the Consultation Letter and Project Update can also be found in Appendix C.

3. Consideration for Local Impacts and Local Influence

Since one of the objectives of community engagement includes listening to the views, opportunities and concerns and interests of the Local Communities and cooperatively developing solutions that address the issues raised, it was important that the engagement process resulted in tangible changes to the proposed project based on local feedback.

The project is in the development phase. The layout of the project has been refined in consideration of archaeological, cultural, environmental, technical, economic and consultation (social) input received during the early development phase. These considerations may at times conflict with each other or have different levels of significance. For example, addressing one landowner's concern could have implications on another landowner/ Local Communities or an environmental feature. With this in mind, Barbers Point Solar will endeavor to make development decisions that appropriately balance these considerations, with the intent of developing the best possible project from an archaeological, cultural, environmental, technical, economic, and social perspective. We will continue to engage the Local Communities on key Project changes and communicate how their input has influenced development decisions.

3.1. Address Concerns

First, it should be emphasized that community outreach and engagement is itself an effective way to address community concerns. Such concerns are often based on a lack of information or understanding about the nature of a proposed project and its potential impacts on (including benefits to) the community. Providing information about the Project and development process, through extensive outreach, has been integral in addressing concerns.

Barbers Point Solar has addressed concerns about the Project by providing technical memorandums/reports and undertaking design changes and actions where commercially reasonable and possible in direct response to community requests.

3.2. Design Change Based on Feedback from Early Engagement

As initially proposed in the Hawaiian Electric RFP, the Project's Point of Interconnection/generation transmission line (POI/gen-tie) was to interconnect into the existing Hawaiian Electric transmission line for the Kalaeloa Renewable Energy Park. Some stakeholders expressed concerns about potential impacts to historical features. Barbers Point Solar listened to this feedback. After discussions with Hawaiian Electric, government agencies, and additional field surveys, Barbers Point Solar was able to identify a new POI/gen-tie route that would avoid the noted historical features.

Please refer to the Archaeological Inventory Survey, Cultural Impact Assessment, and Biological Resources Survey reports for further details on how local knowledge and input has been incorporated into the project design, best management practices, and avoidance and minimization measures.

As project development proceeds further, existing community input will be considered at the appropriate time in the Project design phase and will be incorporated if commercially reasonable and possible. Community engagement will continue for the life of the project.

4. Community Engagement Activities Summary

Barbers Point Solar continues to engage in extensive outreach and engagement efforts. These efforts have focused on (i) Beneficiary Consultation Meeting, (ii) Public Open House, (iii) Community Update Meeting, and (iv) meetings with community members and organizations.

4.1. Beneficiary Consultation Meeting

In January 2019, Innergex responded to an RFP issued by DHHL for a solar project to be located on two parcels of its industrial land in Kalaeloa. DHHL selected Innergex's Barbers Point Solar Project proposal and initiated the steps to sign a Right of Entry to develop the parcels and bid into the pending HECO RFP.

On March 21, 2019, DHHL and Innergex hosted a beneficiary consultation meeting on the proposed Project from 6:00 pm – 8:00 pm at the Kapolei Middle School. The meeting was advertised through DHHL mailed invitation letters to 1,453 Lessees and Applicants that reside in the Kapolei (96707) and a notice on DHHL's website. Ten (10) beneficiaries participated in the consultation meeting and one (1) beneficiary emailed written comments. The public comment period for the Project ran until April 5, 2019 (2 weeks). The Beneficiary Consultation Report, including presentation, can be found in Appendix D.

4.2. Public Open House

In accordance with the terms of the RFP, a Public Open House was held on July 8, 2020. Due to COVID-19 restrictions, the meeting was held virtually via the WebEx platform. The meeting was advertised through the Project website, newspaper advertisements (refer to Section 2.3 above), and email and letter invites to various stakeholders and area homesteaders. Approximately 32 people attended the virtual open house. The public comment period for the Project ran from July 9, 2020 to August 7, 2020. Refer to Appendix F for written feedback provided.

The Public Open House format included information on the State of Hawaii's renewable energy and Project information presented by Barbers Point Solar including a PowerPoint presentation. Barbers Point Solar and its consultants were also in attendance to answer questions.

The Public Open House was attended by a broad cross-section of Oahu residents and stakeholders. Attendees included residents of Oahu, DHHL, PUC, and Hawaiian Electric.

Questions posed by the public at the Public Open House included the following:

- What are the sites zoned at?
- What type of technology will be used?
- How can we be sure that you will be here for the long term?
- How much dedicated funding is going to the Heritage Center?
- Would Innergex consider a partnership with KCDC or another Native Hawaiian entity?
- How did DHHL identify suitable lands for these projects?
- What led to the Kalaeloa parcel being made available to development?
- I heard that batteries lose their power fast, like a cell phone. How can you build a battery that will last for 25 years?
- Besides DHHL are you also partnering with Goodwill Hawaii and other organizations that are housed in the Kapolei region?
- What happens if the PUC does not allow the Power Purchase Agreement?
- Will there be opportunities for scholarships or donations to Kapolei schools?
- How does this project connect to HECO grid?
- Are there opporutnities to revisit the design if there are concerns raised by the community?
- There are very few electric car chargers in Kapolei and Kanehili. Can you explore the ways that Innergex can establish those?
- How will the batteries be disposed of?
- What type of safety features do the batteries have?
- Can the battery capacity be expanded at a later date?
- What are Innergex's solar operating assets and were there any health issues associated with them?
- What is the site currently being used as? If there are tenants, what will happen to them?
- Has Innergex completed a solar project on Oahu previously? if so, how large a facility is it, who was the contractor, and how is it performing?
- Is there HCDA zoning tied to the Kalaeloa Master Plan? What is it and are solar panels compatible with HCDA zoning?
- Do you have studies on how these solar panels with affect the temperatures and rainfall in the future and how the solar farms with affect Ordy Pond and the endangered wildlife there?
- What will be a household estimated electric bill when the project is fully operational?
- Could you share which First Nations and other native peoples you have worked with in the past, and how successful those efforts have been?
- Besides DHHL are you also partnering with Goodwill Hawaii and other non-profit organizations that are housed in the Kapolei community?
- Will there be donation/partnerships or scholarships offered to Kapolei High School and Kapolei Charter School?
- Can you share Innergex's community engagement process following this virtual meeting and moving forward?
- Will there be an increase in our electric bills to pay for this project?
- What will you be doing with the kiawe wood in the area?
- Would homesteaders be able to get wood for personal use?
- What happens at end of PPA contract?
- How can you ensure that glare will not be an issue for the airport?
- Are there studies on how the project will effect the temperature, water-ways and wildlife in the region?

Questions were answered during the Public Open House by members of the Project team. A recording of the Virtual Public Open House can be viewed on the Project's website.[5]

4.3. Community Update Meeting

Kapolei Community Development Corporation (KCDC) and the Kapolei Homestead Associations in collaboration with Barbers Point Solar hosted a Kapolei Homestead Project Update Meeting on November 10, 2020. Due to COVID-19 restrictions, the meeting was held virtually via the WebEx platform. The meeting was advertised through the KCDC website and Facebook page, Project website, and invites to various stakeholders and area homesteaders.

The Community Update Meeting included information on the State of Hawaii's renewable energy and Project information, including timelines, preliminary study results, permitting, equipment/construction, visual simulations, decommissioning, and benefits presented by Barbers Point Solar including a PowerPoint presentation. Barbers Point Solar and its consultants were also in attendance to answer questions.

Questions posed by the public at the Community Update Meeting included the following:

- Which organization is conducting the Archaeological and Cultural Survey?
- How many participants are logged on to the meeting?
- Has Innergex seen the Aloha+Challenge information? https://aloha-challenge.hawaiigreengrowth.org/
- Was the Navy asked to submit pertinent information for this area? Anything buried or stored underground, etc.?
- The Council for Native Hawaiian Advancement (CNHA) is having training for solar installation. I'm hoping the impetus for this training is the solar project. If not, I would encourage the project to dialogue with CNHA.
- Kudos on the job fair. As a preliminary event, perhaps KCDC might consider hosting a resume/job interview fair to help prepare potential candidates.
- How did Innergex determine a community benefit of 1%?
- The design of KCDC as beneficiary is a great decision.
- I support it. We need to be vigilant.

Questions were answered during the Community Update Meeting by KCDC and members of the Project team. A recording of the Virtual Public Open House can be viewed on the Project's website.[6]

4.4. Meetings with Community Members and Organizations

Barbers Point Solar has engaged in extensive outreach and engagement with community members and organizations by conducting one-one-one and small group meetings and attending and speaking at various organization meetings.

The foregoing Public Open Houses and meetings with community members and organizations generally support a conclusion that the broader community of Kapolei residents remain supportive of the Project. The KCDC Board consists of community leaders from the Kapolei homestead communities – Malu'ohai, Kaupe'a, Kauluokaha'i and

[5] https://www.innergex.com/wp-content/uploads/2020/07/Barbers-Point-Solar-Project-Virtual-Public-Open-House-20200709-0334-1.mp4
[6] https://www.innergex.com/hawaii/wp-content/uploads/2020/11/Barbers-Point-Solar-Project-Virtual-Update-20201111-0432-1.mp4

Kānehili. The President of the KCDC has provided a letter of support and reconfirmed support for the Project during the November 10, 2020 community virtual Project update meeting, which states.

> "KCDC supports the solar project at Kalaeloa, because it aligns with DHHL's guiding documents but more importantly because this project provides DHHL, its beneficiaries, KCDC and the Kapolei homesteads with the resources for a sustainable future." Scott Abrigo – President of Kapolei Community Development Corporation.

A copy of this letter is included in the Appendix A Community Outreach Plan, "Engagement Conducted to Date." A summary of the dates and organizations for meetings with community members and organizations of Barbers Point Solar's outreach is as follows.

DATE	STAKEHOLDER/ORGANIZATION
October 18, 2018	President, Kapolei Community Development Corporation (KCDC)
March 1, 2019	President and Founding Members, KCDC
March 21, 2019	Beneficiary Consultation Meeting hosted by DHHL and Innergex
July 8-9, 2019	Hawaiian Homes Commission Meeting/ Public Hearing
July 15, 2019	Mr. Bond, MCAS Ewa Field Historian
August – September 2019	DHHL Site Tenant On-Site Meetings
August 21, 2019	President and Board Members, KCDC
September 16, 2019	Hawaiian Homes Commission Meeting
September 23-24, 2019	Attended Council for Native Hawaiian Advancement (CNDA) convention
October 3, 2019	Program Manager, CNHA and President, Makaha Hawaiian Cultural & Training Center
October 7, 2019	Board Members and DHHL Ewa Homestead Association Boards leadership, KCDC
November 2019 – February 2020	CNHA and Makaha Learning Center – curriculum development and scheduling of the solar training course
January 8, 2020	Ewa Historic Airfield (Mr. Bond)
February 5, 2020	DHHL
April – May 2020	DHHL Site Tenant On-Site Meetings
May 26, 2020	DHHL & SHPD Staff
June 25, 2020	President, KCDC
June 26, 2020	Office Manager, CNHA
June 27, 2020	President & CEO, CNHA
July 1, 2020	DHHL & SHPD
July 6, 2020	Kaupe'a Homestead Association Representative, KCDC
July 7, 2020	Board Members & Community Members, Rotary Club of Kapolei

DATE	STAKEHOLDER/ORGANIZATION
July 7, 2020	Executive Director, Historic Hawaii Foundation
July 7, 2020	Pacific Links Hawaii
July 17, 2020	Instructor, Trainer focus, Kapolei Charter School
July 29, 2020	Member, Prince Kūhiō Hawaiian Civic Club
July 28, 2020	Former President, ʻAhahui Siwila Hawaiʻi O Kapolei (Kapolei Hawaiian Civic Club)/ President of the Board for CNHA
July 29, 2020	Former COO, Pacific Links Hawaii/CEO of Hawaii Community Foundation
July 30, 2020	Hawaii Energy Conference
August 3, 2020	Instructor – Facilities Management Program, University of Hawaii West Oʻahu
August 5, 2020	Mall Manager, Ka Makana Aliʻi Mall
August 6, 2020	President and Members, Rotary Club of Kapolei Sunrise
August 17, 2020	Program Manager, CNHA
August 17, 2020	Waiʻanae Gold ʻĀina Bars, Founder – Vince Dodge
August 18, 2020	Managing Attorney, Earth Justice
August 18, 2020	Chapter Director, Sierra Club
August 21, 2020	Principal, Kapolei High School
August 26, 2020	Airport Manager – Kalaeloa Airport (JRF) & Kawaihapai-Dillingham Airfield (HDH) - State of Hawaii DOTA Oahu District and Civil Air Patrol members
August 27, 2020	Chair and Board Members, Neighborhood Board #34 (Makakilo/Kapolei)
September 3, 2020	UH West O'ahu, Instructor, Facilities Management
September 6, 2020	Rotary Club of Kapolei, Club Members
September 9, 2020	Oahu Island Burial Council
September 11, 2020	State Historic Preservation Division
September 15, 2020	Waiʻanae Gold ʻĀina Bars, Founder – Vince Dodge
September 21, 2020	Discussion with Makaha Learning Center, President
September 22, 2020	CNHA, Program Manager –Rona Kekauoha
September 24-27, 2020	Correspondences with Cultural Descendant Carolyn Keala Norman
September 26, 2020	Kalaeloa Airport, Airport Manager & Pilots
September 26, 2020	Neighborhood Board #34, Board
September 28, 2020	Rotary Club of Kapolei Sunset, Club members
September 28, 2020	Ewa Beach Community Based Development Organization
October 1, 2020	Kapolei Community Development Corporation, President

DATE	STAKEHOLDER/ORGANIZATION
October 2, 2020	Hawaii Community Development Authority (HCDA)(Kalaeloa Planning & Development Director) & DHHL (Lands & Planning Departments)
October 6, 2020	Site visit with Kimberly Kalama, Hoakalei Cultural Foundation
October 17, 2020	Site visit with Waiʻanae Gold, Founder
October 23, 2020	Kapolei Community Development Corporation, President
October 26, 2020	Mākaha Learning Center, President
October 28, 2020	Site Visit with State Historic Preservation Division (SHPD) (Archaeology Branch Chief Dr. Susan Lebo and Architectural Historian Julia Flauaus)
October 28, 2020	DHHL (Chair and Land & Planning Staff)
October 30, 2020	U.S. Fish and Wildlife Services - Pacific Islands Fish and Wildlife Office (USFWS) and Department of Land and Natural Resources - Division of Forestry and Wildlife (DOFAW)
November 9, 2020	ʻAha Moku ʻEwa Representative / Kalaeloa Heritage Park & Legacy Foundation, Director
November 10, 2020	Presentation to KCDC board and Kapolei homesteaders
November 13, 2020	DOFAW
November 13, 2020	Co-founder and member of KCDC / President of Maluʻohai Homestead, Aunty Homelani Schneider
November 18, 2020	Site visit Kalaeloa Ranch, President – Ihilani Cummings
November 23, 2020	Site visit with Hawaii Explosives & Fireworks (Stephanie Pascua)
December 9, 2020	Site visit with the Barbers Point Horse Stables, Riding Academy Manager
December 17, 2020	Deliver makana to external stakeholders and CIA participants
December 21, 2020	Site visit with John Bond, Kanehili Cultural Hui; Daniel Martinez, Pearl Harbor National Memorial, and staff
December 23, 2020	Local community subcontractor
December 28, 2020	HUNT Development and DHHL tenants
January 12, 2021	Attended Solar Training Program class to speak with students regarding the Job Fair, including CNHA and Programs Manager
January 21, 2021	DHHL (Chair and Land & Planning Staff)
January 22, 2021	HUNT Development
January 22, 2021	SHPD Staff
January 25, 20201	Site visit with John Bond, Kanehili Cultural Hui and Ross Stephenson, Hawaiian Railway Society

DATE	STAKEHOLDER/ORGANIZATION
January 27, 2021	HUNT Development and Navy
January 29, 2021	Site visit DHHL tenant manager
January 29, 2021	KCDC board representatives
February 2, 2021	Attended Honolulu Draft Climate Action Plan Virtual Workshop
February 4, 2021	Supported a Solar Job Fair for graduates of the CNHA Solar Trades Academy
February 18, 2021	DHHL & SHPD staff
February 24, 2021	Navy staff
March 4, 2021	Navy staff
March 5, 2021	Site visit with John Bond, Kanehili Cultural Hui
March 18, 2021	DHHL Land & Planning Staff
March 26, 2021	Makaha Learning Center Staff
March 31, 2021	DHHL Land & Planning Staff
April 19, 2021	SHPD staff
April 20, 2021	DHHL staff
April 30, 2021	Barbers Point Riding Academy, Manager
May 5, 20201	DHHL (Chair and Land & Planning Staff)
June 10, 2021	Participated in HCDA Kalaeloa Stakeholders meeting
June 10, 2021	SHPD (Administrator and staff) and DHHL (Chair and Land & Planning Staff)
June 11, 2021	KCDC, President
June 16, 2021	Office of Hawaiian Affairs staff
June 17, 2021	Site visit with Cultural Impact Assessment participants
June 29, 2021	DHHL staff
July 7 and 9, 2021	Site visit with FPS Painting
July 14, 2021	Attended HCDA Mater Plan & Rules Update meeting
July 20,2014	Attended community meeting and spoke with Kaupe'a & Kanehili Community Association leaders attending
July 23,2021	Met leaders of Kaupe'a Community Association, including a SCHHA manager
July 27, 2021	Lunch with Kanehili and Kaupe'a community members
July 27, 2021	Site tour with Rep. Lopresti and staff

5. Project and Community Benefits

5.1. Project Benefits

The Island of Oahu's *Oahu General Plan (Proposed Revision 2017)* states:

> *There is no more salient example of the direct impact of world events on an island community than the provision of energy. With about 90% of Oahu's electrical and transportation needs powered by imported fossil fuels, increasing energy self-sufficiency is a major stride toward sustainability…Renewable energy development, efficient energy utilization, conservation, and reducing energy demand are addressed with the goals of reducing dependence on outside sources, increasing the resiliency of energy sources, and promoting sustainable energy practices.*

The Barbers Point Solar Project will contribute to DHHL & Oahu's renewable energy goals as called out in the DHHL *2014 Oahu Island Plan* and Island of Oahu's *Oahu General Plan* and potentially offer benefits listed below:

- **Lower Cost, More Equitable, Stable-Priced Energy Feeding the Grid.** Early community feedback from residents emphasized that the cost of electricity is a prevalent concern. Projects like the Barbers Point Solar Project are intended to contribute to lowering electricity bills over the long term. The proposed price is less than Hawaiian Electric's current cost of generating power with fossil fuel and the price will be fixed for 25 years.

- **Battery Energy Storage Can Reduce Curtailment.** The recently publicized curtailment of other wind and solar projects has been viewed by residents as a waste of energy generation—and investment—by the utility. These concerns underscore the importance of energy storage systems for projects like Barbers Point Solar in reducing curtailment. The stored power can be dispatched in the morning or evening—when rooftop solar is not available—can help meet demands of residents returning home to deal with dinner, baths, washing, and other tasks or during emergencies.

- **Experience and Capacity.** As a mature and experienced global company, Innergex brings necessary resources, capital, and expertise in the field of renewable solar energy. In addition, Innergex has a track record of working with indigenous and multi-cultural communities and shaping a win-win outcome with them. As captured in its core values, Innergex engages with a community, not as a developer, but as a long-term community partner for the life of the project.

- **An Opportunity for Workforce and Local Business**. Throughout the life of the project, Innergex commits to using the local workforce and local companies wherever feasible, maximizing the investment in Oahu. These opportunities provide invaluable experiences for workers and companies in an ever-expanding energy sector in Hawaii.

- **A Clean Power Future with Less Vulnerability.** A great deal of concern exists among residents regarding Oahu's vulnerability to external threats because of its reliance on imported fuel. Harsh memories of shipping strikes, world oil prices, and geo-political forces stoke fears of the disruption these events could again cause to daily lives. Knowing that the sun is a readily available reliable resource, Oahu residents are supportive of the utility harnessing a renewable resource to improve the island's energy stability and grid resiliency.

- **Project location.** The Project is sited in a relatively remote and industrial area that has already been determined by HECO to be a prime site for energy generation. The Project is located in an area of

Kalaeloa that is not immediately adjacent to any existing or planned residential communities. DHHL selected these two industrial sites because they do not have infrastructure or facilities required for commercial development. Leasing this land to a solar project accommodates DHHL's long-term plans for commercial/industrial development. The Project is compatible with zoning and land use classifications, including Kalaeloa Community Development District / Hawaii Community Development Authority rules and standards.

The Project Area is designated as "Industrial" in the Oahu Island Plan (DHHL 2014) and "Mixed Use" in the Kapolei Regional Plan (DHHL 2010). Lands in the Kalaeloa area are not intended for residential development but rather are intended for revenue generation (DHHL 2010). Solar development therefore complies with this land use requirement.

5.2. Community Benefits

In addition to the above stated Project benefits, the Project will also provide direct community benefits through the development of a community benefits package. Barbers Point Solar, and its parent company Innergex is committed to applying its expertise, resources and dedication to the good of the planet in actively addressing Oahu's unique challenges. The package, which would come into effect during Project operations, consists of:

- **Dedicated Funding to Kapolei Heritage Centre (KHC).** In the course of pre-development, members of the Innergex team have met with various homestead community members to ascertain the preference of the community for benefits. Innergex has committed dedicated funds (1% of the actual gross project revenues) for the Kapolei Heritage Centre. This funding will provide funds for the operations and maintenance of the centre. The Innergex team will also work with the KHC Board to provide in-kind services to implement this financial support for the expansion plans for the center.

  The benefit of working with the KCDC is that its membership includes the homesteader associations in the Kapolei/ Kalaeloa area including Malu'ohai, Kaupe'a, Kanehili and Kauluokaha'i homestead communities but also provides a place for all of Oahu and neighbor island Hawaiians to meet on Oahu for various purposes.

- **Support Solar Training Program.** Conversations with the Center for Native Hawaiian Advancement (CNHA) President and the Innergex team have taken place to outline creative ways to help the native Hawaiian community benefit from renewable energy projects.

  One of CNHA's priorities is to train its constituents so that they can become employable in new and expanding fields and further career advancement in areas requiring skilled trades. CNHA sponsors training seminars and classes to teach skills, trades, and certifications to help attendees qualify and obtain jobs in a related field. Innergex is pleased to work with CNHA to achieve this goal of developing a solar project installation skills training course for its members and beneficiaries looking to participate in this industry, with a particular focus on utility-scale projects, where it is expected the most jobs will be available in the next couple of years.

  On October 3, 2019, Innergex connected the CNHA Training Program Manager with the President of Mākaha Learning Center (MLC), which teaches apprenticeship and certificate programs primarily to native Hawaiians in the Mākaha-Waianae communities. MLC is currently certified to teach the NABCEP program. For trainees to become NABCEP-certified, installers must attain at least one year of installation experience and must document all training and installations. Installers must also pass

a rigorous exam, sign a code of ethics, and take continuing education courses for re-certification every three years. The MLC curriculum includes cultural components in all of their programs. They are connected to the Associated Builders & Contractors Association and source their instructors from local construction companies.

In 2020, MLC developed a focused curriculum for this course in collaboration with the CNHA team. This is an ideal opportunity to enhance the existing labor force in this field, particularly with the number of anticipated projects requiring skilled labor. This approach will provide skills for life for the participants and increase island labor participation in this growing industry on a statewide basis.

The first solar training program was held in 2020-2021. Innergex has provided support for this program and sponsored a job fair for the graduating students at the conclusions of the program where they could directly meet and talk with solar contractors.

To watch a video on the solar training program please visit the project website.[7]

- **Partnership with Waiʻanae Gold to generate local food opportunities.** Innergex has partnered with Waiʻanae Gold to make the kiawe pods on the project site available to be collected so that they can be turned into kiawe bean pod flour and ʻĀina Bars

  To watch a video where Waiʻanae Gold's Vince Kanaʻi Dodge shows the behind the scenes of kiawe bean pod flour production and discusses the importance of partnerships like with Barbers Point to generate local food opportunities please visit the project website.[8]

- **Working in Collaboration with Existing Tenants & DHHL**. Innergex is working in collaboration with DHHL and the existing tenants to explore alternative unencumbered areas within the parcels (e.g. revetment area) and/or off site locations to minimize impacts to the three existing tenants so as to allow for safe construction or operation of the solar project.

- **Local Employment & Contracting.** Construction and operation phases will create benefits in terms of new employment opportunities, as well as the use of local suppliers. Preference would be given to retaining local persons, consultants, businesses and contractors throughout the development of the project.

- **Sponsorships.** Opportunities abound within Oahu's robust non-profit sector and its year-round schedule of festivals, events, conferences, fundraisers, etc. Innergex is committed to evaluating sponsorships annually and providing support to a variety of events and causes.

- **Memberships.** Through memberships in various community organizations, Innergex will participate in specific programs that support the missions of the organization and help to advance mutually held values and goals.

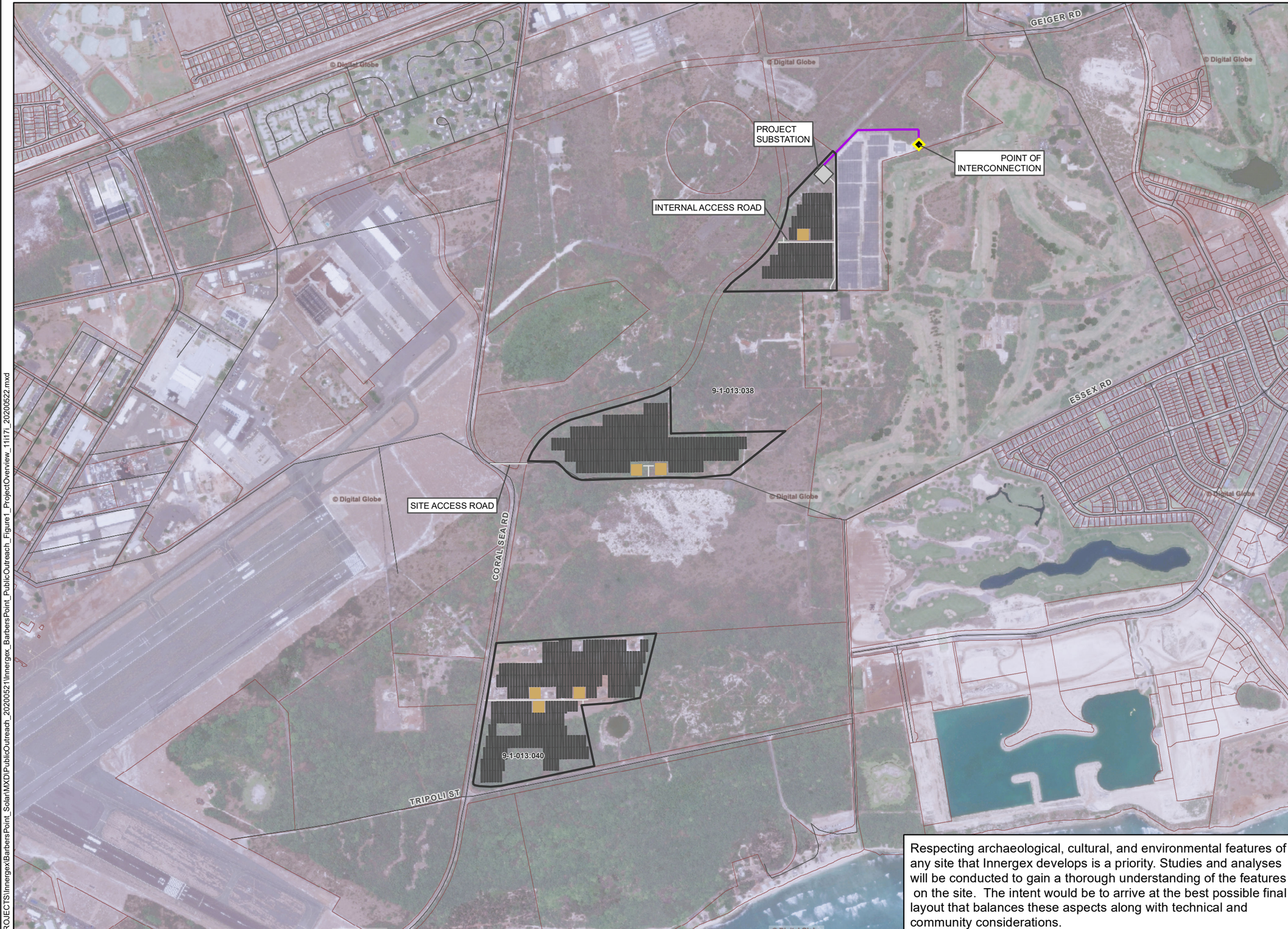
[7] https://www.dropbox.com/s/a029ercjdnz6bvz/SolarTrainingV7.mp4?dl=0
[8] https://www.innergex.com/hawaii/barbers-point/benefits/

Figure 1 – Preliminary Project Overview

Barbers Point Solar Project

Figure 1 Conceptual Project Overview

HONOLULU COUNTY, HI

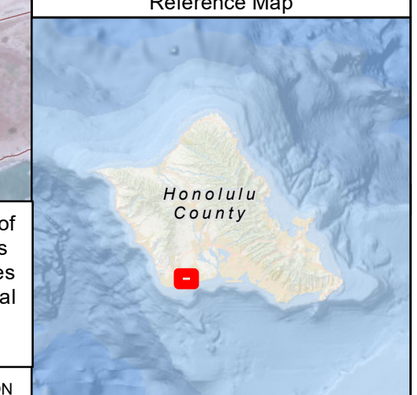


- Project Study Area
- Solar Array
- DC-Energy Storage System Unit
- Generation-Tie Line
- Existing Seconday Road
- TMK Boundary

Respecting archaeological, cultural, and environmental features of any site that Innergex develops is a priority. Studies and analyses will be conducted to gain a thorough understanding of the features on the site. The intent would be to arrive at the best possible final layout that balances these aspects along with technical and community considerations.

Innergex Renewable Development USA LLC

Reference Map



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0 0.25 0.5 1 Miles

NOT FOR CONSTRUCTION

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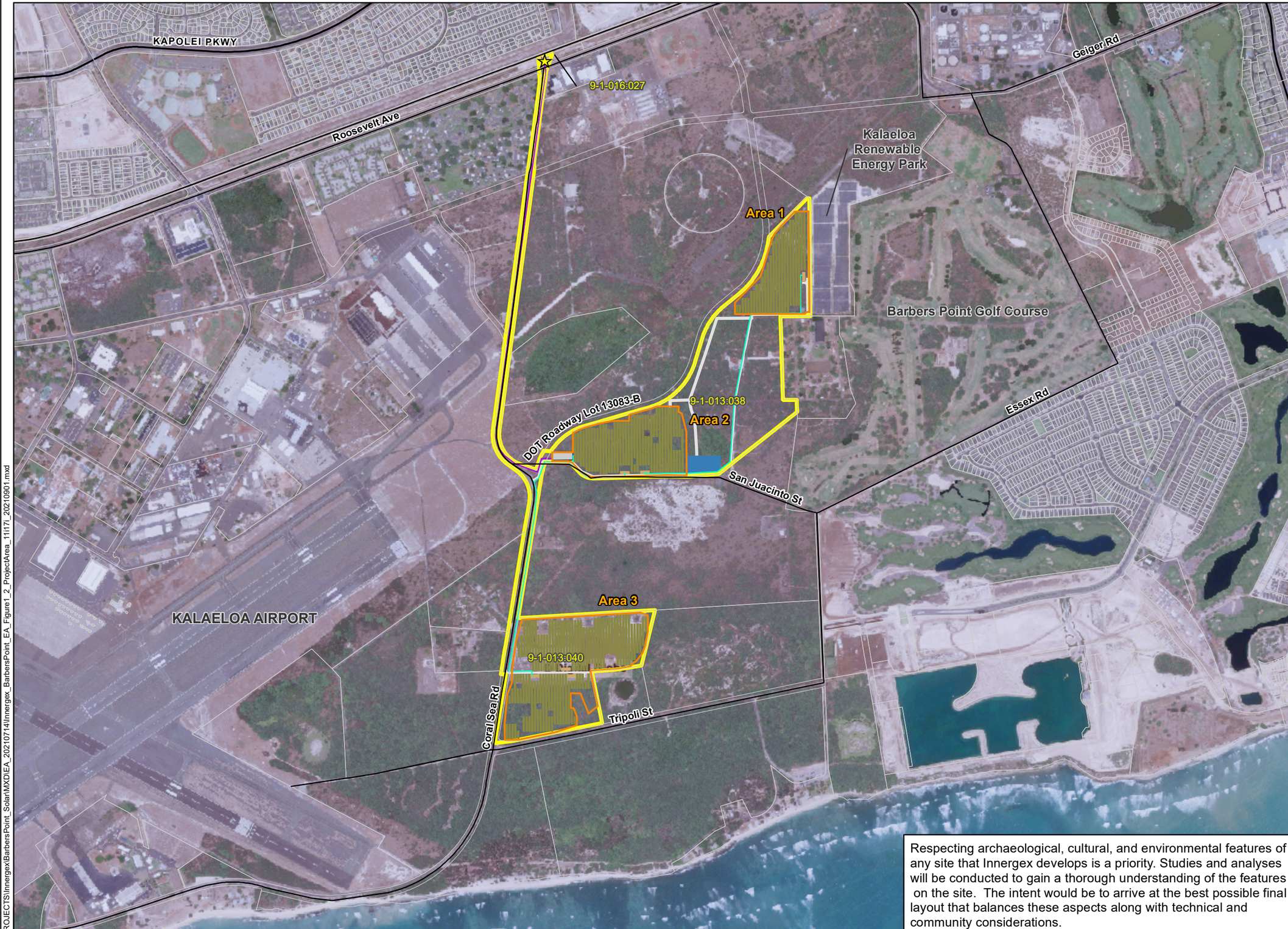
Figure 2 – Update Design Layout

Barbers Point Solar Project

Figure 1-2
Project Area

CITY AND COUNTY OF HONOLULU



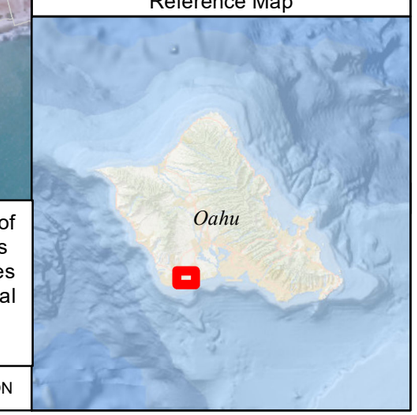
Respecting archaeological, cultural, and environmental features of any site that Innergex develops is a priority. Studies and analyses will be conducted to gain a thorough understanding of the features on the site. The intent would be to arrive at the best possible final layout that balances these aspects along with technical and community considerations.

- Project Area
- TMK Boundary
- Road
- Overhead Gen-Tie Line Termination Point at Existing HECO 46-kV Transmission Line
- Security Fence
- Solar Array
- Collector Line
- Project Substation
- Power Conversion System
- Temporary Laydown (Staging) Area
- Site Access Road & Collector Line
- 46-kV Transmission Line (Overhead and Underground)

TETRA TECH

Barbers Point Solar LLC

Reference Map



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Appendix A – Community Outreach and Engagement Plan

INNERGEX

Renewable Energy.
Sustainable Development.

Community Outreach & Engagement Plan for the Barbers Point Solar Project

A solar photovoltaic system and battery energy storage system proposal put forward by Innergex Renewable Development USA, LLC.

Prepared November 2019
Updated May 2020

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Note to readers: This plan is considered a guiding document that can change over time in order to ensure that the communities around the proposed project site are properly engaged. We will adjust our approach and plan based on community feedback along the way. We welcome guidance and input from members of the community on how to best engage with them.

A. INTRODUCTION

On August 22, 2019, the Hawaii Electric Company (HECO) formally began the search for additional variable, renewable, and dispatchable generation projects and energy storage projects for the island of Oahu. HECO is seeking 1,300,000 megawatt hours (MWh) annually. Innergex Renewable Development USA, LLC. (Innergex), a wholly owned subsidiary of Innergex Renewable Energy Inc., is proposing the Barbers Point Solar Project (the Project) in response to HECO's procurement.

Obtaining community support is critical to a project's viability and success. That support is the ultimate result of building a relationship between the project team and individuals and groups in the community. It is built on a spirit of listening to the values and priorities of residents as the project looks for win-win opportunities. This relationship, based on mutual respect, is a process carefully nurtured and protected. This plan is based on these fundamentals.

Every community that hosts one of Innergex's projects is unique and Innergex always tries to adapt to each location's individual needs. Creating lasting bonds of trust between people is at the core of our development strategy and Innergex is proud of the numerous and long-term relationships it has built with indigenous and rural communities across Canada.

This community engagement plan is designed to build trust in the community for Innergex and the proposed Project. The plan proposes to meet a series of community and communication objectives centered on creating opportunities for the community to obtain information on the proposed project which will empower them to provide critical input and perspectives on it. These exchanges will enable the project to balance socio-cultural considerations with environmental and technical parameters as it evolves.

Innergex has already begun outreach activities for the Project. As such, the mandatory public meeting described in Section 5.3 of the RFP will actually be the culmination of the first round of engagement activities, not the beginning of it. It expands upon the formal consultative requirements of the county, state, and federal regulatory permitting and approval processes.

Throughout the RFP and regulatory processes, Innergex will add to its initial conversations with the local community, including community associations; state and county government administrators and elected officials; environmental and conservation groups; native Hawaiian and other cultural interests; and local businesses. Dialogue with organizations will also be initiated through this plan with the intent of understanding how their interests may be impacted and/or improved by the proposed project.

As importantly, outreach and communications will go beyond already established groups and will incorporate one-on-one engagement sessions that enables the project team to hear from stakeholders whose views are not captured by meetings with established groups. Prior experiences have underscored that these more individualized exchanges provide an avenue for input to those who may be intimidated by large gatherings. These also foster rich, unfettered input from the stakeholders as well as an opportunity to answer specific questions about the project.

Initial materials such as a Fact Sheet and FAQ will be developed to support Innergex's community engagement efforts. As planning continues, these tools will be updated and reissued to keep the community informed and to invite continuous feedback. A Community Feedback document will be developed that details how community input has influenced the development and siting of the project. The plan will incorporate traditional news media, new communication channels, and other community resources to augment information sharing, accuracy, and accessibility about and to the project. As the project moves through the regulatory processes, a regularly issued project update notice will be developed and published to keep readers informed on the project's progress.

Innergex will regularly assess its outreach strategies with the assistance of local partners and residents and adjust them for greatest effectiveness and relevance with stakeholders.

B. PROPOSED SOLAR AND ENERGY STORAGE PROJECT CONCEPT

The Barbers Point Solar Project is situated in the District of Kalaeloa, a region that was formerly a Naval Air Station and critical for US Military operations during WWII. Today, the region is mostly industrial, and the electrical grid is in need of upgrades.

The Project is to be sited on two non-contiguous lots (Parcel 38 & 40) owned by Department of Hawaiian Home Lands (DHHL); together they total 147 acres but an estimated 47 acres on Parcel 38 are not usable due to the location of historical structures related to WWII. The Right of Entry for the site was secured via a competitive request for proposal process from DHHL in August 2019. The Project's TMK are (1) 9-1-013:038 and (1) 9-1-013:040. A 0.25-mile 46 kV gen-tie line connects the Project to the CEIP 46 46 kV Circuit.

The conceptual design of the Project is for a 15 MW solar photovoltaic (PV) system coupled with a four-hour, 15 MW (60 MWh) battery energy storage system. The Project would consist of solar fields with arrays of PV panels that would be arranged in rows on fixed tilt or single-axis tracking foundations. Other equipment on site would include inverters, combiners, transformer(s), overhead and buried conduits, and onsite collection lines.

Access to Project would primarily be via the existing Coral Sea Road with a portion of the project potentially being accessed via the northeast.

Innergex submitted the Barbers Point Solar Project proposal as part of the HECO competitive RFP process on November 5, 2019. The Project was selected to be in the Final Award Group in May 2020 and is in the process of negotiating a power purchase agreement. Innergex anticipates completing construction (12 months) and beginning operations of the project by the end of 2023.

This project is in the early development proposal stage. A preliminary desktop assessment of the Project has been completed which looks at the existing environmental and archaeological/ cultural resources at the project area and identifies regulatory requirements, issues, constraints, and limitations as they relate to the project. Detailed archaeological, cultural, environmental and

technical studies will commence in 2020. A conceptual layout for the project has been prepared (see Figure) and will be presented to the local community for feedback as described in this plan and modified where commercially feasible and possible to respond to that feedback.

C. COMMUNITY SCOPING AND PROJECT BENEFITS

The DHHL and HECO entered into an Energy Partnership Charter in August 2009 agreeing to work together to achieve energy self-sufficiency and sustainability, specifically including the leasing of lands owned by DHHL for renewable energy projects.

The DHHL *2014 Oahu Island Plan* is a comprehensive development plan for DHHL lands that required extensive beneficiary consultations and public meetings. The plan designated several sites for renewable energy development primarily on industrial zoned land including these parcels in Kalaeloa. DHHL has four residential developments mauka of these sites in Kapolei that will be the largest Hawaiian beneficiary community in the state.

Innergex has focused on working with these communities, in conjunction with the Kapolei Community Development Council (KCDC), as they are the most geographically impacted. The team is also working with the Council for Native Hawaiian Advancement (CNHA) to develop a statewide outreach by establishing a program for job trainings for Hawaiians in the solar industry.

The project is located in an area of Kalaeloa that is not immediately adjacent to any existing or planned residential communities. DHHL selected these two industrial sites because they do not have infrastructure or facilities required for commercial development. Leasing this land to a solar project accommodates DHHL's long-term plan for commercial/ industrial development after the end of the project lease, and after infrastructure development has reached this area.

Hunt Corporation is planning residential developments on some of the Kalaeloa lands previously owned by the U.S. Navy. Those developments areas are on the other side of the airport and mauka of Roosevelt Avenue.

The Island of Oahu's *Oahu General Plan (Proposed Revision 2017)* states:

> *There is no more salient example of the direct impact of world events on an island community than the provision of energy. With about 90% of Oahu's electrical and transportation needs powered by imported fossil fuels, increasing energy self-sufficiency is a major stride toward sustainability…Renewable energy development, efficient energy utilization, conservation, and reducing energy demand are addressed with the goals of reducing dependence on outside sources, increasing the resiliency of energy sources, and promoting sustainable energy practices.*

The Barbers Point Solar Project will contribute to DHHL & Oahu's renewable energy goals as called out in the DHHL *2014 Oahu Island Plan* and Island of Oahu's *Oahu General Plan* and potentially offer benefits listed below:

- **Lower Cost, More Equitable, Stable-Priced Energy Feeding the Grid.** Early community feedback from residents emphasized that the cost of electricity is a prevalent concern. Projects like the Barbers Point Solar Project are intended to contribute to lowering electricity bills over the long term. The proposed price is less than Hawaiian Electric's current cost of generating power with fossil fuel and the price will be fixed for 25 years.

- **Battery Energy Storage Can Reduce Curtailment.** The recently publicized curtailment of other wind and solar projects has been viewed by residents as a waste of energy generation—and investment—by the utility. These concerns underscore the importance of energy storage systems for projects like Barbers Point Solar in reducing curtailment. The stored power can be dispatched in the morning or evening—when rooftop solar is not available—can help meet demands of residents returning home to deal with dinner, baths, washing, and other tasks or during emergencies.

- **Experience and Capacity.** As a mature and experienced global company, Innergex brings necessary resources, capital, and expertise in the field of renewable solar energy. In addition, Innergex has a track record of working with indigenous and multi-cultural communities and shaping a win-win outcome with them. As captured in its core values, Innergex engages with a community, not as a developer, but as a long-term community partner for the life of the project.

- **An Opportunity for Workforce and Local Business**. Throughout the life of the project, Innergex commits to using the local workforce and local companies wherever feasible, maximizing the investment in Oahu. These opportunities provide invaluable experiences for workers and companies in an ever-expanding energy sector in Hawaii.

- **A Clean Power Future with Less Vulnerability.** A great deal of concern exists among residents regarding Oahu's vulnerability to external threats because of its reliance on imported fuel. Harsh memories of shipping strikes, world oil prices, and geo-political forces stoke fears of the disruption these events could again cause to daily lives. Knowing that the sun is a readily available reliable resource, Oahu residents are supportive of the utility harnessing a renewable resource to improve the island's energy stability and grid resiliency.

- **Project location.** The Project is sited in a relatively remote and industrial area that has already been determined by HECO to be a prime site for energy generation. The Project is located in an area of Kalaeloa that is not immediately adjacent to any existing or planned residential communities. DHHL selected these two industrial sites because they do not have infrastructure or facilities required for commercial development. Leasing this land to a solar project accommodates DHHL's long-term plans for commercial/industrial development.

The Project is compatible with zoning and land use classifications, including Kalaeloa Community Development District / Hawaii Community Development Authority rules and standards.

The Project Area is designated as "Industrial" in the Oahu Island Plan (DHHL 2014) and "Mixed Use" in the Kapolei Regional Plan (DHHL 2010). Lands in the Kalaeloa area are not intended for residential development but rather are intended for revenue generation (DHHL 2010). Solar development therefore complies with this land use requirement.

D. COMMUNITY BENEFITS

Innergex's core values lends themselves to weaving its strengths into the fabric of Oahu and doing so in ways that include and also go beyond monetary investments to organizations or causes. The development of the Barbers Point Solar Project is designed to meet company goals and advance the well-being of Oahu's residents. In developing the proposed community benefit package, Innergex looked beyond the boundaries of the project and the basic requirements of the RFP as it becomes a new neighbor in the Oahu community.

Innergex is committed to applying its expertise, resources, and dedication to the good of the planet in actively addressing Oahu's unique challenges. The package, which would come into effect during Project operations, consists of:

- **Dedicated Funding to Kapolei Community Heritage Centre (KCHC).** In the course of pre-development, members of the Innergex team have met with various homestead community members to ascertain the preference of the community for benefits. Innergex has committed dedicated funds (1% of the actual gross project revenues) for the Kapolei Community Heritage Centre. This funding will provide funds for the operations and maintenance of the centre. The Innergex team will also work with the KCHC Board to provide in-kind services to implement this financial support for the expansion plans for the center.

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- **Support Training Program for the Center for Native Hawaiian Advancement.** Conversations with the Center for Native Hawaiian Advancement (CNHA) President and the Innergex team have taken place to outline creative ways to help the native Hawaiian community benefit from renewable energy projects.

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MLC is in the process of preparing to provide training and has developed a focused curriculum for this course in collaboration with the CNHA team. This is an ideal opportunity to enhance the existing labor force in this field, particularly with the number of anticipated projects requiring skilled labor. This approach will provide skills for life for the participants and increase island labor participation in this growing industry on a statewide basis. Innergex will provide support for this program and will sponsor a job fair for solar contractors and the graduating students at the conclusion of the programs. The first training program is currently in planning and will be scheduled once the restrictions due to Covid-19 allow classroom training.

- **Working in Collaboration with Existing Tenants & DHHL**. Innergex is working in collaboration with DHHL and the existing tenants to explore alternative unencumbered areas within the parcels and/or ways to minimize impacts to the three existing tenants so as to allow for safe construction or operation of the solar project.

- **Local Employment & Contracting.** Construction and operation phases will create benefits in terms of new employment opportunities, as well as the use of local suppliers. Preference would be given to retaining local persons, consultants, businesses and contractors throughout the development of the project.

- **Sponsorships.** Opportunities abound within Maui's robust non-profit sector and its year-round schedule of festivals, events, conferences, fundraisers, etc. Innergex is committed to evaluating sponsorships annually and providing support to a variety of events and causes.

- **Memberships.** Through memberships in various community organizations, Innergex will participate in specific programs that support the missions of the organization and help to advance mutually held values and goals.

E. GOVERNMENT APPROVALS

Innergex has conducted extensive environmental and regulatory due diligence for the construction and operation of the proposed Project. A preliminary desktop assessment of the Project has been conducted, which looks at the existing environmental and cultural/archaeological resources at the Project area and identifies regulatory requirements, issues, constraints, and limitations as they relate to the Project. Innergex has used this preliminary information to site the Project in a location that minimizes environmental impacts and permit requirements.

Based on the preliminary data obtained for the Project Area, there does not appear to be any known environmentally significant resources that would preclude the proposed Project; however, additional biological and site-specific resource surveys and studies are required to assess potential Project impacts, required avoidance and minimization measures and/or mitigation, and design limitations, and to refine required permitting criteria.

These detailed studies will include general and detailed plant and wildlife surveys, wetland and waterways assessments, archaeological and cultural impact assessments, visual impact and glare analyses, and traffic and noise studies.

Initial coordination meetings are being held with key agencies. These meetings provide an opportunity to fully understand how federal, state, or local agency rules and policies could affect the Project, to confirm permits required and how permitting issues may differ for various Project components, and to confirm a schedule for approvals. Innergex is conducting meetings with key regulatory agencies, including Hawaii Community Development Agency (HCDA), DHHL, the U.S. Navy, State Historic Preservation Division (SHPD), U.S. Fish and Wildlife Service, Department of Land and Natural Resources, Division of Forestry and Wildlife, Hawaii Department of Health (HDOH), and the City and County of Honolulu.

Based on the existing information available, the following permits will likely be required to construct and operate the project:

- National Environmental Policy Act environmental review (if Navy lands are used for access or transmission);
    - Including National Historic Perseveration Act, Section 106 Compliance and Coastal Zone Management federal consistency concurrence
- Hawaii Environmental Policy Act environmental review under HRS Chapter 343, accepting agency is DHHL;
- Community Development District ("CDD")/HCDA Development Permit (Parcels 38A, 38B, and 40);
- CDD/HCDA Conditional Use Permit (Parcel 38A);

- Hawaii Revised Statute Chapter 6 E compliance, including SHPD review and approval of Archaeological Inventory Survey;
- Clean Water Act §402 National Pollution Discharge Elimination System (NPDES) General Stormwater Permit from HDOH;
- Federal Aviation Administration (FAA) Determination of No Hazard;
- Construction Noise permit from HDOH;
- Easement for Use of Coral Sea Road right-of-way; and
- Building, grading, grubbing, and electrical permits from Honolulu County.

F. POTENTIAL CHALLENGES, OPPORTUNITIES & MITIGATION

Innergex will be sensitive and prepared to respond to potential challenges on a variety of concerns previously identified through research, shared in community interactions, or publicized. The following challenges are not in any ranked order. Priorities among these concerns (or others) will be more clearly identified as engagement strategies and community consultations continue.

- **Right of Entry and Lease.** At a Hawaiian Homes Commission Public Hearing on July 8, 2019, DHHL presented their renewable energy development plans on DHHL Parcels 38 and 40 and introduced Innergex as the company that was granted a Right of Entry Lease from DHHL to develop the Project. Primary critiques from attendees and from online commenters indicate the following sentiments:
    - DHHL focusing on revenue generation rather than housing supply.
      The Commission response was that it is necessary to generate revenue from use of non-residential leases in order to pay for the cost of developing infrastructure for new housing developments.
    - Innergex being a non-Hawaiian company.
      The solicitation was open to the public. DHHL was seeking qualified bidders who had the experience and financial depth to develop projects. No qualified Hawaiian bidders responded.
    - Lease revenue should be higher.
      The lease value was the best offer and based on the type of land and lack of infrastructure was assessed as the best financial offer available.

  <u>Possible Mitigation:</u> Innergex is working with KCDC and the leaders of the homesteads communities to inform the members of the key issues affecting and benefitting the community and to clarify the areas of concern about the long-term lease. KCDC members will be providing information to elected officials so that they themselves can address concerns that may arise due to misinformation or lack of understanding of the lease or the project itself. It is our understanding that KCDC believe this approach from the grassroots constituents is the most effective way to convey support of this project and the DHHL lease

to the various stakeholders and elected officials. Innergex will support and attend these meetings as deemed appropriate.

The President of Kapolei Community Development Corporation (KCDC), Scott Abrigo, wrote in support of the Project, "KCDC supports the solar project at Kalaeloa, because it aligns with DHHL's guiding documents but more importantly because this project provides DHHL, its beneficiaries, KCDC and the Kapolei homesteads with the resources for a sustainable future."

- **Suitability of Hawaiian Home Lands for Homesteads.** There are thousands of acres of trust lands sitting vacant. The state has not issued homestead leases in these areas because there are no roads, no water infrastructure, and no electricity hookups—for which the government says funding is not available. This includes the Barbers Point project site. Some of these lands are leased for income revenue meant to benefit the native Hawaiians. Not all native Hawaiians agree with this approach and feel that focus should be placed on securing homesteads.

  Possible Mitigation: DHHL owns these parcels that are currently overgrown and mostly inaccessible with no utilities or infrastructure available to benefit other uses at this time. DHHL does not have the resources allocated to develop these parcels before the lease term is expired. Alternative uses are minimal. Innergex is working in collaboration with DHHL and the existing tenants to explore alternative unencumbered areas within the parcels and/or ways to minimize impacts to the three existing tenants so as to allow for safe construction or operation of the solar project.

- **Hawaiian Edward Maria of EC Trucking.** Edward Maria**,** who previously asked DHHL for land to lease for his trucking business, along with the Sovereign Council of Hawaiian Homestead Associations ("SCHHA") sought an administrative hearing to contest DHHL's Right of Entry Approval to Innergex (note: they believed the decision was ill-advised and short-sighted). Both contested cases were denied.

  Possible Mitigation: Ongoing work with the community, including continuing to work with CNHA and the solar training programs to provide direct benefits to newly qualified workers in the community with job opportunities in a growing field. These direct benefits for the larger community could help mitigate concerns with these parties.

- **Location.** The location of the Barbers Point Solar Project on DHHL land may be one of its challenges; recent objections by Hawaiians related to the use of its land or land it considers sacred have led to some opposition.

  Possible Mitigation: Innergex will continue to work with the Hawaiian community and publicize its work with CNHA partnering with skills training and job fairs as well as the benefit of a utility-scale solar site.

Similarly, others may be concerned by seeing the large installation from afar and how that would affect their aesthetic values, disturb the existing landscape, or disrupt the rural undeveloped land surrounded by an industrial and urban setting. The perception may arise as well, even unsubstantiated, of possible reflection or glare off the panels.

The visual setting surrounding the Project area consists primarily of rural undeveloped land, as well as the Kalealoa Airport to the west of the Project area, the Barbers Point golf course, Hoakalei County Club, the KREP solar facility to the east, the Aloha Solar project to the southwest, and the community of Kapolei to the north. The coast line is approximately 0.4 miles south of the Project area. Innergex will produce and share visual simulations of the project from various distances and angles. The visual simulations can diffuse fears about the visibility of the panels.

The proposed project is located in proximity to the Kalaeloa Airport; questions could arise from air traffic controllers and pilots about whether any glare is anticipated that could affect airport operations.

Possible Mitigation: Innergex will be prepared to share the visual simulations of the solar project. In addition, a glare analysis will be conducted to assess the potential for glare from each landing approach at Kapaeloa Airport and from sensitive receptors in the vicinity of the Project. Consultation with the FAA would be conducted to address any glare concerns from an aviation perspective. The Project is on the entry side of the departure path and parallels the existing KREP solar installation, so any existing glare issues would likely be similar to that project with similar mitigation. The Project is anticipated to only have minor impacts associated with glare.

- **Uncertainty About Lower Electricity Costs.** On a personal level, residents may be uncertain and/or mistrust claims that any savings from the project will lead to lower electricity bills versus only increasing profits for the utility and/or the developer. While initial investments need to be made in renewable energy infrastructure and the utility and the developer should be able to make a profit, residents may not support costs being borne by ratepayers paying higher prices. Whether renewable energy projects will improve affordability of living on Oahu may be questioned.

  Possible Mitigation: Innergex will emphasize their price per kWh that will be below HECO's cost to produce its current fossil fuel power and the stability of pricing (i.e., fixed price) over the life of the project as compared to the volatile history of Hawaii's dependence on fossil fuel.

- **Disturbances During Construction.** Traffic impacts, both during and post-construction are frequently raised about proposed developments. Related to this, the planned access route(s) and duration of the anticipated heavy-duty vehicles during construction may come

up. Attention may be called to noise during drilling or the need for rock-removal, and the hours of operation for the construction phase.

Possible Mitigation: This project will be the fourth solar project in this general vicinity where there are three other 5 MW projects. The community has been very accepting of these projects and there has been little to no resistance to having solar farms in the area of Barbers Point. There is little impact to any of these communities because the location of the project is in a low traffic area on Coral Sea Road and there is no visibility from the homes in the area. There is adequate capacity for construction traffic.

Innergex will proactively share details of their construction schedule and routes with the surrounding communities and will assure that any construction traffic and noise will not impact residents during evening hours. A Traffic Impact Analysis will be conducted, it will detail this information, and shared.

Construction noise is not likely to impact the neighbors. The closest residences are on the other side of a golf course and open space for a planned County Park or state land. The closest residences are approximately 0.5 miles east of the project and the Barbers Point golf course is approximately 400 feet from the proposed Project area. In accordance with conditions of the community noise permit, acceptable hours of work will be adhered to. In the event Innergex must blast or do noisy drilling, they will notify affected communities in advance.

- **Environmental, Cultural, Archaeological Impacts.** Concerns may be expressed relating to environmental, cultural, and archaeological aspects of the project site and understanding the results of studies on possible impacts on any that are uncovered. These may range from how the drainage will be managed to prevent runoff, how the project might affect wildlife, whether there are archaeological, cultural, and/or historical resources in the area, to the process of decommissioning of the solar equipment at the end of its useful life.

  Possible Mitigation: Innergex will commission comprehensive biological, archeological, cultural and technical studies to fully inform the project as it is designed. The reports and summaries of results will be posted on the website and shared in project update notices and at public information sessions and meetings. Any real or perceived impacts will be weighed against the larger impact on the environment of Oahu's current dependence on fossil fuel for power.

  Based on the preliminary desktop data obtained for the Project area, there does not appear to be any known environmentally significant resources that would preclude the proposed Project; however, additional biological and site-specific resource surveys and studies are required to assess potential Project impacts, required avoidance and minimization measures and/or mitigation, design limitations, and to refine required permitting criteria. These detailed studies will include: general and detailed plant and wildlife surveys, wetland and

waterways assessments, archaeological and cultural impact assessments, visual impact and glare analyses, and traffic and noise studies.

Previous archaeological investigations have been undertaken in the Project Study Area beginning in 1991 as part of larger studies associated with former U.S. Navy actions. Previous studies identified five known archaeological sites within the Project Area parcels. These sites include habitation and agricultural complexes that include rock walls, modified and unmodified sinkholes, stone enclosures, a homestead, and military-associated features. No known burials have been previously found within the Project Area. Once the Project area boundary is finalized (which will include all Project activities that may require ground disturbance), an archaeological consultant, authorized by the State Historic Preservation Division (SHPD), will initiate consultation with Oahu's SHPD and will complete a supplemental archaeological investigation survey (AIS) of the Project area. The AIS will include a comprehensive field study documenting all of the extant archaeological features within the Project Area and reassess the significance of such resources, as well as new treatment recommendations for all of the documented sites.

As part of the archaeological resource support, Innergex's archaeological consultant will also determine the presence or absence of cultural practices or traditionally significant cultural places with the Project Area and vicinity. Background research and (if appropriate) ethnographic interviews with knowledgeable native Hawaiian consultants will be conducted to determine if there are any known significant sites in or near the Project Area. If cultural practices or traditionally significant cultural places are identified within the Project Area or within the vicinity of the Project, Innergex will work with the archaeological consultant to assess potential Project impact to these sites and associated avoidance and minimization or mitigation measures. As the proposed Project will be subject to HRS Chapter 343, a Cultural Impact Assessment will be prepared as part of the environmental review process.

- **Operational and Equipment Practices.** The recent fires in the past year and past publicity of other incidences could stir fears about the installation triggering fires, especially from its batteries. Yet others may claim unhealthy effects of electric and magnetic fields (EMF) emissions. Post-construction, residents may want to know whether the panels will produce noise as they track the sun.

  Possible Mitigation: Innergex will share technical assessments about EMFs and noise that indicate no effect at the distance of the panels from homes or establishments. Similarly, specifications about the batteries and fire precautions will be developed in consultation with the Fire Department and will be shared and readily available as the project progresses through the development and permitting processes.

- **Lack of Access to Adequate and Accurate Information.** Residents' access to accurate information throughout the development and life of the project will need to be addressed.

Proactively disseminating information will be critical to minimizing misunderstandings and misperceptions about the project.

Possible Mitigation: Multiple channels and outreach methods will be tapped, utilized, and regularly evaluated for the broadest reach and responsiveness to concerns and questions. Project update notices, public information sessions, and other meetings will provide regular updates, which will also be captured on the website.

G. GOALS AND OBJECTIVES OF THE OUTREACH PLAN

Innergex is an independent renewable power producer with 30 years of experience which develops, acquires, owns and operates hydroelectric facilities, wind farms and solar farms. As a global corporation, Innergex conducts operations in Canada, the United States, France and Chile The numerous years of undertaking large/grid-scale renewable energy projects contributes to our keen understanding that, as "newcomers" into the community, learning and honoring the values and priorities of the community are foundational to a project's success.

Innergex's community outreach plan is designed to build trust—in Innergex, in the Project, in the promised goals. Strategies outlined in this plan support proactively learning from Oahu residents, fostering understanding of the project, and inviting their ongoing input on the proposed Project concept. As noted above, meetings and other consultations with local resources and leaders have already occurred and will continue throughout the planning, development, construction and operational phases. These exchanges have been and will continue to be vital in helping Innergex respond more effectively to opportunities and concerns. It also provides an iterative process with residents as Innergex seeks mutually beneficial ways to move forward.

To support the development of the Barbers Point Solar Project, Innergex will work closely with local partners to:

1. Listen and learn from residents about their views, concerns and interests as well as glean local insights about the project site.
2. Develop mutually acceptable solutions that are commercially feasible and possible to address the issues or to capitalize on opportunities.
3. Be transparent in providing information about the proposal and describing its implications for the community, including any trade-offs.
4. Establish an open line of communication with the local communities throughout the life of the project.
5. Engage, keep informed, and learn from elected officials to ensure area policymakers are aligned with project goals.

Where changes cannot be made to address such issues, Innergex is committed to being transparent about the limitations that prevent the changes from being made.

H. COMPREHENSIVE COMMUNITY OUTREACH AND COMMUNICATION STRATEGY

Multiple audiences across a large geographic area that represent diverse interests and concerns call for an array of outreach strategies and tools to meet the objectives of the Community Outreach and Communication Strategy. Innergex wants the community to know that the project team is accessible and welcomes interactions. The team will draw from the following tools and activities to achieve its objectives for engaging groups and residents in the community. Strategies will be evaluated after each action, each event, and significant change in the Oahu landscape and then adjusted as necessary as the project unfolds.

Stakeholders

The following groups and individuals have been identified as stakeholders who will have an interest in learning more about the proposed Project and are a wealth of information for the project team. They tend to be deeply involved in the local community, rooted in its history, the establishments, and society. Local business, agriculture enterprises, native Hawaiian cultural practitioners, environmental specialists, government leaders and other community leaders were consulted to develop this preliminary list. Some groups are on the list because they will have direct involvement in the regulatory and approval process. Other groups, such as elected officials or administrators, are included as they can connect the project team to others for assistance or constituents go to them for information on developers and/or projects. Others can provide distinct insights into community sentiment. As community engagement progresses, the list of stakeholders will be expanded.

Government Agencies	• Department of Hawaiian Home Lands • Hawaii Community Development Corporation • State Historic Preservation Division of the Department of Land & Natural Resources • County of Oahu Planning Department • County of Oahu Office of Economic Development (Director and Energy Commissioner) • Neighborhood Board #34 (Makakilo, Kapolei, Honokai Hale)
Elected Officials	• Mayor of Honolulu County Kirk Caldwell • Honolulu County Councilmember Kymberly Marcos Pine, District 1 (running for mayor in 2020) • State Senators Kurt Fevella, Mike Gabbard, Maile Shimabukuro • State Representatives Sharon Har, Bob McDermott, Stacelynn Eli, Rida Cabanilla Arakawa
Neighboring and Adjacent Property Owners	• Kapolei Community Development Corporation • Ocean Pointe Residential Community Association

	• Ewa by Gentry Community Association • Ewa Beach Community Association • Neighborhood Board #34: Makakilo, Kapolei, Honokai Hale • Kalaeloa School District • Barbers Point Golf Course • US Navy/ NAVFAC • US Coast Guard • Kalaeloa Airport/ FAA • Hunt Company • Kalaeloa Heritage Park (HCDA)
Environmental and Conservation Groups	• Sierra Club • Earth Justice
Other Community and Business Organizations	• Council for Native Hawaiian Advancement (CNHA) • 'Ahahui Siwila Hawai'i O Kapolei (Kapolei Hawaiian Civic Club) • Prince Kuhio Hawaiian Civic Club • Native Hawaiian Chamber of Commerce • Hoakalei Country Club • Wai Kai Hale Club • Coral Creek Golf Course • Hawaii Prince Golf Course • Ewa Villages Golf Course • Kapolei Golf Club • Rotary Club of Kapolei • Rotary Club of Kapolei Sunset • Kanehi'li Cultural Hui (Save Ewa Field) Hawaiian Cultural Consultants • Naval Air Museum • Hawaiian Railway Society • Historic Hawaii Foundation • Pacific War Memorial Association • DHHL Current Site Lessees • Office of Hawaiian Affairs • Oahu Economic Development Board • Barbers Point Riding Club
Cultural Groups and Leaders	• Aha Moku 'Ewe Representative Shad Kane • Office of Hawaiian Affairs

	• Native Hawaiian organizations, traditional cultural practitioners, and kamaʻāina with cultural and generational ties to the region – this list will be updated as part of the cultural impact assessment.

Information Tools

Fact Sheet	Single-page, outline presentation of key facts about the project
FAQ	Frequently asked questions about the project. This will be updated as the project unfolds, e.g. as results of studies are released or as themes of questions emerge from meetings. Updated responses in the FAQ will convey the value the project gains from conversations with the community.
Community Feedback "What We've Heard/What We've Done"	A Community Feedback document will be developed that details how community input has influenced the development and siting of the project.
Website	A web presence is a necessity to this project. Updated as frequently as recommended by best practices, it will provide the most comprehensive source of information at any given time about the project. It will also include summaries of outreach efforts and studies as they become available. The website will invite commentary or questions from visitors to the site.
PowerPoint / Poster Boards	Presentations are anticipated for meetings with groups and will be designed to adjust for length of time allowed. In hard copy, slides will also serve a dual purpose as a reference binder for smaller or one-on-one meetings. Selection of slides will include an introduction to Innergex, history of the area, rationale for the site, features of the site, description of the project team, possibly testimony.
Post Cards / Mailers	Ideal for invitations (e.g. to information sessions), alerts (e.g., related to construction), or other notifications, post cards provide an attention-getting piece.

Project Update Notices	Project update notices will be published to include updates, images, and upcoming relevant events as appropriate. It will be brief, written for a lay audience, and provide an ongoing connection and transparency to community members. The registered database of recipients will be developed from meetings and events along with others who are looked to as organizational leaders or representatives who can disseminate information to a larger audience.

Outreach Strategies

- **Introductory and Update Meetings**
  Since the DHHL RFP in early 2019, numerous meetings have been arranged and will continue to be arranged with organizations, groups, and individuals from the list of Stakeholders who represent a cross-section of interests (government officials, neighbor and adjacent property owners, environmental/conservation, cultural practitioners, businesses). These meetings will aid in the preparation of the public meeting and information sessions by helping to understand the most prevalent concerns that the project should be prepared to respond to. Afterwards, regular update meetings with stakeholders will be arranged at frequencies to be determined in collaboration with the stakeholder's preference (e.g. quarterly, bi-annually, etc.).

  The initial set of PowerPoint slides that has been used to date will be updated to convey the ongoing story of Barbers Point Solar, including an introduction to Innergex, introduction to the project, site selection rationale, benefits of the project, etc. The PowerPoint will be updated as information becomes available, e.g. on specific questions from the community about the project or results of studies.

  Information packets will be prepared, tailored to the audience and design of the meetings, and distributed; packets may include the Fact Sheet, FAQ, information about Innergex, and any useful images or maps.

- **Community Presentations**
  Engaging with organizations and individuals on the Stakeholders list and others through oral/visual/virtual presentations will continue throughout the development phase and life of project. If interested, presentations will be made to the groups, tailored to their schedule, availability and at a location convenient to their members. Information packets will be distributed and include the Fact Sheet, FAQ, information about Innergex, and any useful images or maps.

- **Government/Community Association Meetings**
  Innergex's outreach strategy includes engaging area representatives, such as, Senators, Representatives, government officials, and leaders of community associations. These individuals will have significant influence on the project's progress and outcomes through their individual forums and policymaking authority. Through a series of regular status updates and informational meetings, Innergex will keep the area policymakers informed of progress and challenges in order to maintain a positive relationship with these important individuals and agencies

- **Public Meeting per Section 5.3 of the RFP.**
  The Public Meeting will be held on July 8, 2020. Between the time of the announcement of the Final Award List and this Public Meeting, identified groups potentially affected by Barbers Point Solar will be invited to the meeting. Media advisories will be issued to the media and organizations prior to the public meeting. Due to COVID-19 restrictions, the public meeting and possibly other meetings will be held using virtual technology. The Public Meeting will include project team members who will highlight various aspects of the project, slides with maps and visual simulations will be on screen, followed by a Q&A period. Those attending will be encouraged to submit written comments. This will allow the Project to take fullest advantage of their presence to capture feedback and questions. Registration for the virtual open house will enable Barbers Point Solar to follow-up, distribute material to the attendees and keep them updated as the Project progresses.

- **Information Sessions**
  Information sessions provide a non-intimidating forum for those curious about the project to get answers directly from Innergex. After initial outreach to groups and residents and convening the public meeting, information sessions at key milestones in the project will allow for the sharing of updates on the project and allow those who have not had an opportunity to access Innergex and the Project team to engage in meaningful face time. Information session hours (possibly 10 am to 7 pm) will span an entire day to accommodate the varying work schedules of community members – subject to COVID-19 health and safety restrictions. Invites will be sent to neighboring residents and businesses, and the organizations listed in the stakeholder table, but all interested parties will be welcomed. Announcements in the local newspaper and/or community newsletters will supplement e-invites to the Project distribution list to advertise the information sessions to the broader community. Innergex will provide appropriate project information to the KCHC centre to make it publicly available.

- **Stakeholder Engagement Sessions**
  While the list described above is extensive, Innergex will seek one-on-one engagement sessions with a sampling of residents who are not represented by or are not active with any of those groups; who are not comfortable participating in larger community gatherings and meetings; or whose schedules (e.g. work or family) do not lend themselves to join in. These one-on-one sessions/meetings will be conducted by Innergex and/or our local consultants

who have existing networks in the area. The initial list will be developed from the relationships of the local project team and then expanded through recommendations from those that participate of others the project should talk to. Sessions/meetings will be held when and where the individual feels it is most convenient and comfortable to them. This additional effort will help ensure that the project is hearing representative views outside of a public forum. Examples are small business owners, teachers, hotel workers, parents of younger children, shift workers, etc.

- **Local Media Editorial Boards**
  Innergex will seek meetings with editorial boards, publishers, and/or key reporters to establish a productive relationship. This will ensure that the local media has the information needed to understand the Barbers Point Solar Project, provide us with the opportunity to answer questions and establish contacts for possible future interviews. Innergex intends to be available to any local media outlet that contacts us. In addition to traditional print media, this outreach would include relevant radio and TV leadership.

- **Testimonials**
  As the PUC and permitting processes approach, the relationship, trust, and support the Innergex team has sought to build from its numerous interactions will be tapped to share their sentiments and perspectives in support of the project.

Documenting Outreach and Feedback

- **Public Meeting & 30 Day Comment Period**
  A meeting summary report will be produced following the Public Meeting and 30 day comment period that summarizes the feedback received (verbally and in writing), key concerns raised, and responses by Innergex to address the concerns raised. These proposed responses will represent the direct influence that local community and key groups' feedback has on the proposed project. Best efforts will be made to distribute the report(s) in a way that makes them accessible to the community and key groups.

- **Community Feedback and Influence on Project Design**
  As community feedback and suggestions are received, the information will be logged, tracked and distributed to appropriate Innergex team members and representatives who can make decisions on refinement of the project design.

  Feedback, whether technical, environmental, socio-cultural, or political, is vital to the success of the project as we refine the project's design. A Community Feedback handout will be prepared and regularly updated that summarizes what we have heard and what we have done.

- **Community Engagement Report**
  A report that outlines the community engagement process, activities, and outcomes with all the identified local communities and stakeholders will be developed as part of the RFP and regulatory approval processes.

I. ENGAGEMENT TIMELINE

The timeline below provides an overview of when the main elements of the engagement activity will be undertaken. Specific dates and times of meetings will be established in coordination with the appropriate local communities and members of the local communities and will be notified accordingly.

Preliminary Development Schedule

Barbers Point Solar Project	2019				2020				2021				2022				2023			
DEVELOPMENT TASKS	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
DHHL Proposal Submitted																				
DHHL ROE Negotiations*		X																		
DHHL Final Lease Negotiations																				
LEASE PERIODS			**ROE PERIOD**								**LEASE PERIOD**									
Community Engagement																				
HECO Request for Proposal																				
HECO Short List																				
HECO Final Award																				
HECO PPA Negotiation & Executed																				
HECO Interconnection Study (IRS)																				
PUC Approval																				
Phase I ESA Survey																				
Archaeological & Cultural Surveys; SHPD Concurrence; Plans																				
Environmental & Technical Studies; Construction Monitoring																				
Engineering Design																				
Geotechnical Surveys																				
Agency Consultation, Permit Applications & Approvals																				
Environmental Assessment*																				
HCDA Development & Conditional Use Permits*																				
Notice to Existing Tenants																				
Notice to Proceed w/ Construction																				
Building & Construction Permits																				
Procurement																				
Construction																				
Testing and Commissioning																				
Commercial Operations Date																				

(*) Public Hearings required as part of the process
(X) Public Hearing completed

This timeline represents Innergex's engagement efforts as part of the RFP process, and extends into development, construction, and operations. If the Project obtains a power purchase agreement within the RFP and PUC processes, engagement of the local community and key groups will continue, and the formal consultation process required as part of any regulatory permitting and approval processes under applicable county, state, and federal law will be carried out. This would be in addition to ongoing outreach efforts to be completed by Innergex in accordance with Section H of this plan.

Milestone / Trigger	Outreach Description
Selection of Priority List January 2020	HECO confirmed the Selection of Priority List. Engagement activities, as described in Section H of this plan have been commenced, specifically outreach strategy such as introductory meetings. One-on-one and large group meetings have been delayed due to the COVID-19 situation.
Selection of Final Award Group May 2020	HECO confirmed the Project is in the Final Award Group and have commenced power purchase agreement negotiations. Continue engagement activities, as described in Section H of this plan, specifically, outreach strategies such as introductory and update meetings, community meetings, resident interviews, etc.
RFP Public Meeting July 8, 2020	Media advisories to be submitted to various media outlets and organizations prior to the public meeting. Public meeting will be hosted as described in Section 5.3 of the RFP and HECO's supplemental detailed instructions for community outreach criteria.
RFP Consultation Report September 2020	As part of the power purchase agreement negotiation phase, prepare an initial consultation report that outlines the community engagement process, activities, and outcomes with all the identified local communities as part of the RFP and regulatory approval processes.
Throughout the development phase	Continue engagement activities as described in Section H of this plan, specifically, outreach strategies such as update meetings, community meetings, and information sessions at frequencies to be determined in collaboration with the stakeholder's preference (e.g. quarterly, bi-annually, etc.).
After archaeological, cultural, environmental, and technical studies are completed	Organize information sessions and update meetings to update the community on project development, including responses to community feedback to date, results of the studies, proposed mitigation measures, and next steps for permitting.
After application for State & County Special Use Permits submitted	Organize information sessions and update meetings to update the community on project development, including response to community feedback to date, and comments on the environmental assessment application.

Milestone / Trigger	Outreach Description
Environmental Assessment 2021/2022	Public hearings associated with formal State and County Special Use Permit process.
Prior to and during Construction Q2 2022 – Q4 2023	Organize information session and update meetings to update the community prior to commencing construction, including response to community feedback to date, upcoming construction activities, construction schedule, and employment opportunities.
Operations Q1 2024 – life of project	Organize information sessions and update meetings to update the community on project operations. Educational site visits will be offered to stakeholders throughout the life of the project.
Annually or as per specified regulatory approval processes, as applicable	Prepare a consultation report that outlines the community engagement process, activities, and outcomes with all the identified local communities.

J. CONTACT DETAILS

Please feel free to contact us at any time and to pass on our contact details to others in the community who have questions. Due to the speed of mail delivery, interested individuals are encouraged to reach out via the following phone or email:

For more information on Hawaiian Electric Company's development go to: https://www.hawaiielectriclight.com/clean-energy-hawaii/selling-power-to-the-utility/competitive-bidding-for-new-generation

Innergex Contacts

Project email: barberspointsolar@innergex.com
Barbers Point Project website: barberspointsolar.com
Innergex's company website: www.innergex.com

Eddie Park, Director – Business Development
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Julia Mancinelli, Director – Environment
Phone: 1 (604) 345-4009
Email: JMancinelli@innergex.com
Canada mailing address: 1100 – 888 Dunsmuir Avenue, Vancouver, BC, Canada, V6C 3K4

Local Development and Community Engagement Consultant

Jody Allione, Project Development Consultant
Phone: 1 (808) 347-3174
Email: jodyallione39@gmail.com

Figure 1 – Conceptual Project Overview

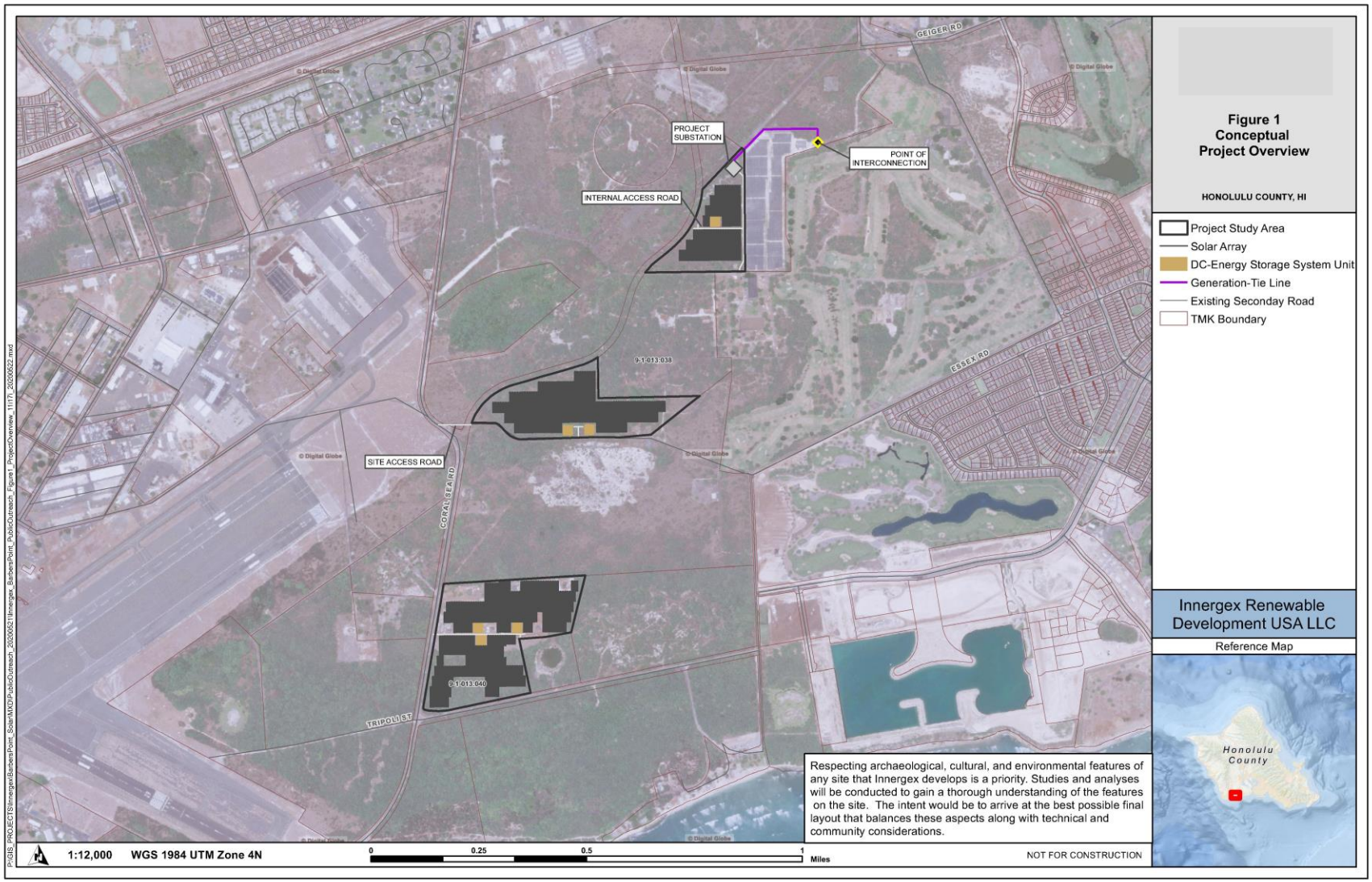


Figure 2 – Barbers Point Solar Project Stakeholders

Appendix - Engagement Conducted to Date

KAPOLEI
COMMUNITY
DEVELOPMENT
CORPORATION
P.O. Box 75658 Kapolei, HI 96707-0658

Public Hearing Testimony on
Proposed Kalaeloa Solar Energy Project
July 9, 2019 - 9:00 am
Hale Ponoʻi, Department of Hawaiian Homeg

Aloha mai kākou,

My name is Scott Abrigo and I live in Maluohai which is a homestead in Kapolei and Iʻm also the President of Kapolei Community Development Corporation ("KCDC"). KCDC supports the proposed solar project on Department of Hawaiian Home Lands ("DHHL") lands in Kalaeloa, Oʻahu and the issuance of a right-of-entry permit to Innergex Renewables USA LLC for due diligence purposes and the issuance of a long-term General Lease to develop a 20 megawatts solar project.

KCDC supports the solar project in Kalaeloa because this project will provide DHHL with much needed revenue to build new homesteads throughout the State. Maluohai was built in 2000 and is the first homestead built in Kapolei. Over the nineteen years Iʻve lived in Maluohai, I have observed the tremendous growth of homesteading in Kapolei with the construction of Kaupeʻa, Kānehili and recently Kaʻuluokahaʻi. Today, the number of homesteads in Kapolei total approximately 1,000. Multiply this number by the 2010 Census average Kapolei homestead household of 4.5, and you have approximately 4,500 homesteaders living in Kapolei today. There are also an additional 1,000 homesteads being built in Kaʻuluokahaʻi, bringing the total at full build-out to approximately 2,000 homes and 9,000 homesteaders! At full build-out Kapolei will be one of the largest if not the largest homestead in the State. This growth is directly attributed to DHHLʻs ability to generate revenue from its lands to build new homesteads. Revenue generated on Oʻahu lands account for approximately 45% of income generated Statewide. The dispositions on Oʻahu lands proposed for Commercial, Industrial, and General Agriculture use total approximately 2,400 acres and provide approximately $6.6 million dollars (2014) in revenue annually that is then directed to supporting DHHLʻs homesteading priority. Interesting note: 2,400 acres equal to only 0.2% of all of DHHLʻs land holdings Statewide.

KCDC supports the solar project in Kalaeloa because this project is consistent with DHHLʻs guiding documents and long range plans. Objective 2 from DHHLʻs 2009 Hoʻomaluō Energy Policy states that DHHL should facilitate the use of diverse renewable energy resources. This objective goes on to recommend activities which include the Department pursuing the leasing of lands suitable for renewable energy development. This solar project also aligns with the

designated Industrial use in DHHL's 2014 Oahu Island Plan and revenue generation use in DHHL's 2010 Kapolei Regional Plan.

Lastly, KCDC supports the solar project in Kalaeloa, because it will provide KCDC with resources for a sustainable future. KCDC is 501(c)3 non-profit organization that serves the homesteads in the Kapolei Region. The board is composed of volunteer homesteaders from Kapolei coming together to enhance their homestead's lifestyle and well-being through its community center named the Kapolei Heritage Center ("KHC"). The KHC is the primary conduit of how KCDC serves its homesteaders by providing a space to hold kupuna programs, keiki and parent learning classes, financial literacy classes, cultural workshops, healthy eating classes, driving school, church, community meetings and just providing a place where our homesteaders can gather, collaborate, share ideas, kanikapila and talk story. Beyond operating, managing and maintaining the KHC, KCDC in partnership with the Kapolei homestead associations funded an endowment that awards an annual scholarship to a student from the Kapolei homestead to attend college. KCDC also sponsors events like the recent Kapu'uola Hula Festival to promote KCDC's mission and purpose beyond its community center. This work is not easy nor is it free, and KCDC continues to innovate in its ability to raise the necessary capital to operate as well as complete the construction of the KHC and continue to provide programs that positively impact our homestead community. Being a Community Development Corporation ("CDC") positions KCDC and its homesteaders that we serve at the table on projects that are in our region, so we have a voice on what happens in our community. The Department conducted a Beneficiary Consultation with Kapolei beneficiaries in March 2019. At this meeting, our community was in favor and supportive of this proposed solar project. This prompted KCDC to also support the project and take a seat at the table to have discussions with DHHL and Innergex Renewables USA LLC on the impacts of this project on our homestead community. The result of these discussions was a community benefit package of 1% of gross revenues over the 25-year lease term amounting to approximately $30-$35K annually to KCDC. This revenue will be used by KCDC to build-out, operate, manage and maintain the Kapolei Heritage Center and expand on its programming to benefit the Kapolei homestead community.

In closing, KCDC supports the solar project at Kalaeloa, because it aligns with DHHL's guiding documents but more importantly because this project provides DHHL, its beneficiaries, KCDC and the Kapolei homesteads with the resources for a sustainable future. We humbly ask that the Hawaiian Homes Commission approve this project and mahalo for your consideration of KCDC's testimony.

Me ka mahalo,

Scott A. Abrigo
President
Kapolei Community Development Corporation

DATE	PARTICIPANTS/ ORGANIZATION	TOPIC
February 2019	DHHL	Notice of Award of Site Right of Entry
March 1, 2019	Kalaeloa Community Heritage Center (KCHC) President & Founding members	Terms proposed as a beneficiary of proceeds from a DHHL solar project in Kalaeloa
March 21, 2019	Hawaiian Beneficiaries (1500 invitations issued by DHHL and a notice on their website) 15 attendees	To discuss a solar project at this location with the community.
July 15, 2019	John Bond, Ewa Airfield Advocate	Ewa Airfield Historic & Cultural issues
July 8-9, 2019	DHHL Commissioners and Hawaiian Beneficiaries meetings	Review approval of Right of Entry/ Lease for Kalaeloa site leases
August 21, 2019	KCHC President & Board member, CNHA President	Discuss additional Community Benefits and path to set up training programs
August - September	DHHL site tenants calls & meetings on site	Various issues related to site and ongoing tenancy. Reviewed options on unused areas and discussed culturally impacted areas.
September 23-24, 2019	CNHA Convention	Meet CNHA staff and other parties interested in training program
October 3, 2019	CNHA Program Manager & Makaha Hawaiian Cultural & Training Center President	Discuss solar jobs training program and outreach to students and labor. Programs to be designed to achieve job certifications & qualify for employment in the solar industry.
October 7, 2019	KCHC Board Meeting, three DHHL Ewa Homestead Association Boards leadership	Discuss Community Benefits and overall community concerns & issues

November 2019 – February 2020	CNHA and Makaha Learning Center	Ongoing discussions to develop curriculum and schedule for the Solar Training Course. Discussions on providing course on neighbor islands.
January 8, 2020	Ewa Historic Airfield (John Bond) & DHHL	Discussions regarding plans for revetment area.
February 5, 2020	DHHL	Discussions related to current tenants, Ewa Airfield plans, and revetment status.
May 22, 2020 (Postponed due to Covid-19)	KCDC Joint Community Association Board meeting	Update project status and support for Community-wide debriefing including intro to CBRE opportunities.
May 26, 2020	SHPD	Discussions regards DHHL's long-term plans and solar project. on Parcels 38 & 40.
May 2020	DHHL site tenants calls & meetings on site	Various issues related to site and ongoing tenancy. Reviewed options on unused areas and access coordination.

Appendix B – Project Handouts

BARBERS POINT SOLAR PROJECT

Barbers Point Solar Project is a proposed 15 MW_{AC} solar PV system coupled with a four-hour 15 MW (60 MWh) DC-coupled battery energy storage system. The Project is to be located on industrial zoned land owned by Department of Hawaiian Home Lands (DHHL) in Kapolei on the island of Oahu. The solar array and associated infrastructure would utilize approximately 100-acres. A generation tie-line would extend approximately 0.25-miles northeast from the solar array to connect into the existing Hawaiian Electric Companies grid.

INNERGEX

THE STATE'S GOAL IS TO BE 100% RENEWABLE ENERGY BY 2045

In 2019, Hawaiian Electric launched the second phase of their renewable energy procurement process, the single largest procurement effort undertaken by a U.S. utility, for approximately 900 MW of new renewable generation.

The Hawaiian Electric Companies launched a request for proposals for clean, renewable energy projects for Oahu, Maui and Hawaii Island that would help the state meet its goal of 100% renewable energy by 2045 to bring more stable electricity costs to consumers and reduce its dependency on imported sources of energy.

Innergex submitted the Barbers Point Solar Project as part of the competitive procurement process. For Oahu, new renewable energy projects are needed to replace a 180-megawatt coal-fired plant due to close by September 2022. Barbers Point was selected to be in the Final Award Group and is in the process of negotiating a power purchase agreement.

BACKGROUND

n August 2009, the Department of Hawaiian Home Lands (DHHL) and Hawaiian Electric executed the Energy Partnership Charter with a share vision for an energy future for Hawaii that would serve as a model of energy self-sufficiency and sustainability and leave a legacy for future generations to come. Critical energy objectives were set, including identifying suitable renewable projects for DHHL's suitable lands that were not suitable for homestead development.

The parcels at Kalaeloa are designated as Industrial and have qualities that are ideal for a solar project. DHHL lands in Kalaeloa were deemed not suitable for homesteading due to their proximity to a nearby airport as well as their remote locations, physical characteristics, and lack of infrastructure for residential development. It was also determined that the highest and best use of these available lands would be in the renewable energy category as a result of limiting issues including land tenure, presence of historical structures, and topography. The area's terrain is considered karst which is characterized by porous and permeable coralline limestone reef deposit, making much of DHHL's Kalaeloa land susceptible to sink holes and therefore more appropriate for low-intensity industrial use. Revenues developed from industrial leasing of these available lands are used by DHHL to develop new homesteads in suitable residential areas throughout the state.

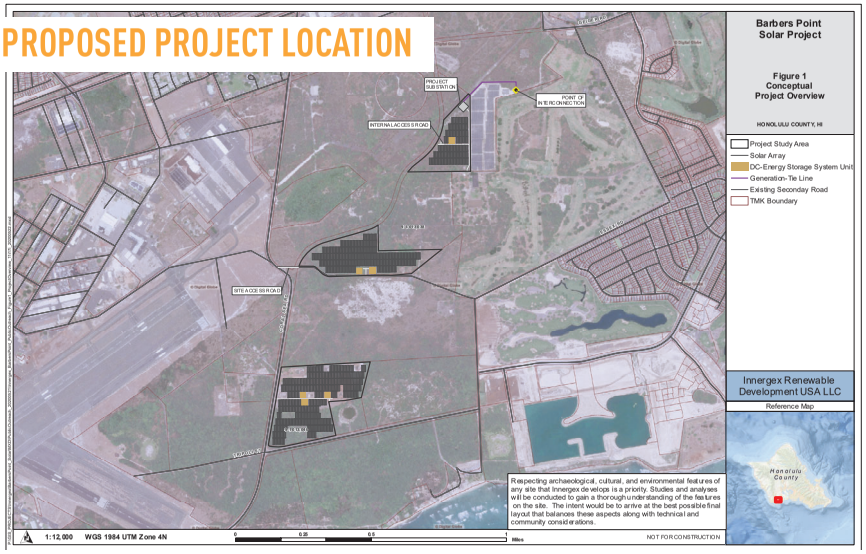
Renewable energy sites were selected by DHHL in consultation with the beneficiary community as part of their planning processes throughout 2008 – 2014. In 2018 and in 2019, DHHL ran consecutive competitive solicitation processes for the disposition of these sites by general leases for renewable energy projects. The DHHL RFP was widely advertised and all qualified applicants were welcomed to bid.

Innergex was selected by DHHL as the final applicant for the proposed project site and to continue with the leasing process that includes consultation meetings with DHHL's beneficiaries and public hearings. A non-exclusive Right-of-Entry was issued on August 1, 2019 for an initial period of two years with the option to extend for three additional one-year periods to conduct due diligence activities and investigation related to the development of a solar project. Innergex would seek a 25-year term lease to match the power purchase agreement. At the end of the project life, Innergex is committed to removing the solar equipment and restoring the site to its previous condition.

COMMUNITY

Innergex has a 30-year history of developing and operating successful and environmentally responsible renewable energy projects around the world. At Innergex, the trust and mutual respect we develop with the communities in which we operate is something we strive hard to earn and keep.

PROPOSED PROJECT LOCATION



Innergex will give preference qualified local suppliers and contractors throughout the development of the project. During operations, the project's community benefits package will be dedicated funding to the Kapolei Community Development Corporation for the Heritage Center. Innergex is working with the Center for Native Hawaiian Advancement and the Mākaha Training Center who will be providing a solar installation skills training course for its members and beneficiaries who are looking to participate in this industry, with a particular focus on utility-scale projects. The project will also contribute to local organizations, community projects and events throughout the life of the project.

ENVIRONMENT & PERMITTING

Innergex takes its environmental responsibilities very seriously, and our facilities are developed and operated with strict adherence to environmental codes and best practices. A preliminary desktop assessment of the Project has been conducted to examine existing environmental and cultural/ archaeological resources at the Project area to help identify regulatory requirements, issues, constraints, and limitations. Innergex has used this preliminary information to site the Project in a location that minimizes these impacts.

Based on the preliminary desktop data obtained, there does not appear to be any known environmentally significant resources that would preclude the proposed Project. However additional biological and site-specific resource surveys and studies are required to assess potential Project impacts, required avoidance and minimization measures and/or mitigation, design limitations. These detailed studies will include: general and detailed plant and wildlife surveys; wetland and waterways assessments; archaeological and cultural impact assessments; visual impact and glare analyses; and traffic and noise studies.

ZONING AND LAND USE

Land within the Project Area lies entirely within the City and County of Honolulu (County) Military and Federal Preservation District (F-1) Zone. It is located within the Kalaeloa Master Plan and is subject to the Kalaeloa Community Development District rules, which are enforced by the Hawaii Community Development Authority (HCDA).

As the Project is located within the F-1 zone, on DHHL lands, and potentially on U.S. Navy owned land, the Project is not subject to County zoning (DHHL 2018) but is designated as "Industrial" in the Oahu Island Plan (DHHL 2014) and "Mixed Use" in the Kapolei Regional Plan (DHHL 2010). Lands in the Kalaeloa area are not intended for residential development but rather are intended for revenue generation (DHHL 2010). Solar development complies with this land use requirement.

The Project will provide DHHL with lease revenues, which will be utilized to build homes and fund educational programs for native Hawaiians.

ARCHAEOLOGY RESOURCES AND CULTURAL PRACTICES

Previous archaeological investigations have been undertaken in the Project Study Area beginning in 1991 as part of larger studies associated with former U.S. Navy actions. Five known archaeological sites within the Project area parcels have been identified. These sites include rock walls, modified and unmodified sinkholes, stone enclosures, a homestead, and military-associated features. No known burials have been previously found within the Project area. Once the Project area boundary is finalized, an authorized archaeological consultant, will initiate consultation with Oahu's State of Hawaii Historic Preservation Division and will complete a supplemental archaeological investigation survey of the Project Area.

If cultural practices or traditionally significant cultural places are identified within the Project area or within the vicinity of the Project, Innergex will work with the archaeological consultant to assess potential Project impact to these sites and associated avoidance and minimization or mitigation measures. A Cultural Impact Assessment will also be required as a part of the environmental review process.

SOLAR POWER FACTS

Solar energy is the conversion of sunlight into usable energy forms. The sun's rays transmit light energy, in the form of photons, which can be converted to electricity using certain materials that naturally release electrons when exposed to light. Solar energy is the cleanest, most abundant renewable energy source available.

More information on solar energy is available at Innergex (innergex.com), the Solar Energy Industries Association (seia.org) and the International Energy Agency (iea.org)

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Proposed Project Timeline

2019
- Site Right-of-Entry

2020
- Hawaiian Electric Selection to Final Award Group
- Environmental/Archaeological studies
- Power Purchase Agreement (PPA) negotiations begin
- Interconnection studies

2021
- Public Utilities Commission PPA approval

2022
- Permit approvals
- Financing
- Construction

2023
- Testing
- Commercial operation begins

2024
- 25-year PPA Term

2048
- Extend Project or Decommission & Recycle

ABOUT INNERGEX

For 30 years, Innergex has believed in a world where abundant renewable energy promotes healthier communities and creates shared prosperity. As an independent renewable power producer which develops, acquires, owns and operates hydroelectric facilities, wind farms and solar farms, Innergex is convinced that generating power from renewable sources will lead the way to a better world. Innergex conducts operations in Canada, the United States, France and Chile.

FOR FURTHER INFORMATION

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BARBERS POINT SOLAR PROJECT FAST FACTS

BARBERS POINT SOLAR PROJECT

15 MW solar photovoltaic (PV) facility coupled with a 60 MWh (4-hour) DC-coupled battery energy storage system (DC-ESS). A 46-kV generator-tie line would extend approximately 0.25 miles northeast from the solar array to connect into the existing Hawaiian Electric grid.

PROJECT DEVELOPER

Founded in 1990, Innergex is an independent renewable power producer which develops, acquires, owns and operates hydroelectric facilities, wind farms, and solar farms in the United States, Canada, France and Chile.

SITE

The project is to be located on two non-contiguous lots (Parcel 38 & 40) owned by the Department of Hawaiian Home Lands (DHHL) in Kapolei on the island of Oahu. The solar arrays and associated infrastructure would utilize approximately 100-acres.

DHHL LANDS

The Barbers Point Solar Project will contribute to DHHL & Oahu's renewable energy goals as called out in the DHHL *2014 Oahu Island Plan* and Island of Oahu's *Oahu General Pla*n.

DHHL lands in Kalaeloa, Oahu were deemed not suitable for homesteading due to their proximity to a nearby airport as well as their remote locations, physical characteristics, and lack of infrastructure for residential development.

While all DHHL lands in Kalaeloa are zoned for Industrial use, several parcels were designated for renewable energy production in 2014 through the Department's beneficiary consultation process and in accordance with DHHL's 2009 Ho`omaluō *energy policy*.

It was also determined that the highest and best use of these available lands would be in the renewable energy category as a result of limiting issues including land tenure, presence of historical structures, and topography. The area's terrain is considered karst which is characterized by porous and permeable coralline limestone reef deposit, making much of DHHL's Kalaeloa land susceptible to sink holes and therefore more appropriate for low-intensity industrial use. Revenues developed from industrial leasing of these available lands are used by DHHL to develop new homesteads in suitable residential areas throughout the state.

In 2019, DHHL selected this solar project as part of a competitive solicitation process for the disposition of this site by general lease for a renewable energy project.

COMPLETION DATE

The project plans to be completed and begin commercial operations by the end of 2023.

LENGTH OF SERVICE

The proposed Power Purchase Agreement (PPA) with Hawaiian Electric Company, Inc. ("Hawaii Electric") will be for 25 years. Thereafter, the project can be purchased by Hawaii Electric, have its PPA renewed, or be decommissioned.

BENEFITS

- In addition to the General Lease terms, Innergex has also dedicated 1% of the annual project revenues to the Kapolei Community Heritage Centre (KCHC). The KCHC membership includes the homesteader associations in the Kapolei/Kaleaeloa area including Malu‘ōhai, Kaupe‘a, Kānehili, and Ka‘uluokaha‘i communities.

- Working with Center for Native Hawaiian Advancement (CNHA) and the Makaha Training Center who will be providing a solar installation skills training course for its members and beneficiaries who are looking to participate in this industry, with a particular focus on utility-scale projects. Innergex will sponsor job fairs at the conclusion of these courses.

- In keeping with Innergex's core values, preference will be given to local resources and contractors throughout the development of the project.

- Through annual sponsorship evaluation, the project will contribute to local organizations, community projects, and events throughout the life of the project.

- The project's energy storage system can load shift the full energy output of the project to be used during peak demand in the evening or at other times when the sun is not shining.

FUNDING SOURCE

Innergex will be responsible for 100% of the infrastructure, start-up, operational, maintenance, and decommissioning and recycling costs.

For more information: **www.barberspointsolar.com**

Email: **barberspointsolar@innergex.com**

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BARBERS POINT SOLAR PROJECT

FREQUENTLY ASKED QUESTIONS

WHAT IS THE BARBERS POINT SOLAR PROJECT?

Innergex is proposing a 15 MW solar photovoltaic system coupled with a 15 MW, 4-hour (60MWh) DC-coupled energy storage system (DE-ESS) project (the Project) located in Kapolei on the island of Oahu. The Project is to be located on two non-contiguous lots (Parcels 38 & 40) owned by Department of Hawaiian Home Lands (DHHL). The solar array and associated infrastructure will utilize approximately 100 acres and will interconnect to the Hawaiian Electric grid via a 0.25-mile 46-kilovolt generation-tie line.

WHAT LED DHHL TO IDENTIFY SUITABLE LANDS FOR RENEWABLE ENERGY PROJECTS?

In August 2009, the DHHL and Hawaiian Electric executed the Energy Partnership Charter with a shared vision for an energy future for Hawaii that would serve as a model of energy self-sufficiency and sustainability and leave a legacy for future generations to come. Critical energy objectives were set, including identifying suitable renewable projects for DHHL's suitable lands that were not suitable for homestead development.

DHHL has developed a three-tiered planning system to guide planning on its land holdings and policies for resource management, for the benefit of current and future beneficiaries (DHHL 2014). The planning system includes an over-arching General Plan; Strategic Program Plans and Island Plans, including the Oahu Island Plan; and Regional and Development plans, such as the Kapolei Regional Plan. The parcels at Kalaeloa are designated as Industrial and have qualities that are ideal for a solar project. The proposed project would provide DHHL with revenue, which would be utilized for developing homestead sites.

WHAT LED TO THE KALAELOA PARCELS OF LAND BEING AVAILABLE FOR SOLAR DEVELOPMENT?

Renewable energy sites were selected by DHHL in consultation with the beneficiary community as part of their planning processes throughout 2008 – 2014. DHHL lands in Kalaeloa, O`ahu were deemed not suitable for homesteading due to their proximity to a nearby airport as well as their remote locations, physical characteristics, and lack of infrastructure for residential development.

While all DHHL lands in Kalaeloa are zoned for Industrial use, several parcels were designated for renewable energy production in 2014 through the Department's beneficiary consultation process and in accordance with DHHL's 2009 Ho`omaluō energy policy.

It was also determined that the highest and best use of these available lands would be in the renewable energy category as a result of limiting issues including land tenure, presence of historical structures, and topography. The area's terrain is considered karst which is characterized by porous and permeable coralline limestone reef deposit, making much of DHHL's Kalaeloa land susceptible to sink holes and therefore more appropriate for low-intensity industrial use. Revenues developed from industrial leasing of these available lands are used by DHHL to develop new homesteads in suitable residential areas throughout the state.

In 2018 and in 2019, DHHL ran consecutive competitive solicitation processes for the disposition of these sites by general leases for renewable energy projects. The DHHL RFP was widely advertised and all qualified applicants were welcomed to bid.

Innergex was selected by DHHL as the final applicant for the proposed project site and to continue with the leasing process that includes consultation meetings with DHHL's beneficiaries and public hearings. A non-exclusive Right-of-Entry was issued on August 1, 2019 for an initial period of two years with the option to extend for three additional one-year periods to conduct due diligence activities and investigation related to the development of a solar project. Innergex would seek a 25-year term lease to match the power purchase agreement. At the end of the PPA, Innergex is committed to remove the solar equipment and return the site to its previous condition.

WHAT LEAD TO THIS PROJECT BEING DEVELOPED?

Innergex responded to a competitive Request for Proposal (RFP) issued by Hawaiian Electric in 2019 for renewable energy that will help stabilize and lower costs while reducing the state's reliance on imported fossil fuels and cutting greenhouse gas emissions.

WHO IS INNERGEX?

Founded in 1990, Innergex is an independent renewable power producer which develops, acquires, owns and operates hydroelectric facilities, wind farms and solar farms. Innergex has operating projects in the United States, Canada, Chile, and France. It is a priority for us to be a good community partner because we are a long-term owner and operator of projects.

WHO IS FUNDING THE BARBERS POINT SOLAR PROJECT?

Innergex will be responsible for 100% of the development, construction, and start-up costs. After completion, Innergex will also be responsible for all operational and maintenance costs.

WILL THIS MEAN INCREASED COSTS FOR CONSUMERS?

Oahu has some of the highest electricity prices in the United States at 31 cents per kWh. The price of solar plus energy storage in the recent Hawaiian Electric RFPs is the lowest to date for renewable electricity in the state. The Project will provide a fixed, long-term price for 25-years, in place of volatile prices of fossil fuels, will put downward pressure on electricity rates.

WHAT WILL THE PROPOSED PROJECT ACCOMPLISH?

The proposed Project will power approximately 6,200 homes with renewable energy. This would contribute to the State of Hawaii's goal to be 100% renewable by 2045 and reduce the state's dependency on imported fossil fuel.

HOW ELSE WILL THE COMMUNITY BENEFIT FROM THE PROPOSED PROJECT?

Innergex will give preference to qualified local suppliers and contractors throughout the development of the project. During operations, the project's community benefits package will be dedicated funding to the Kapolei Community Development Corporation (KCDC) for the Heritage Center. The benefit of working with the KCDC is that its membership includes the homesteader associations in the Kapolei/Kalaeloa area, including Malu'ōhai, Kaupe'a, Kānehili and Ka'uluokaha'i homestead communities, but also provides a place for all of Oahu and neighbor island Hawaiians to meet on Oahu for various purposes. Innergex is working with the Center for Native Hawaiian Advancement and the Mākaha Training Center who will be providing a solar installation skills training course for its members and beneficiaries who are looking to participate in this industry, with a particular focus on utility-scale projects. The project will also contribute to local organizations, community projects and events throughout the life of the project. Through annual sponsorship evaluation, the project will contribute to local organizations, community projects and events throughout the life of the project.

WHY IS ENERGY STORAGE PART OF THIS PROPOSED PROJECT?

The DC-coupled battery energy storage system (DC-ESS) is a key aspect of the RFP. The DC-ESS would be completely charged from the solar panels during the day. The energy can then be used during peak demand in the evening or at other times when the sun is not shining.

ARE THERE ANY CULTURAL OR ENVIRONMENTAL FEATURES TO CONSIDER FOR THE SITE?

Respecting archaeological, cultural, and environmental features of any site that Innergex develops is a priority. These studies and analyses will be conducted to gain a thorough understanding of the site and any findings. The intent would be to arrive at the best possible final layout that balances archaeological, cultural, environmental, technical, economic, and community considerations.

WHAT IS THE OVERALL IMPACT OF SOLAR PROJECTS ON THE ENVIRONMENT?

Innergex must provide a complete analysis of the greenhouse gas (GHG) emissions created throughout the life cycle of the project as part of the Public Utilities Commission approval process.

The analysis of GHG emissions created throughout the life cycle of the project will include:

- Solar PV Manufacturing, Including Material Extraction,
- Battery Storage Manufacturing, Including Material Extraction,
- Transmission Line Manufacturing, Including Material Extraction
- Additional Transportation to and from Oahu and Project Construction
- Operations
- Decommissioning & Disposal

This comprehensive inventory of emissions is compiled and compared to the alternative production of the equivalent amount of energy production as if the project were not built.

A recent analysis showed that a similar sized project in Hawaii would avoid 94% of the Lifecycle and Operational GHG emissions that would have been produced by the normal generation mix.

WHAT IS THE TIMELINE FOR THE PROPOSED PROJECT?

Innergex responded to Hawaiian Electric's RFP and was selected to start PPA negotiations in May 2020. Innergex anticipates completing construction and beginning operation of the project by the end of 2023. The initial term under the PPA is 25 years. Thereafter, the project can be acquired by Hawaiian Electric, have its PPA renewed, or be decommissioned, recycled and site returned to its original state.

HOW WILL THE PROJECT BE DECOMMISSIONED?

As part of the decommissioning of a typical solar project after its useful lifecycle (between 25-35 years), any and all components associated with the project would be removed and the area would be returned to substantially the same condition as existed prior to project development. Decommissioning criteria include consideration of local environmental factors to minimize effects such as erosion during the removal process, and the recycling of all possible materials demolished or removed from the site.

Reuse or recycling of materials would be prioritized over disposal. Recycling is an area of great focus in the solar industry, and programs for both batteries and solar panels are advancing every year. Panels and batteries would most likely be shipped to recycling facilities on the mainland.

If any materials need replacing before the facility end-of-life, Innergex would seek the most environmentally responsible route for reuse, recycling or disposal.

For more information: **www.barberspointsolar.com**

Email: **barberspointsolar@innergex.com**

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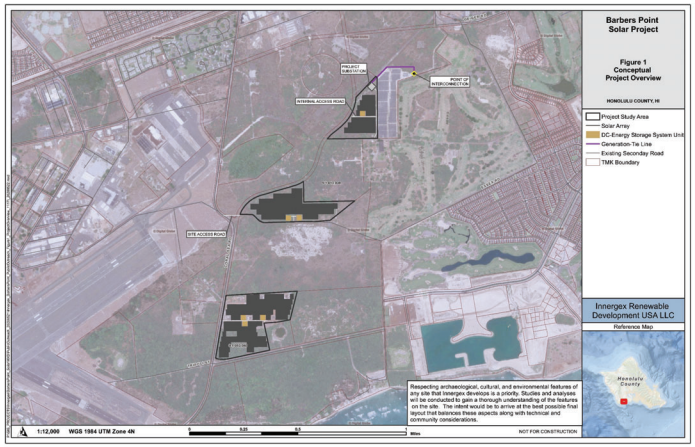
BARBERS POINT SOLAR PROJECT

PROJECT SUMMARY & COMMUNITY OUTREACH

Proposer Name (Company Name)	Barbers Point Solar, LLC
Parent Company/ Owner/ Sponsor/ Business Affiliation/etc.	Innergex Renewable Development USA LLC
Project Name	Barbers Point Solar Project
Net AC Capacity of the Facility (MW)	15 MW_{ac}
Proposed Facility Location in/ near what City/ Area	Kapolei, Oahu
TMK(s) of Facility Location	(1) 9-1-013:038, (1) 9-1-013:040
Point of Interconnection's Circuit or Substation Name	CEIP 46 - 46kV circuit
Project Description	Barbers Point Solar Project ("the Project") is a proposed 15 MW_{AC} solar photovoltaic (PV) system coupled with a 4-hour 15 MW, (60MWh) DC-coupled battery energy storage system (DC-ESS). The Project is to be located on two non-contiguous lots (Parcels 38 & 40) owned by Department of Hawaiian Home Lands (DHHL) in Kapolei on the island of Oahu. The solar array and associated infrastructure would utilize approximately 100-acres. A 46-kilovolt (kV) generator-tie line would extend approximately 0.25-miles northeast from the solar array to connect into the Hawaiian Electric grid at the existing CEIP 46 46 kV Circuit.

Project Site Map
Site Layout Plan
Interconnection Route

The following is a conceptual project site map and layout that will be updated once detailed studies and analyses have been conducted



ENVIRONMENTAL COMPLIANCE, IMPACTS AND PERMITTING PLAN

Overall land use and environmental permits and approvals strategy

Innergex has conducted extensive environmental and regulatory due diligence for the construction and operation of the proposed Project. A preliminary assessment of the Project has been conducted, which looks at the existing environmental and cultural/archaeological resources at the Project area and identifies regulatory requirements, issues, constraints, and limitations as they relate to the Project. Innergex has used this preliminary information to site the Project in a location that minimizes environmental impacts and identify permit requirements.

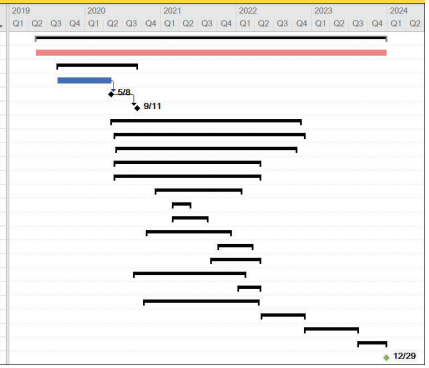
Based on the preliminary desktop data obtained for the Project area, there does not appear to be any known environmentally significant resources that would preclude the proposed Project; however, additional biological and site-specific resource surveys and studies are required to assess potential Project impacts, required avoidance and minimization measures and/or mitigation, design limitations, and to refine required permitting criteria.

These detailed studies will include general and detailed plant and wildlife surveys, wetland and waterways assessments, archaeological and cultural impact assessments, visual impact and glare analyses, and traffic and noise studies.

Initial coordination meetings with key agencies will provide an opportunity to fully understand how federal, state, or local agency rules and policies could affect the Project, to confirm permits required and how permitting issues may differ for various Project components, and to confirm a schedule for approvals. Innergex plans to conduct meetings with key regulatory agencies, including Hawaii Community Development Agency (HCDA), Department of Hawaiian Home Lands, the U.S. Navy, State Historic Preservation Division (SHPD), U.S. Fish and Wildlife Service, Department of Land and Natural Resources, Division of Forestry and Wildlife, Hawaii Department of Health (HDOH), and the City and County of Honolulu.

Gantt format schedule which identifies the sequencing of permit applications and approval activities and critical path.

Task Name	Duration	Start	Finish
Barbers Point Solar Project Schedule	**1212 days**	**Thu 5/9/19**	**Fri 12/29/23**
Community Outreach and Engagement	**1212 days**	**Thu 5/9/19**	**Fri 12/29/23**
Power Purchase Agreement	**277 days**	**Thu 8/22/19**	**Fri 9/11/20**
RFP Process	187 days	Thu 8/22/19	Fri 5/8/20
Final Award Selection	0 days	Fri 5/8/20	Fri 5/8/20
PPA Execution	0 days	Fri 9/11/20	Fri 9/11/20
Engineering	**655 days**	**Fri 5/8/20**	**Sat 11/12/22**
Surveys, Assessments and Permitting	**658 days**	**Mon 5/25/20**	**Thu 12/1/22**
Archaeological, Cultural, Environmental Surveys and Studies	625 days	Mon 6/1/20	Fri 10/21/22
Agency Consultation and Permit Applications	504 days	Mon 5/25/20	Thu 4/28/22
Agency Consultation	504 days	Mon 5/25/20	Thu 4/28/22
NEPA enviromental review (if Navy lands are used)	299 days	Tue 12/8/20	Fri 1/28/22
ESA Section 7 Compliance	61 days	Tue 3/2/21	Tue 5/25/21
NHPA Section 106 Compliance	121 days	Tue 3/2/21	Tue 8/17/21
Hawaii Environmental Policy Act (HEPA) EA	290 days	Wed 10/28/20	Tue 12/7/21
HCDA Permits	118 days	Fri 10/8/21	Tue 3/22/22
USACE CWA Section 404 Nationwide Permit (NWP) (if neede	170 days	Fri 9/3/21	Thu 4/28/22
Blanket CWA Section 401 Water Quality Certification (WQC)	388 days	Mon 8/24/20	Thu 2/17/22
Coastal Zone Management (CZM) Consistency Determination	75 days	Fri 1/14/22	Thu 4/28/22
City and County of Honolulu Easement	398 days	Tue 10/13/20	Thu 4/21/22
Construction Permits	150 days	Thu 5/5/22	Thu 12/1/22
Facility Construction	**183 days**	**Thu 12/1/22**	**Mon 8/14/23**
Testing and Commissioning	**99 days**	**Mon 8/14/23**	**Fri 12/29/23**
Commercial Operations Date	**0 days**	**Fri 12/29/23**	**Fri 12/29/23**



City Zoning and Land Use Classification

Land within the Project area lies entirely within the City and County of Honolulu (County) Military and Federal Preservation District (F-1) Zone, is located within the Kalaeloa Master Plan, and is subject to the Kalaeloa Community Development District (CDD) rules, which are enforced by the Hawaii Community Development Authority (HCDA).

As the Project is located within the F-1 zone, is located on DHHL lands and potentially on U.S. Navy owned land, the Project is not subject to County zoning (DHHL 2018). As specified in the Kalaeloa CDD, Parcels 38B and 40 of the Project Area are located within Transect Zone T2: Rural/Open Space Zone and Parcel 38A is located with Transect Zone T3: General Urban Zone.

Because the Project constitutes a man-made change on a lot greater than 40,000 square feet (0.92 acres) within the Kalaeloa CDD, the Project will require a Development Permit within any zone, per §15-215-78 of the CDD Rules (HCDA 2012). Per §15-215-79 of the CDD Rules, within Zone T2, solar facilities are "permitted by right" such that a Conditional Use Permit (CUP) is not required. Within Zone T3, solar facilities are an allowed use with an approved CUP (HCDA 2012).

The following development standards apply to the T2 and T3 Transect Zones.

- Front Yard Setback: 5'15" in both T2 and T3
- Side and Rear Yard Setback: 0' in both T2 and T3

DHHL lands in Kalaeloa, O`ahu were deemed not suitable for homesteading due to their proximity to a nearby airport as well as their remote locations, physical characteristics, and lack of infrastructure for residential development. While all DHHL lands in Kalaeloa are zoned for Industrial use, several parcels were designated for renewable energy production in 2014 through the Department's beneficiary consultation process and in accordance with DHHL's 2009 Ho`omaluō *energy policy*.

It was also determined that the highest and best use of these available lands would be in the renewable energy category as a result of limiting issues including land tenure, presence of historical structures, and topography. The area's terrain is considered karst which is characterized by porous and permeable coralline limestone reef deposit, making much of DHHL's Kalaeloa land susceptible to sink holes and therefore more appropriate for low-intensity industrial use. Revenues developed from industrial leasing of these available lands are used by DHHL to develop new homesteads in suitable residential areas throughout the state.

The State Urban District generally includes areas that are currently in urban use, as well as vacant areas for future development. There are no restrictions on solar energy development within the State Urban District. Therefore, the Project is anticipated to be compliant with the current state land use designation.

Discretionary and non-discretionary Land use, environmental and construction permits and approvals

Listing of Permits and Approvals

Based on preliminary analysis, of the below identifies all land use, environmental and construction permits, and approvals anticipated to be required for development, financing, construction and operation of the proposed Project. Through engagement with government agencies and officials and various studies and analyses, the list will be refined as needed.

- National Environmental Policy Act environmental review (if Navy lands are used for access or transmission);
  - Including Section 106 Compliance and Coastal Management Zone federal consistency concurrence
- Hawaii Environmental Policy Act environmental review under HRS Chapter 343;
- CDD/HCDA Development Permit (Parcels 38A, 38B, and 40);
- CDD/HCDA Conditional Use Permit (Parcel 38A);
- Hawaii Revised Statute Chapter 6 E compliance, including SHPD review and approval of Archaeological Inventory Survey;
- Clean Water Act §402 National Pollution Discharge and Elimination System General Stormwater Permit from HDOH;
- Federal Aviation Administration Determination of No Hazard;
- Construction Noise Permit from HDOH;
- Easement for Use of Coral Sea Road Right-of-Way;
- Grading, grubbing, building, and electrical permits from Honolulu County

Preliminary environmental assessment of the site (including ant pre-existing environmental conditions)

A Preliminary Environmental Assessment (EA) was conducted in late 2019, which provides a high-level review of pre-existing environmental conditions, and potential short- and long-term impacts associated with the proposed Project in a variety of environmental areas, including: air quality, wildlife, vegetation, climate, soils, land use, natural hazards, noise, traffic, socio-economic characteristics, visual impacts, hazardous waste, water quality, public safety, and recreation. No long-term direct or indirect impacts are anticipated from construction or operation of the proposed Project with the implementation of appropriate best management practices and avoidance and minimization measures. However, the Preliminary EA identifies areas in which further study is required and will form the basis of our environmental program going forward.

The Preliminary Environmental Assessment can be found on the project website barberspointsolar.com.

CULTURAL RESOURCE IMPACTS

Proposer's updated Community Outreach Plan must include a plan that (1) identifies cultural, historic or natural resources that will be impacted by the project (2) describes the potential impacts on these resources and (3) identifies measures to mitigate such impacts.

Previous archaeological investigations have been undertaken in the Project Study Area beginning in 1991 as part of larger studies associated with former U.S. Navy actions. Previous studies identified five known archaeological sites within the Project Area parcels. These sites include habitation and agricultural complexes that include rock walls, modified and unmodified sinkholes, stone enclosures, a homestead, and military-associated features. No known burials have been previously found within the Project Area. Once the Project area boundary is finalized (which will include all Project activities that may require ground disturbance), an archaeological consultant, authorized by the State Historic Preservation Division (SHPD), will initiate consultation with Oahu's SHPD and will complete a supplemental archaeological investigation survey (AIS) of the Project area. The AIS will include a comprehensive field study documenting all of the extant archaeological features within the Project Area and reassess the significance of such resources, as well as new treatment recommendations for all of the documented sites.

As part of the archaeological resource support, the archaeological consultant will also determine the presence or absence of cultural practices or traditionally significant cultural places with the Project area and vicinity. Background research and (if appropriate) ethnographic interviews with knowledgeable native Hawaiians will be conducted to determine if there are any known significant sites in or near the Project Area. If cultural practices or traditionally significant cultural places are identified within the Project Area or within the vicinity of the Project, Innergex will work with the archaeological consultant to assess potential Project impact to these sites and associated avoidance and minimization or mitigation measures. This will be detailed in a Cultural Impact Assessment.

COMMUNITY OUTREACH

Detailed Community Outreach Plan

Obtaining community support is critical to a project's viability and success. That support is the ultimate result of building a relationship between the project team, individuals and groups in the community. It is built on a spirit of listening to the values and priorities of residents as the project looks for win-win opportunities. This relationship, based on mutual respect, is a process carefully nurtured and protected. Innergex's Community Outreach & Engagement Plan is based on these fundamentals.

Every community that hosts one of Innergex's projects is unique, and Innergex always tries to adapt to each location's individual needs. Creating lasting bonds of trust between people is at the core of our development strategy and we're proud of the numerous and long-term relationships we have built with indigenous and rural communities across Canada.

The Community Outreach & Engagement Plan is designed to build trust in the community for Innergex and the proposed Project. The plan proposes to meet a series of community and communication objectives centered on creating opportunities for the community to obtain information on the proposed project, which will empower them to provide critical input and provide their perspectives. These exchanges will enable the project to balance socio-cultural considerations with environmental and technical parameters as it evolves.

Throughout the development process, Innergex will build on its initial conversations with the local community, including community associations; state and county government administrators and elected officials; environmental and conservation groups; native Hawaiian and other cultural interests; and local businesses. Dialogue with organizations will also be initiated through this plan with the intent of understanding how their interests may be impacted and/or improved by the proposed project.

As importantly, outreach and communications will go beyond already established groups and will incorporate one-on-one engagement sessions that enables the project team to hear from residents whose views are not captured by meetings with established groups. Prior experiences have underscored that these more individualized exchanges provide an avenue for input to those who may be intimidated by large gatherings. These also foster rich, unfettered input from the residents as well as an opportunity to answer specific questions about the project.

Initial materials such as a Fact Sheet and FAQ will be developed to support Innergex's community engagement efforts. As planning evolves, these will be updated and reissued to keep the community informed and to invite continuous feedback. A Community Feedback document will be developed that details how community input has influenced the development and siting of the project. The plan will incorporate traditional news media, new communication channels, and other community resources to augment information sharing, accuracy, and accessibility about and to the project. As the project moves through the regulatory processes, project update notices will be developed and published to keep readers informed on the project's progress.

Innergex will regularly assess its outreach strategies with the assistance of local partners and residents and adjust them for greatest effectiveness and relevance with stakeholders.

Comprehensive details are included in the Project Community Outreach & Engagement Plan which can be found on the project website.

Local Community Support or Opposition

It is important to Innergex that we hear the views of all relevant parties so that we can address concerns and clear up any misconceptions, as well as receive input that can lead to a better-designed project which provides benefits to as many people as possible.

Attached to the Community Outreach & Engagement Plan is a letter from the President of Kapolei Community Development Corporation (KCDC), Scott Abrigo, in support of the Project wherein it states, "KCDC supports the solar project at Kalaeloa, because it aligns with DHHL's guiding documents but more importantly because this project provides DHHL, its beneficiaries, KCDC and the Kapolei homesteads with the resources for a sustainable future."

At the July 2019 DHHL Commission meeting, the DHHL voted on approving a Right of Entry and lease terms for Innergex to lease this site. Members of the statewide Sovereign Council of Hawaiian Homestead Associations (SCCHA) protested the lease under the premise that it violated requirements to lease first to homesteaders.

DHHL and the Deputy Attorney General disagreed with this interpretation and cited its 2014 Oahu Development Plan and the process it went through, including extensive community engagement, to designate lands for renewable energy that would generate revenue for DHHL to fund the development of residential lands for beneficiary homesteads. Following public hearings and two contested cases on the matter, DHHL Commissioners concluded that staff had complied with the law in soliciting and granting this lease to Innergex for the Project area.

Community Outreach Efforts

Multiple audiences across a large geographic area that represent diverse interests and concerns call for an array of outreach strategies and tools to meet the objectives of the Community Outreach & Engagement Plan.

Innergex wants the community to know that the project team is accessible and welcomes interactions. The team will draw from a mix of tools (e.g. Fast Facts, FAQ, Community Feedback handouts, website, presentation slides/poster boards, mailers, and project update notices) and activities (e.g. introductory and update meetings, community presentations, public meetings, information sessions, local media editorial boards, and testimonials) to achieve its objectives for engaging groups and residents in the community. Strategies will be evaluated after each action and event and adjust as necessary as the project unfolds. Innergex will also prepare a Community Engagement Report, summarizing activities.

In accordance with the DHHL RFP requirements, a community information meeting was held in March 2019. DHHL also held public hearings on July 9 and July 10, 2019, for the approval of the ROE and lease terms. Additional community outreach efforts have occurred in 2019 and are detailed in the Community Outreach & Engagement Plan.

Innergex will build upon its existing relationships with community members in the engagement efforts going forward. A public meeting is planned for July 8, 2020. Given the current situation with COVID-19, this meeting will be held virtually (online). Project information will be presented, and the opportunity to ask questions will be offered, with project team members available to respond in real time.

Community Benefits

Innergex's philosophy has always been to develop and operate reliable, high-quality projects while respecting the environment and balancing the best interests of communities and partners. Innergex is committed to applying its expertise, resources, and dedication to the good of the planet in actively addressing Oahu's unique challenges.

The Community Contribution is intended to share project benefits with the community over the long term and to recognize the value of the support from the local community for the Project.

Dedicated Funding to Kapolei Community Heritage Center (KCHC)
Innergex has committed dedicated funds (1% of the actual gross project revenues of the project) for the Kapolei Community Heritage Center. The Innergex team will also work with the KCHC Board to provide in-kind services to implement this financial support for the expansion plans for the center. The benefit of working with the KCHC is that its membership includes the homesteader associations in the Kapolei/Kalaeloa area, including Malu'ohai, Kaupe'a, Kanehili and Kauluokaha'i homestead communities, but also provides a place for all of Oahu and neighbor island Hawaiians to meet on Oahu for various purposes.

Support Training Program for the Center for Native Hawaiian Advancement (CNHA)
One of CNHA's priorities is to train its constituents so that they can become employable in new and expanding fields and further career advancement in areas requiring skilled trades. Innergex is pleased to work with CHNA to achieve this goal of developing a solar project installation skills training course for its members and beneficiaries looking to participate in this industry, with a particular focus on utility-scale projects, where it is expected the most jobs will be available in the next couple of years.

On October 3, 2019, Innergex connected the CNHA Training Program Manager with the President of Makaha Learning Center (MLC), which teaches apprenticeship and certificate programs primarily to native Hawaiians in the Makaha-Waianae communities to enhance the existing labor force in this field, particularly with the number of anticipated projects requiring skilled labour.

Innergex will provide support for this program and will sponsor a job fair for solar contractors and the graduating students at the conclusion of the programs. The first training program is currently in planning and will be scheduled once the restrictions due to Covid-19 allow classroom training.

Local Employment & Contracting
Construction and operation phases will create benefits in terms of new employment opportunities, as well as the use of local suppliers. Preference would be given to retaining local persons, consultants, businesses and contractors throughout the development of the project.

Sponsorships
Opportunities abound within Oahu's robust non-profit sector and its year-round schedule of festivals, events, conferences, fundraisers, etc. Innergex is committed to evaluating sponsorships annually and providing support to a variety of events and causes.

Memberships
Through membership in various community organizations, Innergex will participate in specific programs that support the mission of the organizations and help advance mutually held values and goals.

Project Benefits & Community Benefits are further details in the Project's Community Outreach & Engagement Plan.

For more information: www.barberspointsolar.com

Email: barberspointsolar@innergex.com

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Appendix C – Advertisements, Media Advisory, and Project Updates

CONTACT: Eddie Park, Director Development, 619-577-2736

epark@innergex.com

FOR IMMEDIATE RELEASE

June 2, 2020

MEDIA ADVISORY: NOTICE OF VIRTUAL PUBLIC OPEN HOUSE FOR PROPOSED BARBERS POINT SOLAR PROJECT

Innergex Renewable Development USA LLC has been selected to the Final Award Group in the Hawaiian Electric's competitive process to negotiate a contract for our Barbers Point Solar project that will help in the state's goal of transitioning to 100% renewable energy by 2045. We are proposing a proposed 15 MW solar and 60 MWh battery energy storage system on industrially zoned land in Kapolei on the island of Oahu.

Should a contract be awarded for the Project, all required permits and approvals would still need to be obtained and further community engagement sessions will be conducted.

DATE: July 8, 2020

TIME: 5:30 pm – 6:30 pm (HST)

LOCATION: Online

TO REGISTER: Go to barberspointsolar.com and click the registration link or email us at baberspointsolar@innergex.com and a registration link and event details will be emailed to you.

PURPOSE: To share information about a solar and battery storage project for a renewable energy project proposed to be developed in Kapolei near Kalaeloa and to solicit public comments to be filed with the Public Utilities Commission.

CONTACT: For more information, call 619-577-2736, email barberspointsolar@innergex.com, or visit barberspointsolar.com

-30-

ON **SMALL BUSINESS** BY JANIS L. MAGIN

JMAGIN@BIZJOURNALS.COM 808-955-8041 @PBNJANIS

GRAPHIC DESIGN

HonBlue puts 'local style' into Covid signage for businesses

COURTESY HONBLUE

HonBlue began making signs and floor decals for businesses to advise employees and customers to wash their hands, wear face masks and maintain social distancing soon after the Covid-19 pandemic caused shutdowns across the state, but now that more companies are reopening, they've given their signage some Hawaii style.

HonBlue President Larry Heim said the Covid-related signs were a way for his business to pivot after the coronavirus led to the total shutdown of Hawaii's tourism industry and forced him to lay off some 35% of his 115 employees.

The company's HonBlue division, which services the architecture and construction sectors, has remained steady, but the commercial printing division is focused nearly all on the visitor industry, and its large-format graphics division gets about 50% of its business from tourism.

Heim said that as the state and the City and County of Honolulu began to allow more businesses to open, those companies needed ways to communicate safety policies to staff and customers, so HonBlue began producing safety floor decals telling people where to stand, as well as signs and banners reminding them to wear face masks or use hand sanitizer.

The company is also fabricating acrylic sneeze guards and dividers.

"That kept us really busy, we were able to bring many employees back," he said. "That was really a very important change was being able to get these jobs back – businesses were buying these signs."

Heim said the requests he's hearing from small business customers lately is for reopening signage.

"We were kind of bothered by the tone of the [original] signage," he said. "That message still needed to happen but [we thought] this needs more of a local, friendly touch, so we had our designer do some of what we call 'local style.'

"You can still tell the message, but you can tell it with aloha," he said.

The products are being offered in six color themes with local-style names including mauka, makai and red dirt, and include phrases such as "please kokua," "spread aloha not germs" and "e komo mai."

Some of the company's larger customers, including hotels and hospitals, have been designing their own messaging and signage to conform with their brand and décor.

The signs are designed for small businesses that cannot afford to buy custom signs – Heim said the cost makes sense for orders of 50 or more of a particular item. Customers can order them online and prices start at $6.99 for individual decals and go as high as $359 for a retractable vertical banner.

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NOTICE OF VIRTUAL PUBLIC OPEN HOUSE

FOR THE PROPOSED BARBERS POINT SOLAR PROJECT

Innergex Renewable Development USA LLC has been selected to the Final Award Group in Hawaiian Electric's competitive process to negotiate a contract for our Barbers Point Solar Project that will help in the state's goal of transitioning to 100% renewable energy by 2045. We are proposing a 15 MW solar and 60 MWh battery energy storage system on industrially zoned Department of Hawaiian Home Lands (DHHL) land in Kapolei on the island of Oahu.

Should a contract be awarded for the Project, all required permits and approvals would still need to be obtained and further community engagement outreach will be conducted.

Due to current physical distancing guidelines and in order to provide a safe information sharing environment, we will be holding a virtual community meeting to provide information and get feedback on the proposed project as part of the procurement process. Innergex representatives will outline the project details including its components, environmental and archaeological surveys, community benefits, and the overall process followed by a question and answer period. We encourage and welcome all interested community members to join us for this information session.

If you are unable to attend the virtual open house you may still make a written submission during the public comment period which begins July 9, 2020 and ends August 7, 2020. All comments received during this period in relation to the proposed project will be considered.

VIRTUAL PUBLIC OPEN HOUSE INFORMATION

Date: Wednesday, July 8, 2020

Time: 5:30 pm – 6:30 pm (HST)

To Register: Go to barberspointsolar.com and click the registration link or email us at baberspointsolar@innergex.com and a registration link and event details will be emailed to you.

For more information on the proposed Barbers Point Solar Project please visit **barberspointsolar.com**

or email **barberspointsolar@innergex.com**

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Merchandise Wanted

Cash 4 Vintage Film Cameras! Leica, Hasselblad, Nikon, Rolleiflex, Olympus & More! Buying entire collections! Any condition. Will drive to you. Let's talk story! 808-465-9204

CASH 4 YOUR OLD WATCHES!! Collector buying Rolex, Omega, Hamilton, Bulova, Longines & More! Any Condition, broken ok. Gold Jewelry too! Honest/Fair.Will Drive to You. Let's talk story. 808-465-9204 (R.Haltsuka)

WANTED 2006 Toyota 4Runner Luggage Rack on Passenger Side,Silver 808-256-3836

Wanted Older Seikos, Citizens, Omega, Divers, Dress, Automatic Watches, G-shock 343-9126

WANTED : Selmer (Paris, France) Saxophones; Alto, Tenor, Soprano, Mark Six/ Super Balance Action Sax Wanted, 40's, 50's, 60's. Any condition. Cash buyer. 1-808-822-3414

WANTED : Selmer (Paris, France) Saxophones; Alto, Tenor, Soprano, Mark Six/ Super Balance Action Sax Wanted, 40's, 50's, 60's. Any condition. Cash buyer. 1-808-822-3414

Wanted WWI/II German, Japanese, American, Helmet, Bayonet, Medals. 343-9126

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Court Notices

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PETER T. STONE #2788
1099 Alakea Street, Suite 1500
Honolulu, Hawaii 96813
Telephone: (808) 489-9741

Attorneys for Petitioner
1900 CAPITAL TRUST II, BY U.S. BANK TRUST NATIONAL ASSOCIATION, NOT IN ITS INDIVIDUAL CAPACITY BUT SOLELY AS CERTIFICATE TRUSTEE

THIRD CIRCUIT COURT NOTICE

P. NO. 3CLP-20-0000114

THE ESTATE OF EDWARD REYES MENDIOLA, DECEASED.

FILED, Petition for Appointment of Special Administrator of 1900 CAPITAL TRUST II, BY U.S. BANK TRUST NATIONAL ASSOCIATION, NOT IN ITS INDIVIDUAL CAPACITY BUT SOLELY AS CERTIFICATE TRUSTEE, showing property within the jurisdiction of this Court and asking that Mimi Mendiola Castro, whose address is 669 College Parkway Apt. 13, Carson City, Nevada 89706 and William Mendiola, whose address is P.O. Box 436, Hanapepe, Hawaii 96716-0436 and Naomi Mendiola, whose address is 1377 Kapiolani Street, Apt. 206B, Hilo, Hawaii 96720-4082, be appointed Co-Special Administrators for said estate.

That, Tuesday, June 30, 2020 at 8:00 a.m. before presiding Judge at Hale Kaulike, 777 Kilauea Avenue, Hilo, HI 96720 is the appointed date, time and place of hearing on the Petition and all interested person.

Pursuant to Rule 10(c) of the Hawaii Probate Rules, any party wishing to object or respond to the Petition shall file such objection with the Court or serve it on all interested persons within thirty (30) days of the date of this Notice.

DATED: Hilo, Hawaii, APR 27 2020.

Byron K. Foy
CLERK OF THE ABOVE-ENTITLED COURT
(SA1280503 5/26, 6/2, 6/9/20)

Notices to Creditors

FIRST CIRCUIT COURT NOTICE AND NOTICE TO CREDITORS

P. NO. 1CLP-20-0000296

ESTATE OF TAMMY CHEUNG JA TABUYO, Deceased

FILED, an Application by BILLY J. A. TABUYO, alleging intestacy of said decedent, showing property within the jurisdiction of this Court and asking that BILLY J. A. TABUYO, whose address is 1910 Lusitana Street, Honolulu, Hawaii 96813, be appointed Personal Representative of said estate.

If any interested person has objection to the informal probate, the person may file a petition for formal intestacy proceedings; if any interested person desires further notice concerning the estate, including notice concerning the closing and distribution of the estate, the person must file a Demand for Notice pursuant to HRS § 560:3-204.

All creditors of the above-named estate are hereby notified to present their claims with proper vouchers or duly authenticated copies thereof, even if the claim is secured by a mortgage upon real estate, to said nominee at the address shown above within four (4) months from the date of the first publication of this notice or they will be forever barred.

Dated: Honolulu, Hawaii, MAY 13 2020.

R. SO
Clerk of the Above-Entitled Court

JAMES H. SEKI, ATTORNEY AT LAW
A LAW CORPORATION
James H. Seki, Attorney at Law
Telephone No. (808) 542-9261
Attorney for Applicant
(SA1280501 5/26, 6/2, 6/9/20)

Summons

IN THE CIRCUIT COURT OF THE FIRST CIRCUIT

STATE OF HAWAII

SUMMONS

TO: PRODUCTION HAWAII INCORPORATED, SPECIAL EVENT EQUIPMENT, INCORPORATED, and MICHAEL C. ROSSELL

YOU ARE HEREBY NOTIFIED that Plaintiff SHOBU'S REFRIGERATION AND AIR CONDITIONING, INC., Plaintiff, has filed an Amended Complaint in Civil No. 19-1-0550-04, praying for a judgment for the sum of $89,800.00 plus prejudgment interest, its reasonable attorneys' fees and costs, and any further relief that this Court deems proper.

YOU ARE HEREBY SUMMONED to appear before the Honorable John M. Tonaki in his courtroom in the 5th floor, 1111 Alakea Street, Honolulu, HI 96813 on July 14, 2020, at 9:00 o'clock a.m., of said day or to file an answer or other pleading and serve it before said day upon Plaintiff's attorney, LESTER K. M. LEU of LEU OKUDA & DOI whose address is The Merchant House, 222 Merchant Street, Main Floor, Honolulu, Hawaii 96813. If you fail to do so, judgment by default will be taken against you for the relief demanded in the Complaint.

DATED: Honolulu, Hawaii, May 13, 2020.

/s/Jannie E. Chun (SEAL)
CLERK OF THE ABOVE-ENTITLED COURT
(SA1280025 5/26, 6/2, 6/9, 6/16/20)

For questions related to your Honolulu Star-Advertiser subscription call
538-NEWS(6397)
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IN THE FAMILY COURT OF THE THIRD CIRCUIT

STATE OF HAWAII

FC-S No. 19-0057K

In the interest of a FEMALE CHILD born January 21, 2006
Born to Pamelarina Jack

TO: PAMELARINA JACK JOSHUA WILLIAMS

UNKOWN NATURAL FATHER

YOU ARE HEREBY NOTIFIED that a hearing regarding the above-identified matter will be held at the Family Court of the Third Circuit, Kona Division, Keahuolu Courthouse, 74-5451 Kamakaeha Avenue, Kailua-Kona, Hawaii 96740 on July 7, 2020 at 10:00 a.m. before the Honorable Presiding Judge of the above-entitled Court;

You are hereby advised that if you fail to appear on the date set forth in the notice or to file an answer with the clerk of the Family Court of the Third Circuit, Kona Division, whose mailing address is: Keahuolu Courthouse, 74-5451 Kamakaeha Avenue, Kailua-Kona, Hawaii 96740, before the date of the hearing, further action shall be taken without further notice to you.

YOUR PARENTAL AND CUSTODIAL DUTIES AND RIGHTS CONCERNING THE CHILD WHO IS THE SUBJECT OF A PETITION MAY BE TERMINATED BY AWARD OF PERMANENT CUSTODY IF YOU FAIL TO APPEAR ON THE DATE SET FORTH IN THIS NOTICE.

At the hearing, you have the right to retain and be represented by an attorney. If you cannot afford an attorney, please contact the Family Court regarding the appointment of an attorney to represent you.

DATED: Kailua-Kona, Hawaii, MAY 22, 2020.

SHANNON THARP
CLERK OF THE ABOVE-ENTITLED COURT

CLARE E. CONNORS 7936
Attorney General
VALERIE LOWSON 10968
Deputy Attorney General
77-6399 Nalani Street, Suite 101
Kailua-Kona, Hawaii 96740
Tel. No. (808) 327-6260
Attorneys for the Department
of Human Services
(SA1280822 5/26, 6/2, 6/9, 6/16/20)

Public Notice

NOTICE OF VIRTUAL PUBLIC OPEN HOUSE

FOR THE PROPOSED BARBERS POINT SOLAR PROJECT

Innergex Renewable Development USA LLC has been selected to the Final Award Group in Hawaiian Electric's competitive process to negotiate a contract for our Barbers Point Solar Project that will help in the state's goal of transitioning to 100% renewable energy by 2045. We are proposing a 15 MW solar and 60 MWh battery energy storage system on industrially zoned Department of Hawaiian Home Lands (DHHL) land in Kapolei on the island of Oahu.

Should a contract be awarded for the Project, all required permits and approvals would still need to be obtained and further community engagement outreach will be conducted.

Due to current physical distancing guidelines and in order to provide a safe information sharing environment, we will be holding a virtual community meeting to provide information and get feedback on the proposed project as part of the procurement process. Innergex representatives will outline the project details including its components, environmental and archaeological surveys, community benefits, and the overall process followed by a question and answer period. We encourage and welcome all interested community members to join us for this information session.

If you are unable to attend the virtual open house you may still make a written submission during the public comment period which begins July 9, 2020 and ends August 7, 2020. All comments received during this period in relation to the proposed project will be considered.

HAWAII'S
Service Directory

Accounting-Bookkeeping

343-1388 LILIA QUAN Accountant, Professional, Computerized Accounting, Payroll & Tax Services.

Carpentry

All Home Repairs
Free Estimates - to $1K
386-7663

CARPENTRY 30+ yrs exp. Finish, doors, windows, drywall, cabinets, framing. 497-0089. to 1K dickshanley@yahoo.com

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All Types Electrical
Affordable. Lic'd & Ins'd
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(CT33587) 892-4961

SJ Electric, LLC
Small jobs welcome.
Free estimates.
(C20857) 352-5184

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HANDYMAN AFFORDABLE! Carpentry, Floors, Roofing, Drywall, Tile, Concrete, Painting. 542-1267. to $1K

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Rock & tile walls. All concrete. Free est. C34365. Insured. 230-0224

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Brazilian & Brazilian $45 Massage $75/Facial $45 1272 S. King St. #203 Free Parking. BEO-20792

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All Types Plumbing
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Lic#33587. 892-4961

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amechhawaii.com
841-0777

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Flex hours. Low rates. Bonded/Insured. Hansen's Helpers 962-6898

Tree Trimming

The calendar is displaying all events. View virtual events only here. Some events may have changed so please verify prior to attending. You may update any submitted events here.

NOTICE OF VIRTUAL
PUBLIC OPEN HOUSE
R THE PROPOSED BARBERS POINT SOLAR PROJECT

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ect will be considered.

Barbers Point Solar Project Virtual Open House

Wednesday, July 08, 2020
5:30 pm - 6:30 pm

Online

Kapolei, HI

Virtual Event URL: No website has been specified for this event.

Price: Free

Note: Virtual Event.

Innergex Renewable Development USA LLC has been selected to the Final Award Group in Hawaiian Electric's competitive process to negotiate a contract for our Barbers Point Solar Project that will help in the state's goal of transitioning to 100% renewable energy by 2045. We are proposing a 15 MW solar and 60 MWh battery energy storage system on industrially zoned Department of Hawaiian Home Lands (DHHL) land in Kapolei on the island of Oahu. Due to current physical distancing guidelines and in order to provide a safe information sharing environment, we will be holding a virtual community meeting to provide information and get feedback on the proposed project as part of the procurement process. Innergex representatives will outline the project details including its components, environmental and archaeological surveys, community benefits, and the overall process followed by a question and answer period. We encourage and welcome all interested community members to join us for this information session. To Register: Go to barberspointsolar.com and click the registration link or email us at

Show Full Description

Contact Info
Matthew Wright
mwright@innergex.com
(236) 985-4796

Promote This

Edit Flag

acy Policy has been updated. By continuing to use our site, you are acknowledging and agreeing to our updated Privacy Policy and our Terms of Service. I Agree

COVID-19 Related Information
Health | Labor FAQ's | Human Services | Inter-Island Travel Form| Transpacific Travel Form |
Recovery Navigator

(http://dhhl.hawaii.gov)

Established by Prince Kūhiō & the U.S. Congress
Department of Hawaiian Home Lands (http://dhhl.hawaii.gov)

Home (http://dhhl.hawaii.gov/) » Asset Management

ASSET MANAGEMENT

UPDATES:

COVID-19 Relief Response for Lessees, Licensees, and Permittees

PROJECTS:

The Barbers Point Solar Project

- Virtual Public Open House:
  - Date: Wednesday, July 8, 2020
  - Time: 5:30 – 6:30 pm (HST)
  - Click here or e-mail barberspointsolar@innergex.com and a registration link and event details will be emailed to you.

Mehana Solar

- Virtual Community Meeting:
  - Date: Wednesday, July 15, 2020
  - Time: 6:00 pm – 8:00 pm (HST)
  - The meeting will be held virtually via Zoom. RSVP by filling out this Google Form

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June 23, 2020

Aloha!

Re: You Are Invited to a Virtual Public Open House
Barbers Point Solar Project on DHHL Lands in Kalaeloa

I hope this letter finds you well given the unprecedented circumstances associated with COVID-19. We are writing today to provide you with an update on the proposed Barbers Point Solar Project and our upcoming Virtual Public Open House.

BACKGROUND

In 2019, the Department of Hawaiian Home Lands (DHHL) launched a competitive solicitation process for a Right-of-Entry agreement to develop a solar project in Kalaeloa. Innergex Renewables USA LLC (Innergex) was selected through this process which also included consultation meetings with DHHL beneficiaries and public hearings. Subsequently, Innergex submitted a proposal for the Barbers Point Solar Project in response to a Hawaiian Electric competitive procurement process and recently was selected to the Final Award Group to negotiate a power purchase agreement that will help the state in its goal to transition to 100% renewable energy by 2045.

INVITATION

Due to current physical distancing guidelines and in order to provide a safe information sharing environment, we will be holding a virtual community meeting to provide information and get feedback on the proposed project as part of the procurement process. We encourage and welcome all interested community members to join us for this information session.

YOU ARE INVITED!
VIRTUAL PUBLIC OPEN HOUSE - BARBERS POINT SOLAR PROJECT

Date: Wednesday, July 8, 2020
Time: 5:30 pm – 6:30 pm (HST)

To Register: Go to barberspointsolar.com and click the registration link or email us at barberspointsolar@innergex.com and a registration link and event details will be emailed to you.

Written comments may also be submitted after the meeting, no later than August 7, 2020
via email to: barberspointsolar@Innergex.com

Innergex Renewables USA LLC
4660 La Jolla Village Drive, Suite 680
San Diego (California) 92122
Tel. 858 346-4004 | info@innergex.com
www.innergex.com

Innergex Renewable Energy Inc.
888 Dunsmuir Street, Suite 1100
Vancouver, British Columbia V6C 3K4 Canada
Tel. 604 633-9990 | info@innergex.com
www.innergex.com

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THE PROJECT

The Barbers Point Solar Project is a proposed 15 MW_{AC} solar photovoltaic system coupled with a 15 MW, 4-hour (60 MWh) battery energy storage system. The Project is to be located on land owned by DHHL in Kalaeloa on the island of Oahu. The solar array and associated infrastructure would utilize approximately 100-acres.

The project would lower customer bills, reduce Oahu's exposure to fuel price volatility, offset greenhouse gas emissions, create energy security and grid resiliency, and contribute to the State's 100% renewable energy mandate. The storage system will allow the power to be dispatched in the morning and evening when the utility needs it most and during emergencies – when rooftop solar is not available. Once all permits and approvals are obtained, the project is targeted to start construction by the end of 2022 and be operational by the end of 2023. The proposed Project would power about 6,200 Oahu households with clean, renewable energy.

We are excited to share that the project's community benefits package will be dedicated funding to the Kapolei Community Development Corporation for the Heritage Center. Innergex is working with the Center for Native Hawaiian Advancement and the Makaha Training Center to support work force development by providing a solar installation skills training course for its members and beneficiaries who are looking to participate in this industry, with a particular focus on utility-scale projects. Innergex will give preference to qualified local suppliers and contractors throughout the development of the project. The project will also contribute to local organizations, beneficiary projects and events throughout the life of the project.

We will continue to provide updates. We have much to share with you and look forward to connecting with you over the coming months. For more information, please visit the project website barberspointsolar.com. We welcome any input or ideas you may have, please contact me personally, my colleague Julia Mancinelli, or our Oahu team member, Jody Allione by emailing us at barberspointsolar@innergex.com.

We hope you can join us for the virtual community open house.

Mahalo,

Eddie Park

Eddie Park
Director – Business Development
Innergex Renewables USA LLC

Barbers Point Solar Project
Nov. 10, 2020 6:30 PM
WebEx Link:
http://bit.ly/BPUpdate1
Phone-in: 1-844-621-3956
Access code: 126 704 1493

Ho'omaka Marketplace
Nov. 12, 2020 6:30 PM
Join Zoom Meeting
Meeting ID: 890 0808 4625
Passcode: 675084

Links to Virtual Meetings
http://kapoleiheritage.org/events

Kapolei Homesteads Project Update Meetings

KCDC and the Kapolei Homestead Associations are hosting virtual Kapolei homestead meetings to provide project updates on the **Barbers Point Solar Project** in Kalaeloa and the **Ho'omaka Marketplace** project at the corner of Kualaka'i and Kapolei Parkway. Please log on and join us at **6:30PM** on **November 10th and November 12th** to get updates on these exciting projects. Links to these meetings can also be found at KCDC's Website **http://kapoleiheritage.org/events**

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May 28, 2021

RE: Barbers Point Solar Project
'Ewa District, O'ahu; TMKs 9-1-013:038, 9-1-013:040, and 9-1-016:027
Pre-Assessment Consultation for HRS Chapter 343 Environmental Assessment

---

Dear Interested Party,

Barbers Point Solar, LLC is proposing to build and operate the Barbers Point Solar Project (Project) located in east Kalaeloa (east of Kalaeloa Airport) in the 'Ewa District, on the island of O'ahu.

The Project area encompasses approximately 163-acres primarily located within tax map keys (TMKs): 9-1-013:038 and :040, both owned by Department of Hawaiian Home Lands (DHHL). Project electrical transmission lines will also be located within rights-of-way owned by Hawai'i Department of Transportation (HDOT) (Coral Sea Road and Roosevelt Avenue) and Hawai'i Community Development Authority (HCDA) as well as within a portion of TMK 9-1-016:027 (owned by Kapolei Infrastructure, LLC).

As the Project would involve the use of State-owned land, compliance with Hawai'i Revised Statutes (HRS) Chapter 343 is required. Pursuant to the requirements of HRS Chapter 343 and Hawai'i Administrative Rules (HAR) §11-200.1, Barbers Point Solar, LLC is preparing an environmental assessment (EA) to evaluate the potential environmental effects of the project. DHHL has agreed to be the Accepting Authority for the EA. The Project does not require the use of federal lands.

As part of the environmental review process, pre-assessment consultation is being conducted to obtain input on the scope of issues to be considered in the Draft EA. An overview of the Project and a location map are attached. We are requesting input regarding the Project, including concerns related to particular environmental resources, as well as relevant information that should be considered in the evaluation.

Please provide comments regarding the scope of the EA in writing via U.S. postal mail to Leslie McClain at Tetra Tech (737 Bishop Street, Suite 2340, Honolulu, Hawai'i 96813) or email barberspointsolar@innergex.com. Comments must be postmarked by June 30, 2021 to be considered in the Draft EA.

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United States
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info@innergex.com | www.innergex.com

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Thank you for your participation in the environmental review process for the proposed project.

Sincerely,

Barbers Point Solar, LLC

Julia Mancinelli

Julia Mancinelli
Director – Environment
Innergex Renewable Energy Inc.
JMancinelli@innergex.com

Attachments: Project Overview
Location Map

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Barbers Point Solar Project Overview

Barbers Point Solar, LLC is proposing to develop, own and operate the Barbers Point Solar Project (Project) located in east Kalaeloa, ‘Ewa District, on the island of O‘ahu. The Project will consist of a 15-megawatt (MW) solar photovoltaic system coupled with a 15 MW, 4-hour (60 MW-hour) photovoltaic coupled battery energy storage system (PV-Coupled ESS) as well as ancillary support infrastructure. The Project area encompasses approximately 163-acres primarily located within tax map keys (TMKs): 9-1-013:038 and :040, both owned by Department of Hawaiian Home Lands (DHHL). Project electrical transmission lines will be located within rights-of-way (ROWs) owned by Hawai‘i Department of Transportation (HDOT) (Coral Sea Road and Roosevelt Avenue) and Hawai‘i Community Development Authority (HCDA) as well as within a portion of TMK 9-1-016:027 (owned by Kapolei Infrastructure, LLC). The Project area is shown in the attached figure.

The purpose of the Project is to construct and operate a renewable energy facility on the DHHL property that would generate and store electricity derived from solar resources, thereby providing clean, renewable energy for the island of O‘ahu. The Project will assist DHHL in meeting Objective 2 of the Hawaiian Homes Commission (HHC) 2009 Ho‘omaluō Energy Policy, which instructs DHHL to pursue the leasing of lands identified as suitable for renewable energy projects[1]. Also, in 2009, DHHL and Hawaiian Electric entered into an Energy Partnership Charter[2] where the two organizations agreed to collaborate on achieving critical energy objectives including the leasing of DHHL owned lands for renewable energy projects. In coordination with DHHL, Barbers Point Solar, LLC developed a preliminary layout for a solar plus storage facility and submitted a proposal to Hawaiian Electric Company (Hawaiian Electric) in response to their *Request for Proposals for Variable Renewable Dispatchable Generation for the Island of O‘ahu*, issued in August 2019. This competitive procurement process for renewable energy projects specifically targeted projects that would satisfy the resource needs identified in Hawaiian Electric’s 2016 Power Supply Improvement Plan, as part of the effort to meet Hawai‘i’s goal of generating 100 percent of its energy needs from renewable sources by 2045. The Project is one of five O’ahu based solar plus storage projects selected by Hawaiian Electric from the August 2019 request for proposals.

The major components of the Project would include:

- Solar Panels: The solar PV system would include a series of panels arranged into arrays consisting of evenly-spaced rows. The panels would be mounted on a racking system installed on posts. The Project’s solar arrays will include three areas: Area 1 in the northern portion of TMK 9-1-013:038, Area 2 in the southern portion of TMK 9-1-013:038, and Area 3 located on TMK 9-1-013:040.

- Battery Energy Storage System: The photovoltaic coupled battery energy storage system (PV-Coupled ESS) would be distributed across the Project area and would include a self-contained standalone unit that combines a lithium-ion battery system, inverter, and controller. The PV-Coupled ESS units would incorporate several layers of protection to avoid failures, to contain potential hazardous substances, and to prevent fires.

[1] Department of Hawaiian Home Lands. Ho‘omaluō Energy Policy. January 2009.
[2] DHHL-HECO-Energy-Partnership-Charter-082709.pdf (hawaii.gov)

- Collector Lines: The solar panels and battery units would connect with a Project substation primarily via underground electrical collector lines. The collector line connecting the solar arrays on TMK 9-1-013:040 to the collector substation on TMK 9-1-013:038 will run along Coral Sea Road. Portions of this line may need to be overhead depending on final site design and ROW constraints. Also, in cases where subsurface conditions make it difficult or too costly to trench, other portions of the collection system may go overhead similar to a transmission line.

- Substation: A project collector substation would be constructed on DHHL TMK 9-1-013:038 and will function to increase the voltage from the PV system to 46 kV in order to match the voltage of the Hawaiian Electric electrical grid. The Project collector substation and associated interconnection infrastructure will include equipment such as medium voltage bus structure, circuit breakers and switches, a main power transformer, and associated underground electrical lines.

- Overhead Generation-Tie Line: An approximately 1.5 mile generation-tie line (combination of overhead and underground) will extend underground from the Project's collector substation, north along Coral Sea Road and transition to overhead at the existing 12 kV Hawaii Electric overhead transmission line. The 46 kV will be overbuilt on top of the 12 kV transmission line and terminate to the existing Hawaiian Electric 46-kV overhead transmission line located on TMK 9-1-016:027 (owned by Kapolei Infrastructure, LLC) near the intersection of Coral Sea Road and Roosevelt Avenue.

- Access and Site Work: Access to solar array Areas 1 and 2 on TMK 9-1-013:038 will be provided by a new driveway off of Coral Sea Road. This driveway will be located within an existing HCDA ROW associated with Roadway Lot 13083. Access to DHHL's parcel 9-1-013:40 is currently via Coral Sea Road; however, the Project proposes to construct a new driveway on Coral Sea Road to accommodate construction access. Access within the Project's two solar array parcels will be provided through a network of existing and new on-site access roads. Improvements to existing roads may include drainage upgrades, smoothing, and graveling as needed to accommodate construction vehicles. New access roads may require excavation and fill to achieve acceptable grades.

The Project would be constructed and operated by Barbers Point Solar, LLC, and the power generated by the Project would be sold to Hawaiian Electric under a new 25-year power purchase agreement (PPA). It is anticipated that construction and commissioning would require approximately 12-15 months, with commercial operations commencing at the end of 2023. Once operational, the Project would provide the energy needed to power approximately 6,200 homes on O'ahu each year, offsetting approximately 1,139,396 barrels of fossil fuel consumption by Hawaiian Electric's generating units and approximately 455,598 metric tons of greenhouse gas emissions over the life of the Project[3].

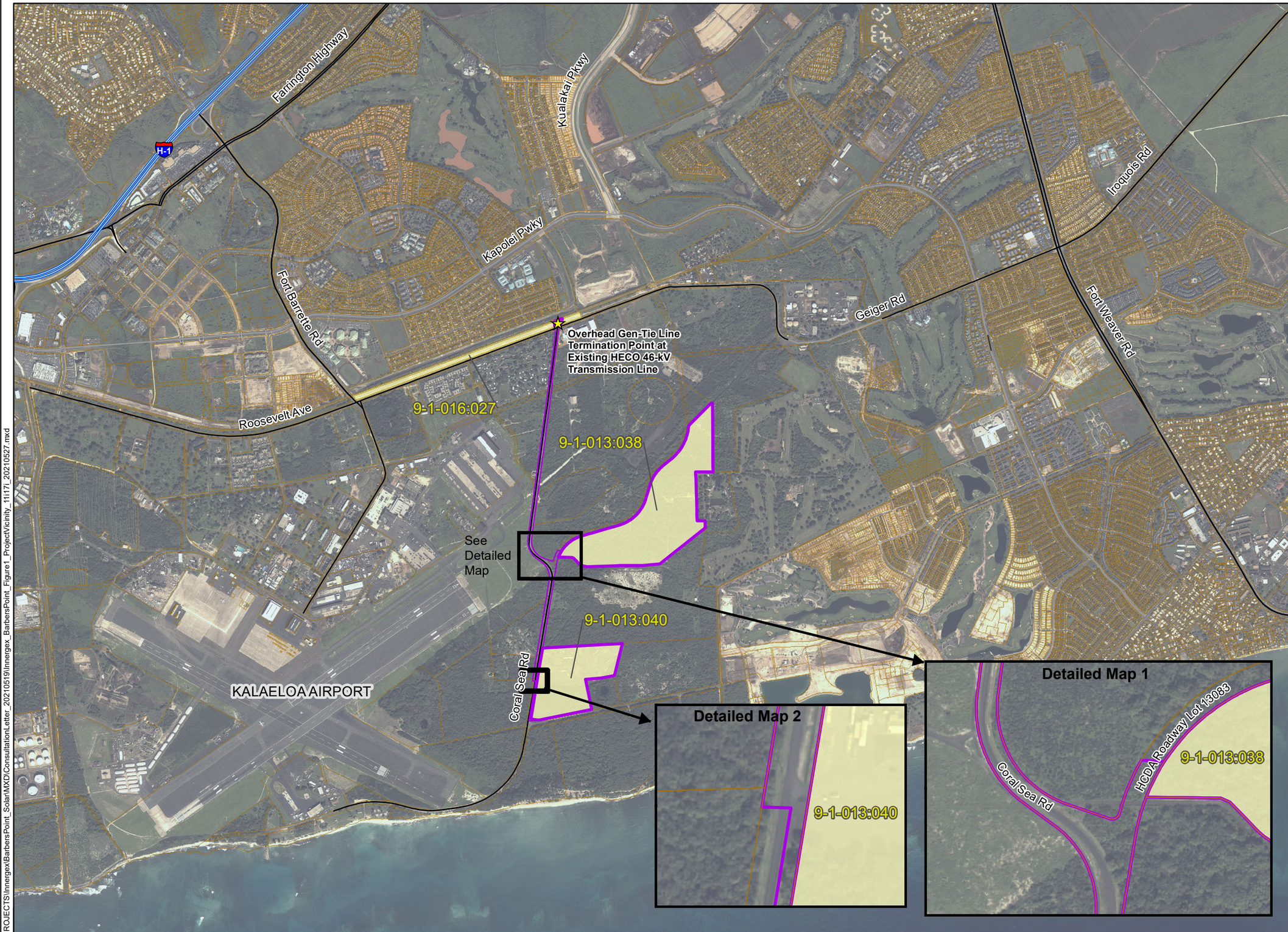
For more information regarding the Project, please visit www.barberspointsolar.com.

[3] Hawaiian Electric Company PUC Filing Docket No. 2020-0143.

Barbers Point Solar

Figure 1
Project Vicinity

CITY AND COUNTY OF HONOLULU

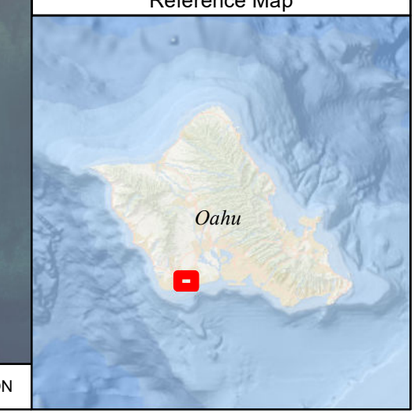


Project Study Area
Project TMK
TMK Boundary
Interstate Highway
State Highway
County Road

TETRA TECH

Barbers Point Solar LLC

Reference Map



1:24,000

WGS 1984 UTM Zone 4N

0 0.5 1 Miles

NOT FOR CONSTRUCTION

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June 7, 2021

REFERENCE: Barbers Point Solar Project Update
Notice of Pre-Assessment Consultation for HRS Chapter 343 Environmental Assessment

---

Dear Landowner, Tenant, Occupant, or Stakeholder,

We hope this email finds you well. We are pleased to provide you with the latest update about our **Barbers Point Solar Project**, which would be developed on land owned by the Department of Hawaiian Home Lands (DHHL) in the ‘Ewa District, O‘ahu.

The goal is energy independence.

As part of Hawaii’s renewable energy mandate to achieve 100% renewable portfolio standard by the year 2045 the state needs to reach the following milestones first: 30% by 2020, 40% by 2030, 70% by 2040, 100% by 2045. This is a very challenging but realistic achievement. In 2019, Hawaiian Electric launched the second phase of their competitive bid for renewable energy, the single largest procurement effort in the State of Hawaii, for approximately 900 MW of new renewable generation. Innergex submitted the Barbers Point Solar Project as a competitive bid and a power purchase agreement was executed with Hawaiian Electric in September 2020, currently awaiting approval by the Public Utilities Commission.

Seeking community input on environmental assessment.

As the Barbers Point Solar Project is located on State-owned land in east Kalaeloa (east of Kalaeloa Airport) in the ‘Ewa District, compliance with Hawaii Revised Statutes (HRS) Chapter 343 is required. Pursuant to the requirements of HRS Chapter 343 and Hawaii Administrative Rules (HAR) §11 200.1, Barbers Point Solar, LLC is preparing an environmental assessment (EA) to evaluate the potential environmental effects of the project. As part of the environmental review process, a pre-assessment consultation letter is being sent to interested parties (please see attached), to obtain input on the scope of issues to be considered in the Draft EA. We welcome input from community members and would encourage you to submit your input to barberspointsolar@innergex.com.

We would like to invite you to view our website at www.innergex.com/hawaii/barbers-point/ to access the preliminary technical studies that have been conducted to date, and learn more about some of the benefits the Project will provide the community:

Innergex Renewable Energy Inc.
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- One of key advantages of utility scale solar projects with battery energy storage systems (BESS) is that it benefits all users connected to the Hawaiian Electric grid (residential, commercial, industrial). The price of solar plus BESS in recent Maui Electric RFP's is the lowest to date for renewable electricity in the state and is cheaper than the cost of traditional fossil fuel generation.
- The Project will power approximately 6,200 Oahu households with clean, renewable energy.
- Barbers Point Solar's 25-year fixed price PPA will provide pricing stability to Hawaiian Electric and reduce the volatility and risk from fossil fuel dependence. There will be no escalators in the pricing over the 25 years.
- Barbers Point Solar's BESS will enable Hawaiian Electric to utilize stored solar energy to meet peak demands or respond to the unforeseen shutdown of one or more other units on Hawaiian Electric's system, improving the system's reliability and grid stability.
- In addition to providing opportunities for local workforce and businesses, the Project will provide local training opportunities such as the partnership between the Council for Native Hawaiian Advancement and the Mākaha Learning Center, facilitated by Innergex, to establish a Solar Training Program – an intensive learning opportunity for 30 Native Hawaiian students to gain and develop the technical skills needed to succeed in the solar industry. You can learn more about it in our newsletter Ka Puni Uila.
- The Project will also partner up with local organizations such as Wai'anae Gold, and provide sponsorships and donations for local festivals, events, conferences, fundraisers.

We will continue to provide updates.

As part of our commitment to being a good neighbor and long-term resident of Kalaeloa, we will continue to engage with the community and apply our resources and expertise, sponsorship opportunities and support to local organizations as needed.

Please do not hesitate to contact me directly at (808) 298-2615 or at mbmartin@innergex.com if you have any feedback or questions. Again, we sincerely look forward to this opportunity to share with you more details of the Project.

Mahalo

Barbers Point Solar, LLC

Myriam Bernede-Martin

Myriam Bernede-Martin
Senior Advisor – Community Relations
Innergex Renewables USA LLC
mbmartin@innergex.com

Appendix D – Beneficiary Consultation Meeting, Public Open House, and Community Update Meeting Presentations

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS

April 15-16, 2019

To: Chairman and Members, Hawaiian Homes Commission

Thru: Andrew Choy, Acting Planning Program Manager

From: Julie-Ann Cachola, Planner

Subject: G-2 Acceptance of the Beneficiary Consultation Report for the Kalaeloa Solar Energy Project Proposed by Innergex Renewables USA LLC, at Kalaeloa, Oahu

RECOMMENDED ACTION

That the Hawaiian Homes Commission (HHC) accept this report as the official record of the information disseminated on the Kalaeloa Solar Energy Project and beneficiary questions and comments raised in response.

DISCUSSION

Introduction

In December 2018, DHHL issued a solicitation for renewable energy projects at Kalaeloa, O'ahu. In January 2019, four competitive proposals were submitted for Kalaeloa. One proposal was disqualified because the developer did not meet the definition of a renewable energy producer. The three remaining proposals were evaluated and scored. The top ranked project was a solar energy project proposed by Innergex Renewables USA LLC.

Following the selection of a renewable energy developer, the Planning Office conducted a Beneficiary Consultation meeting at the Kapolei Middle School on March 21, 2019. The DHHL and Innergex presented background information about renewable energy and Innergex's proposed solar energy project at Kalaeloa. Beneficiaries shared their concerns and raised questions which were answered by Innergex or DHHL. This submittal provides a record of that beneficiary consultation meeting.

Notification

On March 4, 2019 DHHL mailed invitation letters **(Exhibit A)** to 1,453 Lessees and Applicants that reside in the Kapolei (96707) area, which is the area where the proposed project is located. The letter invited beneficiaries to attend a beneficiary consultation meeting at the Kapolei Middle School on Thursday, March 21, 2019 from 6:00 p.m. to 8:00 p.m. to get information and provide comments on Innergex's Proposed Solar Energy Project at Kalaeloa.

Beneficiary Consultation Meeting

Ten(10) beneficiaries participated in the consultation meeting and one (1) beneficiary emailed written comments **(Exhibit B)**. Two (2) Innergex representatives and four (4) DHHL staff from the Chairman's Office, the Land Management Division, and the Planning Office were also present. All attendees received a handout containing all presentation slides**(Exhibit C)**, an informational brochure about Innergex (**Exhibit D**) and a blank sheet for comments.

Purpose of the Meeting

The Department's presenter, Julie-Ann Cachola, from DHHL's Planning Office made introductions and explained that the purpose of the beneficiary consulation meeting, was to provide beneficiaries with information on the proposed project, to answer their questions and to record their concerns. More specifically, the meeting was to:

1. Provide background information about Kalaeloa and renewable energy
   - Why was a solar energy project being proposed at Kalaeloa?
   - Why was DHHL getting involved in renewable energy at this time?
2. Provide Innergex the opportunity to present their proposed solar project to beneficiaries who reside in the area.
3. Provide beneficiaries the opportunity to ask questions and articulate their concerns directly to Innergex.
4. Explain upcoming activities and next steps related to the project.

About Kalaeloa

Relevant background information on Kalaeloa was presented:

1. DHHL has 555 acres in Kalaeloa.
2. The lands are designated for Industrial uses.
3. The current focus is on the Eastern parcels.
4. There are large concrete bunkers and revetments that reduces the area that can be used to generate electricity from solar panels.

Relevant background information on renewable energy was also presented:

The Demand for Renewable Energy

1. The State Legislature establishes Renewable Portfolio Standards (RPS) which requires a specified percentage of the electricity that utilities sell that must come from renewable energy resources. By the year 2020, the utility needs to produce at least 30% of its electricity from renewable energy resources.
2. In its 2017-2018 Sustainability Report, the Hawaiian Electric Company reported that they were on-track to meet the 2020 RPS as they are already producing 26.8% of its electricity with renewable energy resources.
3. In 2015, the State Legislature established the Renewable Portfolio Standard of 100% by the year 2045. This means that by the year 2045, 100% of the electricity the utilities sell must be produced using renewable energy resources. This was a game-changing, landmark decision that created a huge demand for renewable energy projects across the State.

Complex Processes

In spite of these compelling reasons to support renewable energy, the presenter cautioned that in reality, engaging in renewable energy development involves complex and independent processes, including:

1. HECO's Request for Proposals (RFP) requirements
2. DHHL's requirements to lease land for renewable energy
3. DHHL's long-term land disposition requirements
4. Developer financing
5. Government tax credits

Major Players

To further illustrate the complexity involved in developing renewable energy, the presenter identified three (3) entities and their respective interests.

The Utility

1. The utility (HECO) controls the market because they are the only entity that will buy power from the renewable energy producers. Their goal is to purchase renewable energy at a low, fixed price.

Energy Producers

2. Renewable energy producers have the technology to produce renewable energy, but they need the energy resource and they need the utility to buy the energy they produce. They need exclusive access to an abundant renewable energy resource, which means that they need developable land in the right location. In order to utilize their technology, they need to secure a PPA from HECO.

Landowners

3. Large landowners can give energy producers the site control they require. Landowners are looking for a viable energy producer that will give them a high lease rent while still remaining competitively priced to ensure that it is selected by HECO for a PPA.

Private Lands

Private landowners can be flexible. They can render decisions and respond quickly to accommodate the needs of the renewable energy producer.

Public Lands

For Public landowners, like DHHL, land decisions are made by a Board or Commission, governed by statutes and rules that mandate a competitive, transparent, and public process that requires more time to complete.

In consideration of all the requirements that must be completed before DHHL issues a long-term General Lease, we decided to start our process earlier. It is DHHL's goal to complete the requirements to award a land disposition before HECO releases its Phase 2 RFP sometime in May or June 2019.

Innergex's Next Steps

The presenter outlined the work that Innergex needs to complete to secure a PPA from HECO. In addition, before the long-term General Lease is executed, Innergex needs to complete the Chapter 343,HRS, environmental review process.

Summary of Beneficiary Comments and Questions

Consultation meetings with beneficiaries provide valuable insight and information on the issues that the developer and the Department should address. With conventional development projects, this kind of insight often comes too late in the planning and development process when plans have been drawn and there is no room for adjustments. By consulting with our beneficiaries early in the process, issues can be identified and addressed in due diligence studies.

This section of the report provides a summary of beneficiary concerns raised during the meeting. **Exhibit E** is a complete record of beneficiary comments, questions, and DHHL and Innergex responses to the questions.

1. **Beneficiaries are interested in direct benefits.**
   Beneficiaries wanted to know if they could get solar panels through Innergex. Innergex explained that they are helping HECO to achieve their renewable energy goals. They do no provide solar panels for individual homes. Further, if they were able to secure a PPA with HECO, it would not necessarily result in the lowering of their monthly electric bill. Innergex explained that over the long-term, bills would go down and we will not experience big spikes in our electric bills as has been the case when the price of our electricity was pegged to the price of oil.

   During the discussion, the option of Community-Based Renewable Energy or Community Solar received a lot of attention and interest. Beneficiaries wanted more information about this option and they wanted to know if Community Solar was better than constructing solar panels on their roofs. Innergex explained that HECO is beginning to explore Community Solar, noting that one pilot project will be on DHHL land in Kalaeloa. Community solar is for people who live in apartment buildings, who don't own a rooftop, or have rooftops that are in need of repair. If you don't have a roof, you can purchase solar panels in the Community Solar project. You receive a credit on your electric bill based on how much you invested in the community solar project.

2. **The financial offer needs to be increased.**
   Beneficiaries felt that Innergex should pay more in terms of lease rent and community benefits, considering the amount of land they are requesting. One beneficiary asked if the Innergex would provide other benefits, like infrastructure. Another beneficiary wanted to know how the Innergex offer compared to what other landowners were getting from other renewable energy companies. Another beneficiary wanted to know, beside the Department and the Kapolei Heritage Center, if any other organizations or schools would benefit from the project.

3. **Give us an example of how Innergex works with communities.**
   Innergex explained that with First Nations, they get to the know the community. They work out a plan on how they can work together. They may bring in volunteers to help the community with their projects. Chair Masagatani felt this

was an important question and requested that Innergex submit a written response.

Subsequent to the Beneficiary Consultation meeting, Innergex sent an email that explained that each First Nation has its own rules and process. In that way, Innergex's process for community engagement depends on the rules and process required by the Nation, and whether or not they are partnering or entering into a participation agreement. Some nations have specific mandates with steps that you need to navigate. Innergex noted that if a Nation does not have procedures in place, the process is more fluid, and relationship-based.

In their written response, Innergex provided a link to a 3-minute video that explained how renewable energy development is consistent with their cultural values. Through interviews on the video, it explained that the tribe was embracing new technology involved in renewable energy development, while also retaining their cultural values—and in this way, they looked forward to a brighter future. The video can be found at: https://www.innergex.com/sites//kwoiek-creek/

4. **More informational meetings.**
One beneficiary wanted more informational meetings to answer everyone's questions. He noted that he was only hearing from the people who are selling solar systems. He wanted information about what is available from someone who is not trying to sell us anything.

RECOMMENDATION:

Staff respectfully requests the Commission's approval of the Recommended Action.

DAVID Y. IGE
GOVERNOR
STATE OF HAWAII

JOSH GREEN
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

March 4, 2019

Aloha!

The Department of Hawaiian Home Lands (DHHL) is considering issuing a long-term General Lease at Kalaeloa (see map) to Innergex Renewables USA LLC to develop a 20-megawatt solar energy project which may also include a battery storage component. We want to inform beneficiaries and get input on the proposed project. We are inviting all lessees and applicants who reside in the Kapolei (96707) zip code area to attend the scheduled Beneficiary Consultation meeting:

BENEFICIARY CONSULTATION MEETING
ON INNERGEX'S PROPOSED SOLAR ENERGY PROJECT AT KALAELOA
KAPOLEI MIDDLE SCHOOL CAFETERIA
THURSDAY, MARCH 21, 2019
6:00 p.m. to 8:00 p.m.

The Consultation meeting will clarify DHHL requirements for renewable energy development, including the process and timeframe involved in awarding a General Lease. Innergex representatives will explain their proposed solar energy project. Most of the meeting will focus on responding to beneficiary questions and ensuring an accurate record of beneficiary comments. Written comments may also be submitted after the meeting, no later than Friday, April 5, 2019 via email to: dhhl.planning@hawaii.gov .

Staff will prepare a Beneficiary Consultation Report that will compile the input received and will submit the Report to the Hawaiian Homes Commission at its regular meeting in April 2019. In June 2019, two Public Hearings will be held to hear concerns from the General Public, including beneficiaries. The Commission can take action on Innergex's long-term General Lease upon completion of the Public Hearings. These steps leading up to the General Lease and requirements of the General Lease will be explained at the Beneficiary Consultation meeting.

For these reasons, I look forward to your participation at the Beneficiary Consultation meeting.

Aloha,

Jobie M.K. Masagatani
Chairman, Hawaiian Homes Commission

EXHIBIT B

List of Beneficiary Participants
Beneficiary Consultation Meeting
Innergex Solar Energy Project at Kalaeloa
March 21, 2019

1	Scott	Abrigo
2	Reiann	Hyatt
3	Kehau	Naeole
4	Kaulana	Pakele
5	Lisa	Pakele
6	PeeWee	Ryan
7	Luke	Solatorio
8	Evelyn	Souza
9	Franklin	Souza
10	Shirley	Swinney
11	Victoria KC	Yuen

HAWAIIAN HOME LANDS
HAWAIIAN HOMES COMMISSION · DEPARTMENT OF HAWAIIAN HOME LANDS

Beneficiary Consultation Meeting on the Proposed Innergex Kalaeloa Solar Project

Kapolei Middle School
Thursday, March 21, 2019
6:00 pm–8:00 pm

Purpose and Agenda

1. Share Information on Renewable Energy and DHHL
   - Why/How is DHHL involved in Renewable Energy?
   - Why Kalaeloa?
   - Why Now?
2. Innergex will Present their Proposed Kalaeloa Solar Project
3. Beneficiary Comments, Concerns, Answer Questions
4. Next Steps:
   - How to Submit Comments
   - Deadline for Comments
   - Public Hearings in June

How to Submit Comments

1. Participate in tonight's meeting—we are taking notes.
2. Purple Half-Sheets--Write your comments/concerns on the half-sheet blanks and leave it at the registration table.
3. You can think about it and submit written comments later.

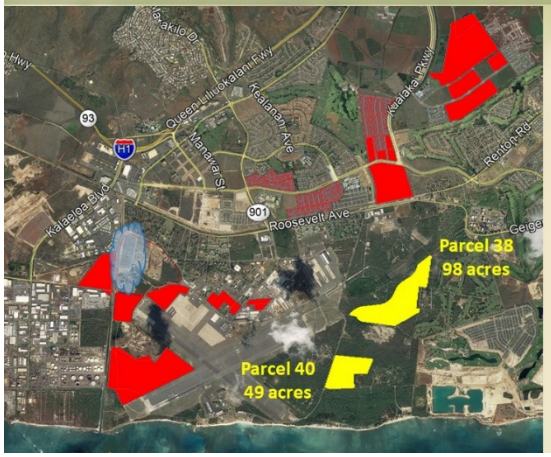
   The deadline for comments is Friday April 5, 2019 (2 weeks)

   Written comments can be:
   - Dropped off with the Receptionist
   - Emailed to the Planning Office at: DHHL.Planning@hawaii.gov
   - Mailed to: DHHL Planning Office
     P.O. Box 1879
     Honolulu, HI 96805

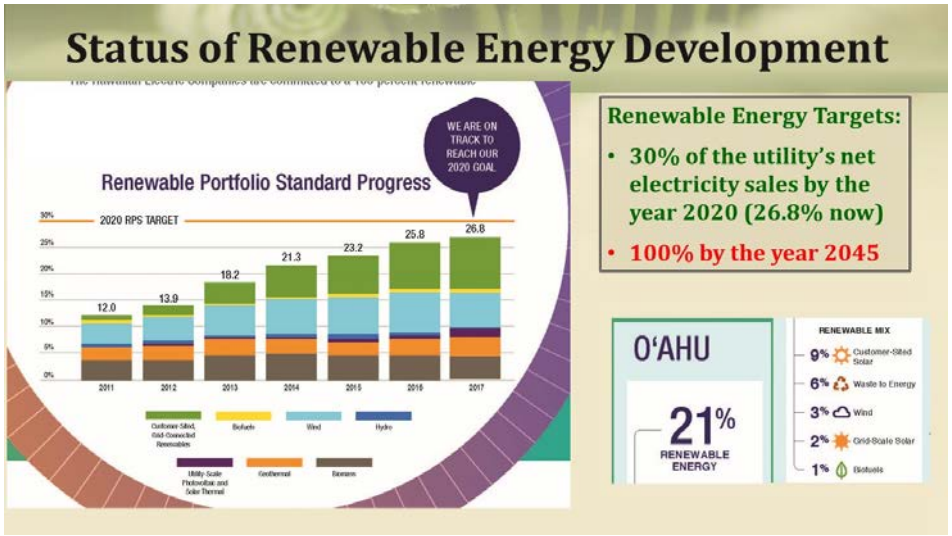
Info. on the 2019 solicitation-- http://dhhl.hawaii.gov/procurement/

Beneficiary Consultation page on our website: www.Hawaii.gov/dhhl

DHHL Kalaeloa Lands, Honouliuli Ahupua'a



- DHHL Land at Kalaeloa = 555 acres
- Land Use Designation = Industrial
- Blue area–location of existing Kalaeloa Solar Two Project:
  - 5 MW; began operations January 2015; lease rent $374,000/year
- Current focus on East Kalaeloa parcels (yellow)



Why is DHHL Interested in Developing Renewable Energy at Kalaeloa?

- **With the goal of 100% renewable energy by 2045, there is a need and demand for renewable energy.**
- **The parcels at Kalaeloa have qualities that Solar companies look for: level of direct solar radiation; access to existing transmission and distribution infrastructure; south facing exposure; flat land; area free of shading from mountains, buildings or trees.**
- **DHHL's Energy Policy – Hoʻomaluō supports renewable energy**
- **Revenue can be used for homestead projects; community benefits go directly to the homestead community**

How Do We Get On-Board?

Complex and Independent Processes:

- HECO's RFP Process
- PUC has to Approve Everything
- DHHL's Normal Land Disposition Process
- DHHL's Process to Lease Land for Renewable Energy Development
- Developer's planning, design, financing, use of tax credits
- Homestead Community Projects

MAJOR PLAYERS	ROLE/FUNCTION
1. The Utility **-HECO, MECO, HELCO** • ***Secure renewable energy resource*** • ***Low, Fixed price***	• Goal: secure low rate for the Power Purchase Agreements (PPAs)— the producer agrees to produce the energy and the utility agrees to buy it at a certain rate. • Process: [11-months] 1. HECO releases RFP 2. Renewable Energy producers submit proposals. 3. HECO selects short list of companies 4. Companies make Best and Final Offer 5. HECO negotiates PPA 6. PPA to PUC for approval • HECO Phase 2 RFPs: May/June 2019
2. Renewable Energy Producers • ***Long-term PPA*** • ***Land/Resource***	• Plan, design, finance, construct, own, operate and maintain a renewable energy facility that generates and dispatches energy to HECO. • They need land for their facility • They need renewable energy resource
3. Large Landowners (private and public) • ***High Lease Rent*** • ***Without pricing out of the market***	• Private landowner—can sell, lease or give land to any renewable energy producer • Public landowner (State DHHL): General Lease lands for renewable energy development pursuant to Chapter 171-95.3, HRS. • Required to notify other renewable energy producers so they can submit a proposal. • Required to conduct 2 Public Hearings on island • Action taken on the project must be on island • Use of state lands require Chapter 343, HRS compliance (Environmental Assessment) ****Our process requires more time—so we're trying to get in front of it.**

What Have We Done So Far?

- **HHC Approval for the 2019 Solicitation Process**
- **Published a Solicitation for Renewable Energy Development Proposals for Kahikinui, Maui and Kalaeloa, O'ahu.**
- **Received Four (4) Applications to Develop Solar Energy at the two Kalaeloa parcels.**
- **A Committee Reviewed and Scored the Proposals. One was disqualified.**
- ****Innergex Renewables USA LLC was selected****
- **Beneficiary Consultation Meeting.**

What Do We Still Need to Do?

I. For Innergex to Develop the Project
1. They need time on the land to do their studies.
2. Accurate site information will provide more accurate cost estimates.
3. They need to get a PPA from HECO
4. The use of State lands require an EA/EIS which has to be completed before entering into a long-term land agreement.

II. For DHHL to Lease the Land to Innergex
1. Negotiate Final Terms of the Agreement
2. Conduct 2 Public Hearings on Island - June
3. Commission Approval on Island

III. Approve Land Disposition
1. Right-of-Entry (ROE): 2 years, option to extend (3) 1-year periods
2. Date of Construction-New terms
3. Innergex asking for a 25-year term to start when the project can deliver energy to the power grid and extensions to match the PPA extensions

The Proposed Project

WHO:

- **Innergex Renewables USA LLC**
- **Wholly-owned subsidiary of Innergex Renewable Energy, Inc., a publicly-traded $1.39 billion Canadian corp.**
- **Same developer that received final award under HECO's 2018 RFP for 15MW solar project in Ulupalakua, Maui and 30MW in Waimea, Hawai'i Island**

The Proposed Project (Cont'd.)

WHAT?

- Construction of a 20MW solar energy project
- High-efficiency PV panels on single-axis trackers
- May include battery storage

WHY?

- On O'ahu, HECO still requires about 160,000 MWhrs (roughly 60 MW) in renewable energy generation to meet its 2022 power needs.

The Proposed Project (Cont'd.)

WHERE?

- Exact location to be determined in due diligence and investigation period during ROE:

HOW MUCH LAND IS NEEDED?

- Less than 100 acres (out of the combined total of 147 acres)
- Actual land for solar panels about 67% (67 acres) with remainder for access and security

WHEN?

- Due diligence and investigation period – 2 Years
- Option to extend ROE for three one-year periods
- Project completion and operation by December 2022
- Innergex requesting a 25-year lease term from the date that the solar project can deliver energy to the power grid and extensions to match the HECO PPA.

The Proposed Project (Cont'd.)

FINANCIAL OFFER:

- r

Confidential

The Proposed Project (Cont'd.)

FINANCIAL OFFER: (Cont'd.)

Confidential

NEXT STEPS

- Negotiate final ROE and General Lease terms
- April 15-16 HHC Meeting
  - Beneficiary Consultation Report
- June
  - Conduct (2) Public Hearings on Maui
  - Conduct (2) Public Hearings on O'ahu (notices will be in the newspaper)
  - Decision-making by HHC

INNERGEX RENEWABLE ENERGY INC.

Founded in 1990, Innergex Renewable Energy Inc. is a Canadian corporation which develops, acquires, owns and operates run-of-river hydroelectric facilities, wind farms, solar farms and geothermal plants.

Innergex conducts operations in Canada, France, the United States, Chile and Iceland.

Pure play in the renewable energy industry

Head Office in Longueuil, Québec

INNERGEX

OUR MISSION

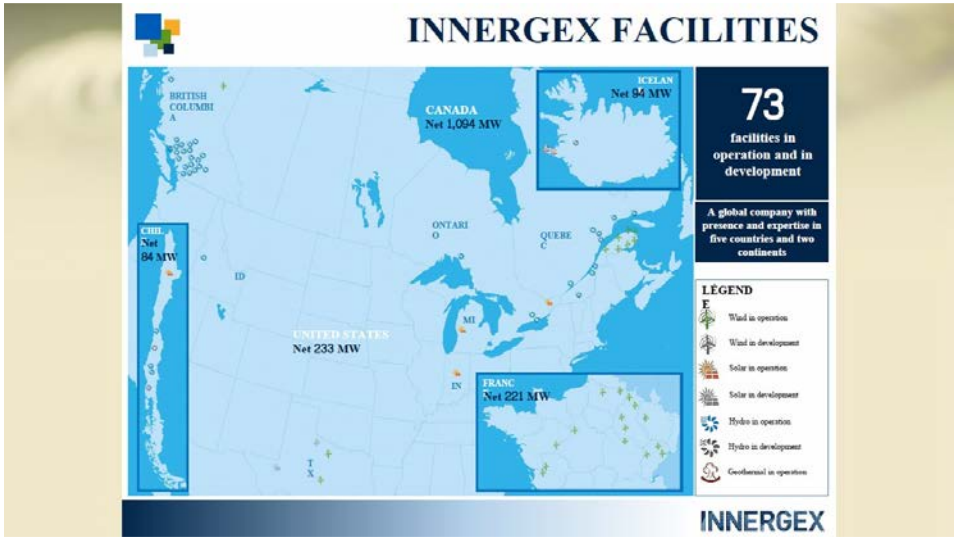
Our mission is to increase our production of renewable energy by developing and operating high-quality facilities while respecting the environment and balancing the best interests of the host communities, our partners and our investors.

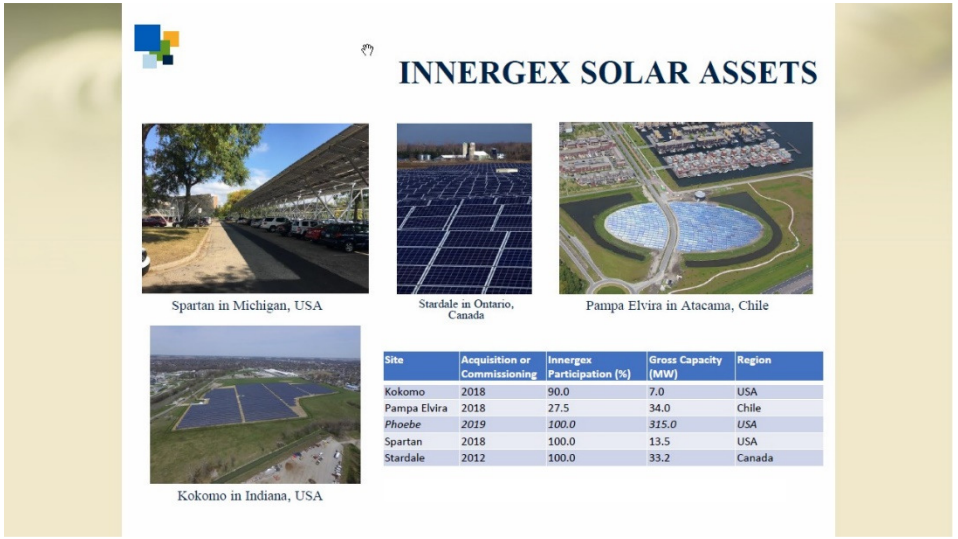
INNERGEX

A SUSTAINABLE BUSINESS MODEL

We strive for a sustainable approach in all aspects of our business: the energy we produce, the contribution we make to local communities, the revenue we generate and the returns we provide to investors.

Social Acceptance 1	Respect for the Environment 2	Corporate Profitability 3
Projects and socio-economic benefits for the communities and our partners	Avoid, minimize, mitigate or compensate for any impact on the surrounding ecosystem	Stability and growth of dividends to holders of common shares



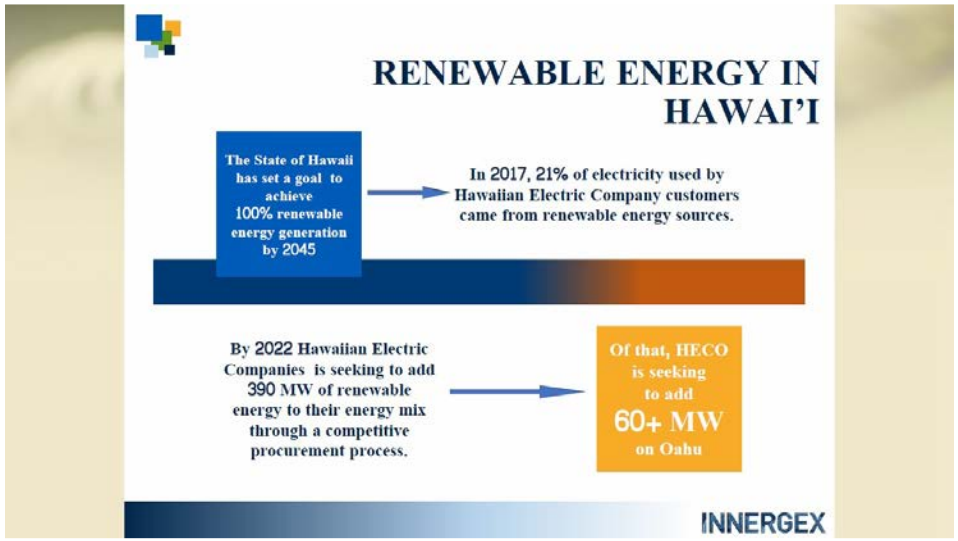


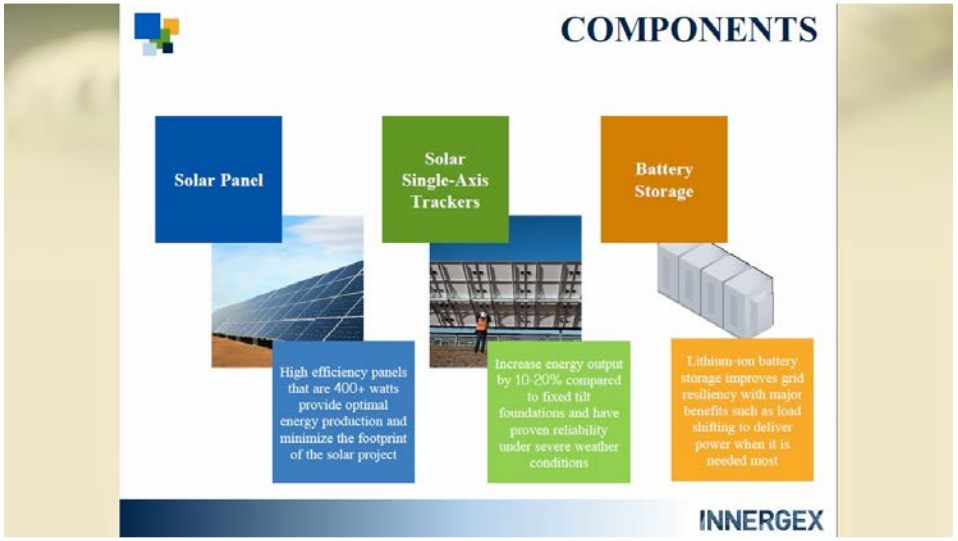
Site	Acquisition or Commissioning	Innergex Participation (%)	Gross Capacity (MW)	Region
Kokomo	2018	90.0	7.0	USA
Pampa Elvira	2018	27.5	34.0	Chile
Phoebe	*2019*	*100.0*	*315.0*	*USA*
Spartan	2018	100.0	13.5	USA
Stardale	2012	100.0	33.2	Canada

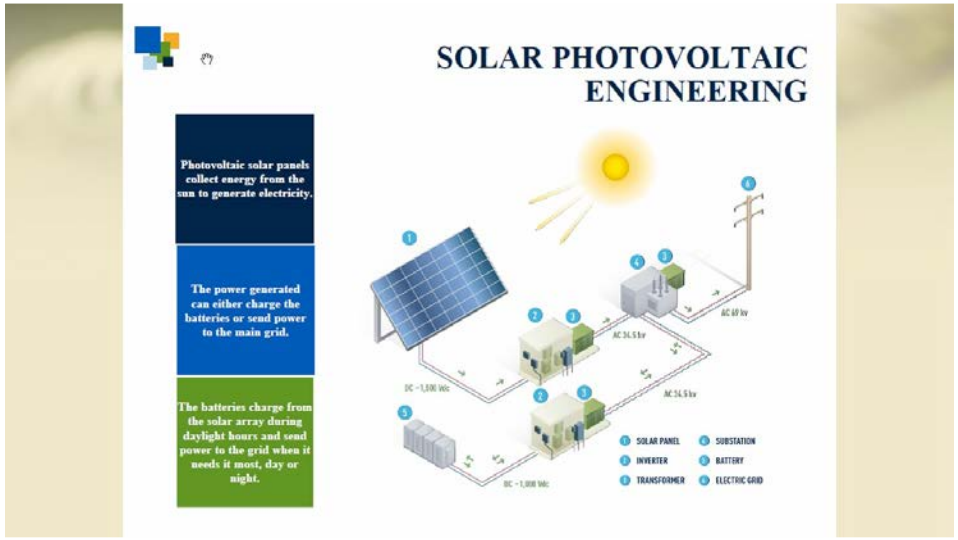
COMMITTED TO THE ENVIRONMENT
Low impact on environment compared to other forms of energy generation
1
Virtually emissions-free
2
No significant impact to surrounding ecosystems
3
Offsetting potential greenhouse gas production from carbon-based power plants
4
INNERGEX

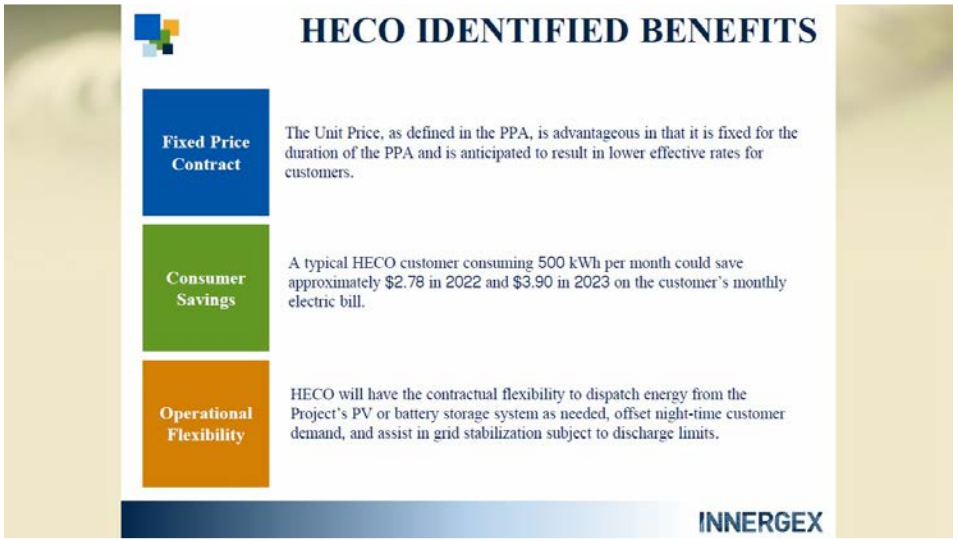
A COMMITTED PARTNER
Innergex acknowledges its responsibility to the host territories of its projects and participates in their socio-economic development
Opportunities for local businesses
Job creation
Economic benefits
Community Benefits
INNERGEX

FIRST NATIONS PARTNERSHIPS
Innergex has gained a reputation as a partner of choice for First Nations seeking to develop business opportunities in the renewable energy sector.
Our development model with neighbor communities is based on:
•Sharing information,
•Understanding local issues and concerns
•Community benefits and education.
Four operating facilities with local communities or First Nations.
"We trust that Innergex will work within our traditional territory in a manner respectful of the environment, our culture and our constitutional aboriginal rights, titles and interest."
Chief Stanley Thomas, Saik'uz First Nation, BC.
INNERGEX


RENEWABLE ENERGY IN HAWAI'I
The State of Hawaii has set a goal to achieve 100% renewable energy generation by 2045
In 2017, 21% of electricity used by Hawaiian Electric Company customers came from renewable energy sources.
By 2022 Hawaiian Electric Companies is seeking to add 390 MW of renewable energy to their energy mix through a competitive procurement process.
Of that, HECO is seeking to add 60+ MW on Oahu
INNERGEX


COMPONENTS
Solar Panel
Solar Single-Axis Trackers
Battery Storage
High efficiency panels that are 400+ watts provide optimal energy production and minimize the footprint of the solar project
Increase energy output by 10-20% compared to fixed tilt foundations and have proven reliability under severe weather conditions
Lithium-ion battery storage improves grid resiliency with major benefits such as load shifting to deliver power when it is needed most
INNERGEX


SOLAR PHOTOVOLTAIC ENGINEERING
Photovoltaic solar panels collect energy from the sun to generate electricity.
The power generated can either charge the batteries or send power to the main grid.
The batteries charge from the solar array during daylight hours and send power to the grid when it needs it most, day or night.
SOLAR PANEL
INVERTER
TRANSFORMER
SUBSTATION
BATTERY
ELECTRIC GRID


HECO IDENTIFIED BENEFITS
Fixed Price Contract
The Unit Price, as defined in the PPA, is advantageous in that it is fixed for the duration of the PPA and is anticipated to result in lower effective rates for customers.
Consumer Savings
A typical HECO customer consuming 500 kWh per month could save approximately $2.78 in 2022 and $3.90 in 2023 on the customer's monthly electric bill.
Operational Flexibility
HECO will have the contractual flexibility to dispatch energy from the Project's PV or battery storage system as needed, offset night-time customer demand, and assist in grid stabilization subject to discharge limits.
INNERGEX

BENEFITS
We have three community benefit strategies for sharing benefits with the local community that reflect the economics of the Project.
Local supplier procurement and employment
Contribution to the Community
Community event sponsorships and participation
INNERGEX
INNERGEX

COMMUNITY BENEFITS PROPOSED

The Kapolei Heritage Center

- Estimated $35,000/year during 25-year lease term to be designated for the Kapolei Community Development Corporation ***Heritage Center*** starting in 2023.
- Preliminary discussions with KCDC indicate this could cover the Center's annual utility and maintenance fees.
- Community education related to energy savings opportunities, job training and subcontracting opportunities with HALE and its program vendors & consultants.
- Volunteer support for the building of the Halau Center.

INNERGEX

HAWAIIAN HOME LANDS
HAWAIIAN HOMES COMMISSION · DEPARTMENT OF HAWAIIAN HOME LANDS

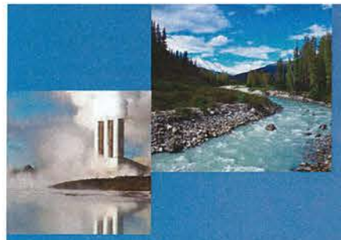
Submit comments, concerns or questions by Friday, April 5, 2019

via email to

dhhl.planning@hawaii.gov

These will be incorporated into the beneficiary consultation report presented to the HHC at its regularly-scheduled meeting in April

Mahalo!



SUSTAINABLE BUSINESS MODEL

1.
Social acceptance of projects and socioeconomic benefits for the communities and partners.

2.
Respect for the environment to avoid, minimize, mitigate or compensate for any impact on the surrounding ecosystem.

3.
Corporate profitability to ensure stability and growth of dividends to holders of common shares.

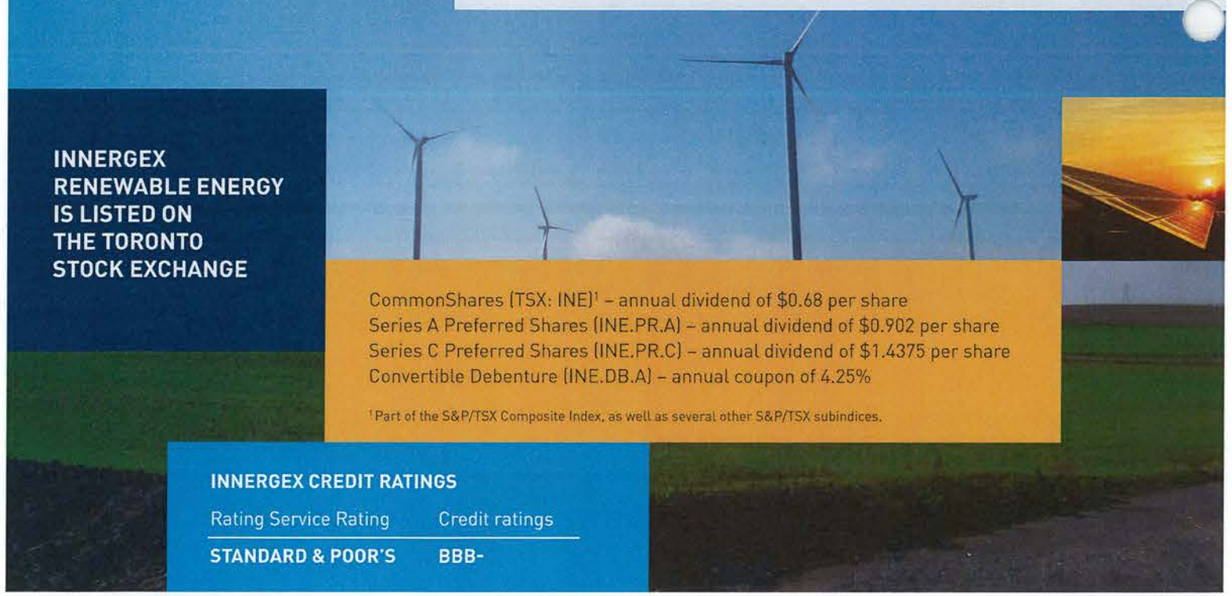
MISSION
Our mission is to increase our production of renewable energy by developing and operating high quality facilities while respecting the environment and balancing the best interests of the host communities, our partners, and our investors.

STRATEGY
Our strategy for building shareholder value is to develop or acquire high-quality facilities that generate sustainable cash flows and provide an attractive risk-adjusted return on invested capital, and to distribute a stable dividend.

GROWTH
Our growth is solidly rooted in a long-term vision and strict adherence to our mission and our values. Going forward, our time-tested approach will continue to guide us in achieving our vision of providing renewable energy for a sustainable future.

PARTNER
Our ability to understand and adapt to each community's individual needs has been a hallmark of how we approach each project. Whether it be through shared economic benefits, employment opportunities, shared ownership, partnership agreements, or community investment, we recognize our responsibility and opportunity to help bring socio-economic development to rural and First Nation communities.

VALUES
Conscientious innovators who are respectful of their partners, the members of the Innergex team champion fundamental values that earn them the respect of the partners and the communities that host their projects. Our relationships with local communities are based on core values of transparency, integrity, responsibility, and collaboration.



INNERGEX RENEWABLE ENERGY IS LISTED ON THE TORONTO STOCK EXCHANGE

CommonShares (TSX: INE)[1] – annual dividend of $0.68 per share
Series A Preferred Shares (INE.PR.A) – annual dividend of $0.902 per share
Series C Preferred Shares (INE.PR.C) – annual dividend of $1.4375 per share
Convertible Debenture (INE.DB.A) – annual coupon of 4.25%

[1] Part of the S&P/TSX Composite Index, as well as several other S&P/TSX subindices.

INNERGEX CREDIT RATINGS

Rating Service Rating	Credit ratings
STANDARD & POOR'S	BBB-

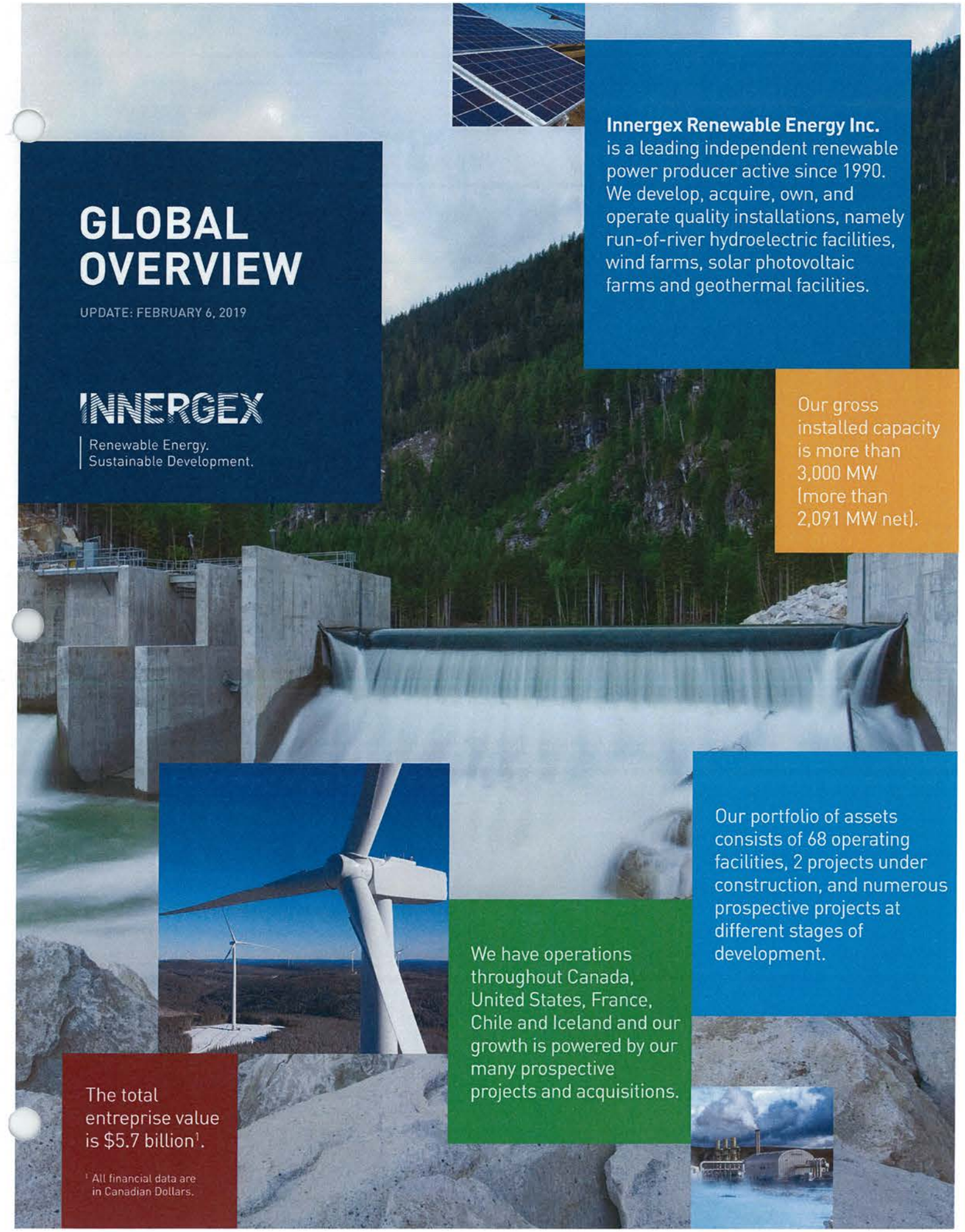
LONGUEUIL (Head Office)
1225 Saint-Charles Street West, 10th floor
Longueuil, Québec J4K 0B9
Tel. 450 928-2550 Fax 450 928-2544
info@innergex.com

REGIONAL OFFICES
Lyon, France
San Diego, USA
Vancouver, Canada

INNERGEX
Renewable Energy.
Sustainable Development.

innergex.com

ITEM G-2, EXHIBIT D



GLOBAL OVERVIEW

UPDATE: FEBRUARY 6, 2019

INNERGEX
Renewable Energy.
Sustainable Development.

Innergex Renewable Energy Inc. is a leading independent renewable power producer active since 1990. We develop, acquire, own, and operate quality installations, namely run-of-river hydroelectric facilities, wind farms, solar photovoltaic farms and geothermal facilities.

Our gross installed capacity is more than 3,000 MW (more than 2,091 MW net).

Our portfolio of assets consists of 68 operating facilities, 2 projects under construction, and numerous prospective projects at different stages of development.

We have operations throughout Canada, United States, France, Chile and Iceland and our growth is powered by our many prospective projects and acquisitions.

The total entreprise value is $5.7 billion[1].

[1] All financial data are in Canadian Dollars.

INNERGEX FACILITIES

IN OPERATION
2,091 /3,072 MW
(net[1]/gross capacity)

- **37 hydro facilities** (796 / 1,181 MW)
- **25 wind farms** (1,139 / 1,629 MW)
- **4 solar farms** (62 / 88 MW_{DC})
- **2 geothermal facilities** (94 / 174 MW)

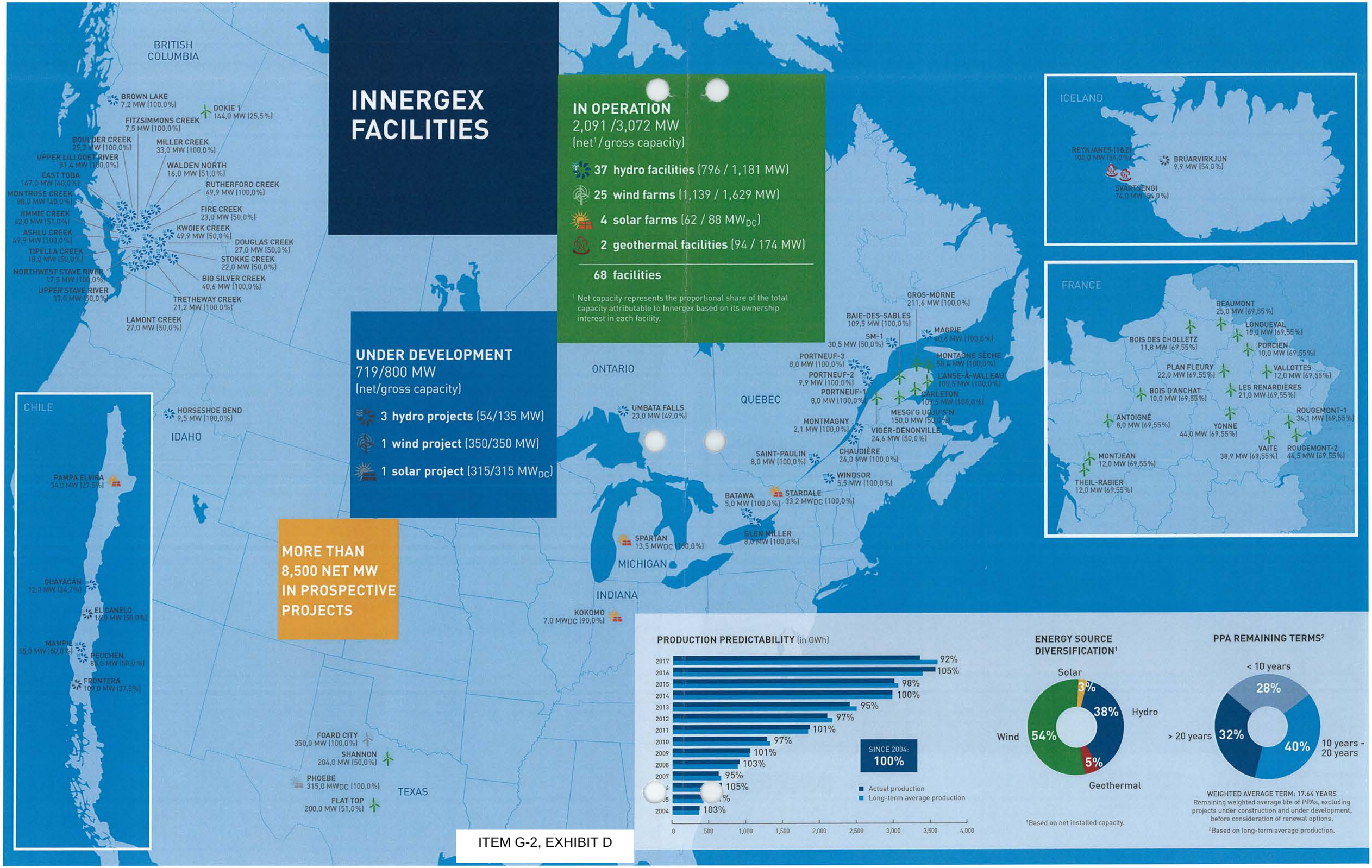
68 facilities

[1] Net capacity represents the proportional share of the total capacity attributable to Innergex based on its ownership interest in each facility.

UNDER DEVELOPMENT
719/800 MW
(net/gross capacity)

- **3 hydro projects** (54/135 MW)
- **1 wind project** (350/350 MW)
- **1 solar project** (315/315 MW_{DC})

MORE THAN 8,500 NET MW IN PROSPECTIVE PROJECTS



ITEM G-2, EXHIBIT D

EXHIBIT E

Beneficiary Comments, Questions and Responses by Subject

Beneficiary Consultation on Innergex's Solar Energy Project at Kalaeloa
Kapolei Middle School
March 21, 2019
6:00 p.m. to 8:00 p.m.

QUESTION OR COMMENT	RESPONSE
During construction, is the land under a Right-of-Entry or a General Lease?	It would be under a General Lease at the time construction begins.
Can you give us an example of how Innergex works with communities? DHHL: Chair Masagatani requested that Innergex respond to this question in writing so it could be included in the Beneficiary Consultation Report. She wants to be able to say specifically what their process is when engaging community.	Innergex: How they work with First Nations--They get to know the community. They work out a plan on how they can work together. They may bring in volunteers to help the community with their projects. In response to the Chair's request, Innergex explained in an email that each nation has its own rules and process. The process for community engagement depends on the nation and whether or not they are partnering (co-ownership) or entering into a participation agreement. Some nations have specific procedural mandates with steps that you need to navigate. Others have no procedures where the process is fluid and relationship based. There are no general mandates.
Is this project just to create revenue for the Department? Can we purchase a PV system to go into the project?	Innergex: we're just trying to help HECO meet their renewable energy goals. HECO is limiting rooftop solar and is requiring battery storage. Helps community at large. Payment to DHHL, payment to KHC.
I got a system through Sunrun and now I have to buy the energy through SunRun. How will your project benefit us?	Innergex: It might not benefit lessees that already have a PV system. HECO is in the process of changing the mix of energy. Over time, the power bill will go down and we won't see if fluctuate with price of oil.
I want to have more informational meetings to answer everyone's questions. I'm only hearing from the people who are selling solar systems. We need information about what is available from someone who is not trying to sell us anything.	
You're requesting a General Lease now, but that will come to an end. Will we be able to benefit from this project?	If you're plugged into the grid, you will still benefit. You could also plug into the Community Based Renewable Energy (Community Solar) program. The benefit is power that is not generated from oil.

QUESTION OR COMMENT	RESPONSE
On your financial offer for the General Lease, is this the maximum amount that you are offering for this much land? How do the other areas compare with this? What kinds of benefits do the beneficiaries get? The State is benefitting. Beside KCDC, are the schools going to benefit directly from solar power?	
It's a large parcel of land – we need to get a higher price so we can take 10,000 people off the waitlist, into a hale. We're paying electric bills, or we have a solar lease that has a balloon payment after 7 years of lease payments. We're looking for a company that will locate on Hawaiian Home Lands and will benefit the homesteaders. Maybe Community Solar can do that?	
Can Community Solar benefit lessees individually? The benefit is not just about revenue going to DHHL. Can we go through your company individually to get electricity?	HECO is experimenting with Community Solar--there will be two in this area—and one of them is on Hawaiian Home Lands. But HECO is limiting it. The PUC won't allow us to do that.
Please explain what Community Solar is.	Innergex: Community Solar is an opportunity for people-- who don't own a roof, or who have a roof that needs repair, or are renting, or live in an apartment building—to buy solar panels. They are buying the energy that is produced from those panels, but at a wholesale price of 50%. You get a reduction by half of your cost. For a regular solar project--if the solar panels are on your roof, you get 100% of the benefit, but it will take 10-12 years to pay it off.
	DHHL: HECO is developing a 1.5MW Community Based Renewable Energy (Community Solar) project at the end of the runway at Kalaeloa. People who buy into the project would get a credit on their bill. This is good for people who live the valleys, where there's too much shade, so you can't have panels. The project will probably accommodate 1,500 homes. Projects on HHLs will offer lessees the first chance to invest. The project could submit a proposal in HECO's Phase II RFP that would expand the project.
How much do you have to pay to buy a panel?	I'm not sure.
In comparison to what you are offering, and the CBRE project, which is the better deal for us?	
With the monies paying for the lease, is that the only benefit to the DHHL? What are other benefits, like infrastructure?	

QUESTION OR COMMENT	RESPONSE
I don’t know what a solar farm will look like. I know what panels look like.	Go down to PASHA, take a look in Kalaeloa at the project that’s there.
Main benefit is to generate revenue to DHHL?	Yes, and funding to Kapolei Heritage Center.

IF YOU HAVE A QUESTION

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PROJECT TEAM PRESENTERS

Eddie Park
Director – Development, Innergex

Julia Mancinelli
Director- Environment, Innergex

Jamie Horner
Senior Director - Storage and Innovation, Innergex

Jody Allione
Project Development Consultant

Luis P. Salaveria
Government Affairs

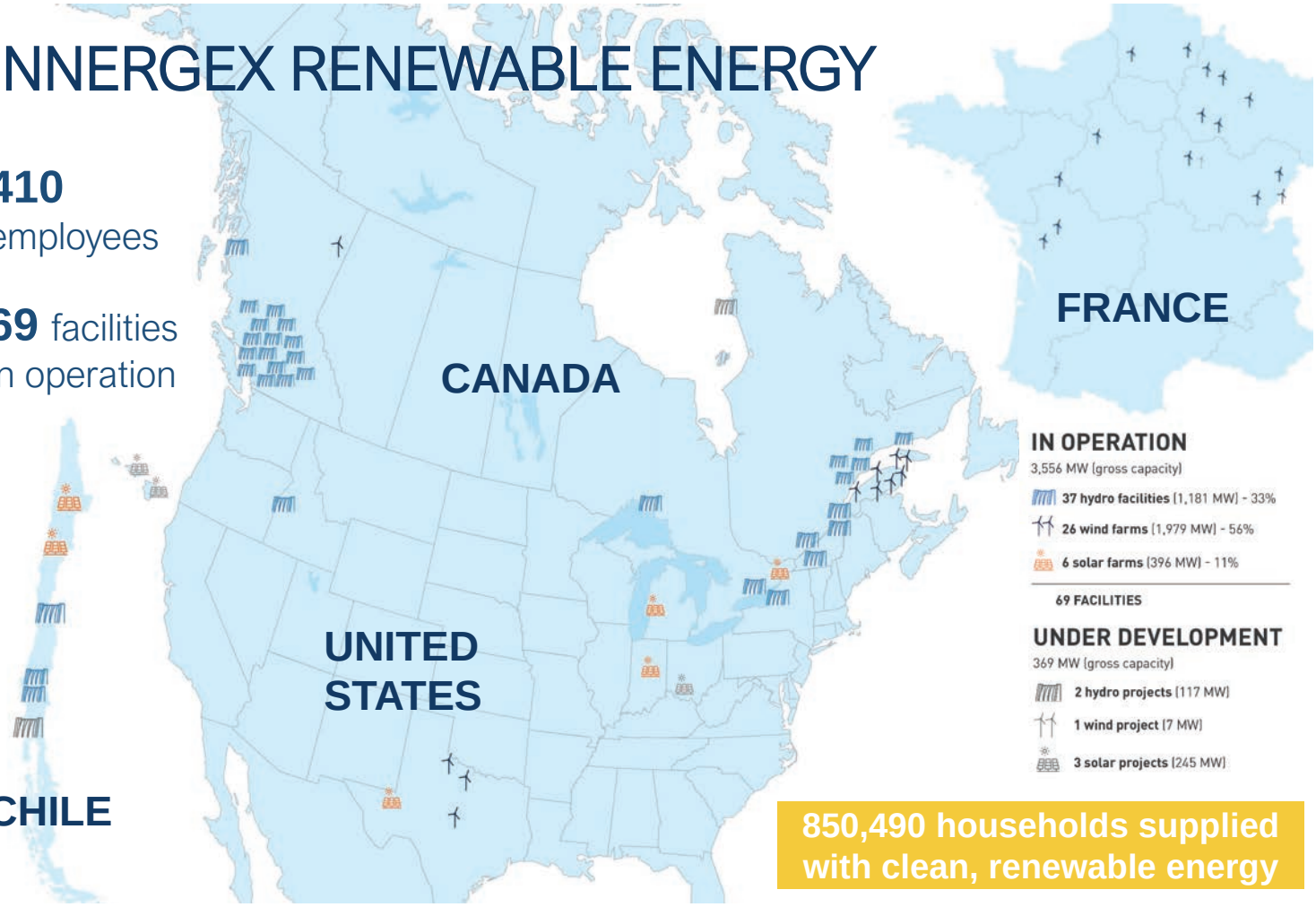
AGENDA

- Welcome and Introductions
  - Innergex
- Barbers Point Solar Project
  - Overview
  - Timelines
  - Studies & Permitting
  - Equipment
  - Visual Simulations
  - Benefits
- Q&A

INNERGEX RENEWABLE ENERGY

410 employees

69 facilities in operation



850,490 households supplied with clean, renewable energy

A SUSTAINABLE BUSINESS MODEL

It all starts with **a shared vision.**
Integrating sustainable development into our strategic planning, decision-making process, and daily activities has always been part of our DNA.

People

We are a team of passionate individuals who build strong partnerships with local communities.

Planet

We believe that renewable energy is part of the solution to climate change.

Prosperity

We generate value for our employees, our shareholders, our partners and our host communities.

RENEWABLE ENERGY IN HAWAII

Hawaii has set a goal to achieve

100%

renewable energy generation by 2045

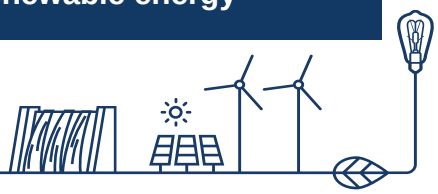
In 2019, Hawaiian Electric launched the second phase of their renewable energy procurement process, the single largest procurement effort in the State of Hawaii, for approximately 900 MW of new renewable generation.

Innergex submitted the Barbers Point Solar Project as a competitive bid as part of the Hawaiian Electric procurement process. The project was selected to be in the Final Award Group and is in the process of negotiating a power purchase agreement.

The Barbers Point Solar project would power approximately

6,200

Oahu households with renewable energy



THE PROJECT

- 15 MW solar PV system coupled with a 60 MWh battery energy storage system (BESS).
- Site is located on lands owned by Department of Hawaiian Home Lands (DHHL) in Kalaeloa on the island of Oahu.
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- Provides area of Kalaeloa with localized stored renewable generation and improves grid stability.
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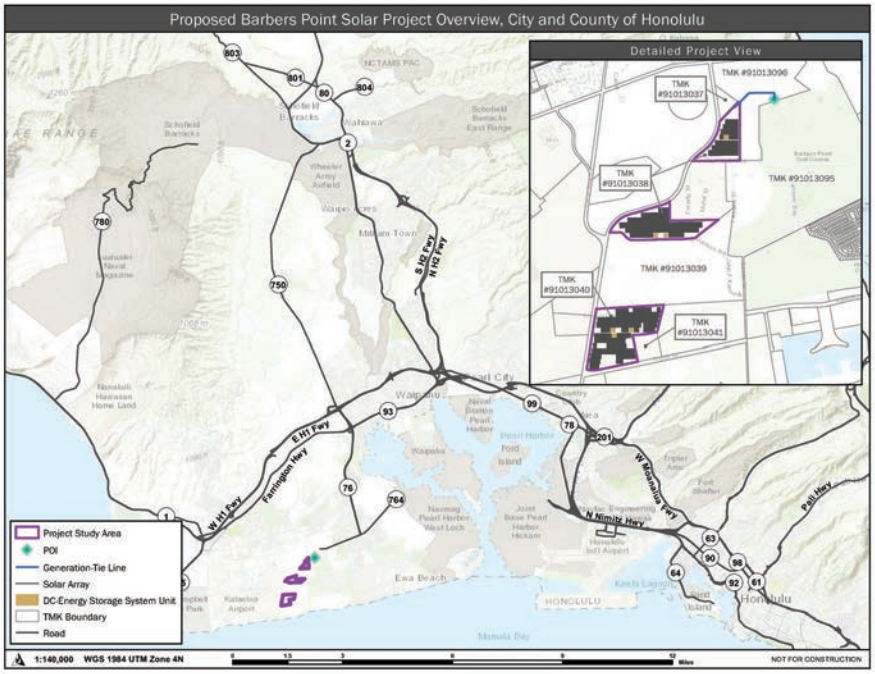
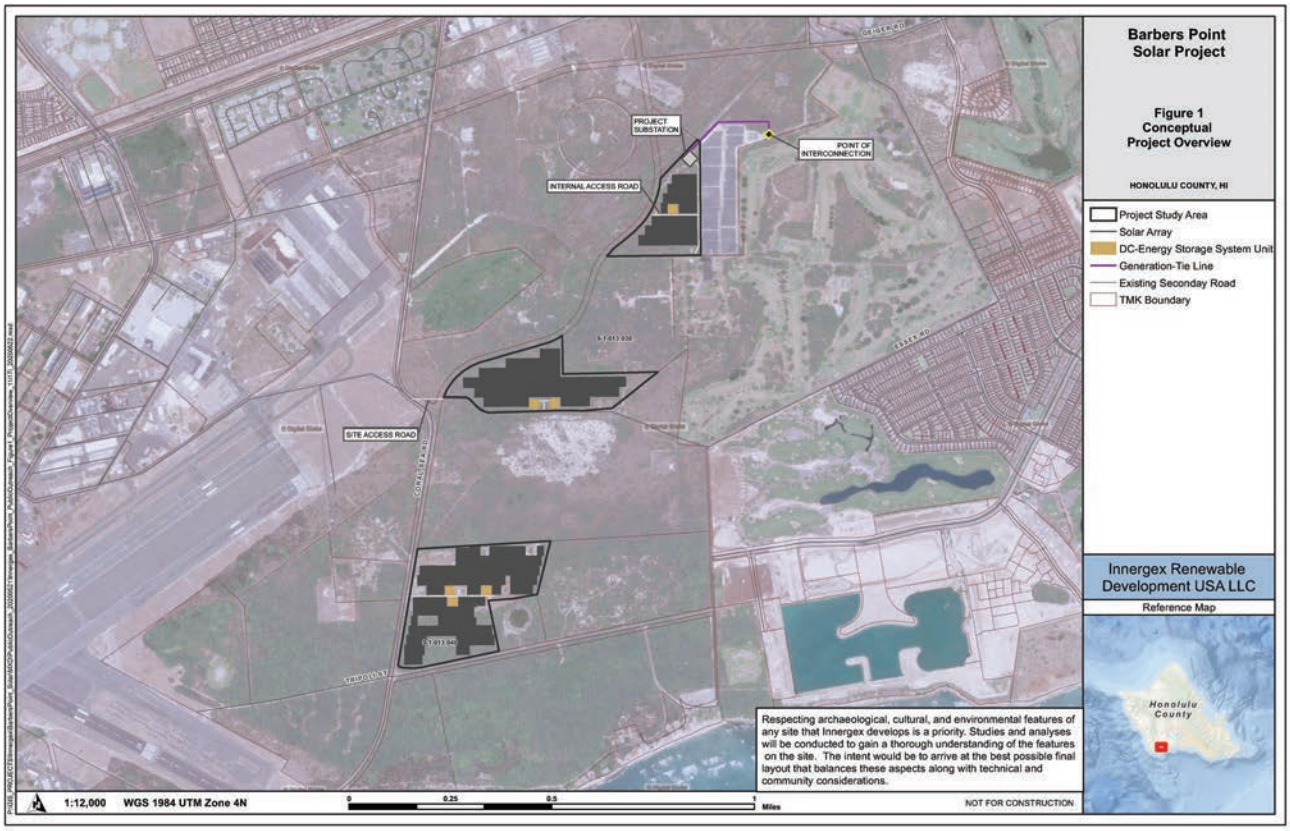


PRELIMINARY SITE LAYOUT PLAN



TIMELINE

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Hawaiian Short-eared Owl Survey

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Geotechnical Studies

Wetland and Waterways Assessments

Pre-construction Biological Clearance Surveys

Traffic Impact Assessment

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Important aspects to consider before finalizing the design and building of a project are the potential archaeological, cultural and historical properties the project could impact.

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- Archival research
- Surface survey
- Test excavations
- Data analysis
- Reporting

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- Federal Aviation Administration Determination of No Hazard
- Construction Noise Permit
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- Grading, grubbing, building, and electrical permits from Honolulu County.

EQUIPMENT

Solar Panel

High efficiency panels that are 400+ watts provide optimal energy production and minimize the footprint of the solar project

Solar Single-Axis Trackers

Increase energy output by 10-20% compared to fixed tilt foundations and have proven reliability under severe weather conditions

Battery Storage

Lithium-ion battery storage improves grid resiliency with major benefits such as load shifting to deliver power when it is needed most

CONSTRUCTION PHASES

1 Land preparation, fencing, and roadwork

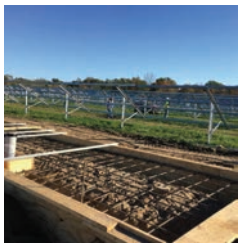
2 Foundations, underground cabling

3 Install support racks and solar panels

4 Electrical substation and transmission line

5 Battery storage installation

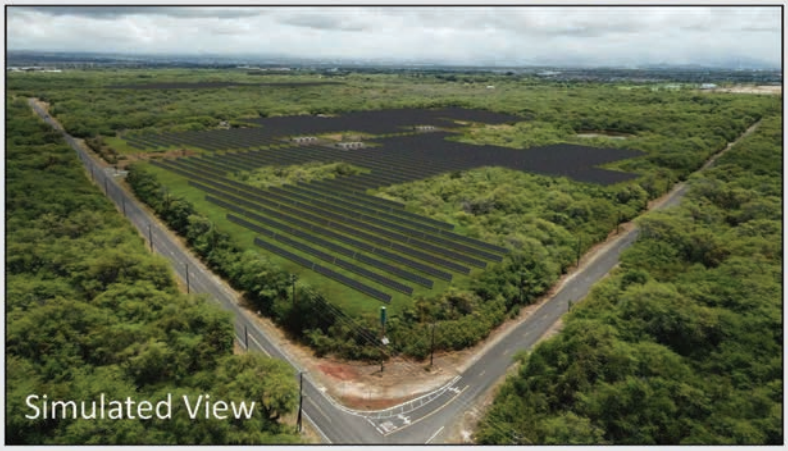
6 Commissioning



SIMULATED VIEW #1
CORAL SEA RD AND TRIPOLI ROAD

Existing Condition

The photograph to the right shows the current conditions of the Project area, including the existing vegetation.



The photograph shows an aerial view toward the Project area from the intersection of Coral Sea Road and Tripoli Road from an altitude of approximately 150 feet. From the simulated view, the area would have minimal visibility from the ground along either road because the solar field would be partially screened by existing Keawe trees and vegetation.

BARBER'S POINT SOLAR PROJECT

PHOTO SIMULATION

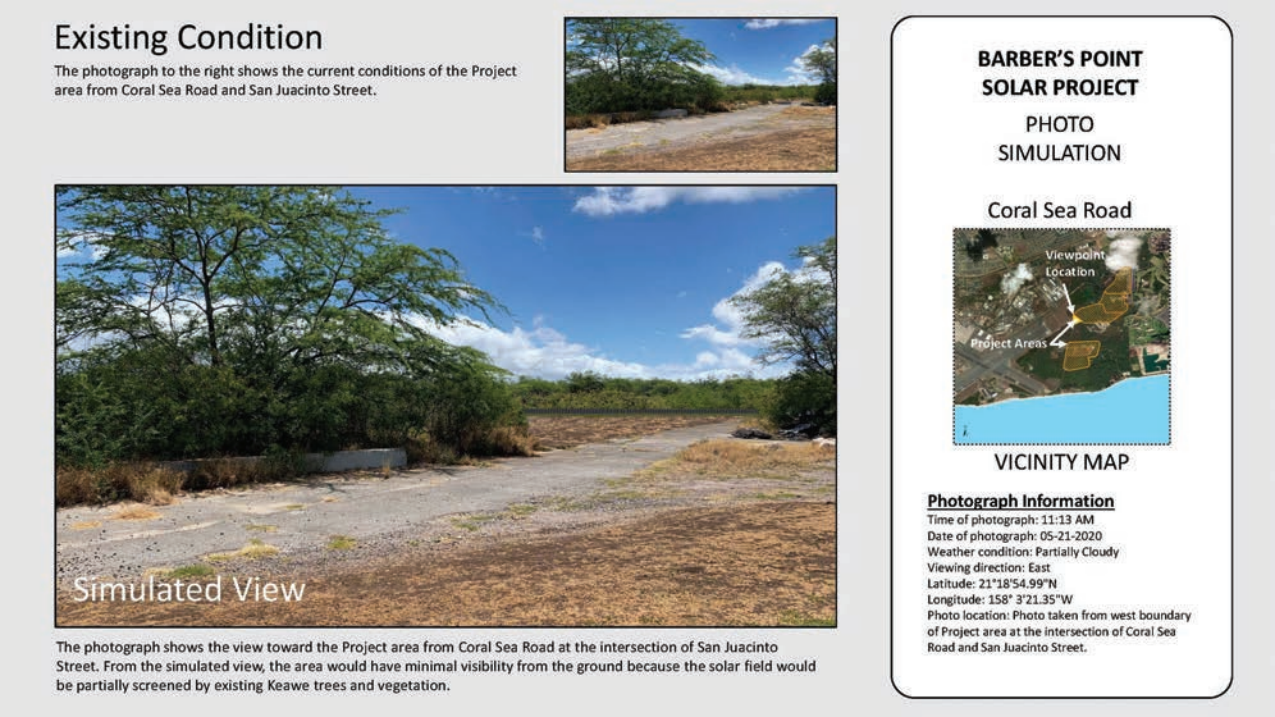
Coral Sea Road

VICINITY MAP

Photograph Information

Time of photograph: 11:35 AM
Date of photograph: 05-18-2020
Weather condition: Partially Cloudy
Viewing direction: North East
Latitude: 21°18'18.78"N
Longitude: 158° 3'26.14"W
Photo location: Photo taken from south west corner of Project area at the intersection of Coral Sea Road and Tripoli Road, from an altitude of approximately 150 ft.

SIMULATED VIEW #2
CORAL SEA ROAD AND SAN JUACINTO STREET

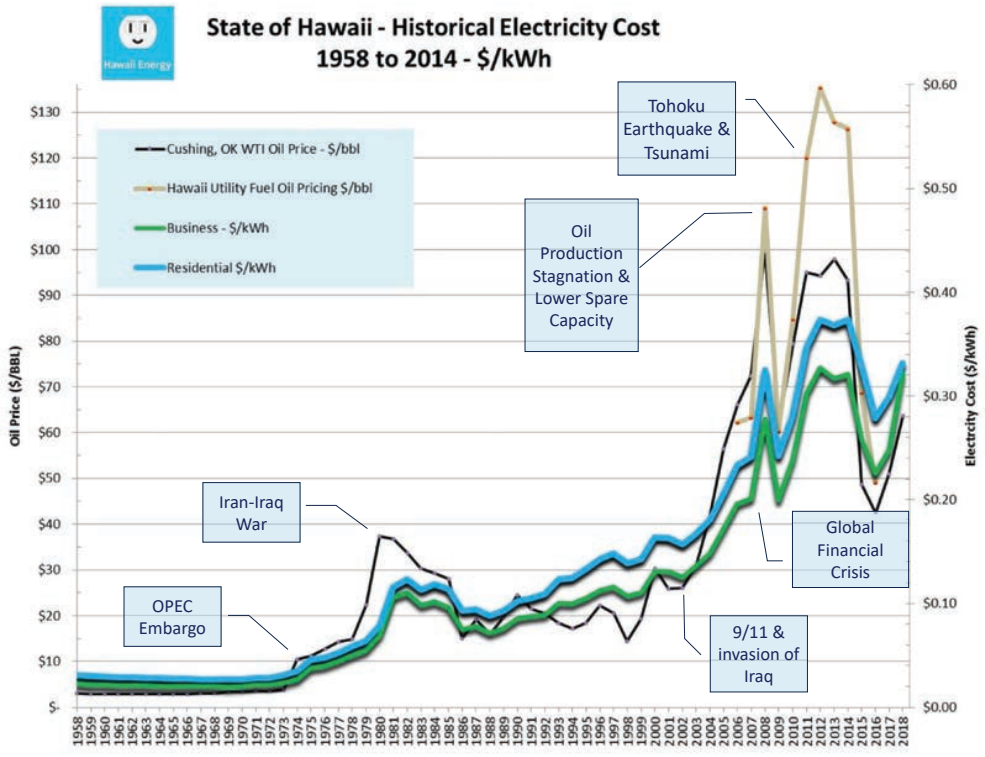


DECOMMISSIONING

The Power Purchase Agreement with HECO would be for a 25-year term.

- Innergex is responsible for the entire project life cycle, including the costs of decommissioning and recycling of component parts.
- As part of the decommissioning of a typical solar project, any and all components would be removed and the area would be returned to a similar condition as existed prior to the Project being developed.
- Reuse or recycling of materials will be prioritized over disposal. Recycling is an area of great focus in the solar industry, and programs for both batteries and solar panels are advancing every year.

PROJECT BENEFITS – HISTORIC ELECTRICITY COST



Source: Hawaii Energy Review of Business and Residential Cost Escalation to 2019

COMMUNITY BENEFITS

"KCDC supports the solar project at Kalaeloa, because it aligns with DHHL's guiding documents but more importantly because this project provides DHHL, its beneficiaries, KCDC and the Kapolei homesteads with the resources for a sustainable future."
- **Scott Abrigo – President of Kapolei Community Development Corporation**

Dedicated funding to Kapolei Community Heritage Center during operations

Support training program at the Center for Native Hawaiian Advancement in partnership with Makaha Learning Center

Sponsorships and donations for local festivals, events, conferences, fundraisers

Memberships and activity in community organizations

Opportunities for local workforce and businesses

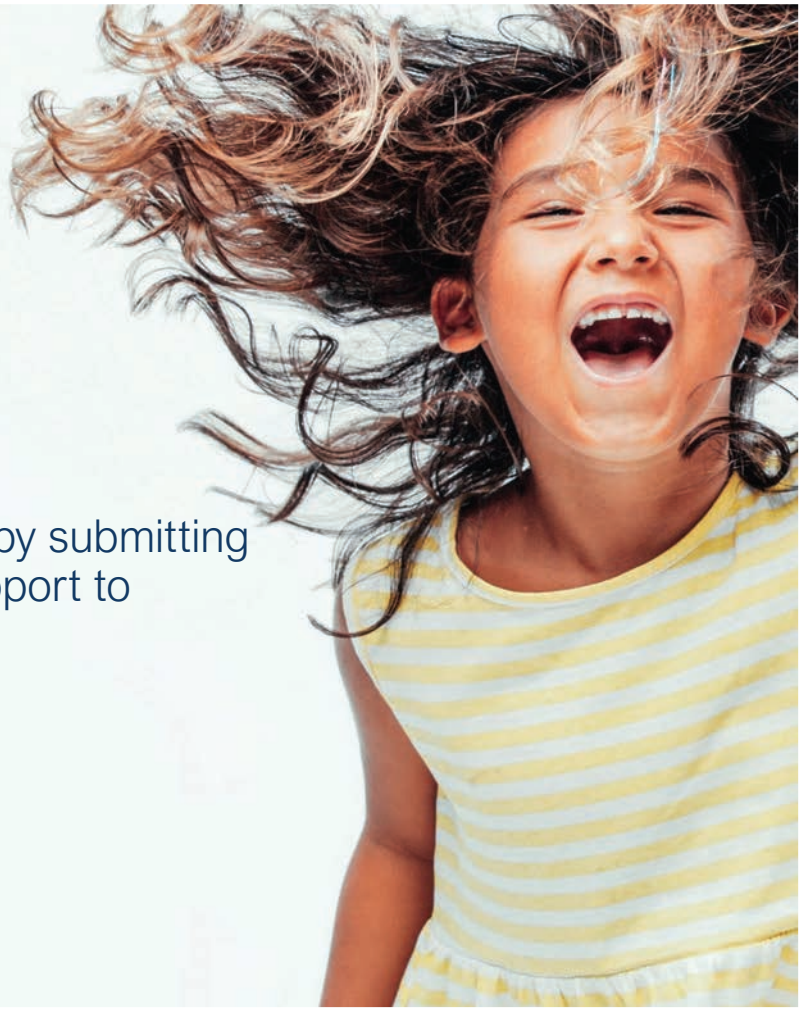
QUESTION AND ANSWER PERIOD

Please send any questions you have through:

- dedicated Q&A panel on the right side of your screen and direct it to the **HOST**
- email to barberspointsolar@innergex.com

INNERGEX

Renewable Energy.
Sustainable Development.



Thank you!

Your opinion is important to us.

Please provide us with feedback by submitting your comments, questions or support to barberspointsolar@innergex.com

Mahalo!

INNERGEX

Renewable Energy.
Sustainable Development.

Barbers Point Solar Energy and Battery Storage Project Update

November 10, 2020

Kapolei Community Development Corporation

INNERGEX

Barber's Point Solar Project Update

November 10, 2020
6:30 PM
WebEx

Kapolei Community Development Corporation

- KCDC is a 501(c)(3) non-profit organization that serves the homesteads of Maluʻōhai, Kaupeʻa, Kānehili and Kauluokahaʻi in the Kapolei Region
- Founded on tenets of Community, Culture, Education & Partnerships in 2008
- Volunteer non-paid board

Scott Abrigo
President
Maluʻōhai

Chantal Keliʻihoʻomalu
Secretary
Kānehili

Kekoa Gonzales
Director
Kānehili

PeeWee Ryan
Vice President
Kānehili

Jame Schaedel
Director
Maluʻōhai Resident Association Designate

Michelle Kauhane
Director
Kaupeʻa Homestead Association Designate

Leonani Puailihau
Treasurer
Maluʻōhai

Guy Kapeliela
Director
Kaupeʻa

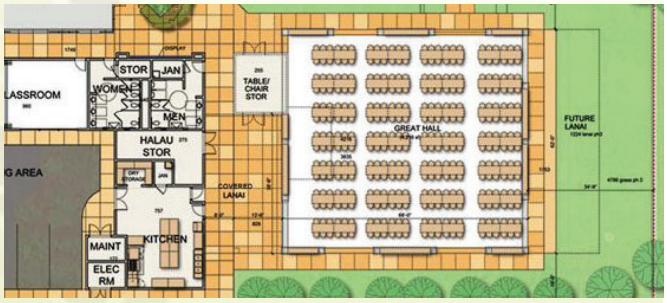
Alika Kea
Director
Kanehili Community Association Designate

Kapolei Heritage Center - Phase 1

- Constructed, managed and operated by KCDC
- KCDC's conduit to serving the Kapolei Homestead Region
- 2 Classrooms
- Certified Kitchen
- Online booking

Proposed Phase 2 - Hālau

- 350+ People Capacity
- Flex space (1 large space or 3 smaller spaces)
- Build parking lot
- Accomodate large events
- More space for programs



Ho'omaka Marketplace

- One of KCDC's parcels
- Subleased to KZ Companies
- Provide KCDC with the resources for a sustainable future
- Open in 2022
- Nov. 12 @ 6:30PM update meeting

Our Progress

KCDC Programs & Initiatives

- **Kupuna** program with Alu Like
- **Keiki and Parent** program with Keiki O Ka ‘Āina
- **Free Ukulele Classes** with Ukulele Project Hawaii
- **Honouliuli Educational Fair** with KS
- **Hāpai Pōhaku Scholarship** with HCF
- **Homestead Health Survey** with Kula

Covid Response

- Partnered with KS, KROC Center Hawaii, Alu Like, CNHA, Hawaii Community Foundation, USDA, Longs Drugs, Innergex
- 38,000 Meals Distributed
- 1,100 Covid Kits
- Raised $15,000
- Thanksgiving Food Distribution

KCDC and the Barbers Point Solar Project

Barbers Point Solar Project

- Project is located in the Kapolei Region
- Aligns with DHHL's guiding documents (Energy Policy, Island and Regional Plans)
- Lands are not suitable for homesteading

INNERGEX

Barbers Point Solar Project

- Kapolei homestead supported the project during initial community consultations
- Community Benefit Agreement (1% gross project revenue) that will used to operate and maintain the Kapolei Heritage Center and support KCDC's programs

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Eddie Park
Director – Development, Innergex

Julia Mancinelli
Director-Environment, Innergex

Jody Allione
Project Development Consultant

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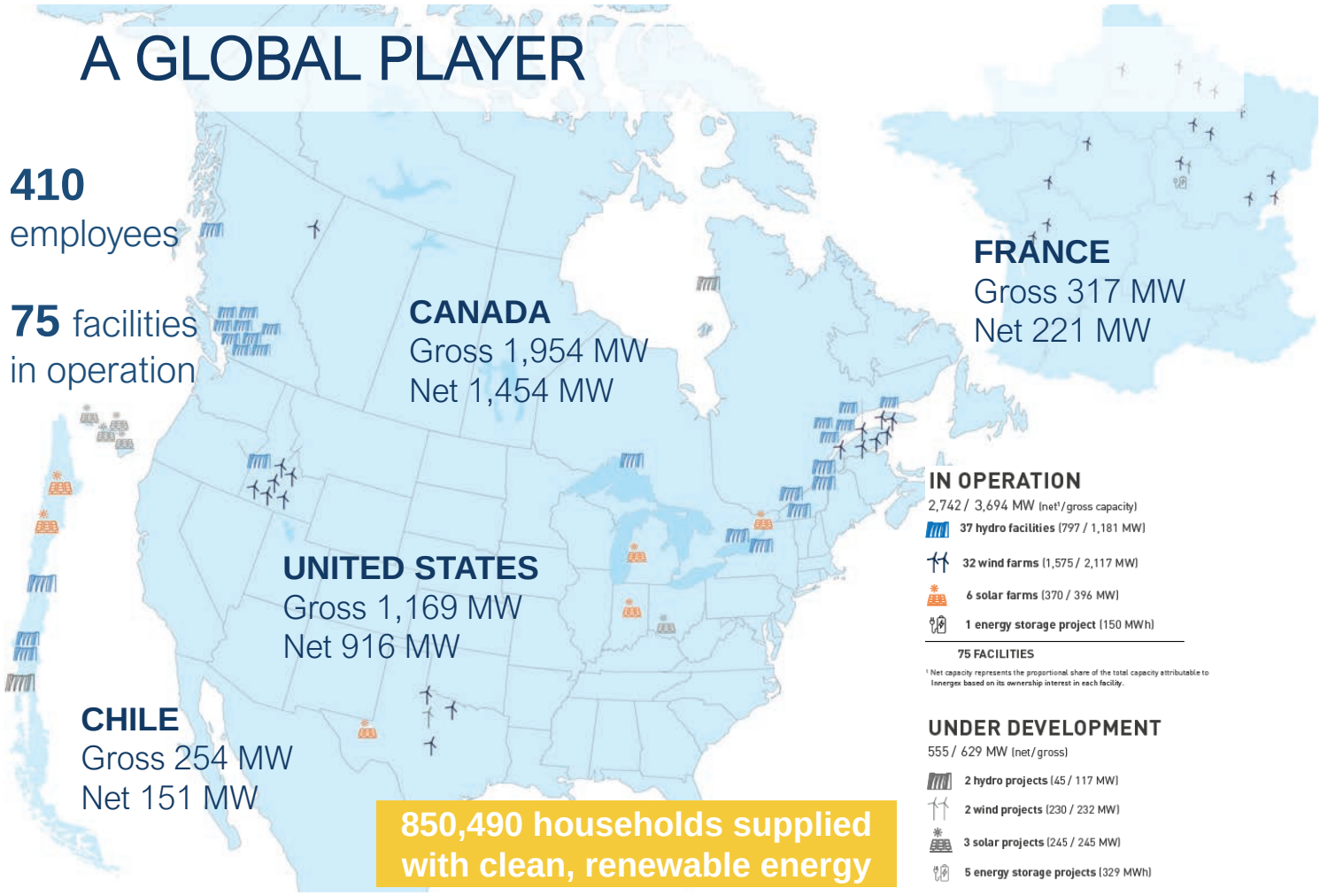
  - Innergex
- Barbers Point Solar Project
  - Renewable Energy in Hawaii
  - The Project
  - Timelines
  - Studies & Permitting
  - Equipment/Construction
  - Visual Simulations
  - Decommissioning
  - Benefits
- Q&A

A GLOBAL PLAYER

410 employees

75 facilities in operation



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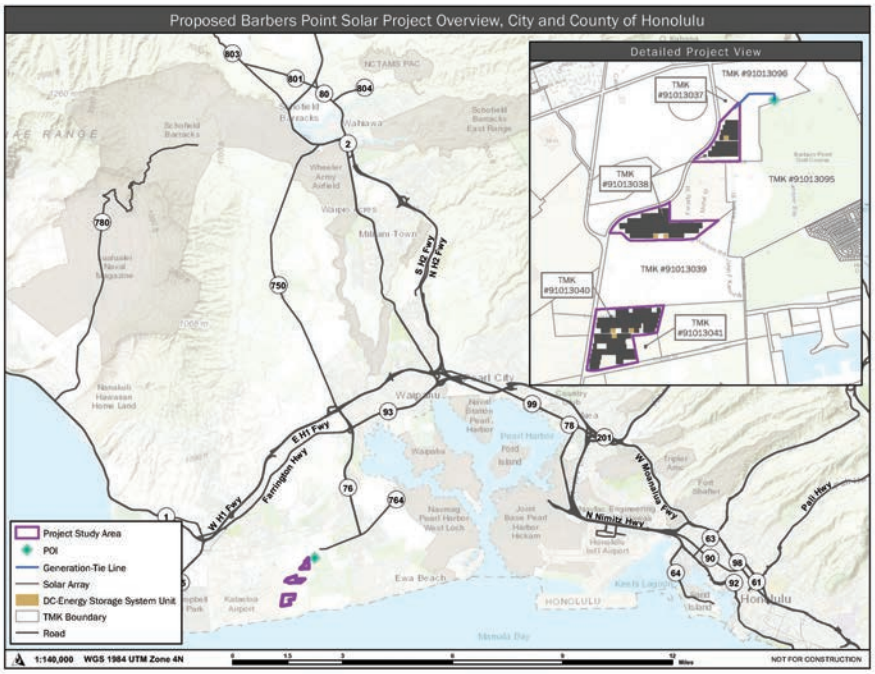
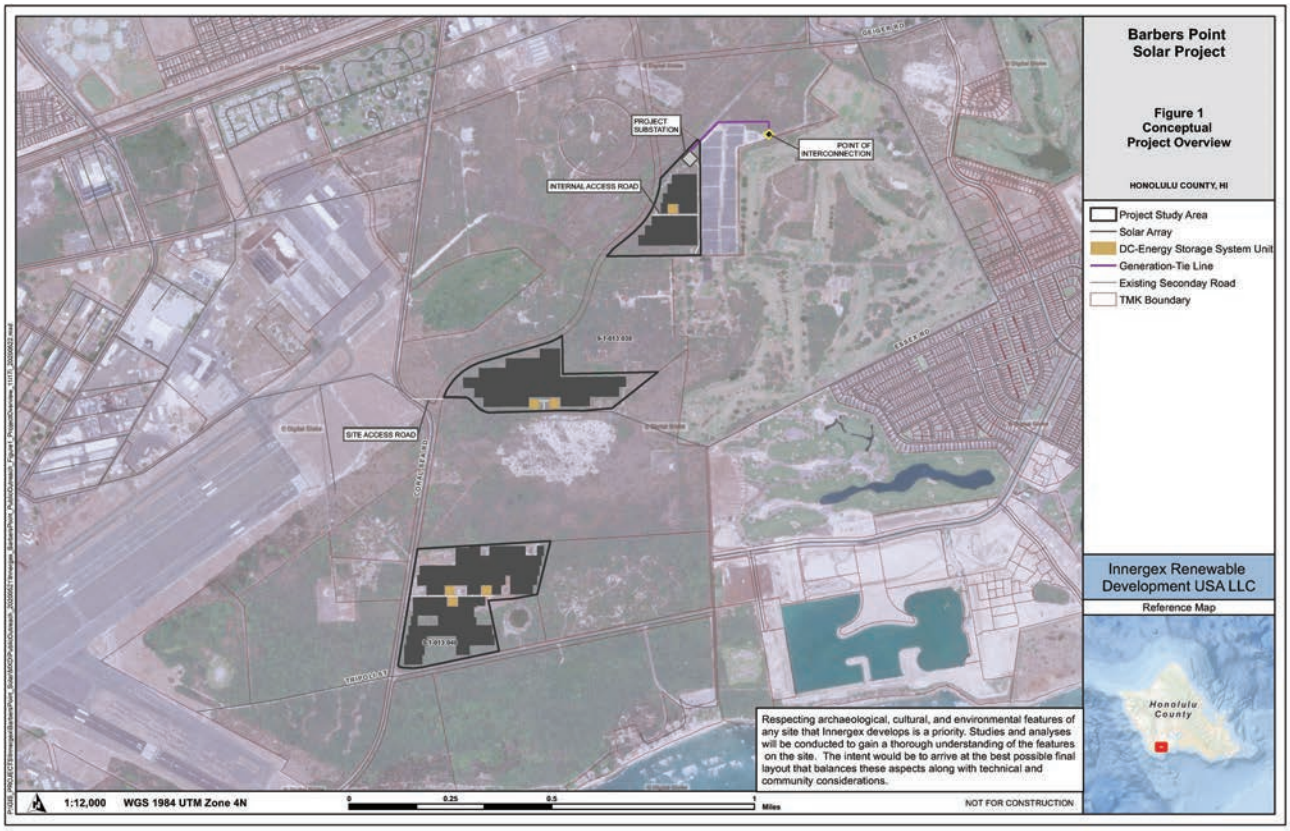


Barbers Point will be capable of generating up to 37,014 MWh per year

PRELIMINARY SITE LAYOUT PLAN



TIMELINE

July 2018	Execution of Right of Entry ✓
August 2019	Request for Proposals Issued ✓
November 2019	Request for Proposal Bids Submission ✓
May 2020	Final Award Group Selection and Contract Negotiations Begin ✓
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PRELIMINARY BIOLOGICAL SURVEY RESULTS

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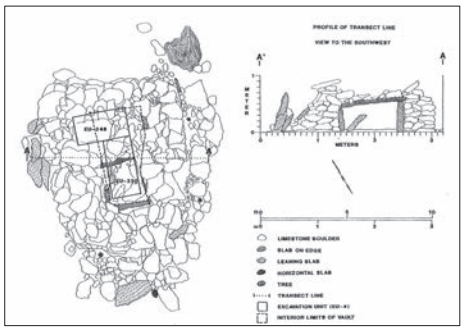
PRELIMINARY ARCHAEOLOGICAL SURVEYS

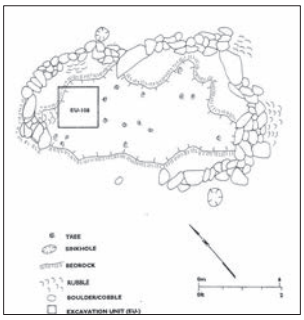
T-004, modified sink



SIHP 50-80-12-5100 “vaulted” cairn; no iwi kūpuna identified in excavation

SIHP 50-80-12-5106 Feature L enclosure

T-255, large unmodified sink



SIHP -1745 Feature A modified sink

T-091, C-shape

UPCOMING SURVEY – GEOTECHNICAL

An archaeological monitor will be on site full-time during the geotechnical surveys.

Geotechnical field survey photos from Paeahu Solar Project on Maui

REQUIRED GOVERNMENT PERMITS AND APPROVALS

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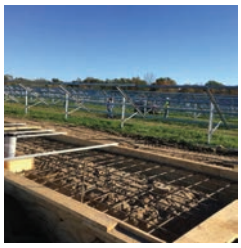
5 Battery storage installation

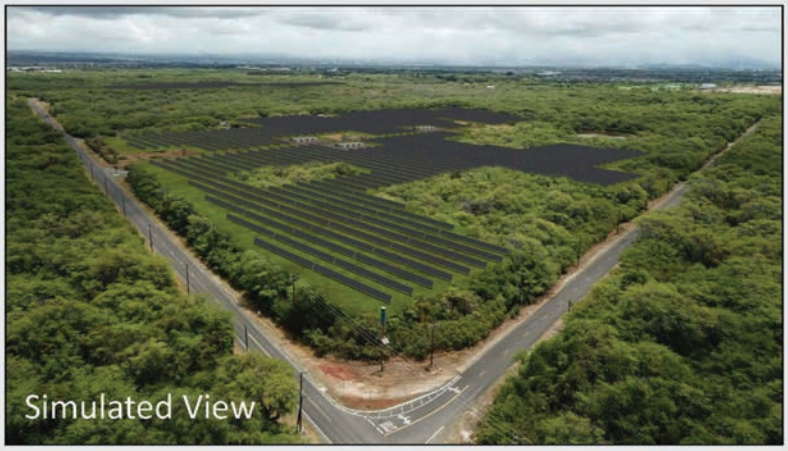
6 Commissioning



SIMULATED VIEW #1
CORAL SEA RD AND TRIPOLI ROAD

Existing Condition

The photograph to the right shows the current conditions of the Project area, including the existing vegetation.



The photograph shows an aerial view toward the Project area from the intersection of Coral Sea Road and Tripoli Road from an altitude of approximately 150 feet. From the simulated view, the area would have minimal visibility from the ground along either road because the solar field would be partially screened by existing Keawe trees and vegetation.

BARBER'S POINT SOLAR PROJECT

PHOTO SIMULATION

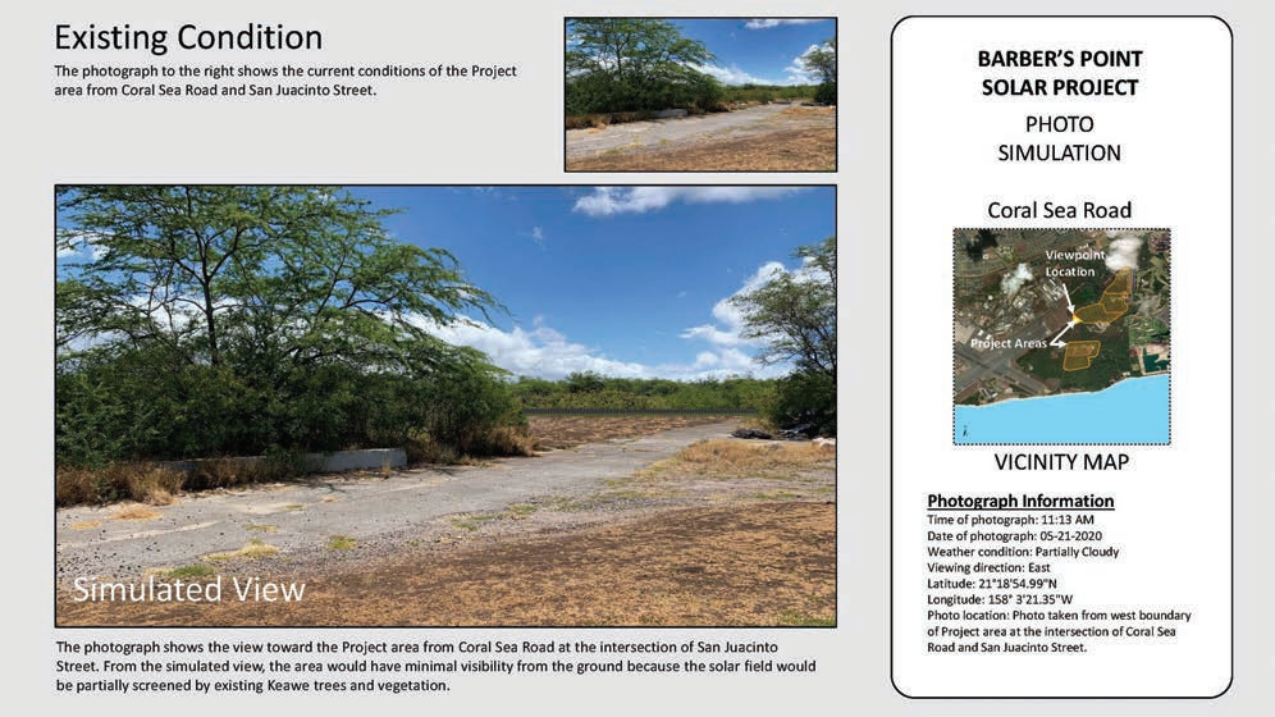
Coral Sea Road

VICINITY MAP

Photograph Information

Time of photograph: 11:35 AM
Date of photograph: 05-18-2020
Weather condition: Partially Cloudy
Viewing direction: North East
Latitude: 21°18'18.78"N
Longitude: 158° 3'26.14"W
Photo location: Photo taken from south west corner of Project area at the intersection of Coral Sea Road and Tripoli Road, from an altitude of approximately 150 ft.

SIMULATED VIEW #2
CORAL SEA ROAD AND SAN JUACINTO STREET

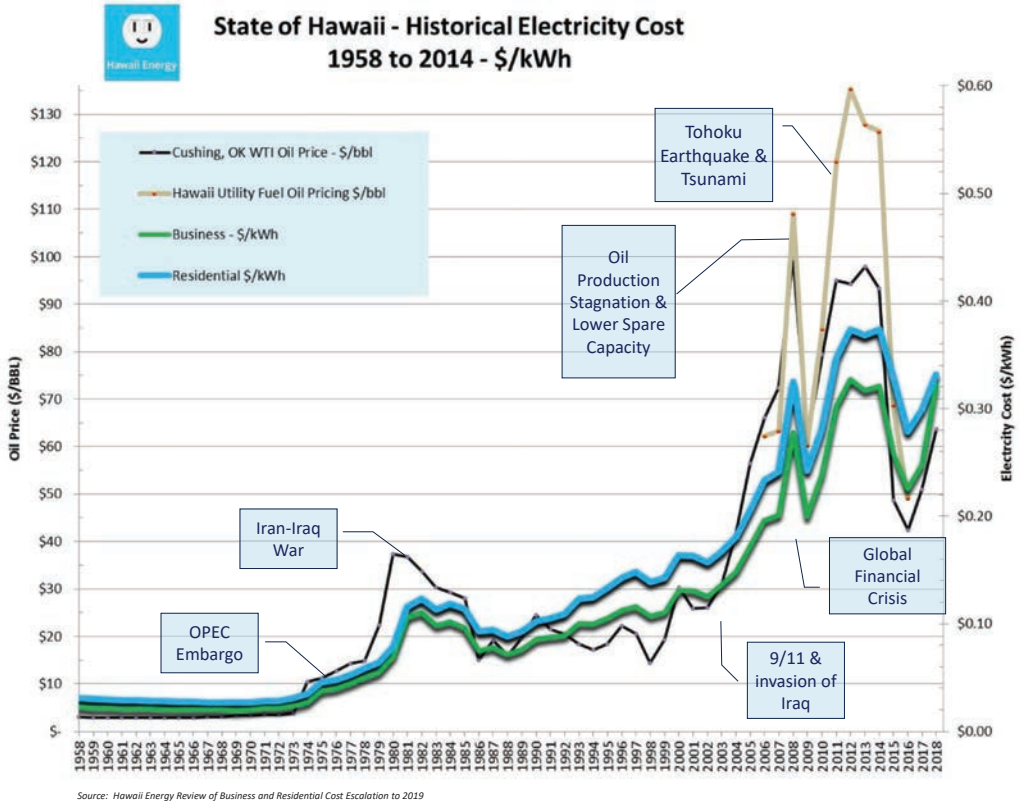


DECOMMISSIONING

The Power Purchase Agreement with HECO would be for a 25-year term.

- Innergex is responsible for the entire project life cycle, including the costs of decommissioning and recycling of component parts.
- As part of the decommissioning of a typical solar project, any and all components would be removed and the area would be returned to a similar condition as existed prior to the Project being developed.
- Reuse or recycling of materials will be prioritized over disposal. Recycling is an area of great focus in the solar industry, and programs for both batteries and solar panels are advancing every year.

PROJECT BENEFITS



COMMUNITY BENEFITS

"KCDC supports the solar project at Kalaeloa, because it aligns with DHHL's guiding documents but more importantly because this project provides DHHL, its beneficiaries, KCDC and the Kapolei homesteads with the resources for a sustainable future."
- **Scott Abrigo – President of Kapolei Community Development Corporation**

Dedicated funding to KCDC Kapolei Heritage Center	Support training program at the CNHA in partnership with Makaha Learning Centre	Opportunities for local workforce and businesses	Sponsorships and donations for local festivals, events, conferences, fundraisers	Memberships and activity in community organizations	Exploring other potential opportunities: adaptive re-use, tenant relocation, CBRE

LOCAL TRAINING OPPORTUNITIES

HAWAIIAN TRADES ACADEMY
O'AHU SOLAR PROGRAM

O'ahu Solar Program Applications Now Open!

Our Solar Program is your gateway to a career in the solar industry. It all starts with the fundamentals, and a solid understanding of various components, system architectures, and applications for photovoltaic (PV) systems. Program participants will learn site analysis, system sizing, array configuration, and performance estimation. Participants will also receive an OSHA-10 certification.

Instruction will be a hybrid of in-person and distance learning in order to abide by COVID-19 social distancing rules and regulations. The class will be split into two groups and take turns in attending in person and online. Classes for both groups are on Tuesdays and Thursdays from 5 - 9 p.m. for 8 consecutive weeks starting November 3rd.

At the end of the program, students will have the opportunity to participate in a job fair and meet employers who are looking to hire our trained graduates.

Applicants need to be at least 18 years old. Class enrollment is limited so complete this form if you are seriously interested. We will contact you to notify you if you have been selected for this program.

Mahalo nui to Innergex and the Makaha Learning Center for partnering with CNHA to bring this unique learning opportunity to our community.

APPLY ONLINE

INNERGEX

MAKAHA
LEARNING CENTER

The CNHA Hawaiian Trades Academy has launched the O'ahu Solar Program as a gateway to a career in the solar industry. If selected, there is no cost to attend the program.

PARTNERSHIP WITH WAI'ANAE GOLD

"The partnership with DTL and Innergex to get access to this aina in Kalaeloa, it's a key piece"

QUESTION AND ANSWER PERIOD

Please send any questions you have through:

- dedicated **CHAT** panel on the right side of your screen and direct it to the **HOST**
- email to barberspointsolar@innergex.com

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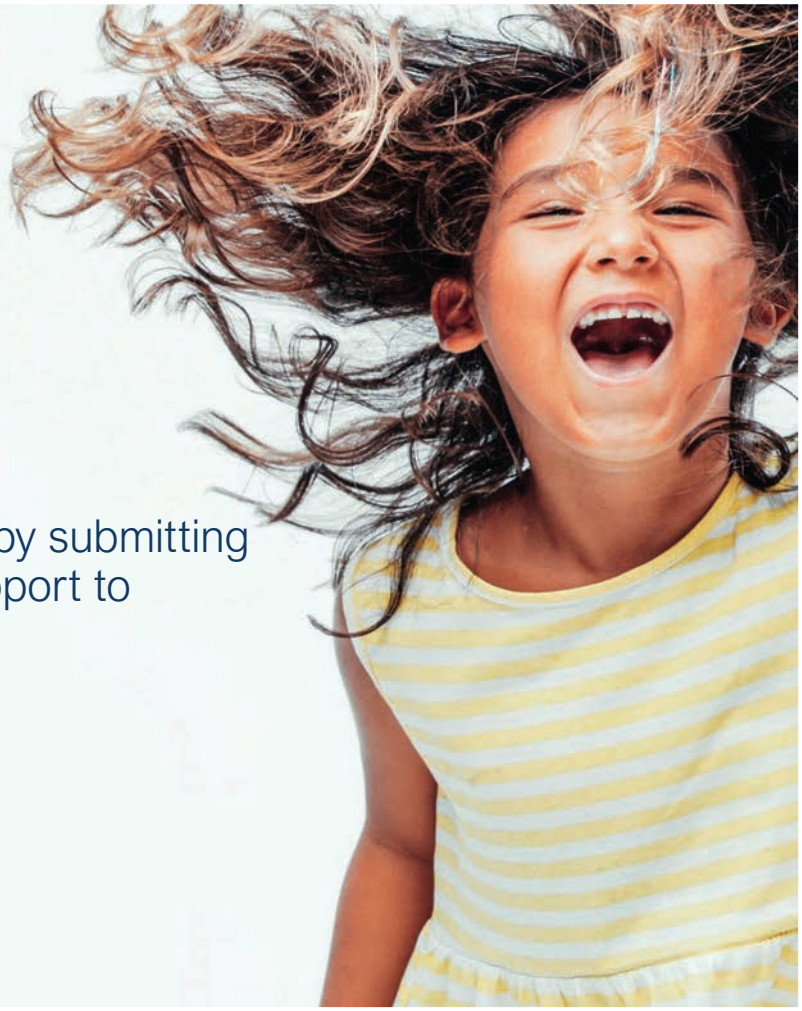
Renewable Energy.
Sustainable Development.



Thank you!

Your opinion is important to us.

Please provide us with feedback by submitting your comments, questions or support to barberspointsolar@innergex.com

Mahalo!

Appendix E – Public Comments

Marie Ryan

From: Jody Allione [redacted]
Sent: June 15, 2020 4:27 PM
To: Van der Veer, Valerie
Cc: Eddie Park; Julia Mancinelli
Subject: Re: Req for status as Consulting Party / Innergex Kalaeloa

Follow Up Flag: Follow up
Flag Status: Completed

MISE EN GARDE : Ce courriel provient de l'externe. Avant d'accéder à une pièce jointe ou à un lien de ce courriel, assurez-vous de reconnaître l'expéditeur et que le contenu est de confiance.
WARNING: This is an external e-mail. Before opening an attachment or clicking on a link, please make sure you recognize the sender and that the content is safe.

Aloha Valerie,
Here is the website link for the Barbers Point Solar project, that can also be accessed from the HECO Renewable Energy website.
https://www.innergex.com/development-opportunities-in-hawaii/the-barbers-point-solar-project/
The next public information meeting will be held via webinar due to Covid 19 mandates. See the attached announcement as posted in the Star Advertiser.

Julia Mancinelli

From: Barberspointsolar
Sent: Tuesday, November 10, 2020 9:57 PM
To: Monte McComber; Celeste Connors
Cc: Barberspointsolar; jodyallione[redacted]
Subject: RE: Connecting with Hawai`i Green Growth and the Aloha+ Challenge

Aloha Monte & Celeste

Thank you for e-troducing us to Celeste. Yes, we would be happy to meet and learn about the Aloha + Challenge.

Please let us know if there is a day/ time that works to virtually meet.

Sincerely

Julia Mancinelli
Director - Environment

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30 ans years

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Tel. 604 633-9990 x2231 | Cell. 604 345-4009 | www.innergex.com
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From: Monte McComber <[redacted]>
Sent: Tuesday, November 10, 2020 9:30 PM
To: Barberspointsolar <barberspointsolar@innergex.com>; Celeste Connors <[redacted]>
Subject: Connecting with Hawai`i Green Growth and the Aloha+ Challenge

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Aloha e Julia,

Via this message, I'd like to e-troduce you to Celeste Connors, CEO and Executive Director at Hawai`i Green Growth Local2030 (HGG). As I mentioned in the chat in tonight's WebEx presentation, the Barbers Point Solar Project may find it beneficial to learn about the Aloha+ Challenge and to connect with HGG. Aloha+ Challenge Link: https://aloha-challenge.hawaiigreengrowth.org/ As part of my job as the Cultural Director for Royal Hawaiian Center, I got involved with HGG as part of the Ala Wai Watershed Project .

Celeste, Julia Mancinelli from Inngerx can share about the 25-year plan for the Barbers Point Solar Project. Barbers Point Solar Project Link: https://www.innergex.com/development-opportunities-in-hawaii/the-barbers-point-solar-project/

Here's a quick timeline update for the Barbers Point Solar Project:

COMPLETED
July 2018, Execution of Right of Entry
August 2019, Request for Proposal Issued
November 2019, Request for Proposal Bid Submission
May 2020, Final Award Group Selection and Contract Negotiations Begin
September 2020, Execute Power Purchase Agreement (PPA)
Q1 2021, Public Utilities Commission Approval of the PPA

That's all from me.

Cheers
Monte McComber

Julia Mancinelli
Director - Environment

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Julia Mancinelli

From: Barberspointsolar
Sent: Sunday, November 8, 2020 1:47 PM
To: Alice Patig; Barberspointsolar
Subject: RE: Need info for student project

Aloha Alice

Thank you for your interest in our project and Hawaii's transition to 100% renewable energy.

As our project is in the early development phase the finer details of equipment and layout within the project study area have not been finalized. However, the preliminary layout and assumptions for inputs/equipment are detailed in the power purchase agreement (PPA) with Hawaiian Electric Company. Our PPA, as well as other renewable energy developers as part of the Phase I and II distributed renewable energy RFPs, can be found on the Hawaii Public Utilities Commission Document Management System. For our Barbers Point Solar Project, specifically search 2020-0143. Direct link to Barbers Point PPA: https://dms.puc.hawaii.gov/dms/DocumentViewer?pid=A1001001A20I16B50133J01218

Information on Hawaiian Electric Phase 2 Renewable Energy Projects can be found here (including the other project's PUC docket numbers). http://energy.hawaii.gov/hawaiian-electric-phase2

Information on our Barbers Point Solar Project can be found here: https://www.innergex.com/development-opportunities-in-hawaii/the-barbers-point-solar-project/

Best of luck with your assessment.

Innergex's Hawaii Project Team

From: Alice Patig <[redacted]>
Sent: Sunday, November 8, 2020 11:04 AM
To: Barberspointsolar <barberspointsolar@innergex.com>
Subject: Need info for student project

MISE EN GARDE : Ce courriel provient de l'externe. Avant d'accéder à une pièce jointe ou à un lien de ce courriel, assurez-vous de reconnaître l'expéditeur et que le contenu est de confiance.
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Dear Barbers point solar community,

My name is Alice Patig. I grew up on the Big Island and now study Electrical Engineering. I'm doing a research project (due mid November) about your new solar+storage project. I want to find out if the 6 new solar+storage sites on O'ahu can replace the coal plant (I read that here, and my goal is to prove it's true: https://www.renewableenergyworld.com/2020/09/18/hawaiian-electric-proposes-300-mw-of-renewables-plus-2000-mwh-of-storage-to-replace-coal-on-the-islands/?topic=263758).

For my project, I need info about:
- panels: module type, array type, system losses, aximuth and tilt

- battery: energy and power rating and round-trip efficiency
- the overall estimated cost of the project

And, if you already have it:
- approximate power output from the plant (solar+storage or individual) -> but hopefully I can calculate that with the info you give me above.
- if you have any info about the old coal plant or know someone who does, let me know.

I sincerely appreciate your help. I know you are probably busy. This means a lot!

Mahalo nui loa,
Alice

Julia Mancinelli

From: Barberspointsolar
Sent: Tuesday, November 10, 2020 9:58 PM
To: Monte McComber
Cc: Barberspointsolar; jodyallione[redacted]
Subject: RE: Introduction to Ulu A`e Learning Center, Kapolei-based educational and cultural non-profit

Aloha Monte

Yes, happy to connect – please let us know when you are available to meet virtually and/ or in person on Oahu with Jody.

Cheers

Julia Mancinelli
Director - Environment

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30 ans years

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From: Monte McComber <[redacted]>
Sent: Tuesday, November 10, 2020 9:31 PM
To: Barberspointsolar <barberspointsolar@innergex.com>
Subject: Re: Introduction to Ulu A`e Learning Center, Kapolei-based educational and cultural non-profit

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Sorry for not following up. Hoping we can pick up from our last conversation about meeting via video conference.

Mahalo
Monte

On Wed, Jul 15, 2020 at 10:41 AM Barberspointsolar <barberspointsolar@innergex.com> wrote:

> Aloha Monte

Yes, happy to arrange a call next week. Let me know if any of the below days/time work.

Monday, July 20: 7:30 am to 3 pm

Wednesday, July 22: 9 am to 10:30 am or noon to 3 pm

Thursday, July 23: 7:30 am to 10 am or noon to 3 pm

Friday, July 24: 7:30 am to 1 pm

Cheers

Julia Mancinelli
Director - Environment

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From: Monte McComber <[redacted]>
Sent: Wednesday, July 15, 2020 12:41 PM
To: Barberspointsolar <barberspointsolar@innergex.com>
Subject: Re: Introduction to Ulu A`e Learning Center, Kapolei-based educational and cultural non-profit

MISE EN GARDE : Ce courriel provient de l'externe. Avant d'accéder à une pièce jointe ou à un lien de ce courriel, assurez-vous de reconnaître l'expéditeur et que le contenu est de confiance.

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Sorry for the late reply. Might we try for next week? I had to fly, unexpectedly, to Hawai'i Island to assist my grandparents. I don't get the best reception where they live. My apologies.

On Thu, Jul 9, 2020 at 12:14 PM Barberspointsolar <barberspointsolar@innergex.com> wrote:

Aloha Monte

Thank you for attending the webinar yesterday. Yes, we would be happy to connect to hear more about the Ulu A`e Learning Center, programs and other opportunities.

I am available to meet via video conference next week. Please let me know if any of the below dates/times (HST) work.

Monday, July 13: 8-10 am or after 10 am

Tuesday, July 14: any time after 11 am

Wednesday, July 15: 11 am to 3 pm

Thursday, July 16: 8-10 am or noon to 3 pm

We look forward to connecting.

Sincerely

Julia Mancinelli
Director - Environment

INNERGEX

30 ans years

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Tel. 604 633-9990 x2231 | Cell. 604 345-4009 | www.innergex.com

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From: Monte McComber <[redacted]>
Sent: Thursday, July 9, 2020 11:27 AM
To: Barberspointsolar <barberspointsolar@innergex.com>
Subject: Introduction to Ulu A`e Learning Center, Kapolei-based educational and cultural non-profit

MISE EN GARDE : Ce courriel provient de l'externe. Avant d'accéder à une pièce jointe ou à un lien de ce courriel, assurez-vous de reconnaître l'expéditeur et que le contenu est de confiance.

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Aloha Kākou,

My name is Monte McComber. I live in Kapolei and am a board member for Ulu A`e Learning Center, a Kapolei-based educational and cultural non-profit. I attended yesterday's webinar. Mahalo for the outreach and opportunity to learn more about the project. I'm interested in introducing and sharing about Ulu A`e Learning Center, our programs, and the opportunities for partnerships and sponsorships. Please find below a link to our website. I'm happy to arrange a 20-minute video conference with our executive director, Miki`ala Lidstone, and the board to follow-up on sharing about the work we're doing in the community. There are things that Ulu A`e is doing that no other group in the area is doing. Things that have now become signature events for our families. Looking forward to hearing from you.

URL: https://uluae.org/

Mahalo

Monte

[redacted]

Julia Mancinelli

From: Homelani Schaedel <[redacted]>
Sent: Thursday, November 19, 2020 7:36 PM
To: Julia Mancinelli
Subject: RE: Virtual Meeting

MISE EN GARDE : Ce courriel provient de l'externe. Avant d'accéder à une pièce jointe ou à un lien de ce courriel, assurez-vous de reconnaître l'expéditeur et que le contenu est de confiance.
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Aloha e Julia:

I appreciate and am very happy to hear contact was made with Shad. I respect his devotion to caring for the land and sharing his knowledge of our ahupua'a of Honouliuli. I'm glad to have had a conversation with Jody and the project she is working on. I hope to learn more of it as she progresses.

Mahalo for the link to your Power Point, it will be helpful to our Mal'ohai homestead board members who could not attend the virtual meeting.

Malama pono,
Home

From: Julia Mancinelli [mailto:JMancinelli@innergex.com]
Sent: Thursday, November 19, 2020 5:13 PM
To: Homelani Schaedel <[redacted]>
Cc: jodyallione[redacted] <[redacted]>; Barberspointsolar <barberspointsolar@innergex.com>
Subject: RE: Virtual Meeting

Aloha Home

I wanted to circle back on your three Barbers Point items below.

Pacific Legacy had a really lovely and informative cultural interview with Shad Kane last week. I am also glad to hear that you were able to have an in-depth conversation with Jody about CBRE.

The PowerPoint presentation and recording of the KCDC community update is now posted on our the project website in the downloads section. https://www.innergex.com/hawaii/barbers-point/downloads/

Please do not hesitate to reach out should you have any further questions.

Cheers

Julia Mancinelli
Director - Environment

888 Dunsmuir Street, Suite 1100, Vancouver, BC V6C 3K4
Tel. 604 633-9990 x2231 | Cell. 604 345-4009 | www.innergex.com
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From: Barberspointsolar <barberspointsolar@innergex.com>
Sent: Tuesday, November 10, 2020 9:51 PM
To: Homelani Schaedel <[redacted]>; Barberspointsolar <barberspointsolar@innergex.com>; jodyallione[redacted] <[redacted]>
Subject: RE: Virtual Meeting

Aloha Home

Thank you for attending tonight's event and apologies for your questions not making it to the host.

1. Yes, the team has reached out to Shad Kane/Heritage Park and requested to conduct a cultural interview with him.
2. @Jody Allione can you please connect to further discuss CBRE.
3. Yes, we will be posting the presentation and a recording of the video onto our project website. Once it is posted, I can sent you a link.

Sincerely

Julia Mancinelli
Director - Environment

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Tel. 604 633-9990 x2231 | Cell. 604 345-4009 | www.innergex.com
Facebook | Twitter | LinkedIn

From: Homelani Schaedel <[redacted]>
Sent: Tuesday, November 10, 2020 9:27 PM
To: Barberspointsolar <barberspointsolar@innergex.com>
Subject: Virtual Meeting

MISE EN GARDE : Ce courriel provient de l'externe. Avant d'accéder à une pièce jointe ou à un lien de ce courriel, assurez-vous de reconnaître l'expéditeur et que le contenu est de confiance.
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Aloha

I submitted 2 questions to Chat, but I guess Matt didn't get them?

1. Has anyone had cultural consultation with Shad Kane/Heritage Park?
2. Would like more info on the last box Jodi when Jodi was speaking…ending with CBRE
3. Will you share your powerpoint with us?

Mahalo,
Home Schaedel
Malu'ohai

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Super Balanos Active Sax
Wanted, 40's, 50's, 60's.
Any condition. Cash buyer.
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Honolulu, Hawaii 96813
Telephone: (808) 489-9741

Attorneys for Petitioner
1900 CAPITAL TRUST II, BY U.S. BANK TRUST NATIONAL ASSOCIATION, NOT IN ITS INDIVIDUAL CAPACITY BUT SOLELY AS CERTIFICATE TRUSTEE

THIRD CIRCUIT COURT NOTICE

P. NO. 3CLP-20-0000114

THE ESTATE OF EDWARD REYES MENDIOLA,
DECEASED.

FILED, Petition for Appointment of Special Administrator of 1900 CAPITAL TRUST II, BY U.S. BANK TRUST NATIONAL ASSOCIATION, NOT IN ITS INDIVIDUAL CAPACITY BUT SOLELY AS CERTIFICATE TRUSTEE, showing property within the jurisdiction of this Court and asking that Mimi Mendiola Castro, whose address is 669 College Parkway Apt. 13, Carson City, Nevada 89706 and William Mendiola, whose address is P.O. Box 436, Hanapepe, Hawaii 96716-0436 and Naomi Mendiola, whose address is 1377 Kapiolani Street, Apt. 206B, Hilo, Hawaii 96720-4062, be appointed Co-Special Administrators for said estate.

That, Tuesday, June 30, 2020 at 8:00 a.m. before presiding Judge at Hale Kaulike, 777 Kilauea Avenue, Hilo, HI 96720 is the appointed date, time and place of hearing on the Petition and all interested person.

Pursuant to Rule 10(e) of the Hawaii Probate Rules, any party wishing to object or respond to the Petition shall file such objection with the Court or serve it on all interested persons within thirty (30) days of the date of this Notice.

DATED: Hilo, Hawaii, APR 27 2020.

Byron K. Poy
CLERK OF THE ABOVE-ENTITLED COURT
(SA1280503 5/26, 6/2, 6/9/20)

Notices to Creditors

FIRST CIRCUIT COURT NOTICE AND NOTICE TO CREDITORS

P. NO. 1CLP-20-0000296

ESTATE OF TAMMY CHEUNG JA TABUYO, Deceased

FILED, an Application by BILLY J. A. TABUYO, alleging intestacy of said decedent, showing property within the jurisdiction of this Court and asking that BILLY J. A. TABUYO, whose address is 1910 Luziana Street, Honolulu, Hawaii 96813, be appointed Personal Representative of said estate.

If any interested person has objection to the informal probate, the person may file a petition for formal intestacy proceedings; if any interested person desires further notice concerning the estate, including notice concerning the closing and distribution of the estate, the person must file a Demand for Notice pursuant to HRS § 560:3-204.

All creditors of the above-named estate are hereby notified to present their claims with proper vouchers or duly authenticated copies thereof, even if the claim is

Summons

IN THE CIRCUIT COURT OF THE FIRST CIRCUIT

STATE OF HAWAII

SUMMONS

TO: PRODUCTION HAWAII INCORPORATED, SPECIAL EVENT EQUIPMENT, INCORPORATED, and MICHAEL C. ROSSELL

YOU ARE HEREBY NOTIFIED that Plaintiff SHOBU'S REFRIGERATION AND AIR CONDITIONING, INC., Plaintiff, has filed an Amended Complaint in Civil No. 19-1-0550-04, praying for a judgment for the sum of $89,800.00 plus prejudgment interest, its reasonable attorneys' fees and costs, and any further relief that this Court deems proper.

YOU ARE HEREBY SUMMONED to appear before the Honorable John M. Tonaki in his courtroom in the 5th floor, 1111 Alakea Street, Honolulu, HI 96813 on July 14, 2020, at 9:00 o'clock a.m., of said day or to file an answer or other pleading and serve it below said day upon Plaintiff's attorney LESTER K. M. LEU of LEU ORUDA & DOI whose address is The Merchant House, 222 Merchant Street, Main Floor, Honolulu, Hawaii 96813. If you fail to do so, judgment by default will be taken against you for the relief demanded in the Complaint.

DATED: Honolulu, Hawaii, May 13, 2020.

/s/Jamie E. Chun (SEAL)
CLERK OF THE ABOVE-ENTITLED COURT
(SA1280025 5/26, 6/2, 6/9, 6/16/20)

For questions related to
your Honolulu Star-Advertiser
subscription call
538-NEWS(6397)
Star Advertiser

Notices to Creditors

Public Notice

Summons

IN THE FAMILY COURT OF THE THIRD CIRCUIT

STATE OF HAWAII

FC-S No. 19-0057K

In the interest of a FEMALE CHILD born January 21, 2006
Born to Pamelarina Jack

TO: PAMELARINA JACK JOSHUA WILLIAMS

UNKOWN NATURAL FATHER

YOU ARE HEREBY NOTIFIED that a hearing regarding the above-i matter will be held at the Family Court of the Third Circuit, Kona Division, Courthouse, 74-5451 Kamakaeha Avenue, Kailua-Kona, Hawaii 96740 o 2020 at 10:00 a.m. before the Honorable Presiding Judge of the above Court;

You are hereby advised that if you fail to appear on the date set for notice or to file an answer with the clerk of the Family Court of the Thir Kona Division, whose mailing address is: Keakaka Courthouse, Kamakaeha Avenue, Kailua-Kona, Hawaii 96740, before the date of the further action shall be taken without further notice to you.

YOUR PARENTAL AND CUSTODIAL DUTIES AND RIGHTS CONCERN CHILD WHO IS THE SUBJECT OF A PETITION MAY BE TERMINATED BY A PERMANENT CUSTODY IF YOU FAIL TO APPEAR ON THE DATE SET FORTH NOTICE.

At the hearing, you have the right to retain and be represente attorney. If you cannot afford an attorney, please contact the Family Court the appointment of an attorney to represent you.

DATED: Kailua-Kona, Hawaii, MAY 22, 2020.

SHANNON THARP
CLERK OF THE ABOVE-ENTITLED COU

CLARE E. CONNORS 7936
Attorney General
VALERIE LOWSON 10998
Deputy Attorney General
77-6399 Nalani Street, Suite 101
Kailua-Kona, Hawaii 96740
Tel. No. (808) 327-6260
Attorneys for the Department
of Human Services
(SA1280822 5/26, 6/2, 6/9, 6/16/20)

Public Notice

NOTICE OF VIRTUAL
PUBLIC OPEN HOUSE

FOR THE PROPOSED BARBERS POINT SOLAR PROJECT

Innergex Renewable Development USA, LLC has been selected to the Final Award Group in Hawaiian Electric's competitive process to negotiate a contract for our Barbers Point Solar Project that

Jody

On Mon, Jun 15, 2020 at 12:46 PM Van der Veer, Valerie [redacted] wrote:

Aloha Jody,

Just checking in regarding the website mentioned in your email below. Can you provide me with the website or link to the conceptual plan?

Also, will there be a public meeting or any meeting in the near future?

Mahalo for any assistance.
Valerie

Sent via the Samsung Galaxy Note8, an AT&T 5G Evolution capable smartphone

-------- Original message --------
From: Jody Allione [redacted]
Date: 5/27/20 5:37 PM (GMT-10:00)
To: "Van der Veer, Valerie" [redacted]
Cc: Eddie Park <EPark@innergex.com>, Julia Mancinelli <JMancinelli@innergex.com>
Subject: Re: Req for status as Consulting Party / Innergex Kalaeloa

Thank you for your interest Valerie. Julia will forward your information to the consultants who will be in touch with you. Please call me at any time if you have any questions.
Jody Allione
[redacted]

On Wed, May 27, 2020 at 3:32 PM Van der Veer, Valerie [redacted] wrote:

Aloha Jody,

We have heard through the coconut wireless that Section 106 consultation, for your Innergex project located on DHHL land in Kalaeloa, will begin in June.

I would like to request to participate as a Consulting Party.

Our organization, the Barbers Point Riding Club (BPRC), is adjacent to a good portion of your project. We are the current stewards of Barbers Point Stables and the historic revetments located on our 25 acre parcel have been adaptively reused to house horses for well over 70 years. Our focus is on protecting and preserving our stables/facility while offering affordable horse boarding to military families.

We hope to be good neighbors and hopefully contribute to the solutions and successes during the 106.

Mahalo and my best,
Valerie

[redacted]

[redacted]

Wire Fraud is Real. Before wiring any money, call the intended recipient at a number you know is valid to confirm the instructions. Additionally, please note that the sender does not have authority to bind a party to a real estate contract via written or verbal communication.

--

Jody Allione

[redacted]

Hawaii Project Development

--

Jody Allione

[redacted]

Hawaii Project Development

Marie Ryan

From: Jody Allione [redacted]
Sent: May 21, 2020 4:22 PM
To: John Bond
Cc: Julia Mancinelli; Eddie Park
Subject: Re: Is DHHL or Innergex planning a Section 106 consultation?

MISE EN GARDE : Ce courriel provient de l'externe. Avant d'accéder à une pièce jointe ou à un lien de ce courriel, assurez-vous de reconnaître l'expéditeur et que le contenu est de confiance.
WARNING: This is an external e-mail. Before opening an attachment or clicking on a link, please make sure you recognize the sender and that the content is safe.

Hi John,

Nice to hear from you. Hope you are doing well in this very interesting time. I appreciate being cc'd on your correspondence related to the Ewa Preservation area.

In response to your inquiries:

- Yes, Section 106 consultation will be occurring – both developer and agencies. Pacific Legacy will be doing this work starting in June. We would appreciate any specific recommendations on who should be consulted beside Kanehili Cultural Hui and who else they should talk to at the Hui besides yourself. There is a long list of consultations being prepared. I am directly involved as the local contact and part of the team including Julia and Eddie from Innergex (cc'd on this email) for general community consultation, but the reps from Pacific Legacy are doing the technical outreach, so they will likely be in touch with you soon.

- A conceptual layout will be available on May 31 – we can forward you a link to the website once it is launched by the end of this month. However a larger study area will be surveyed to allow for flexibility in final design of the project. There will be a public information webinar in early July that will be an open presentation and forum for questions. You will receive an email announcement about this meeting in early June and information on the project will be updated on this website regularly.

- Perhaps we can meet to discuss any issues you have related to the solar project and I'm interested in your position about the Ewa Battlefield Preservation Plan that is in process. We can meet outside somewhere. I have to come up to Kapolei next week on either Wednesday or Friday morning. I will be available to meet after 10:30 am or we can chat on the phone at your convenience if that's more convenient. Let me know if you are interested and I will make the arrangements accordingly.

Best Regards,

Jody

On Thu, May 21, 2020 at 9:54 AM John Bond [redacted] wrote:

> Hi Jody,
>
> Is DHHL or Innergex planning a Section 106 consultation?

Whose responsibility is the community consultation?

Has the actual area of the PV been defined in relation to the DHHL parcel?

John

--

Jody Allione

[redacted]

Hawaii Project Development

Marie Ryan

From: Jody Allione [redacted]
Sent: May 28, 2020 8:59 AM
To: [redacted]
Cc: John Bond; Julia Mancinelli
Subject: Re: DHHL PV Project

MISE EN GARDE : Ce courriel provient de l'externe. Avant d'accéder à une pièce jointe ou à un lien de ce courriel, assurez-vous de reconnaître l'expéditeur et que le contenu est de confiance.
WARNING: This is an external e-mail. Before opening an attachment or clicking on a link, please make sure you recognize the sender and that the content is safe.

Thank you for your email. We will forward your information to the consultants for the Section 106 consultation.

We will be publishing the webinar information for the July 8 webinar in early June and will make sure you are notified.

Mahalo,
Jody

On Thu, May 28, 2020 at 12:03 AM [redacted] wrote:

> Aloha Ms. Allione,
>
> My name is Karen Luke, [redacted] and I have worked with John Bond and Mike Lee, who we all miss very much. May I please be notified of the public information webinar in early July?
>
> Please let me know what information you require of me to participate as a Section 106 consulting party.
>
> Mahalo,
> Karen Luke
> [redacted]

--
Jody Allione
[redacted]

Hawaii Project Development

Marie Ryan

From: Jody Allione [redacted]
Sent: June 3, 2020 6:42 PM
To: Jeffrey Wang
Cc: Julia Mancinelli
Subject: Re: Ewa Battlefield

Follow Up Flag: Follow up
Flag Status: Completed

MISE EN GARDE : Ce courriel provient de l'externe. Avant d'accéder à une pièce jointe ou à un lien de ce courriel, assurez-vous de reconnaître l'expéditeur et que le contenu est de confiance.
WARNING: This is an external e-mail. Before opening an attachment or clicking on a link, please make sure you recognize the sender and that the content is safe.

Mr. Wang,
Thank you for your interest. We will add your name to the consultation list related to Innergex's proposed Barbers Point Solar project.
Jody Allione
Project Consultant
Innergex

On Wed, Jun 3, 2020 at 3:32 PM Jeffrey Wang [redacted] wrote:

> To: Jody Allione
>
> Hello, I would like to introduce myself and become officially recognized as a consulting party for the upcoming projects involving the Ewa Battlefield.
> My name is Jeffrey Wang, MD. I, along with Paul Gomes, represent Military Vehicles of the Pacific. We are a 501c3 entity which supports the historic preservation of the area.
>
> If you have any questions or comments, please do not hesitate to contact me via:
>
> email: [redacted]
> phone: [redacted]
>
> Thank you for your time,
>
> Jeffrey Wang, MD

--

Jody Allione
[redacted]

Hawaii Project Development

Marie Ryan

From: Jody Allione [redacted]
Sent: June 29, 2020 4:01 PM
To: John Bond
Cc: Julia Mancinelli; Eddie Park; McPherson, Nancy M
Subject: Re: Confusing Information: Is/are Innergex Public Meeting(s) July 6, 7, 8?

Follow Up Flag: Follow up
Flag Status: Completed

MISE EN GARDE : Ce courriel provient de l'externe. Avant d'accéder à une pièce jointe ou à un lien de ce courriel, assurez-vous de reconnaître l'expéditeur et que le contenu est de confiance.
WARNING: This is an external e-mail. Before opening an attachment or clicking on a link, please make sure you recognize the sender and that the content is safe.

Hi John,
The notice you published was for a DHHL meeting to review the granting of the RIght of Entry to Innergex last July.

The next public meeting is on July 8 webinar, which is the notice I sent you last week. Ongoing updates are on our website as well: https://www.innergex.com/development-opportunities-in-hawaii/the-barbers-point-solar-project/#:~:text=Barbers%20Point%20Solar%20Project%20is,on%20the%20island%20of%20Oahu.

You can register for the webinar per the link in the yellow banner at the top of the first page.

Aloha,
Jody

On Sun, Jun 28, 2020 at 5:35 PM John Bond [redacted] wrote:

> Aloha,
>
> Is there an update about this? Does the public know where?
>
> https://dhhl.hawaii.gov/wp-content/uploads/2019/07/July-8-9-HHC-Public-Hearing-Kalaeloa.pdf
>
> NOTICE: Hawaiian Homes Commission Public Hearings on the Proposed Kalaeloa
> Solar Energy Project.
>
> Purpose: To provide an outline of the solar energy project proposed by Innergex Renewables USA
> LLC, https://www.innergex.com/about/
> on DHHL lands in Kalaeloa, O'ahu and receive testimony from interested parties
> and the general public.
>
> Dates:
> Monday, July 8, 2019 - *6 p.m.
> Tuesday, July 9, 2019 - *9 a.m.

--

Jody Allione

[redacted]

Hawaii Project Development

Marie Ryan

From: Barberspointsolar
Sent: June 30, 2020 9:09 AM
To: John Bond; Barberspointsolar
Subject: RE: webinar per the link???

Follow Up Flag: Follow up
Flag Status: Completed

Thank you for your interest in attending the Virtual Open House for the Barbers Point Solar Project on Wednesday, July 8, 2020. Please follow the link below and complete the registration process.

Register here: https://innergex.webex.com/innergex/onstage/g.php?MTID=e199a0d67ae5a75fdc758870534da1934

We look forward to sharing this exciting project with you and getting your feedback on our proposal!

BARBERS POINT SOLAR PROJECT

INNERGEX

30 ans years

From: John Bond [redacted]
Sent: Monday, June 29, 2020 6:05 PM
To: Barberspointsolar <barberspointsolar@innergex.com>
Subject: webinar per the link???

MISE EN GARDE : Ce courriel provient de l'externe. Avant d'accéder à une pièce jointe ou à un lien de ce courriel, assurez-vous de reconnaître l'expéditeur et que le contenu est de confiance.
WARNING: This is an external e-mail. Before opening an attachment or clicking on a link, please make sure you recognize the sender and that the content is safe.

When, Where, How?

John Bond

Marie Ryan

From: Pono Shim [redacted]
Sent: July 2, 2020 11:37 AM
To: Barberspointsolar
Subject: RE: Meet Barbers Point Solar Project - Invite to Open House - July 8, 2020

Follow Up Flag: Follow up
Flag Status: Completed

MISE EN GARDE : Ce courriel provient de l'externe. Avant d'accéder à une pièce jointe ou à un lien de ce courriel, assurez-vous de reconnaître l'expéditeur et que le contenu est de confiance.
WARNING: This is an external e-mail. Before opening an attachment or clicking on a link, please make sure you recognize the sender and that the content is safe.

Thank you Vanessa! I'm seeing if the projects my qualify for New Markets Tax Credits since we have been a 3 time awarded CDE and look for good projects if we're awarded again.

Aloha Pono

Sent via the Samsung Galaxy S8+, an AT&T 5G Evolution capable smartphone

-------- Original message --------
From: Barberspointsolar <barberspointsolar@innergex.com>
Date: 7/2/20 8:04 AM (GMT-10:00)
To: Pono Shim [redacted] Barberspointsolar <barberspointsolar@innergex.com>
Subject: RE: Meet Barbers Point Solar Project - Invite to Open House - July 8, 2020

Aloha Pono,

Thank you for your email.

The TMK's for Barbers Point Solar Project is: (1) 9-1-013:038, (1) 9-1-013:040

Thank you!

Vanessa Fahr
Administrative Assistant

INNERGEX
30 ans years

888 Dunsmuir Street, Suite 1100, Vancouver, BC V6C 3K4
Tel. 604 633-9990 x2246 | Fax. 604 633-9991 | www.innergex.com

Facebook | Twitter | LinkedIn

From: Pono Shim [redacted]
Sent: July 1, 2020 12:27 AM
To: Barberspointsolar <barberspointsolar@innergex.com>
Subject: RE: Meet Barbers Point Solar Project - Invite to Open House - July 8, 2020

MISE EN GARDE : Ce courriel provient de l'externe. Avant d'accéder à une pièce jointe ou à un lien de ce courriel, assurez-vous de reconnaître l'expéditeur et que le contenu est de confiance.

WARNING: This is an external e-mail. Before opening an attachment or clicking on a link, please make sure you recognize the sender and that the content is safe.

Aloha~

Would you please send me the TMK of the project sites?

Mahalo, Pono

Pono Shim
[redacted]

From: Barberspointsolar [barberspointsolar@innergex.com]
Sent: Monday, June 29, 2020 12:54 PM
To: Pono Shim
Subject: Meet Barbers Point Solar Project - Invite to Open House - July 8, 2020

Aloha Oahu Economic Development Board

We are writing today to introduce you to the Barbers Point Solar Project and Innergex Renewable Development USA, LLC (Innergex), whom you will be hearing more about in the coming months, and **invite you to a Virtual Public Open House on July 8, 2020**.

Background

In 2019, the Department of Hawaiian Home Lands (DHHL) launched a competitive solicitation process for a Right-of-Entry agreement to develop a solar project in Kalaeloa. Innergex Renewables USA LLC (Innergex) was selected through this process which also included consultation meetings with DHHL beneficiaries and public hearings. Subsequently, Innergex submitted a proposal for the Barbers Point Solar Project in response to a Hawaiian Electric competitive procurement process and recently was selected to the Final Award Group to negotiate a power purchase agreement that will help the state in its goal to transition to 100% renewable energy by 2045.

The Project

The proposed Barbers Point Solar Project is located on a land owned by the Department of Hawaiian Home Lands in Kapolei. The project is a 15 MWac solar PV system coupled with an 60 MWh battery energy storage system (see attached handout). The project would provide Oahu with energy security and grid resiliency through a clean, renewable source of power. The storage system will allow the power to be dispatched in the morning and evening when the utility needs it most and during emergencies – when rooftop solar is not available. Once all permits and approvals are obtained, the project is targeted to start construction by the end of 2022 and be operational by the end of 2023.

From *Scott A. Abrigo – President of Kapolei Community Development Corporation*
"KCDC supports the solar project at Kalaeloa, because it aligns with DHHL's guiding documents but more importantly because this project provides DHHL, its beneficiaries, KCDC and the Kapolei homesteads with the resources for a sustainable future."

Invite to Virtual Open House

Please mark your calendar for our **virtual Public Open House on July 8th** about the project. To register, please visit the project website (barberspointsolar.com) and click the registration link or email us (barberspointsolar@innergex.com) and a registration link and event details will be emailed to you. There is also a wealth of information about the project for you to access on the project website.

If at any time you have any questions or comments you wish to share regarding our project, we welcome you dropping us a line at barberspointsolar@innergex.com. We have much to share with you and look forward to connecting with you over the coming months.

Mahalo

Eddie Park, Director – Business Development
Julia Mancinelli, Director - Environment

INNERGEX
30 ans years

Email: barberspointsolar@innergex.com | barberspointsolar.com | www.innergex.com
Facebook | Twitter | LinkedIn

Marie Ryan

From: Emlovyte Maikui-Grambusch [redacted]
Sent: July 6, 2020 2:07 PM
To: Barberspointsolar
Subject: Barber's Point Solar Project!

MISE EN GARDE : Ce courriel provient de l'externe. Avant d'accéder à une pièce jointe ou à un lien de ce courriel, assurez-vous de reconnaître l'expéditeur et que le contenu est de confiance.
WARNING: This is an external e-mail. Before opening an attachment or clicking on a link, please make sure you recognize the sender and that the content is safe.

My wife and I are part Hawaiian and are DHHL homesteaders. We recently received a letter from your corporation , dated June 23, 2020.
We do not accept you using our mailing address , to mail us this letter.
We have 'never' agreed to DHHL sub leasing DHHL lands to 'any' non-Hawaiian corporate entities.
To us it is immoral, unethical and insulting to ,all Hawaiians!

The sign say's in front of the DHHL administrative office: 'Department of Hawaiian Homes Lands'!
The main word in the title is "HOMES"!
Your corporation is from the mainland, non-Hawaiian and were successful in politically manipulating the Chairman, the DHHL commissioners, Governor and other state
politicians for your own corporate theft of Hawaiian lands.
Your company asked for a lease which should not have transpired in the first placed. The manipulation had been sealed because Hawaiian land "cheap" rent!
Who gave your corporation to use our mailing address to mail us your insulting letter?
You name the project Barbers Point, but refer to the land as Kalaeloa?
Thank-You in conjunction with DHHL, it's Chairman, and the puppet DHHL commissioner's, Governor and crooked state politician's for approving this
cheap land theft from DHHL!
My spouse and I, as DHHL homesteaders do not approve of your project! Anyway shape or form! Period!
Revoke da lease, go back home!

Marie Ryan

From: Barberspointsolar
Sent: July 7, 2020 1:29 PM
To: Pono Shim; Barberspointsolar
Subject: RE: Meet Barbers Point Solar Project - Invite to Open House - July 8, 2020

Follow Up Flag: Follow up
Flag Status: Completed

Aloha Pono,

Eddie and Julia can be available to meet with you on Thursday between 12:30 pm and 2 pm or on Friday anytime between 9 am and 2 pm HST. If any of those times work for you please let me know and I will send a calendar invite to you.

Thank you!

Vanessa Fahr
Administrative Assistant

INNERGEX
30 ans years

888 Dunsmuir Street, Suite 1100, Vancouver, BC V6C 3K4
Tel. 604 633-9990 x2246 | Fax. 604 633-9991 | www.innergex.com
Facebook | Twitter | LinkedIn

From: Pono Shim [redacted]
Sent: July 6, 2020 7:52 PM
To: Barberspointsolar <barberspointsolar@innergex.com>
Subject: RE: Meet Barbers Point Solar Project - Invite to Open House - July 8, 2020

MISE EN GARDE : Ce courriel provient de l'externe. Avant d'accéder à une pièce jointe ou à un lien de ce courriel, assurez-vous de reconnaître l'expéditeur et que le contenu est de confiance.
WARNING: This is an external e-mail. Before opening an attachment or clicking on a link, please make sure you recognize the sender and that the content is safe.

Aloha Vanessa,

May I schedule a meeting with a Principal of the Project to dive a little deeper? The Oahu Economic Development Board formed a Community Development Entity (Punawai O Puuhonua) in Partnership with American Savings Bank about a decade ago.

As a CDE we are eligible to apply for New Markets Tax Credits. We have been awarded 3 times for an aggregate total of $135 mm of NMTC. We're waiting to hear about the next round of awards (probably released this month). We typically

invest our allocation in 3 focus areas: Clean Energy, Healthy Food systems, and Health Care. We have had (in the past) requirements to invest a percentage on DHHL.

Mahalo, Pono

Pono Shim
[redacted]

From: Barberspointsolar [barberspointsolar@innergex.com]
Sent: Thursday, July 02, 2020 8:04 AM
To: Pono Shim; Barberspointsolar
Subject: RE: Meet Barbers Point Solar Project - Invite to Open House - July 8, 2020

Aloha Pono,

Thank you for your email.

The TMK's for Barbers Point Solar Project is: (1) 9-1-013:038, (1) 9-1-013:040

Thank you!

Vanessa Fahr
Administrative Assistant

INNERGEX
30 ans years

888 Dunsmuir Street, Suite 1100, Vancouver, BC V6C 3K4
Tel. 604 633-9990 x2246 | Fax. 604 633-9991 | www.innergex.com
Facebook | Twitter | LinkedIn

From: Pono Shim [redacted]
Sent: July 1, 2020 12:27 AM
To: Barberspointsolar <barberspointsolar@innergex.com>
Subject: RE: Meet Barbers Point Solar Project - Invite to Open House - July 8, 2020

MISE EN GARDE : Ce courriel provient de l'externe. Avant d'accéder à une pièce jointe ou à un lien de ce courriel, assurez-vous de reconnaître l'expéditeur et que le contenu est de confiance.

WARNING: This is an external e-mail. Before opening an attachment or clicking on a link, please make sure you recognize the sender and that the content is safe.

Aloha~

Would you please send me the TMK of the project sites?

Mahalo, Pono

Pono Shim
[redacted]

From: Barberspointsolar [barberspointsolar@innergex.com]
Sent: Monday, June 29, 2020 12:54 PM
To: Pono Shim
Subject: Meet Barbers Point Solar Project - Invite to Open House - July 8, 2020

Aloha Oahu Economic Development Board

We are writing today to introduce you to the Barbers Point Solar Project and Innergex Renewable Development USA, LLC (Innergex), whom you will be hearing more about in the coming months, and **invite you to a Virtual Public Open House on July 8, 2020**.

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The Project

The proposed Barbers Point Solar Project is located on a land owned by the Department of Hawaiian Home Lands in Kapolei. The project is a 15 MWac solar PV system coupled with an 60 MWh battery energy storage system (see attached handout). The project would provide Oahu with energy security and grid resiliency through a clean, renewable source of power. The storage system will allow the power to be dispatched in the morning and evening when the utility needs it most and during emergencies – when rooftop solar is not available. Once all permits and approvals are obtained, the project is targeted to start construction by the end of 2022 and be operational by the end of 2023.

From *Scott A. Abrigo – President of Kapolei Community Development Corporation*
"KCDC supports the solar project at Kalaeloa, because it aligns with DHHL's guiding documents but more importantly because this project provides DHHL, its beneficiaries, KCDC and the Kapolei homesteads with the resources for a sustainable future."

Invite to Virtual Open House

Please mark your calendar for our **virtual Public Open House on July 8th** about the project. To register, please visit the project website (barberspointsolar.com) and click the registration link or email us (barberspointsolar@innergex.com) and a registration link and event details will be emailed to you. There is also a wealth of information about the project for you to access on the project website.

If at any time you have any questions or comments you wish to share regarding our project, we welcome you dropping us a line at barberspointsolar@innergex.com. We have much to share with you and look forward to connecting with you over the coming months.

Mahalo

Eddie Park, Director – Business Development
Julia Mancinelli, Director - Environment

Email: barberspointsolar@innergex.com | barberspointsolar.com |
www.innergex.com
Facebook | Twitter | LinkedIn

Marie Ryan

From: James Palakiko [redacted]
Sent: July 8, 2020 9:28 PM
To: Barberspointsolar
Subject: BP Solar Project

Follow Up Flag: Follow up
Flag Status: Completed

MISE EN GARDE : Ce courriel provient de l'externe. Avant d'accéder à une pièce jointe ou à un lien de ce courriel, assurez-vous de reconnaître l'expéditeur et que le contenu est de confiance.
WARNING: This is an external e-mail. Before opening an attachment or clicking on a link, please make sure you recognize the sender and that the content is safe.

Aloha,

How will you replace the kiawe or are you going to just remove the equipment and cover the concrete with dirt?

Mahalo
Kimo Palakiko

"Love is the motive
Spirit is the key
Faith is the power
Christ is the reason."

Marie Ryan

From: James Palakiko [redacted]
Sent: July 8, 2020 9:08 PM
To: Barberspointsolar

MISE EN GARDE : Ce courriel provient de l'externe. Avant d'accéder à une pièce jointe ou à un lien de ce courriel, assurez-vous de reconnaître l'expéditeur et que le contenu est de confiance.
WARNING: This is an external e-mail. Before opening an attachment or clicking on a link, please make sure you recognize the sender and that the content is safe.

What are you doing with the Kiawe wood?
Will the Homesteaders be allowed to get the wood for personal use?
How will you replace the kiawe or are you going to just remove the equipment and cover the concrete with dirt?

"Love is the motive
Spirit is the key
Faith is the power
Christ is the reason."

Marie Ryan

From: Tom Berg [redacted]
Sent: July 8, 2020 4:53 PM
To: Barberspointsolar; Melissa Price; Javier Cotín; Javier Cotín; Javier Cotín
Subject: Re: TESTIMONY IN OPPOSITION TO Barbers Point Solar Project

Follow Up Flag: Follow up
Flag Status: Completed

MISE EN GARDE : Ce courriel provient de l'externe. Avant d'accéder à une pièce jointe ou à un lien de ce courriel, assurez-vous de reconnaître l'expéditeur et que le contenu est de confiance.
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Yes - please do list me as a stakeholder.
If you would, how about giving me permission
to scour the area for the presence of the bats and pueo
myself?

As you can see from the attachment I provided
in my earlier email, the State/Price and Cotin
are bonafide liars and scammers- true blue
con artists to the max as they claimed
UHWO never had any pueo habitat in existence-

Got fraud? You betcha.

On Wednesday, July 8, 2020, 01:30:37 PM HST, Barberspointsolar <barberspointsolar@innergex.com> wrote:

Aloha Tom

Thank you for your comment.

Biologists are currently in the process of assessing the biological resources at the site; however, they have acknowledged that ʻōpeʻapeʻa or Hawaiian hoary bat (*Lasiurus cinereus semotus*) and pueo or Hawaiian short-eared owl (*Asio flammeus sandwichensis*) likely utilize land within the Project area. The biologists will conduct pueo surveys following the Pueo Project survey protocol (Price and Cotín, 2018). They will also consult with qualified biologists (e.g., Pueo Project researchers and DOFAW biologists) about known occurrences of pueo in the area.

With regards to the Hawaiian hoary bat, project biologists will note potentially suitable bat habitat in the Project Area. Bat detectors have been deployed in the vicinity of the Project Area for a different research project (not related to the Barber's Point Solar Project). That information can be used to assess relative bat use in the area.

The Project's Environmental Assessment will include a discussion of the biological survey results, the potential for the bat and pueo to occur within the Project area and be impacted by the project, and avoidance and minimization measures that would be implemented.

If you like, we can add you to our stakeholder list and let you know once the Environmental Assessment document is available for review and comment.

Sincerely

Barbers Point Solar Project Team

INNERGEX

30 ans years

barberspointsolar@innergex.com | Barberspointsolar.com | www.innergex.com

Facebook | Twitter | LinkedIn

From: Tom Berg [redacted]
Sent: Monday, July 6, 2020 7:49 AM
To: Barberspointsolar <barberspointsolar@innergex.com>
Subject: TESTIMONY IN OPPOSITION TO Barbers Point Solar Project

MISE EN GARDE : Ce courriel provient de l'externe. Avant d'accéder à une pièce jointe ou à un lien de ce courriel, assurez-vous de reconnaître l'expéditeur et que le contenu est de confiance.

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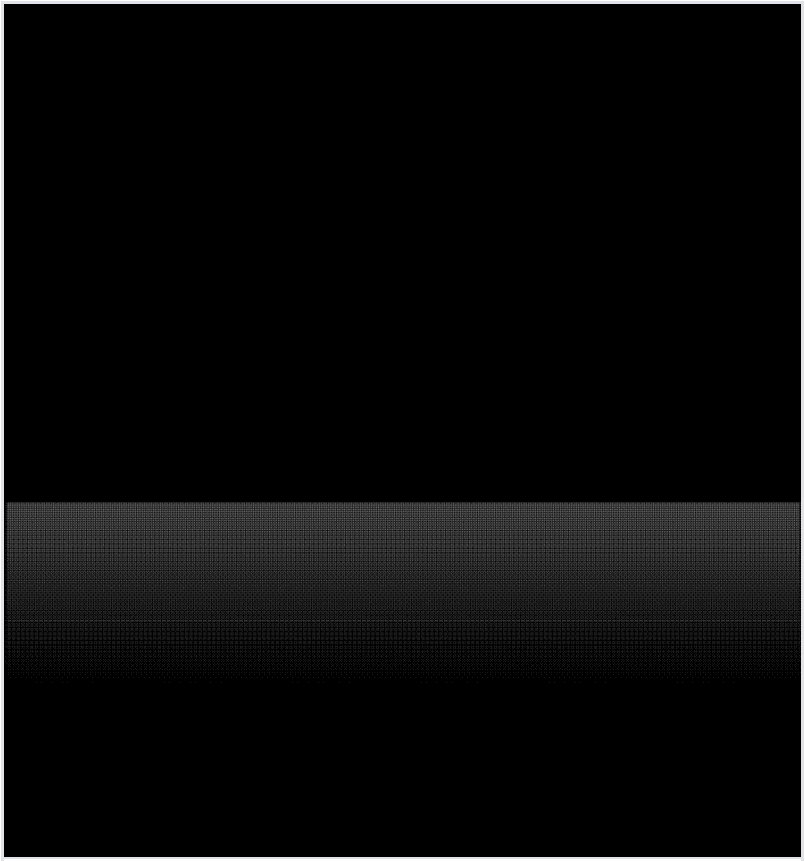
Please accept and include in all records

my entire email pasted below with links

and the attachment as my testimony/comment

in STRONG opposition to your project.

The Barbers Point Solar Project - Innergex



The Barbers Point Solar Project - Innergex

My testimony is attached-

The evidence is clear, that the State

of Hawaii, its own DLNR- meant to protect

the endangered sacred Pueo, is guilty

of lying about the habitat Pueo uses.

The GREEN NEW DEAL- or rather

Hawaii's Clean Energy Initiative is a farce-
a hoax, and being promoted by ignorant,
evil, uneducated greedy people who
will rot in hell for killing by design,
God's sacred being placed here to share
the land with us with purpose.

The solution is ocean wave power-
whereby the environment is left alone.
We don't need solar farms or wind mill
farms- period.....wave oscillation is proven
and will work here and protect our land,
AND WAVE POWER save WILDLIFE from
your asinine project.

Endangered everything has no where
else to go- already existing in limited,
rare habitat for them and these insane
solar farm projects advanced by liberal
left wing nut job Democrats simply compound
the plight of the Pueo and others like the bats
by extirpating all endangered
and threatened wildlife from the region.

WHO WOULD EVER HAVE THOUGHT-
it is the DEMOCRATS who despise wildlife
and will lie for a buck to scam the people-

while Republicans like me are trying

to protect our wildlife.....proves how

dirty the media is.

Please stop this project-

When the hell did

you look for Pueo and Bats for this project?

Answer: ZERO. Never.

So how the hell do you know if you are wiping out their habitat?

I rest my case.

Shame on all of you - take your land rape to the

trash can.

Do include my testimony - attached --as I tell the truth

with facts- exhibits proving you all are sick people-

illustrating your ilk/ you folks are pure evil - lying through

your teeth. Check out this article that exposes

your ignoramus approach to energy use:

https://cornwallalliance.org/2020/06/oahus-energy-irony-hypocrisy-or-both/

Tom Berg

[redacted]

[redacted]

[redacted]

cisco Webex

Registration Confirmed

Thank you for registering.

You are now registered for the event: **Barbers Poin**

You will receive a confirmation email message that

The event will start at 11:30 pm New York Time on
Please join the event on time.

Marie Ryan

From: Barberspointsolar
Sent: July 10, 2020 10:43 AM
To: Van der Veer, Valerie
Cc: Barberspointsolar
Subject: RE: question Re: Registration approved for Web seminar: Barbers Point Solar Project Virtual Public Open House

Follow Up Flag: Follow up
Flag Status: Completed

Aloha Valerie

Thank you for attending our Barbers Point Solar Project virtual open house.

A PDF copy of the presentation and a recording of the presentation/Q&A have been uploaded to our website and can be found at the following link. https://www.innergex.com/development-opportunities-in-hawaii/the-barbers-point-solar-project/#documents

Sincerely

Julia Mancinelli
Director - Environment

888 Dunsmuir Street, Suite 1100, Vancouver, BC V6C 3K4
Tel. 604 633-9990 x2231 | Cell. 604 345-4009 | www.innergex.com
Facebook | Twitter | LinkedIn

From: Van der Veer, Valerie [redacted]
Sent: Thursday, July 9, 2020 2:33 PM
To: Matthew Wright <MWright@innergex.com>
Cc: Barberspointsolar <barberspointsolar@innergex.com>
Subject: question Re: Registration approved for Web seminar: Barbers Point Solar Project Virtual Public Open House

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Aloha!

Thank you for hosting the Virtual Open House! It was very informative.

When you get a moment, can you please provide the link to the presentation so I can forward it to a few peers who were unable to join in.

Mahalo,
Valerie Van der Veer
[redacted]

From: Matthew Wright <mwright@innergex.com>
Sent: Tuesday, June 16, 2020 10:35 AM
To: Van der Veer, Valerie [redacted]
Subject: Registration approved for Web seminar: Barbers Point Solar Project Virtual Public Open House
When: Wednesday, July 8, 2020 5:30 PM-6:30 PM.
Where: https://innergex.webex.com/innergex/onstage/g.php?MTID=e9018b7f8abbdb4b6c2a94c0a5af42a42

Your registration was approved for the following Webex event.

Host: Matthew Wright (mwright@innergex.com)
Event number (access code): 126 462 2715
Registration ID: 791270
Event password: UynywpDJ875

Wednesday, July 8, 2020 5:30 pm, Hawaii Time (Honolulu, GMT-10:00)
Wednesday, July 8, 2020 11:30 pm, Eastern Daylight Time (New York, GMT-04:00)

Join event

Join the audio conference only
+1-408-418-9388 United States Toll
1-844-992-4726 United States Toll Free
Global call-in numbers | Toll-free dialing restrictions

Need help? Go to http://help.webex.com

Wire Fraud is Real. Before wiring any money, call the intended recipient at a number you know is valid to confirm the instructions. Additionally, please note that the sender does not have authority to bind a party to a real estate contract via written or verbal communication.

Marie Ryan

From: Hyatt, RaeAnn P [redacted]
Sent: July 15, 2020 2:57 PM
To: Barberspointsolar
Subject: RE: Follow-up to the Virtual Public Info Meeting on 7/8/20

Follow Up Flag: Follow up
Flag Status: Completed

MISE EN GARDE : Ce courriel provient de l'externe. Avant d'accéder à une pièce jointe ou à un lien de ce courriel, assurez-vous de reconnaître l'expéditeur et que le contenu est de confiance.
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Thank you Julia for your follow-up.
Welcome to the neighborhood! 😊

~~~~~~
Rae Ann Hyatt
[redacted]

From: Barberspointsolar <barberspointsolar@innergex.com>
Sent: Wednesday, July 15, 2020 11:51 AM
To: Hyatt, RaeAnn P [redacted]Barberspointsolar <barberspointsolar@innergex.com>
Subject: [EXTERNAL] RE: Follow-up to the Virtual Public Info Meeting on 7/8/20

Aloha Rae Ann

Thank you very much for reaching out to the school administrators and obtaining their contact details for us – this is very much appreciated.

We will follow up with the two schools to learn more about their educational programs/structures and see where we might be able to support their students and programs.

Sincerely

Julia Mancinelli
Director - Environment

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30 ans years

888 Dunsmuir Street, Suite 1100, Vancouver, BC V6C 3K4
Tel. 604 633-9990 x2231 | Cell. 604 345-4009 | www.innergex.com
Facebook | Twitter | LinkedIn
~~~~~~

From: Hyatt, RaeAnn P [redacted]
Sent: Wednesday, July 15, 2020 2:07 PM
To: Barberspointsolar <barberspointsolar@innergex.com>
Subject: Follow-up to the Virtual Public Info Meeting on 7/8/20
Importance: High

MISE EN GARDE : Ce courriel provient de l'externe. Avant d'accéder à une pièce jointe ou à un lien de ce courriel, assurez-vous de reconnaître l'expéditeur et que le contenu est de confiance.
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Aloha~

I attended the virtual public info meeting which occurred on 7/8/20 and had a follow-up for Mr. Eddie Park or Ms. Julia Mancinelli.

During the Q&A, I inquired about a scholarship to be provided by Innergex Renewable Energy to benefit both the Kapolei High School and Kapolei Charter School student body.

Providing a financial scholarship to these schools to benefit the student(s) will show your promise and commitment to our Kapolei Community.

I've reached out to both school administrators informing them of a scholarship opportunity provided by Innergex, and was granter their approval to forward their work email to you for future reference and contact.

Mr. Wesley Shinkawa, Principal at Kapolei High School email: [redacted] and Dr. Wanda Villareal, Director at Kapolei Charter School email: [redacted]

Kapolei High School serves the greater Kapolei Complex area, with an average class size of 420+ students, in which students and their families are an intrical part of the Kapolei Community.

Kapolei Charter School is a new innovative public Charter High School which was created through Goodwill Hawaii in 2016. This charter high school's average class size is 40-50 students; funding here is always appreciated as it is uniquely jointed with Goodwill Hawaii.

I look forward in knowing that a scholarship will be set-up to benefit both schools and its future leaders and am hopeful that Innergex commitment and promises will be fulfilled to the Kapolei Community.

Thank you for your time and commitment.

~~~~~~

Rae Ann Hyatt
[redacted]
~~~~~~

Marie Ryan

From: Nat Kinney [redacted]
Sent: July 24, 2020 1:09 PM
To: Barberspointsolar
Subject: Barbers Point and Kahana Solar Projects
Attachments: Barbers Point and Kahana Letter to Innergex.pdf; MOA for Renewable Energy Projects.docx

Follow Up Flag: Follow up
Flag Status: Flagged

MISE EN GARDE : Ce courriel provient de l'externe. Avant d'accéder à une pièce jointe ou à un lien de ce courriel, assurez-vous de reconnaître l'expéditeur et que le contenu est de confiance.
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To whom it may concern:

The Hawaii Construction Alliance (hereinafter the "Alliance") is an association of local construction unions charged with promoting the use of skilled labor to build significant construction projects in the State of Hawaii. We recently learned that Hawaii Electric selected your company to construct the Barbers Point and Kahana Solar projects (hereinafter the "Projects"). Congratulations on your selection.

The Alliance's primary purpose is to ensure that construction projects in the State of Hawaii are built by local residents who are highly skilled and trained in construction methods and project safety, and that employers on such projects pay an adequate living wage.

The labor unions affiliated with the Alliance take great pride in their comprehensive, multi-year apprenticeship programs, which train hundreds of young Hawaiians in construction work annually. Apprentices enrolled in union programs receive rigorous safety training, on the job and in the classroom, and apprenticeship programs prioritize worksite safety given the inherently dangerous nature of construction work.

Crucially, this significant investment in local apprenticeship requires a reliable training-to-employment pipeline for local residents.

The Alliance also supports a sustainable middle-class wage for construction workers. This is crucial to breaking the cycle of poverty and maintaining adequate wage standards for construction workers, where otherwise they may fall victim to wage theft, which is rampant in the construction industry.

For these important reasons, the Alliance is not able to support construction projects where there is no demonstrated commitment to using contractors who employ local residents and apprentices and pay them a sustainable-middle class wage.

Such projects are opposed by the Alliance before governmental permitting and approval boards.

The Alliance respectfully requests that Innergex Renewables USA, LLC demonstrate its commitment to the aforementioned principles and values by executing the attached Memorandum of Agreement, which will promote project efficiency, support local residents, and increase investment in the Hawaiian economy. The Alliance looks forward to partnering with Innergex Renewables USA, LLC to construct a high-quality renewable energy project.

Aloha,

Nathaniel Kinney
[redacted]

Marie Ryan

From: Hyatt, RaeAnn P [redacted]
Sent: July 24, 2020 1:23 PM
To: jodyallione[redacted]
Cc: Julia Mancinelli; Eddie Park
Subject: RE: [EXTERNAL] Innergex Educational partnerships

Follow Up Flag: Follow up
Flag Status: Completed

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Aloha Jody~

I appreciate your follow-up and email response.

I'm glad to hear of the future programs that Innergex are planning to incorporate within the High Schools and its community.

Best regards.
Rae Ann Hyatt
[redacted]

[redacted]

From: Jody Allione [redacted]
Sent: Friday, July 24, 2020 10:11 AM
To: Hyatt, RaeAnn P [redacted]
Cc: Julia Mancinelli <JMancinelli@innergex.com>; Eddie Park <epark@innergex.com>
Subject: [EXTERNAL] Innergex Educational partnerships

Aloa Rae Ann,

I am working with Innergex on its Community Outreach and Benefits plans. We are greatly appreciative of your suggestions and have followed up and are getting started on an integrated approach. This email is an update to our plans so far.

We are continuing to work with the Makaha Learning Center (MLC), who has achieved certification for teaching solar field installation skills with the objective to secure certifications for individuals interested in this area. MLC uses a Hawaiian based approach to all of its credentialed programs and hands on field experience is part of the training. We spoke with the staff at the Kapolei Charter School and they are very enthusiastic about the program. Danielle Irwin, who heads up MLC is putting together a plan for a class at this school. Once we know what our enrollment will be, we could reach out to KHS and collaborate with their after school programs to include interested students who may also want to apply. Our focus is job training with a job fair following the conclusion of the programs for those who are choosing this route rather than college.

We are in the planning stages and reviewing the various options including scholarships options that may be offered by Innergex to interested KHS students to cover the program costs for these students who are trade oriented rather than college bound.

Please stay in touch with your great ideas and connections and we fully appreciate both. I am available at any time to discuss these and other approaches.

Mahalo,
Jody
--
Jody Allione
[redacted]

Hawaii Project Development Consultant
Innergex

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APPENDIX J. PRE-ASSESSMENT SCOPING LETTER

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INNERGEX

Renewable Energy.
Sustainable Development.

May 28, 2021

RE: Barbers Point Solar Project
'Ewa District, O'ahu; TMKs 9-1-013:038, 9-1-013:040, and 9-1-016:027
Pre-Assessment Consultation for HRS Chapter 343 Environmental Assessment

---

Dear Interested Party,

Barbers Point Solar, LLC is proposing to build and operate the Barbers Point Solar Project (Project) located in east Kalaeloa (east of Kalaeloa Airport) in the 'Ewa District, on the island of O'ahu.

The Project area encompasses approximately 163-acres primarily located within tax map keys (TMKs): 9-1-013:038 and :040, both owned by Department of Hawaiian Home Lands (DHHL). Project electrical transmission lines will also be located within rights-of-way owned by Hawai'i Department of Transportation (HDOT) (Coral Sea Road and Roosevelt Avenue) and Hawai'i Community Development Authority (HCDA) as well as within a portion of TMK 9-1-016:027 (owned by Kapolei Infrastructure, LLC).

As the Project would involve the use of State-owned land, compliance with Hawai'i Revised Statutes (HRS) Chapter 343 is required. Pursuant to the requirements of HRS Chapter 343 and Hawai'i Administrative Rules (HAR) §11-200.1, Barbers Point Solar, LLC is preparing an environmental assessment (EA) to evaluate the potential environmental effects of the project. DHHL has agreed to be the Accepting Authority for the EA. The Project does not require the use of federal lands.

As part of the environmental review process, pre-assessment consultation is being conducted to obtain input on the scope of issues to be considered in the Draft EA. An overview of the Project and a location map are attached. We are requesting input regarding the Project, including concerns related to particular environmental resources, as well as relevant information that should be considered in the evaluation.

Please provide comments regarding the scope of the EA in writing via U.S. postal mail to Leslie McClain at Tetra Tech (737 Bishop Street, Suite 2340, Honolulu, Hawai'i 96813) or email barberspointsolar@innergex.com. Comments must be postmarked by June 30, 2021 to be considered in the Draft EA.

Innergex Renewable Energy Inc.
888 Dunsmuir Street, Suite 1100
Vancouver, British Columbia V6C 3K4
Canada
Tel. 604 633-9990 | Fax 604 633-9991
info@innergex.com | www.innergex.com

Head Office
1225 Saint-Charles Street West, 10th floor
Longueuil, Québec J4K 0B9
Canada
Tel. 450 928-2550 | Fax 450 928-2544
info@innergex.com | www.innergex.com

Innergex Renewables USA, LLC
3636 Nobel Drive, Suite 260
San Diego, CA 92122
United States
Tel. 858 346-4004 | Fax 604 633-9991
info@innergex.com | www.innergex.com

INNERGEX

Renewable Energy.
Sustainable Development.

Thank you for your participation in the environmental review process for the proposed project.

Sincerely,

Barbers Point Solar, LLC

Julia Mancinelli

Julia Mancinelli
Director – Environment
Innergex Renewable Energy Inc.
JMancinelli@innergex.com

Attachments: Project Overview
Location Map

INNERGEX

Renewable Energy.
Sustainable Development.

Barbers Point Solar Project Overview

Barbers Point Solar, LLC is proposing to develop, own and operate the Barbers Point Solar Project (Project) located in east Kalaeloa, ‘Ewa District, on the island of O‘ahu. The Project will consist of a 15-megawatt (MW) solar photovoltaic system coupled with a 15 MW, 4-hour (60 MW-hour) photovoltaic coupled battery energy storage system (PV-Coupled ESS) as well as ancillary support infrastructure. The Project area encompasses approximately 163-acres primarily located within tax map keys (TMKs): 9-1-013:038 and :040, both owned by Department of Hawaiian Home Lands (DHHL). Project electrical transmission lines will be located within rights-of-way (ROWs) owned by Hawai‘i Department of Transportation (HDOT) (Coral Sea Road and Roosevelt Avenue) and Hawai‘i Community Development Authority (HCDA) as well as within a portion of TMK 9-1-016:027 (owned by Kapolei Infrastructure, LLC). The Project area is shown in the attached figure.

The purpose of the Project is to construct and operate a renewable energy facility on the DHHL property that would generate and store electricity derived from solar resources, thereby providing clean, renewable energy for the island of O‘ahu. The Project will assist DHHL in meeting Objective 2 of the Hawaiian Homes Commission (HHC) 2009 Ho‘omaluō Energy Policy, which instructs DHHL to pursue the leasing of lands identified as suitable for renewable energy projects[1]. Also, in 2009, DHHL and Hawaiian Electric entered into an Energy Partnership Charter[2] where the two organizations agreed to collaborate on achieving critical energy objectives including the leasing of DHHL owned lands for renewable energy projects. In coordination with DHHL, Barbers Point Solar, LLC developed a preliminary layout for a solar plus storage facility and submitted a proposal to Hawaiian Electric Company (Hawaiian Electric) in response to their *Request for Proposals for Variable Renewable Dispatchable Generation for the Island of O‘ahu*, issued in August 2019. This competitive procurement process for renewable energy projects specifically targeted projects that would satisfy the resource needs identified in Hawaiian Electric’s 2016 Power Supply Improvement Plan, as part of the effort to meet Hawai‘i’s goal of generating 100 percent of its energy needs from renewable sources by 2045. The Project is one of five O’ahu based solar plus storage projects selected by Hawaiian Electric from the August 2019 request for proposals.

The major components of the Project would include:

- Solar Panels: The solar PV system would include a series of panels arranged into arrays consisting of evenly-spaced rows. The panels would be mounted on a racking system installed on posts. The Project’s solar arrays will include three areas: Area 1 in the northern portion of TMK 9-1-013:038, Area 2 in the southern portion of TMK 9-1-013:038, and Area 3 located on TMK 9-1-013:040.

- Battery Energy Storage System: The photovoltaic coupled battery energy storage system (PV-Coupled ESS) would be distributed across the Project area and would include a self-contained standalone unit that combines a lithium-ion battery system, inverter, and controller. The PV-Coupled ESS units would incorporate several layers of protection to avoid failures, to contain potential hazardous substances, and to prevent fires.

[1] Department of Hawaiian Home Lands. Ho‘omaluō Energy Policy. January 2009.
[2] DHHL-HECO-Energy-Partnership-Charter-082709.pdf (hawaii.gov)

- Collector Lines: The solar panels and battery units would connect with a Project substation primarily via underground electrical collector lines. The collector line connecting the solar arrays on TMK 9-1-013:040 to the collector substation on TMK 9-1-013:038 will run along Coral Sea Road. Portions of this line may need to be overhead depending on final site design and ROW constraints. Also, in cases where subsurface conditions make it difficult or too costly to trench, other portions of the collection system may go overhead similar to a transmission line.

- Substation: A project collector substation would be constructed on DHHL TMK 9-1-013:038 and will function to increase the voltage from the PV system to 46 kV in order to match the voltage of the Hawaiian Electric electrical grid. The Project collector substation and associated interconnection infrastructure will include equipment such as medium voltage bus structure, circuit breakers and switches, a main power transformer, and associated underground electrical lines.

- Overhead Generation-Tie Line: An approximately 1.5 mile generation-tie line (combination of overhead and underground) will extend underground from the Project's collector substation, north along Coral Sea Road and transition to overhead at the existing 12 kV Hawaii Electric overhead transmission line. The 46 kV will be overbuilt on top of the 12 kV transmission line and terminate to the existing Hawaiian Electric 46-kV overhead transmission line located on TMK 9-1-016:027 (owned by Kapolei Infrastructure, LLC) near the intersection of Coral Sea Road and Roosevelt Avenue.

- Access and Site Work: Access to solar array Areas 1 and 2 on TMK 9-1-013:038 will be provided by a new driveway off of Coral Sea Road. This driveway will be located within an existing HCDA ROW associated with Roadway Lot 13083. Access to DHHL's parcel 9-1-013:40 is currently via Coral Sea Road; however, the Project proposes to construct a new driveway on Coral Sea Road to accommodate construction access. Access within the Project's two solar array parcels will be provided through a network of existing and new on-site access roads. Improvements to existing roads may include drainage upgrades, smoothing, and graveling as needed to accommodate construction vehicles. New access roads may require excavation and fill to achieve acceptable grades.

The Project would be constructed and operated by Barbers Point Solar, LLC, and the power generated by the Project would be sold to Hawaiian Electric under a new 25-year power purchase agreement (PPA). It is anticipated that construction and commissioning would require approximately 12-15 months, with commercial operations commencing at the end of 2023. Once operational, the Project would provide the energy needed to power approximately 6,200 homes on O'ahu each year, offsetting approximately 1,139,396 barrels of fossil fuel consumption by Hawaiian Electric's generating units and approximately 455,598 metric tons of greenhouse gas emissions over the life of the Project[3].

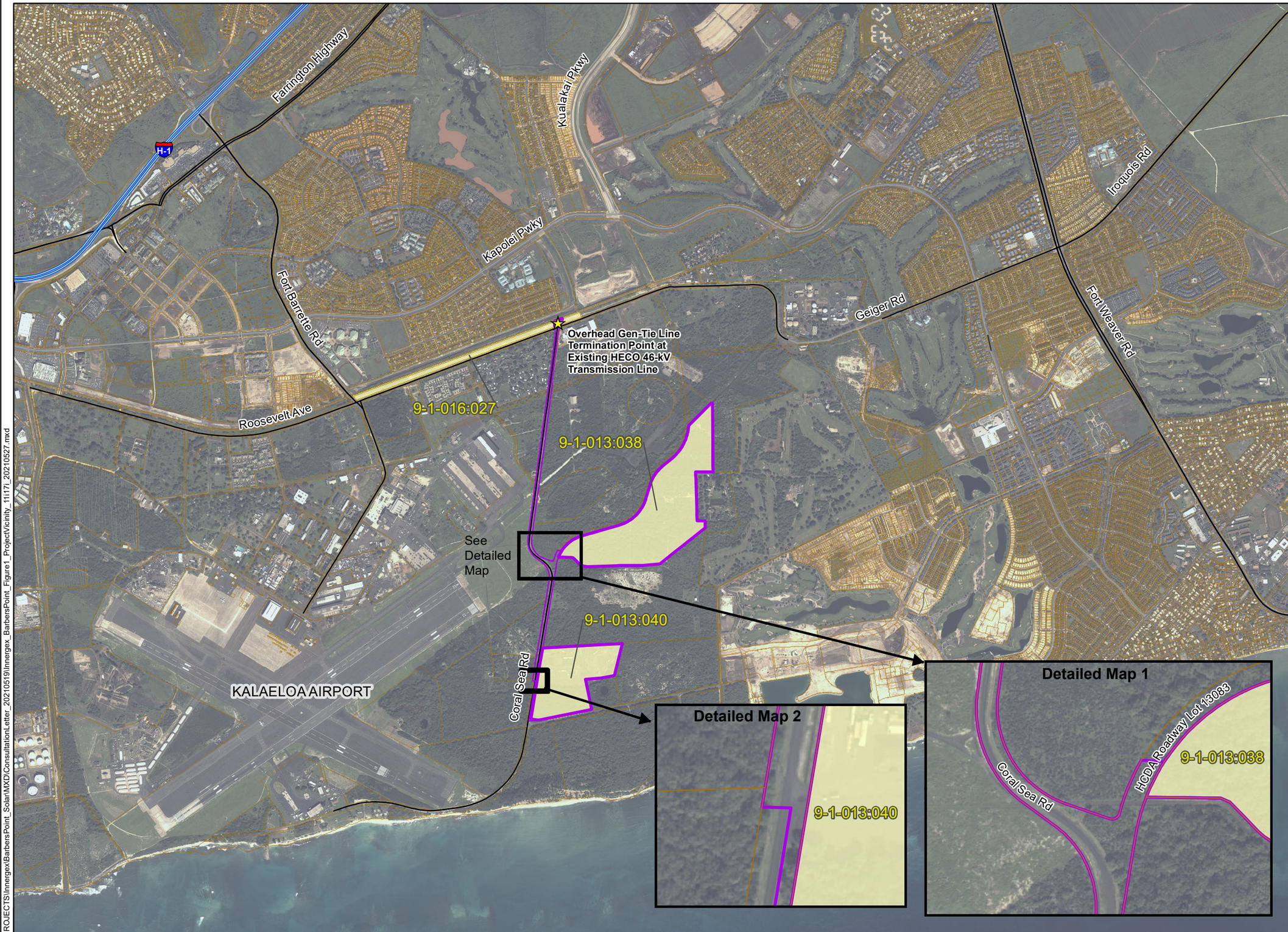
For more information regarding the Project, please visit www.barberspointsolar.com.

[3] Hawaiian Electric Company PUC Filing Docket No. 2020-0143.

Barbers Point Solar

Figure 1
Project Vicinity

CITY AND COUNTY OF HONOLULU

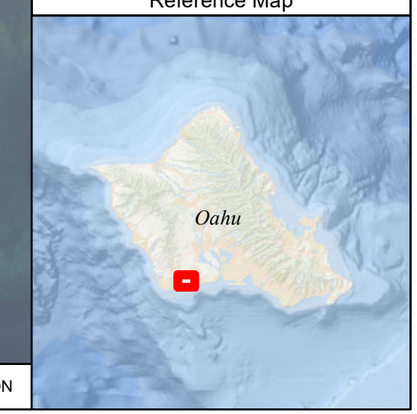


Project Study Area
Project TMK
TMK Boundary
Interstate Highway
State Highway
County Road

TETRA TECH

Barbers Point Solar LLC

Reference Map



1:24,000

WGS 1984 UTM Zone 4N

0 0.5 1 Miles

NOT FOR CONSTRUCTION

P:\GIS_PROJECTS\Innergex\BarbersPoint_Solar\MXD\ConsultationLetter_20210519\Innergex_BarbersPoint_Figure1_ProjectVicinity_11117i_20210527.mxd

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APPENDIX K. PRE-ASSESSMENT SCOPING COMMENTS AND RESPONSES

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Barbers Point Solar Project

Pre-Assessment Scoping Comments and Responses

Pre-Assessment Scoping Comment[1]	Response
1. Aha Moku 'Ewa Representative Shad Kane (email dated June 1, 2021)	
There are excellent Hawaiian cultural structures in an area that is being cleaned right now on the mauka side of the Kalaeloa Ranch. There are several house sites and one that is identified as a heiau. The heiau has the same orientation and construction as other similar structures right across the street in the Kalaeloa Heritage Park. There are also cultural structures makai of the Ranch fronting Tripoli and Coral Sea Road. There are numerous cultural structures east of the Ranch in areas once known as the Northern Trap and Skeet Range and the Southern Trap and Skeet Range. I reported on these once before for these solar projects but no one got back to me.	Barbers Point Solar LLC's archaeological consultant Pacific Legacy has consulted with Shad Kane regarding cultural structures in the Project area. On June 17, 2021, a site visit was organized with the three Cultural Impact Assessment participants, Shad Kane, Mana Caceres, and Keala Norman to visit significant archaeological sites in portions of the Project area. The site visit was facilitated by Mara Mulrooney and Krickette Pacubas (Pacific Legacy) and Myriam Bernede-Martin (Barbers Point Solar LLC). Following the consultation process, the significant historic properties noted by Mr. Kane were recommended for preservation, and mitigation recommendations for all identified historic properties were discussed as well.
2. John Bond, Save Ewa Field, Kanehili Cultural Hui (email dated June 3, 2021)	
There needs to be some more specific details about this project which has apparently changed in design plans. 1. Where will the main electrical facilities be and where will the batteries, etc be located? There needs to be more specific maps and diagrams shown with the connections, etc.	Project details are provided in Section 2 and in the Figure Section of the Draft EA.
2. Is there now no plan to use any part of the 1941-42 MCAS Ewa Field properties? This is not clear.	The Project avoids use of Navy owned TMK 9-1-013:016 and TMK 9-1-013:043. The northern portion of the Project area (located on DHHL owned property TMK 9-1-013:038) is located within the 'Ewa Plain Battlefield Historic District, but does not directly impact any contributing elements of the district.

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	See Figure 1-2 of the Draft EA for a map of the Project area and layout. See the Project's Draft Archaeological Inventory Survey (AIS) in Appendix A for more information and maps of the existing and proposed historic districts.
3. Will the project use any part of the 1942 aircraft revetments?	The Project will not impact the 1942 aircraft revetments located in the Project area. The 43 aircraft revetments documented in the Project's Draft AIS (Appendix A of the Draft EA) have been recommended for Preservation.
4. Will the project use any part of the 1944-1965 Navy SeaBee Camp and Navy interim housing facility that subsequently used those roads and buildings up until around the mid 1960's?	Project equipment will be placed in portions of the area formally occupied by the Seabee Camp (historic property SIHP 50-80-12-05099). Tuggle and Tomonari-Tuggle (1997, Appendix A:168) evaluated SIHP 50-80-12-05099 as lacking integrity. The site's diminished integrity was confirmed during the Project's AIS fieldwork by the presence of only remnant utility features and a large berm on the eastern edge of the historic property that suggests the former Seabee Camp was nearly completely dismantled and a portion of the construction debris was consolidated into the berm or pushed into limestone pits. However, the location of this former camp near the revetments, its association with the development and dismantling of MCAS Ewa, and the setting and feeling of this location remain. Therefore, this historic property has been assessed as significant under Criterion "d" and is recommended for archaeological monitoring. See the Project's Draft AIS in Appendix A of the Draft EA for more details regarding the Seabee Camp, its significance assessment, and mitigation recommendations.
5. Are there specific diagrams of what the solar arrays will look like, including mockups, illustrations, etc. How deep will the holes be for arrays and fencing?	A preliminary site plan and schematics of the facilities are shown in the Figure Section of the Draft EA. As discussed in Section 2.1.1 of the Draft EA, the steel posts for the panel racking system will be installed to a depth of approximately 6–10 feet (depending on specific soil conditions).

Pre-Assessment Scoping Comment[1]	Response
6. How will the historic and cultural sites be protected? Will there be an historical archeological Protection Plan? What sites have been identified so far?	A total of 352 features from 12 historic properties are recommended for preservation. Six historic properties will be completely avoided and preserved (see Table 3-4 in Draft EA) while features included in six additional historic properties will also be avoided and preserved. Properties/features recommended for preservation include most of the traditional Hawaiian features (n=110) and limestone pits (n=190) in the Project area, six U.S. military bunkers in Parcel 40 (T-01), the majority of buildings and contributing elements included in the proposed Revetments Area Historic District (Site T-02), and the underground chambers and associated features that make up Site T-09. Full-time archaeological monitoring will be conducted during all ground-disturbing activities to ensure that all sites slated for preservation will be protected in accordance with an accepted Preservation Plan. See the Project's Draft AIS in Appendix A of the Draft EA for more details regarding the Project's effects on historic and cultural properties and mitigation measures.
7. Is the project considering putting the Coral Sea Road powerline underground? A powerful storm will knock all of the powerlines down like in 2011 when this area was hit by a Derecho - a horizontal storm front with tornadic winds. This area also sees large waterspouts fairly commonly under certain conditions. In 2011 the Ewa area was hit with a Derecho - causing hurricane-force winds, heavy rains, and flash floods. Power was out for many days and power poles had to be replaced everywhere. https://en.wikipedia.org/wiki/Derecho The air was intense, frothy whiteout like being in a hurricane.	As discussed in Section 2.1.6 of the Draft EA, the project generation-tie line will be a combination of overhead and underground lines. The Project would be designed and constructed in compliance with all applicable Federal, State, and local environmental protection, design, and building standards and regulations.
3. City and County of Honolulu, Department of Community Services (letter dated June 4, 2021)	
Our review of the documents indicates that the proposed project will have no adverse impacts on any Department of Community Services' activities or project in the surround neighborhood.	It is noted that the Project would not impact any City and County of Honolulu, Department of Community Services' activities or project in the surrounding neighborhood.

Pre-Assessment Scoping Comment[1]	Response
4. City and County of Honolulu, Department of Planning and Permitting (letter dated June 7, 2021)	
Based on the information in your letter, we have no comments at this time, but we look forward to reviewing your upcoming Draft EA.	It is noted that the City and County of Honolulu, Department of Planning and Permitting (DPP) has no pre-assessment scoping comments on the Project and a copy of the Draft EA will be provided to the DPP.
5. City and County of Honolulu, Police Department (email dated June 8, 2021)	
Based on the information provided, the Honolulu Police Department recommends that all necessary signs, lights, barricades, and other safety equipment be installed and maintained by the contractor during the construction phase of the project, as Roosevelt Avenue is a main thoroughfare in the area. Any impacts to vehicular traffic may cause issues and disruptions to businesses and residents which could lead to complaints.	Section 3.12.2 of the Draft EA discusses impacts associated with Project construction traffic. This includes a description of a Traffic Management Plan with mitigation measures to avoid, minimize and mitigate potential impacts.
6. State of Hawaii, Department of Accounting and General Services (Letter dated June 8, 2021)	
We have no comments to offer at this time as the proposed project does not impact any of the Department of Accounting and General Services' projects or existing facilities.	It is noted that the State of Hawaii, Department of Accounting and General Services has no comments on the Project as the Project would not impact any Department of Accounting and General Services' projects or existing facilities.
7. Jan Becket (email dated June 14, 2021)	
I visited the DHHL property at Ordy Pond several times in 2007 and 2008 and was able to obtain images of structures there before they were impacted and / or destroyed by the Raceway Park operators and by military ordnance cleanup. The principal feature of the area, bordered along one side by Coral Sea Road and on another by Tripoli Road, was a large enclosure walled on three sides and open on the side facing Ordy Pond. As far as I could tell, the structure enclosed an area of sand that did not	The large structure filled with sand has been interpreted as a *kahua*, or Makahiki grounds, in close consultation with Mr. Kane (see Appendix A, Draft AIS report, for a full description of this feature). The low, paved linear structure is connected to the *kahua* and connects it to a small rectangular platform that has been interpreted as a ceremonial feature. All of these features are recommended for preservation (see Appendix A), along with the cluster of agricultural mounds and temporary habitation features southeast of them.

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exist outside its walls. I do not have points for the corners, unfortunately, and have drawn in a very approximate polygon to represent relative dimensions and location. The function of these large pre-contact enclosures is not clear. One exists at Keawaʻula (perhaps connected with ʻuala cultivation), one at Pālehua and another at the rear of Wailupe. Another large, low enclosure exists in the pasture at the old Meadow Gold Ranch on the North Shore. Recent archaeological research at Pālehua has identified one wall aligned on the rising point of the Makaliʻi - a clear confirmation of pre-contact origin. The report suggests that the enclosure was a collection point for Makahiki taxes. Similar work needs to be undertaken for this enclosure. The other two structures were a low, paved, linear structure close to Tripoli and two parallel walls on the NW side of the pond that formed a zig-zag alignment. Images are on the following pages. It is of course my hope and expectation that none of the pre-contact structures near Ordy Pond or in other parcels will be impacted by the solar project. I ask that best practices be observed in setting adequate buffer zones around all structures.	Appropriate buffers will be established in close consultation with cultural descendants and will be detailed in a Preservation Plan. The zig-zag feature has been interpreted as a military training feature and this interpretation was discussed in detail with Mr. Kane and other cultural descendants, who agreed with this functional interpretation. This feature will be impacted by the project.
8. City and County of Honolulu, Honolulu Fire Department (letter dated June 14, 2021)	
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 meters) 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, 2012 Edition, Sections 18.2.3.2.2 and 18.2.3.2.2.1.) A fire department access road shall extend to within 50 feet (15 meters) of at least one exterior door that can be opened from the	As discussed in Section 3.14.1 of the Draft EA, consistent with requirements articulated by the Honolulu Fire Department (HFD), the Project would include service roads that can accommodate fire apparatus.

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outside and that provides access to the interior of the building. (NFPA 1, 2012 Edition, Section 18.2.3.2.1.)	
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 (45,720 millimeters) 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, 2012 Edition, Section 18.3.1, as amended.)	As discussed in Section 3.14.1 of the Draft EA, consistent with requirements articulated by the HFD, the Project would include service roads that can accommodate fire apparatus; it is anticipated that the Project would not need to provide water supply for fire flow as no occupied buildings would be constructed within the Project area.
3. The unobstructed width and unobstructed vertical clearance of a fire apparatus access road shall meet county requirements. (NFPA 1, 2012 Edition, Sections 18.2.3.4.1.1 and 18.2.3.4.1.2, as amended.)	As discussed in Section 3.14.1 of the Draft EA, consistent with requirements articulated by the Honolulu Fire Department (HFD), the Project would include service roads that can accommodate fire apparatus.
4. New photovoltaic systems shall be installed in accordance with Section 11.10, Section 11.12 and NFPA 70. (NFPA 1, 2012 Edition, Section 11.12.1.)	As discussed in Section 3.14.1 of the Draft EA, the Project is being designed in accordance with the National Fire Protection Association (NFPA) 1 and National Electric Code (NEC) requirements for fire prevention for large-scale solar, including installation of fire breaks throughout the Project area.
5. Stationary storage battery systems having an electrolyte capacity of more than 100 gallons (378.5 liters) in sprinklered buildings or 50 gallons (189.3 liters) in unsprinklered buildings for flooded lead-acid, nickel-cadmium, and valve-regulated lead-acid batteries or 1,000 pounds (454 kilograms) for lithium-ion and lithium metal polymer batteries used for facility standby power, emergency	Barbers Point Solar LLC acknowledges that the Project must comply with all fire code requirements for battery storage systems (NFPA 1; 2012 Edition, Chapter 52.1).

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power, or uninterrupted power supplies shall be in accordance with Chapter 52 and Table 52.1. (NFPA 1, 2012 Edition, Section 52.1.)	
6. Submit civil drawings to the City and County of Honolulu's Department of Planning and Permitting for review and approval.	Prior to construction, civil drawings will be submitted to the City and County of Honolulu's Department of Planning and Permitting for review and approval. Barbers Point Solar LLC will consult with the HFD during the planning and design phase, permitting, construction and provide on-site orientation and training (or as requested by the HFD) prior to commercial operation.
9. State of Hawaii, Department of Land and Natural Resources, Divisions of Forestry and Wildlife (Letter dated June 24, 2021)	
We appreciate your proactive planning efforts with DOFAW to date on avoidance, minimization, and mitigation measures for these listed species to inform the development of the solar project. Based on the preliminary project information from the in-person meeting on November 13th, 2020 and the Draft Biological Resources Survey Report, DOFAW provides the following comments on the potential of the proposed work to affect listed species in the vicinity of the project area. Survey records indicate endangered plant species, such as *Euphorbia skottsbergii* var. *skottsbergii* and *Achyranthes splendens* var. *rotundata*, are known to occur within or near the proposed project area. DOFAW recommends that a qualified botanist survey for these rare and endangered plants. Surveys of dry areas should be done after rains to be considered legitimate. If any of these species are found near the project site, we recommend no ground/soil disturbance with heavy machinery within 100 meters of the actual plants even if they are not on the project property. For more information on avoidance and minimization measures for plants please refer to the following link: https://www.fws.gov/pacificislands//articles.cfm?id=149489721	As previously discussed with DOFAW, Tetra Tech conducted a supplemental wet season survey for the endangered ‘akoko (*Euphorbia skottsbergii* var. *skottsbergii*) within portions of the Study Area and areas adjacent to the Study Area in April 2021. The results of the wet season survey for the endangered ‘akoko and recommended avoidance and minimization measure to avoid and minimize potential impacts to the species are discussed in Section 3.4 and Appendix C of the Draft EA. *Achyranthes splendens* var. *rotundata* is not known to occur in the project area and was not found during the Project’s biological surveys conducted in June 2020, August 2020, October 2020, November 2020, April 2021, and May 2021.

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The State endangered Pueo has been observed in the project site vicinity. Pueo are a crepuscular species, most active during dawn and dusk twilights. DOFAW recommends twilight preconstruction surveys by a qualified biologist prior to clearing vegetation for construction. If Pueo nests are present, a buffer zone of 46 m (150 feet) should be established in which no clearing occurs until nesting ceases, and DOFAW staff should be notified. Work should not resume until directed by DOFAW.	Surveys specific to detect the state-listed pueo or Hawaiian short-eared owl (*Asio flammeus sandwichensis*) were conducted on the morning of June 11, 2020 and the evenings of August 17, October 8, and November 16, 2020. One pueo was observed during the surveys. The results of the pueo survey and recommended avoidance and minimization measure to avoid and minimize potential impacts to the species are discussed in Section 3.4 and Appendix C of the Draft EA.
Due to the arid climate and risks of wildfire to listed species, we recommend coordinating with the Hawai'i Wildfire Management Organization (808)-850-900, admin@hawaiiwildfire.org) on how wildfire prevention can be addressed in the project area.	The potential for wildfire to occur within the Project area and measures that would be implemented to avoid and minimize impacts associated with wildfire are discussed in Section 3.13 of the Draft EA. The Project would incorporate fire prevention and suppression measures, and would be designed in accordance with the NFPA and NEC requirements for fire prevention. Barbers Point Solar LLC will be consulting with Hawai'i Wildfire Management Organization regarding wildfire prevention.
State listed waterbirds such as the Hawaiian Stilt (*Himantopus mexicanus knudseni*), Hawaiian Coot (*Fulica alai*), and Hawaiian Moorhen (*Gallinula galeata sandvicensis*) have the potential to occur in the vicinity of the proposed project site. It is against State law to harm or harass these species. If any of these species are present during construction activities, then all activities within 100 feet (30 meters) should cease, and the bird should not be approached. Work may continue after the bird leaves the area of its own accord. If a nest is discovered at any point, please contact the O'ahu DOFAW Office at (808) 973-9778.	The potential for various avian species to occur within the Project area and measures that would be implemented to avoid and minimize impacts to those species (should they occur) are discussed in Section 3.4 of the Draft EA.
The State listed Hawaiian Hoary Bat or 'Ope'ape' a (*Lasiurus cinereus semotus*) has the potential to occur in the vicinity of the project area and may roost in nearby trees. If any site clearing is required this should be timed to avoid disturbance during the bat birthing and pup rearing season (June 1 through September 15). If this cannot be	The potential for Hawaiian Hoary Bat to occur within the Project area and measures that would be implemented to avoid and minimize impacts (should the species occur), including the recommended avoidance of removing or disturbing woody vegetation during the birthing and pupping season and no installation of barbed wire on the

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avoided, woody plants greater than 15 feet (4.6 meters) tall should not be disturbed, removed, or trimmed without consulting DOFAW. It has been documented that hoary bats can become ensnared in barbed wire during flight and die. We therefore recommend the use of barbed wire be avoided, and are pleased to note that your plan states that barbed wire will not be installed at the project site.	Project's perimeter fencing, except as required for safety and code compliance around the Project collector substation), are discussed in Section 3.4 of the Draft EA.
We note that artificial lighting can adversely impact seabirds that may pass through the area at night by causing disorientation. This disorientation can result in collision with manmade artifacts or grounding of birds. For nighttime lighting that might be required, DOFAW recommends that all lights be fully shielded to minimize impacts. Nighttime work that requires outdoor lighting should be avoided during the seabird fledging season from September 15 through December 15. This is the period when young seabirds take their maiden voyage to the open sea. For illustrations and guidance related to seabird-friendly light styles that also protect the dark, starry skies of Hawai'I please visit: https://dlnr.hawaii.gov/wildlife/files/2016/03/DOC439.pdf.	The potential for seabirds to traverse the Project area and measures that would be implemented to avoid and minimize impacts (should the species occur), including the recommendations relative to nighttime lighting and nighttime work, are discussed in Section 3.4 of the Draft EA.
DOFAW recommends minimizing the movement of plant or soil material between worksites, such as in fill. Soil and plant material may contain invasive fungal pathogens, vertebrate and invertebrate pests, or invasive plant parts that could harm Hawai'I native species and ecosystems. We recommend consulting the O'ahu Invasive Species Committee at (808) 266-7994 during planning, design, and construction of the project to be informed of any high-risk invasive species in the area and ways to mitigate their spread. All equipment, materials, and personnel should be cleaned of excess soil and debris to minimize the risk of spreading invasive species.	Avoidance and minimization measures specific to the unintentional introduction or transport of new invasive species, or spread invasive species further, are discussed in Section 3.4 of the Draft EA.
We appreciate your efforts to work with our office for the conservation of Hawai'i's native species. Should the scope of the	Comment acknowledged.

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project change significantly, or should it become apparent that threatened or endangered species may be impacted, please contact our staff as soon as possible. If you have any questions, please contact Paul Radley, Protected Species Habitat Conservation Planning Coordinator at (808) 587-0010 or paul.m.radley@hawaii.gov.	
10. City and County of Honolulu, Board of Water Supply (Letter dated June 15, 2021)	
The Honolulu Board of Water Supply does not have water facilities in the proposed project area. Water service and fire protection should be provided by the private water system.	As discussed in Section 3.15.2 of the Draft EA, water trucks would provide water to the Project site. No connection to the domestic water system is expected to be required.
11. City and County of Honolulu, Department of Facility Maintenance (Letter dated June 15, 2021)	
During construction and upon completion of the project, any damages/deficiencies along the roadway on Tripoli Street shall be repaired to City standards and accepted by the City and at no cost to the City and County of Honolulu.	As discussed in Section 3.12.2 of the Draft EA, any roads or sidewalks damaged by the Project construction would be repaired in accordance with current design standards.
12. Hawaii Community Development Authority (Letter dated June 15, 2021)	
Pursuant to Act 184 of the 2002 Hawaii State Legislature, effective July I, 2002, the Hawaii Community Development Authority (HCDA) assumed the responsibility for implementation of the Community Redevelopment Plan - overseeing remaining conveyances, contract administration, promulgation of administrative rules, and other responsibilities relating to the former Barbers Point Naval Air Station (BPNAS). Act 184, expanded the designation of the Kalaeloa Community Development District (KCDD), to encompass the land within the former BPNAS, including land retained by the Navy and land conveyed to other Federal, State and City agencies. The Navy also utilized the BPNAS base closure to convey 500 acres to the Department of Hawaiian Home Lands (DHHL) through the federal Public Law 104-42, the Hawaiian Home Lands Recovery Act. Parcels	Comment acknowledged.

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Tax Map Key No.: (1)-9-013: 038 and 040 proposed for the Barbers Point Solar Project (Project) site is owned by the DHHL.	
The HCDA provides the following comments: • The Project will require a development permit and the contested case public hearing process pursuant to Hawaii Administrative Rules (HAR) 15-219, Practice and Procedures, • The Project may require variances regarding fencing, landscaping, irrigation, frontages and setbacks; and	As discussed in the Section 5.11 of the Draft EA, the Project will require HCDA Conditional Use Permit (CUP), Development Permit, and Variance.
• HAR 15-215, Kalaeloa Rules require new electrical infrastructure to be underground unless it will be installed on the existing electrical poles.	As discussed in Section 5.9 of the Draft EA, the Project's DC and AC collector lines will primarily be installed underground. Portions of the AC line along Coral Sea Road may need to be overhead depending on coordination with HDOT. Also, in cases where subsurface conditions make it difficult or too costly to trench, other portions of the collection system may go overhead similar to a transmission line. Portions of the Project gen-tie line will be overhead but will be combined with an existing transmission line along Coral Sea Road. In addition, the anticipated Project overhead lines along Coral Sea Road are not in the T3, T4, or T5 transect zones and are therefore not subject to the design standard under HAR §15-215-43(f).
13. State of Hawaii, Department of Transportation (Letter dated June 16, 2021)	
Airports Division (HDOT-A) I. The proposed solar project is within 0.5 miles from Kalaeloa Airport (JRF). All projects within 5 miles from Hawaii State airports are advised to read the Technical Assistance Memorandum (TAM) for guidance with development and activities that may require further review and permits. The TAM can be viewed at this link: http://files.hawa ii.gov /dbedt/op/docs/TAM-FAA-DOT- Airports_08-01-2016.pdf.	The Technical Assistance Memorandum (TAM-2016-1) that provides guidance for development and activities is discussed in Section 3.12.2 of the EA.

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2. The proposed solar project is approximately 2, I 07 feet from the end of Runway 22L at JRF. Federal Aviation Administration (FAA) regulation requires the submittal of FAA Form 7460-1 Notice of Proposed Construction or alteration pursuant to the Code of Federal Regulations, Title 14, Part 77.9, if the construction or alteration is within 20,000 feet of a public use or military airport which exceeds a I 00:1 surface from any point on the runway of each airport with its longest runway more than 3,200 feet. Construction equipment and staging area heights, including heights of temporary construction cranes, shall be included in the submittal. The form and criteria for submittal can be found at the following website: https://oeaaa.faa.gov/oeaaa/external/portal.jsp	As discussed in Section 3.12.2 of the EA, the Project will follow TAM-2016-1 recommendations for filing Form 7460-1 with the FAA.
3. PV systems located in or near the approach path of aircrafts can create a hazardous condition for pilots due to possible glint and glare reflected from the PV array. If glint or glare from the PY array creates a hazardous condition for pilots, the owner of the PY system shall be prepared to immediately mitigate the hazard upon notification by the HDOT-A and/or FAA. A glint and glare analysis must be attached to the PV submittal of FAA Form 7460-1. The following website may assist you with preparation of a glint and glare analysis: www.sandia.gov/glare. When you have received the FAA determination from your submittal of FAA Form 7460-1, please provide a copy for our files.	As discussed in Section 3.12.2 of the EA, a glare analysis was prepared for the Project (see Appendix G) and will be attached to the FAA Form 7460-1.
4. PV systems have also been known to emit radio frequency interference (RFI) to aviation- dedicated radio signals, thereby disrupting the reliability of air-to-ground communications. Again, the owner of the PV system shall be prepared to immediately mitigate the RFI hazard upon notification by the HOOT-A and/or FAA.	As discussed in Section 3.12.2 of the EA, all radio frequency devices associated with the Project would comply with FCC regulations. Project radio frequency devices would operate only within designated frequency bands. No interference with aviation communication frequency is expected due to use of Project radio frequency devices. In the extremely unlikely event of an unexpected radio frequency interference situation and notification by either FAA or DOT Airports

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	Division, the Project's wireless communication system would be disabled and investigated to ensure it does not create a hazardous condition.
5. Due to the proximity to the airport, the developer should be aware of potential noise from aircraft operations. There is also a potential for fumes, smoke, vibrations, odors, etc., resulting from occasional aircraft flight operations over or near the project location. These impacts may increase or decrease over time depending on airport operations	Operation of the Project would not require full-time, on-site staff. It is anticipated that the Project would have up to four employees regularly visiting the site for operations activities. Noise impacts are discussed in Section 3.10.2. Within the Project area, noise would be mitigated by health and safety controls such as hearing protection.
6. Thick smoke from uncontrolled fires are potential obstruction hazards to flight operations. Therefore, the energy or battery storage facility for the solar project shall have sufficient firefighting/fire suppressant ability to prevent potential smoke obstruction in the protected air space.	As discussed in Section 3.13.2 of the Draft EA, the Project would incorporate multiple layers of fire prevention and suppression measures. It is being designed in accordance with the National Fire Protection Association (NFPA) 1 and NEC requirements for fire prevention for large-scale solar.
Highways Division (HDOT-HWY) HDOT-HWY has the following comments relevant to State highways which are to be addressed in the Draft EA: 1. Any work within the State ROW requires a Permit to Perform Work Upon State Highways and a Traffic Management Plan. Construction plans prepared by a Hawaii licensed engineer shall be submitted to the HDOT-H WY Oahu District for review and approval prior to applying for a permit to perform work.	As discussed in Section 2.2.2 and 3.12.2, a Traffic Management Plan would be prepared prior to construction and would be submitted to HDOT for review and approval prior to Project construction. As discussed in the Section 5.11 the Draft EA, the Project acknowledges that it will require a Permit to Perform Work Upon State Highways. Final construction plans will be prepared by a Hawaii licensed engineer will be submitted, along with the Traffic Management Plan, to the HDOT-HWY Oahu District for review and approval prior to applying for a permit to perform work.
2. The HOOT-HWY ROW Branch is reviewing proposed changes to the existing Innergex Use and Occupancy Permit for the proposed	As discussed in the Section 5.11 the Draft EA, the Project acknowledges that it will require a Use and Occupancy Permit.

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project. The permit review and consultation will be conducted outside of the EA consultation process, but the EA should list this permit requirement.	
3. Include a discussion of potential construction-phase and decommission-phase impacts on regional traffic, including the number of trips, construction duration, work schedule, and anticipated routes.	A discussion of potential construction-phase and decommission-phase impacts on regional traffic can be found in Section 3.12.2 and in the Project Traffic Impact Assessment Report (TIAR, Appendix H).
4. Based on our review of similar projects, the operational impacts of the solar facility on State roads would not be significant; however, the EA should include a discussion of existing and future traffic, transit, pedestrian routes, and bikeways in the vicinity	A discussion of potential operation-phase impacts on regional traffic and existing and future traffic conditions can be found in Section 3.12 and in the Project TIAR.
5. Describe other proposed Kalaeloa Master Plan development that would share the project's access driveways or require additional access driveways on Coral Sea Road.	A discussion of existing and future traffic conditions including future improvements and development can be found in Section 3.12 and in the Project TIAR. Barbers Point Solar LLC does not anticipate any other development projects will use the Project's two proposed driveways off Coral Sea Road. With the exception of the currently under construction Aloha Solar Energy Fund II Project located on TMK 9-1-013:070, Barbers Point Solar LLC is not aware of any approved future developments requiring new access driveways off Coral Sea Road.
6. The HDOT-HWY encourages joint-use, single-pole construction at locations where more than one utility or type of facility is involved to minimize the number of utility lines and poles within the State ROW, and visual impacts. Ideally, overhead lines are limited to one side of the roadway.	As discussed in Section 2.1.6, approximately 0.7 mile of the Project generation-tie line along Coral Sea Road is anticipated to be overhead and the overhead line is anticipated to be supported by approximately 55-to 75-foot-tall mono-pole structures (i.e., poles) in order to incorporate the existing Hawaiian Electric owned 12 kV distribution line on the same poles.
7. The United States Coast Guard (USCG) also proposed (2019) use of Coral Sea Road ROW for underground and overhead electrical	The first approximately 0.5 mile of the generation-tie line extending west and north from the collector substation along Coral Sea Road is

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lines. The underground segment was required by HDOT to avoid interference with flight operations at Kalaeloa Airport. The underground portion is in the vicinity of the proposed access to TMK (1) 9-1-013:038, and the same restriction would apply to the proposed project. Recommend consulting with the USCG on the status of their project, and opportunities for co-location of overhead facilities.	expected to be placed underground to comply with Federal Aviation Administration (FAA) clearance requirements/height restriction for placing structures within the runway approaches to the Kalaeloa Airport. The remaining approximately 0.7 mile of generation-tie line along Coral Sea Road to Roosevelt Avenue is anticipated to be overhead. Barbers Point Solar LLC has been in consultations with Aloha Solar Energy Fund II Project, Hawaiian Electric, and HDOT-HWY regarding the existing and planned transmission lines along Coral Sea Road and consolidation of lines where appropriate. The overhead portions of the Project's generation-tie line is anticipated to accommodate the existing Hawaiian Electric owned 12 kV distribution line along Coral Sea Road.
8. Describe the existing utility infrastructure in the vicinity of the project, any proposed removal/decommissioning of existing electrical infrastructure, HCDA 's latest updates for the Kalaeloa Master Plan utility infrastructure and the project's consistency with those plans. Include project alternatives that provide opportunities for current and future co-location of electrical utilities along Coral Sea Road for future Kalaeloa development and land uses.	Existing utility infrastructure is discussed in Section 3.15 of the Draft EA. Remnant utility features from former military use of the Project parcels may be removed during construction of the Project. The Project's consistency with HCDA 's Kalaeloa Master Plan is discussed in Section 5.9.1 of the Draft EA. The Project's proposed generation-tie line provides opportunity for colocation of Hawaiian Electric's 12 kV distribution line.
9. An HDOT-HWY permit is required to transport oversized and/or overweight vehicles and loads on HDOT roadways. The HDOT-HWY may require temporary or permanent roadway improvements to accommodate the safe turning movements of heavy and oversized vehicles on State roads.	As discussed in the Section 5.11 the Draft EA, the Project will require a permit to transport oversized and/or overweight vehicles and loads on HDOT roadways
10. No additional discharge of surface water run-off onto State ROW is permitted. This includes the use of the existing State drainage	Impacts associated with stormwater run-off is discussed in Section 3.15.2 of the Draft EA. The Project would not contribute stormwater

Pre-Assessment Scoping Comment[1]	Response
culverts and channels. All additional stormwater runoff from the project site shall be managed and mitigated onsite. Describe the project's stormwater management.	flows to the stormwater drainage system and would minimize the potential for increased discharge of sediment or other pollutants through BMPs.
14. City and County of Honolulu, Department of Design and Construction (Letter dated June 24, 2021)	
The Department of Design and Construction has no comments to offer at this time.	Comment acknowledged.
15. State of Hawaii, Department of Education (Letter dated June 28, 2021)	
Based upon the information provided, the proposed Project will not impact HIDOE schools.	Comment acknowledged.
16. Historic Hawai'I Foundation (Letter dated June 30, 2021)	
The Notice of Pre-Assessment Consultation stated that the environmental assessment is required by Hawai'i Revised Statutes (HRS) Chapter 343 and Hawai'i Administrative Rules (HAR) Section 11-200.1 for the proposed use of State-owned lands. Please note that the environmental assessment is also required pursuant to HRS 343-5(4) for the proposed use within any historic site as designated in the National or Hawai'i Registers of Historic Places, as provided for in the National Historical Preservation Act of 1966, Public Law 89-665 or HRS Chapter 6-E. A portion of the project (TMK: 9-1-013:038, Area 1) is located within the boundary of the 'Ewa Plain Battlefield historic district, which is listed on both the Hawai'i and the National Registers of Historic Places (State Inventory of Historic Places No. 50-80-12-08025; listed on 8/10/2013).	Comment acknowledged. Section 1.4 of the Draft EA discusses the HRS 343-5 triggers for environmental review including the proposed use within any historic site as designated in the National or Hawai'i Registers of Historic Places, as provided for in the National Historical Preservation Act of 1966, Public Law 89-665 or HRS Chapter 6-E.
Portions of TMK: 9-1-013:038, Area 1 is contained within the 'Ewa Plain Battlefield. The proposed Area 1 site is adjacent to an existing	Comment acknowledged. The proposed Area 1 site does not directly impact any of the contributing elements within the historic district.

Pre-Assessment Scoping Comment[1]	Response
solar array, a portion of which is also located within the ʻEwa Plain Battlefield historic district boundary. The areas covered by the adjacent Kalaeloa Renewable Energy Project (KREP) were determined to be a "non-contributing" and "temporary" within the historic district since the facility is expected to be removed within 20 years and the site cleared to its pre-installation condition. See NR Nomination, ʻEwa Plain Battlefiled, Section 7, page 15.	
Also within the DHHL parcel, between Areas 1 and 2, is an eligible historic district of World War II aircraft revetments (ʻEwa Field South Revetment Dispersal Area). Previous historic inventory surveys and assessments determined that the revetments meet the criteria for listing on both the Hawaiʻi and National Registers of Historic Places. When these parcels were transferred from the Navy to DHHL, the conveyance our of federal ownership was made subject to a perpetual historic preservation covenant mandating the protection and preservation of archaeological sites and World War II-era historic structures, including the remaining revetments (Parcel: 91013038; Tax Map Key Nos. 1-9-1-013-038)". See NR Nomination: Ewa Field South Revetment Historic District, Section 7, page 3.	Comment acknowledged. The Project will not impact the 1942 aircraft revetments located in the Project area. The 43 aircraft revetments documented in the Project's Draft AIS (Appendix A of the Draft EA) have been recommended for Preservation.
Historic Hawaiʻi Foundation is generally supportive of Hawaii's Renewable Energy Mandate in cases where such improvements are located, designed and implemented to avoid, minimize or mitigate effects to historic properties and cultural resources. Project components should be developed in accordance with the Secretary of the Interior's Standards for the Treatment of Historic Properties (SOI Standards) and other relevant standards and guidelines for the treatment of historic properties.	Comment acknowledged. Using the information in the AIS, the Project will be carefully sited to avoid or minimize impacts to historic resources. A preservation plan for the 352 historic features that are recommended for preservation will be developed and submitted to SHPD prior to the commencement of project construction. Project components will be developed in accordance with the Secretary of the Interior's Standards for the Treatment of Historic Properties (SOI Standards) and other relevant standards and guidelines for the treatment of historic properties.
HHF expects that the scope of the Draft Environmental Assessment will include discussion, evaluation and recommendations for project	The Draft EA, including the Project's Draft AIS (Appendix A of the Draft EA) includes discussion, evaluation and recommendations for

Pre-Assessment Scoping Comment[1]	Response
components located within and/or adjacent to both the 'Ewa Plain Battlefield District and the WWII Revetment District. Specifically: • Assessment of how the project will affect the character-defining features of the historic properties; • Discussion of contributing and non-contributing features of the districts that are present within the project area; • The project's potential effect on viewsheds to and from the historic districts; • Direct and indirect effects on the historic districts, both short-term (during construction) and long-term (post-construction); • Permanent and temporary effects on the historic districts, both during the life of the project and when the infrastructure has completed its lifecycle. For example, like the adjacent KREP solar array, will this project be removed and the site restored to pre-installation conditions?	project components located within and/or adjacent to both the 'Ewa Plain Battlefield District and the WWII Revetment District. The Project's Draft AIS discusses the character-defining features of the historic properties associated with the 'Ewa Plain Battlefield District and the proposed WWII Revetment District and discusses the contributing and non-contributing features of the district and proposed district that are present within and near the Project area. Section 3.5 of the Draft EA and the Draft AIS discuss the Project's anticipated short-term (during construction) and long-term (post-construction) effect on these historic properties and their associated features. Section 3.8 of the Draft EA and the Project's Visual Impact Assessment Report (Appendix F) consider the Project's potential effect on viewsheds to and from the 'Ewa Plain Battlefield District. Section 3.17 of the Draft EA discusses the Project's potential direct and indirect effects. Section 2.4 of the Draft EA discusses the Project's decommissioning plan. Decommissioning will involve removal of all equipment associated with the Project and returning the area to substantially the same condition as existed prior to Project development
HHF also expects to see identification and evaluation of any other cultural resources that may be present, including properties to which Native Hawaiians attach religious and cultural significance.	The Draft EA, including the Project's Draft AIS (Appendix A of the Draft EA) includes identification, discussion, and evaluation of historic properties which have cultural significance. Also, a Cultural Impact Assessment has been prepared and included consultations with cultural practitioners to help identify and assess historic properties within the Project area with cultural significance.
17. Hawaii State Energy Office (Letter dated June 30, 2021)	

Pre-Assessment Scoping Comment[1]	Response
HSEO's comments are guided by its statutory purpose under Hawai'i Revised Statutes §196-71 and its mission to promote energy efficiency, renewable energy, and clean transportation to help achieve a resilient, clean energy, and ultimately carbon negative economy. As an island community currently dependent on imported fossil fuels for over 60% of its electrical power, Hawai'i is particularly vulnerable to fuel and energy supply disruptions, unpredictable fuel cost fluctuations, unintended fuel releases impacting both marine and terrestrial environments, and the many impacts associated with climate change. That is why Hawai'i's 100% renewable energy goal is critical to the health, safety, affordability, and well-being of Hawai'i's residents. However, it is important that reaching 100% renewable energy generation by 2045 be done in a manner that prioritizes the health, safety, and well-being of Hawai'i's residents, natural resources, culture, and environment.	As discussed in Section 1.2 of the Draft EA, the Project will help Hawai'i meet the state's need for renewable energy by providing up to 15 MW of solar energy and 60 MWh of battery energy storage. As a renewable energy project, the Project will promote the use of renewable energy sources in Hawai'i. Hawaiian Electric estimates that the Project will fulfill an average of 0.56% of Hawaiian Electric's RPS over the 25-year term of the PPA. The Project would benefit Hawaii by generating clean, renewable energy to replace a portion of 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. In addition, as discussed in Section 6.1 and as detailed throughout the Draft EA, the Project would incorporate a variety of best management practices (BMPs) and mitigation measures such that no significant impacts are anticipated to Hawai'i's residents, natural resources, culture, and environment.
Contribution to State Renewable Energy, Fossil Fuel Displacement, and Greenhouse Gas Goals The proposed 15-megawatt (MW) solar photovoltaic system with a 4-hour 60 megawatt-hour (MWh) battery system has the capacity to generate 37,014 megawatt-hours annually and increase O'ahu's renewable energy portfolio by nearly 0.6%.[Hawai'i Division of Consumer Advocacy's Statement of Position (Feb. 10, 2021).] The Project also includes batteries that are critical components necessary for controlled energy output and grid-stabilization. The Project is one of nine (9) solar plus storage projects being developed or proposed on O'ahu to enable the retirement of O'ahu's 180 MW coal plant by September 1, 2022, and two units of the Hawaiian Electric Wai'au power plant totaling nearly 93 MW in early 2024. Notably, when these power plants are retired their energy production will need to come from alternative sources. If the energy	The Project's contribution to the State's and O'ahu's renewable energy portfolio and the associated benefits, are discussed in Section 1.2 of the Draft EA.

Pre-Assessment Scoping Comment[1]	Response
cannot be produced by renewables and cannot be conserved through energy efficiency measures, the power will come from fossil fuel sources, further underscoring the importance of developing renewable energy and storage projects. The Project is expected to be commercially operational by December 29, 2023, which is an important period between the retirement of these fossil fuel power plants. HSEO recommends the DEA state how the Project would contribute to the State's and O'ahu's renewable energy portfolio and support the retirement of these fossil fuel units. The DEA should identify any other benefits such as grid stabilization, long-term resiliency, and energy self-reliance.	
The Project Pre-assessment Scoping Consultation Letter states the Project would offset approximately 1,139,396 barrels of fossil fuel and approximately 455,598 metric tons of greenhouse gases (GHG) over the 25-year life of the Project. HSEO recommends the DEA incorporate the Hawai'i Greenhouse Gas Emissions Report for 2017 (April 2021) with analysis pursuant to HRS §225P-5 (https://health.hawaii.gov/cab/files/2021/04/2017-Inventory_Final-Report_April-2021.pdf) and lifecycle analysis pursuant to HRS §269-6(b) to inform decision-making by the Hawai'i Public Utilities Commission (PUC).	Data from the Hawai'i Greenhouse Gas Emissions Report for 2017 was incorporated into Section 3.1 of the Draft EA.
Impact to Ratepayers The Project would sell power to Hawaiian Electric at $0.112/kilowatt-hour (kWh) for 25 years under the power purchase agreement (PPA) submitted to the PUC on September 15, 2020. On February 10, 2021, the Hawai'i Consumer Advocate recommended approval of the PPA subject to certain conditions. The PPA is awaiting PUC decision. If approved, Hawaiian Electric estimates the Project would save an average customer who uses 500 kWh per month about $0.25/kWh per month or $12 per year. [Hawai'i Division of Consumer Advocacy's Statement of Position (Feb. 10, 2021).] HSEO recommends the DEA provide the projected estimated value of the Project including the	The value of the Project including the estimated savings to Hawaiian Electric customers over the Project lifetime is presented in Section 1.2 of the Draft EA.

Pre-Assessment Scoping Comment[1]	Response
estimated savings to Hawaiian Electric customers over the Project lifetime.	
Community Input and Benefits Genuine collaboration with community members and stakeholders is necessary for any large renewable energy project to be considered a "win" for the surrounding communities. Past renewable energy projects have received invaluable input by participating and presenting at neighborhood board meetings, conducting one-on-one interviews with local cultural practitioners, conducting public meetings, and other outreach activities with key community stakeholders.	Barbers Point Solar, LLC began conducting community engagement and public outreach activities during the early stages of the Project's development process and continues to engage with the community with Project updates and coordination on community benefits. Barbers Point Solar, LLC and its consultants have held nearly 100 meetings with individuals, community organizations, businesses, and government officials. Project community and stakeholder outreach activities are presented in Section 7.1 and Appendix I of the Draft EA.
The Hawai'i Consumer Advocate notes Innergex conducted virtual public meetings on July 8, 2020, and November 10, 2020, and sent a flyer to 1,043 homesteads in Kapolei informing them of the later meeting [Hawai'i Division of Consumer Advocacy's Statement of Position (Feb. 10, 2021)]. According to the Consumer Advocate, concern was raised at the first meeting about impact to the pueo and the second meeting had only a few questions from community members, none expressing opposition or concerns. However, a concerned comment was submitted to the PUC docket for the Project about the historic value of the Project site and the need to comply with the necessary historic preservation reviews. [Public Comment from John Bond, President, Kanehili Cultural Hui and Save 'Ewa Field (Feb. 16, 2021).] HSEO recommends the DEA identify the public outreach activities conducted by Innergex for the Project, summarize the public input received, and identify the responses to this input including appropriate Project modifications and/or mitigation measures.	The potential for pueo to occur within the Project area and measures that would be implemented to avoid and minimize potential impacts are discussed in Section 3.4 of the Draft EA. The potential for impacts to historic resources within the Project area and measures that would be implemented to avoid and minimize impacts, and the necessary historic preservation reviews, are discussed in Section 3.6 of the Draft EA. Project community and stakeholder outreach activities are presented in Section 7.1 and Appendix I of the Draft EA. A summary of public input received from pre-assessment scoping of the Draft EA and responses to this input are presented in Section 7.2 and included in Appendix K of the Draft EA.
HSEO notes there is a distinction between required public engagement activities – such as required under HRS Chapter 343, the utility procurement process, approval by the PUC, and other permitting requirements – and voluntary community outreach	Project community and stakeholder outreach activities are presented in Section 7.1 and Appendix I of the Draft EA. A summary of public input received from pre-assessment scoping of the Draft EA and responses to this input are presented in Section 7.2 and included in

Pre-Assessment Scoping Comment[1]	Response
activities such as those conducted by Innergex as mentioned above. HSEO encourages Innergex to identify these distinct activities in the DEA and to continue its voluntary outreach activities in addition to fulfilling its regulatory requirements. To date, Innergex has identified several potential community benefits associated with the Project: 1) Dedicated funding to Kapolei Community Heritage Center 2) Solar training program for Center for Native Hawaiian Advancement and the Mākaha Learning Center 3) Commitment to local employment and contracting 4) Sponsorships and donations for local festivities, events, conferences, and fundraisers 5) Memberships in organizations 6) Opportunities to support local schools <u>HSEO recommends the DEA identify all community benefit commitments associated with the Project.</u>	Appendix L of the Draft EA. Details regarding Barbers Point Solar Project's community benefits are included in Appendix I of the Draft EA.
Decommissioning, Site Restoration, and Materials Disposal and Handling Project decommissioning and site restoration upon the end of the useful life of the Project will impact DHHL's long-term plans for these properties. HSEO recommends the DEA discuss the mechanisms in place to implement the required decommissioning of the Project and site restoration. Recognizing the potential environmental impacts caused by the mismanagement of spent photovoltaic (PV) panels throughout the world, on June 25, 2021, Governor David Ige signed Act 92, which requires the Hawai'i Natural Energy Institute (HNEI), in consultation with the Department of Health (DOH), to conduct a comprehensive study to determine best practices for disposal, recycling, and secondary use of clean energy products in the State of Hawai'i. These discarded clean energy products could also have market value potential for Hawai'i or other places.	Project decommissioning and site restoration is discussed in Section 2.4 of the Draft EA. Barbers Point Solar LLC is currently consulting with the DOH Solid and Hazardous Waste Branch regarding the appropriate disposal of the solar panels, as well as other electronic items and batteries, at their end of life. In response to this comment, a letter was sent to Mr. Thomas Brand of DOH Solid and Hazardous Waste Branch on July 9, 2021 requesting consultation on the Barbers Point Solar Project and recommendation on appropriate disposal of solar panels as well as other electronic items and batteries at the end of their useful life.

Pre-Assessment Scoping Comment[1]	Response
Further, the DOH Solid and Hazardous Waste Branch has implemented changes to Hawai'i Administrative Rules (HAR) §11-273, effective on June 7, 2021, that categorize photovoltaic solar panels as a universal waste and streamline a process for their disposal under the universal waste standards. HSEO recommends the DEA discuss how the discarded PV panels, racking, wiring, battery units, and other Project components will be handled upon the end of the useful life of the Project. HSEO further recommends consultation with the DOH Solid and Hazardous Waste Branch regarding the appropriate disposal of the solar panels, as well as other electronic items and batteries, at their end of life.	
Benefit to DHHL Beneficiaries <u>Given the Project's location, HSEO recommends the DEA identify how the Project will directly benefit DHHL beneficiaries.</u>	The Project's benefits to DHHL and its beneficiaries are discussed in Sections 1.0 and 1.2 of the Draft EA and a discussion of the Project's compliance with DHHL's General Plan, Ho'omaluō Energy Policy, O'ahu Island Plan, and Kapolei Regional Plan are discussed in Section 5.8 of the Draft EA.
18. City and County of Honolulu, Department of Transportation Services (Letter dated June 30, 2021)	
1. Neighborhood Impacts. The area representatives, neighborhood board, as well as the area residents, businesses, emergency personnel (fire, ambulance, and police), Oahu Transit Services, Inc. (TheBus and TheHandi- Van), etc., should be kept apprised of the details and status throughout the project and the impacts that the project may have on the adjoining local street area network.	Community outreach and agency coordination is described in Section 7.0 of the Draft EA. Outreach has included DOT, HCDA, DHHL, City and County of Honolulu Fire Department and Police Department, Kapolei Community Development Corporation, the Chair and Board Members of Neighborhood Board #34 (Makakilo/Kapolei), adjacent property owners, and various nearby businesses. The Project will consult with Oahu Transit Services, Inc and will continue to conduct outreach with the surrounding community throughout the Project's development process.
2. Street Usage Permit. A street usage permit from the Department of Transportation Services should be obtained for any construction-related work that may require the temporary closure of any traffic lane or pedestrian mall on a City street.	Barbers Point Solar LLC does not anticipate the need to temporarily close traffic lanes or pedestrian malls on a City and County of Honolulu street as the roads that may require lane closure are owned by HDOT (Coral Sea Road and Franklin D. Roosevelt Avenue).

Pre-Assessment Scoping Comment[1]	Response
	However, if a need for closure were identified during the Project's design and permitting process, a Street Usage Permit from the Department of Transportation Services would be obtained prior to construction.
3. Construction Impacts. Construction materials and equipment should be transported 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.	As discussed in Section 3.12.2, trucks would access the Project site after morning peak hours, where possible. If necessary, heavy load trucks and wide load trucks would access the Project outside of daily peak hours of traffic.
4. Vehicle/Bicycle/Pedestrian Crossing. Any existing pedestrian, bicycle and vehicle access/crossing shall be maintained with the highest safety measures during construction.	As discussed in Section 3.12.2, existing pedestrian, bicycle and vehicle facilities shall be safely maintained. If roadway, sidewalk, or crosswalk closures are necessary, alternate routes would be provided for vehicles, pedestrians, and bicyclists. Alternate routes would be clearly marked for increased safety.
5. Disability and Communication Access Board (DCAB). Project plans (vehicular and pedestrian circulation, sidewalks, parking and pedestrian pathways, vehicular ingress/egress, etc.) should be reviewed and approved by DCAB to ensure full compliance with Americans with Disabilities Act requirements.	Final Project civil design plans will be submitted to City and County of Honolulu DPP for review prior to issuance of building and grading permits. As part of DPP's review, Barbers Point Solar LLC will consult with the DCAB to ensure full compliance with Americans with Disabilities Act requirements.
19. State of Hawaii, Department of Land and Natural Resources, Land Division (Letter dated July 02, 2021)	
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 Special Flood Hazard Area (high-risk areas). State projects are required to comply with 44CFR regulations as stipulated in Section 60.12. Be advised that 44CFR reflects the minimum standards as set forth by the NFIP. Local community flood ordinances may stipulate higher standards that can be more restrictive and would take precedence over the minimum NFIP standards.	As discussed in Section 3.13, the Project area is not located within a Special Flood Hazard Area; therefore, it is understood that the rules and regulations of the NFIP and local community flood ordinances are not applicable. Nevertheless, electrical wiring would be elevated or enclosed to prevent potential flooding damage from natural hazards.

Pre-Assessment Scoping Comment[1]	Response
The owner of the project property and/or their representative is responsible to research the Flood Hazard Zone designation for the project. Flood Hazard Zones are designated IRM), which can be viewed on our Flood Hazard Assessment Tool (FHAT) (http://gis.hawaiinfip.org/FHAT). If there are questions regarding the local flood ordinances, please contact the applicable County NFIP coordinating agency below: o Oahu: City and County of Honolulu, Department of Planning and Permitting (808) 768-8098. o Hawaii Island: County of Hawaii, Department of Public Works (808) 961-8327. o Maui/Molokai/Lanai County of Maui, Department of Planning (808) 270-7253. o Kauai: County of Kauai, Department of Public Works (808) 241-4896	
20. State of Hawaii, Department of Land and Natural Resources, Divisions of Forestry and Wildlife (Letter dated July 15, 2021)	
We appreciate your proactive planning efforts with DOFAW on avoidance and minimization measures for listed species to inform the development of the proposed solar project. Based on the information from the updated June 2021 Draft Biological Resources Survey Report, DOFAW provides the following comments. The wet season survey data from June 2021 report indicates that no *Euphorbia skottsbergii* var. *skottsbergii* were found within 100-meters of the proposed project area. If any *Euphorbia skottsbergii* var. *Skottsbergii* are observed during the construction and operation of the proposed solar project, DOFAW supports the U.S. Fish and Wildlife guidelines and does not support any digging within 100 meters of any endangered plants regardless of their location to the project boundaries.	The recommended avoidance and minimization measure to avoid and minimize potential impacts to the endangered *Euphorbia skottsbergii* var. *skottsbergii*, including establishing and maintaining a 100-meter avoidance buffer from the remaining ʻakoko individuals recorded in TMK 9-1-013:039, are discussed in Section 3.4 and Appendix C of the Draft EA.
Due to the arid climate and risks of wildfire to listed species, we recommend coordinating with the Hawaiʻi Wildfire Management	The potential for wildfire to occur within the Project area and measures that would be implemented to avoid and minimize impacts

Pre-Assessment Scoping Comment[1]	Response
Organization (808-850-900, admin@hawaiiwildfire.org) on how wildfire prevention can be addressed in the project area.	associated with wildfire are discussed in Section 3.13 of the Draft EA. The Project would incorporate fire prevention and suppression measures, and would be designed in accordance with the NFPA and NEC requirements for fire prevention. Barbers Point Solar LLC is consulting with Hawai'i Wildfire Management Organization regarding wildfire prevention.
DOFAW recommends that any Wiliwili (*Erythrina sanwichensis*) trees present at the project site should not be damaged and avoided by project infrastructure when possible. While not State listed species, these Wiliwili have been species of concern in the past and are still a valuable resource for Hawaii's imperiled lowland dry forests. Additionally, we recommend reaching out to the Kalaeloa Heritage and Legacy Foundation near the project site about the best practices for caring for the Wiliwili trees in this area. Please visit: https://www.khlfoundation.org/ for more information.	As discussed in Section 3.4 of the Draft EA, wiliwili trees are present in the Project area; however, no Project components are planned in the areas where the wiliwili trees were mapped during the surveys. Barbers Point Solar, LLC has consulted and will continue to consult with the Kalaeloa Heritage and Legacy Foundation.
The State endangered Pueo has been observed in the project site vicinity. Pueo are a crepuscular species, most active during dawn and dusk twilights. DOFAW recommends twilight pre-construction surveys by a qualified biologist prior to clearing vegetation for construction. If Pueo nests are present, a buffer zone of 46 m (150 feet) should be established in which no clearing occurs until nesting ceases, and DOFAW staff should be notified. Work should not resume until directed by DOFAW.	Avoidance and minimization measure to avoid and minimize potential impacts to the species are discussed in Section 3.4 and Appendix C of the Draft EA.
State listed waterbirds such as the Hawaiian Stilt (*Himantopus mexicanus knudseni*), Hawaiian Coot (*Fulica alai*), and Hawaiian Moorhen (*Gallinula galeata sandvicensis*) have the potential to occur in the vicinity of the proposed project site. It is against State law to harm or harass these species. If any of these species are present during construction activities, then all activities within 100 feet (30 meters) should cease, and the bird should not be approached. Work	The potential for various avian species to occur within the Project area and measures that would be implemented to avoid and minimize impacts to those species (should they occur) are discussed in Section 3.4 of the Draft EA.

Pre-Assessment Scoping Comment[1]	Response
may continue after the bird leaves the area of its own accord. If a nest is discovered at any point, please contact the Oʻahu DOFAW Office at (808) 973-9778.	
We appreciate your efforts to work with our office for the conservation of Hawaiʻi's native species. Should the scope of the project change significantly, or should it become apparent that threatened or endangered species may be impacted, please contact our staff as soon as possible. If you have any questions, please contact Paul Radley, Protected Species Habitat Conservation Planning Coordinator at (808) 587-0010 or paul.m.radley@hawaii.gov.	Comment acknowledged.
21. University of Hawai'i, Mānoa (Letter dated July 22, 2021)	
This is to acknowledge receipt of your letter requesting a review of an environmental assessment (EA) or environmental impact statement (EIS), see attached. The Environmental Center at the University of Hawaiʻi at Mānoa, which for a time was linked to the Water Resources Research Center (WRRC), has been discontinued. As a result of the closure of the Environmental Center, we regret that WRRC no longer has the capacity to review environmental documents.	Comment acknowledged.

NOTES:

[1] Copies of the pre-assessment scoping comment letters are attached.

McClain, Leslie

From: Shad Kane <shadskane@gmail.com>
Sent: Thursday, June 3, 2021 3:55 PM
To: mulrooney
Cc: Barberspointsolar; Julia Mancinelli
Subject: Re: Barbers Point Solar - Preassessment Scoping Consultation

MISE EN GARDE : Ce courriel provient de l'externe. Avant d'accéder à une pièce jointe ou à un lien de ce courriel, assurez-vous de reconnaître l'expéditeur et que le contenu est de confiance.
WARNING: This is an external e-mail. Before opening an attachment or clicking on a link, please make sure you recognize the sender and that the content is safe.

Tues, June 8 works for me. .....shad

On Jun 2, 2021 7:39 AM, "Mara Mulrooney" <mulrooney@pacificlegacy.com> wrote:

Aloha e Uncle Shad,

E kala mai for the radio silence on my end - we've had our heads down working hard on the reports. I'd love to join you for a site visit. Please let me know which days are best for you and we'll go from there.

Mahalo piha,
Mara

On Jun 1, 2021, at 1:03 PM, Shad Kane <shadskane@gmail.com> wrote:

Yes. Mahalo. Let me know when.....Shad Kane

On Jun 1, 2021 12:47 PM, "Julia Mancinelli" <JMancinelli@innergex.com> wrote:

Aloha Shad

Thank you for your comments regarding the scope of the EA.

Mara Mulroney and her team at Pacific Legacy are diligently working on writing up the archaeological inventory survey and cultural impact assessment (CIA) reports and incorporating the knowledge you shared with them. We look forward to sharing these reports and the updated design with you and the community over the summer.

If you have time, we would like to offer to do a site visit with Pacific Legacy to visit the sites you discussed as part of the CIA (and noted below) and talk through how we are planning to incorporate your input into our plans. Please let us know if this would be of interest to you.

Sincerely

Julia Mancinelli
Director - Environment

<image001.jpg>

888 Dunsmuir Street, Suite 1100, Vancouver, BC V6C 3K4
Tel. 604 633-9990 x2231 | Cell. 604 345-4009 | www.innergex.com

Facebook | Twitter | LinkedIn

From: Shad Kane <shadskane@gmail.com>
Sent: Tuesday, June 1, 2021 1:01 PM
To: Barberspointsolar <barberspointsolar@innergex.com>
Cc: Julia Mancinelli <JMancinelli@innergex.com>
Subject: Re: Barbers Point Solar - Preassessment Scoping Consultation

MISE EN GARDE : Ce courriel provient de l'externe. Avant d'accéder à une pièce jointe ou à un lien de ce courriel, assurez-vous de reconnaître l'expéditeur et que le contenu est de confiance.

WARNING: This is an external e-mail. Before opening an attachment or clicking on a link, please make sure you recognize the sender and that the content is safe.

Aloha,

There are excellent Hawaiian cultural structures in an area that is being cleaned right now on the mauka side of the Kalaeloa Ranch. There are several house sites and one that is identified as a heiau. The heiau has the same orientation and construction as other similar structures right across the street in the Kalaeloa Heritage Park. There are also cultural structures makai of the Ranch fronting Tripoli and Coral Sea Road. There are numerous cultural structures east of the Ranch in areas once known as the Northern Trap and SKeet Range and the Southern Trap and Skeet Range. I reported on these once before for these solar projects but no one got back to me.

Mahalo,

Shad Kane

On Tue, Jun 1, 2021 at 6:01 AM Barberspointsolar <barberspointsolar@innergex.com> wrote:

Dear Interested Party

Barbers Point Solar, LLC is proposing to build and operate the Barbers Point Solar Project (Project) located in east Kalaeloa (east of Kalaeloa Airport) in the ʻEwa District, on the island of Oʻahu.

The Project area encompasses approximately 163-acres primarily located within tax map keys (TMKs): 9-1-013:038 and :040, both owned by Department of Hawaiian Home Lands (DHHL). Project electrical transmission lines will also be located within rights-of-way owned by Hawaiʻi Department of Transportation (HDOT) (Coral Sea Road and Roosevelt Avenue) and Hawaiʻi Community Development Authority (HCDA) as well as within a portion of TMK 9-1-016:027 (owned by Kapolei Infrastructure, LLC).

As the Project would involve the use of State-owned land, compliance with Hawaiʻi Revised Statutes (HRS) Chapter 343 is required. Pursuant to the requirements of HRS Chapter 343 and Hawaiʻi Administrative Rules (HAR) §11-200.1, Barbers Point Solar, LLC is preparing an environmental assessment (EA) to evaluate the potential environmental effects of the project. DHHL has agreed to be the Accepting Authority for the EA. The Project does not require the use of federal lands.

As part of the environmental review process, pre-assessment consultation is being conducted to obtain input on the scope of issues to be considered in the Draft EA. An overview of the Project and a location map are attached. We are requesting input regarding the Project, including concerns related to particular environmental resources, as well as relevant information that should be considered in the evaluation.

Please provide comments regarding the scope of the EA in writing via U.S. postal mail to Leslie McClain at Tetra Tech (737 Bishop Street, Suite 2340, Honolulu, Hawaiʻi 96813) or email barberspointsolar@innergex.com. Comments must be postmarked by June 30, 2021 to be considered in the Draft EA.

Thank you for your participation in the environmental review process for the proposed project.

Sincerely

Barbers Point Solar, LLC

Julia Mancinelli
Director - Environment

<image001.jpg>

888 Dunsmuir Street, Suite 1100, Vancouver, BC V6C 3K4
Tel. 604 633-9990 x2231 | Cell. 604 345-4009 | www.innergex.com

Facebook | Twitter | LinkedIn

McClain, Leslie

From: John Bond <ewabond@gmail.com>
Sent: Thursday, June 3, 2021 2:28 PM
To: Barberspointsolar
Cc: Julia Mancinelli; mulrooney; Jennifer Robins; Paul Cleghorn
Subject: Re: Barbers Point Solar - Preassessment Scoping Consultation

Follow Up Flag: Follow up
Flag Status: Flagged

MISE EN GARDE : Ce courriel provient de l'externe. Avant d'accéder à une pièce jointe ou à un lien de ce courriel, assurez-vous de reconnaître l'expéditeur et que le contenu est de confiance.
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Aloha,

There needs to be some more specific details about this project which has apparently changed in design plans.

1. Where will the main electrical facilities be and where will the batteries, etc be located? There needs to be more specific maps and diagrams shown with the connections, etc.

2. Is there now no plan to use any part of the 1941-42 MCAS Ewa Field properties? This is not clear.

3. Will the project use any part of the 1942 aircraft revetments?

4. Will the project use any part of the 1944-1965 Navy SeaBee Camp and Navy interim housing facility that subsequently used those roads and buildings up until around the mid 1960's?

5. Are there specific diagrams of what the solar arrays will look like, including mockups, illustrations, etc. How deep will the holes be for arrays and fencing?

6. How will the historic and cultural sites be protected? Will there be an historical archeological Protection Plan? What sites have been identified so far?

7. Is the project considering putting the Coral Sea Road powerline underground? A powerful storm will knock all of the powerlines down like in 2011 when this area was hit by a Derecho - a horizontal storm front with tornadic winds. This area also sees large waterspouts fairly commonly under certain conditions.

In 2011 the Ewa area was hit with a Derecho - causing hurricane-force winds, heavy rains, and flash floods. Power was out for many days and power poles had to be replaced everywhere.
https://en.wikipedia.org/wiki/Derecho
The air was intense, frothy whiteout like being in a hurricane.

John Bond
Save Ewa Field
Kanehili Cultural Hui

On Tue, Jun 1, 2021 at 6:01 AM Barberspointsolar <barberspointsolar@innergex.com> wrote:

> Dear Interested Party
>
> Barbers Point Solar, LLC is proposing to build and operate the Barbers Point Solar Project (Project) located in east Kalaeloa (east of Kalaeloa Airport) in the ʻEwa District, on the island of Oʻahu.
>
> The Project area encompasses approximately 163-acres primarily located within tax map keys (TMKs): 9-1-013:038 and :040, both owned by Department of Hawaiian Home Lands (DHHL). Project electrical transmission lines will also be located within rights-of-way owned by Hawaiʻi Department of Transportation (HDOT) (Coral Sea Road and Roosevelt Avenue) and Hawaiʻi Community Development Authority (HCDA) as well as within a portion of TMK 9-1-016:027 (owned by Kapolei Infrastructure, LLC).
>
> As the Project would involve the use of State-owned land, compliance with Hawaiʻi Revised Statutes (HRS) Chapter 343 is required. Pursuant to the requirements of HRS Chapter 343 and Hawaiʻi Administrative Rules (HAR) §11-200.1, Barbers Point Solar, LLC is preparing an environmental assessment (EA) to evaluate the potential environmental effects of the project. DHHL has agreed to be the Accepting Authority for the EA. The Project does not require the use of federal lands.
>
> As part of the environmental review process, pre-assessment consultation is being conducted to obtain input on the scope of issues to be considered in the Draft EA. An overview of the Project and a location map are attached. We are requesting input regarding the Project, including concerns related to particular environmental resources, as well as relevant information that should be considered in the evaluation.
>
> Please provide comments regarding the scope of the EA in writing via U.S. postal mail to Leslie McClain at Tetra Tech (737 Bishop Street, Suite 2340, Honolulu, Hawaiʻi 96813) or email barberspointsolar@innergex.com. Comments must be postmarked by June 30, 2021 to be considered in the Draft EA.
>
> Thank you for your participation in the environmental review process for the proposed project.

Sincerely

Barbers Point Solar, LLC

Julia Mancinelli
Director - Environment

888 Dunsmuir Street, Suite 1100, Vancouver, BC V6C 3K4
Tel. 604 633-9990 x2231 | Cell. 604 345-4009 | www.innergex.com

Facebook | Twitter | LinkedIn

DEPARTMENT OF COMMUNITY SERVICES
CITY AND COUNTY OF HONOLULU
925 DILLINGHAM BOULEVARD, SUITE 200•HONOLULU, HAWAII 96817
PHONE: (808) 768-7762 • FAX: (808) 768-7792
www.honolulu.gov/dcs

RICK BLANGIARDI
MAYOR

SARAH ALLEN
DIRECTOR

JOY BARUA
DEPUTY DIRECTOR

June 4, 2021

Ms. Leslie McClain
Tetra Tech
737 Bishop Street, Suite 2340
Honolulu, Hawai'i 96813
Attn: Barbers Point Solar Project DRAFT EA

Dear Ms. McClain:

SUBJECT: Pre-Consultation: DRAFT Environmental Assessment
Barbers Point Solar Project
TMK: (1) 9-1-013:038 and :040, and (1) 9-1-016:027 O'ahu, Hawai'i

Thank you for your Pre-Consultation Draft Environmental Assessment for the Barbers Point Solar Project.

Our review of the documents indicates that the proposed project will have no adverse impacts on any Department of Community Services' activities or projects in the surrounding neighborhood.

Thank you for providing us the opportunity to comment on this matter.

Sincerely,

Sarah Allen
Director

DCS/Admin
2199

INNERGEX

Renewable Energy.
Sustainable Development.

21 JUN -1 P3:07

May 28, 2021

RE: Barbers Point Solar Project
'Ewa District, O'ahu; TMKs 9-1-013:038, 9-1-013:040, and 9-1-016:027
Pre-Assessment Consultation for HRS Chapter 343 Environmental Assessment

---

Dear Interested Party,

Barbers Point Solar, LLC is proposing to build and operate the Barbers Point Solar Project (Project) located in east Kalaeloa (east of Kalaeloa Airport) in the 'Ewa District, on the island of O'ahu.

The Project area encompasses approximately 163-acres primarily located within tax map keys (TMKs): 9-1-013:038 and :040, both owned by Department of Hawaiian Home Lands (DHHL). Project electrical transmission lines will also be located within rights-of-way owned by Hawai'i Department of Transportation (HDOT) (Coral Sea Road and Roosevelt Avenue) and Hawai'i Community Development Authority (HCDA) as well as within a portion of TMK 9-1-016:027 (owned by Kapolei Infrastructure, LLC).

As the Project would involve the use of State-owned land, compliance with Hawai'i Revised Statutes (HRS) Chapter 343 is required. Pursuant to the requirements of HRS Chapter 343 and Hawai'i Administrative Rules (HAR) §11-200.1, Barbers Point Solar, LLC is preparing an environmental assessment (EA) to evaluate the potential environmental effects of the project. DHHL has agreed to be the Accepting Authority for the EA. The Project does not require the use of federal lands.

As part of the environmental review process, pre-assessment consultation is being conducted to obtain input on the scope of issues to be considered in the Draft EA. An overview of the Project and a location map are attached. We are requesting input regarding the Project, including concerns related to particular environmental resources, as well as relevant information that should be considered in the evaluation.

Please provide comments regarding the scope of the EA in writing via U.S. postal mail to Leslie McClain at Tetra Tech (737 Bishop Street, Suite 2340, Honolulu, Hawai'i 96813) or email barberspointsolar@innergex.com. Comments must be postmarked by June 30, 2021 to be considered in the Draft EA.

Innergex Renewable Energy Inc
888 Dunsmuir Street, Suite 1100
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Canada
Tel 604 633-9990 Fax 604 633-9991
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Innergex Renewables USA, LLC
3636 Nobel Drive, Suite 260
San Diego, CA 92122
United States
Tel. 858 346-4004 Fax 604 633-9991
info@innergex.com www.innergex.com

INNERGEX

Renewable Energy.
Sustainable Development.

Thank you for your participation in the environmental review process for the proposed project.

Sincerely,

Barbers Point Solar, LLC

Julia Mancinelli

Julia Mancinelli
Director – Environment
Innergex Renewable Energy Inc.
JMancinelli@innergex.com

Attachments: Project Overview
Location Map

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

RICK BLANGIARDI
MAYOR

DEAN UCHIDA
DIRECTOR

DAWN TAKEUCHI APUNA
DEPUTY DIRECTOR

EUGENE H. TAKAHASHI
DEPUTY DIRECTOR

June 7, 2021 2021/ELOG-1091(MAK)

Ms. Julia Mancinelli, Director
Innergex Renewable Energy LLC
3636 Nobel Drive, Suite 260
San Diego, California 92122

Dear Ms. Mancinelli:

SUBJECT: Pre- Assessment Consultation - Environmental Analysis
Barbers Point Solar Project - Honouliuli
Tax Map Key 9-1-013: 038, 040, and 9-1-016: 027

This in response to your letter, received June 1, 2021, requesting comments regarding the upcoming preparation of an Environmental Assessment (EA). We understand that the proposal is to develop a 15-megawatt solar photovoltaic system coupled with a 15-megawatt, 4-hour photovoltaic coupled battery energy storage system as well as ancillary support infrastructure on the subject properties. Based on the information in your letter, we have no comments at this time, but we look forward to reviewing your upcoming Draft EA.

Thank you for the opportunity to comment on this proposal. Should you have any questions, please contact Michael Kat, of our Zoning Regulations and Permits Branch, at 768-8013, or by email at michael.kat@honolulu.gov.

Very truly yours,

FOR: Dean Uchida
Director

POLICE DEPARTMENT

CITY AND COUNTY OF HONOLULU

801 SOUTH BERETANIA STREET · HONOLULU, HAWAII 96813
TELEPHONE (808) 529-3111 · INTERNET: www.honolulupd.org

RICK BLANGIARDI
MAYOR

RADE K. VANIC
INTERIM CHIEF

JOHN D. McCARTHY
DEPUTY CHIEF

OUR REFERENCE EO-DK

June 8, 2021

SENT VIA EMAIL

Ms. Leslie McClain
barberspointsolar@innergex.com

Dear Ms. McClain:

This is in response to your agency's letter dated May 28, 2021, requesting input on the Pre-Consultation, Environmental Assessment, for the proposed Barbers Point Solar Project to be located east of the Kalaeloa Airport in Ewa Beach.

Based on the information provided, the Honolulu Police Department recommends that all necessary signs, lights, barricades, and other safety equipment be installed and maintained by the contractor during the construction phase of the project, as Roosevelt Avenue is a main thoroughfare in the area. Any impacts to vehicular traffic may cause issues and disruptions to businesses and residents which could lead to complaints.

If there are any questions, please call Major Gail Beckley of District 8 (Kapolei, Waianae) at 723-8400.

Thank you for the opportunity to review this project.

Sincerely,

DARREN CHUN
Assistant Chief of Police
Support Services Bureau

DAVID Y. IGE
GOVERNOR

CURT T. OTAGURO
COMPTROLLER

AUDREY HIDANO
DEPUTY COMPTROLLER

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810-0119

(P)21.108

JUN - 8 2021

Ms. Leslie McClain
TetraTech
737 Bishop Street, Suite 2340
Honolulu, Hawaii 96813

Dear Ms. McClain:

Subject: Pre-Assessment Consultation for Chapter 343, HRS
Barbers Point Solar Project
Ewa District, Oahu, Hawaii
TMK: (1) 9-1-013: 038, (1) 9-1-013: 040, (1) 9-1-016: 027

Thank you for the opportunity to comment on the subject project. We have no comments to offer at this time as the proposed project does not impact any of the Department of Accounting and General Services' projects or existing facilities.

If you have any questions, your staff may call Ms. Gayle Takasaki of the Planning Branch at 586-0584.

Sincerely,

CHRISTINE L. KINIMAKA
Public Works Administrator

GT:mo

From: Jan Becket
To: Barberspointsolar
Subject: Re: Barbers Point Solar - Preassessment Scoping Consultation
Date: Monday, June 14, 2021 7:09:32 PM
Attachments: Ordy Pond.pdf

MISE EN GARDE : Ce courriel provient de l'externe. Avant d'accéder à une pièce jointe ou à un lien de ce courriel, assurez-vous de reconnaître l'expéditeur et que le contenu est de confiance.
WARNING: This is an external e-mail. Before opening an attachment or clicking on a link, please make sure you recognize the sender and that the content is safe.

Aloha Ms. Mancinelli,

Attached is my comment on the proposed solar project at Kalaeloa. It is in pdf format.

best wishes,
Jan Becket
808-265-3727

On Jun 1, 2021, at 9:01 AM, Barberspointsolar <barberspointsolar@innergex.com> wrote:

Dear Interested Party

Barbers Point Solar, LLC is proposing to build and operate the Barbers Point Solar Project (Project) located in east Kalaeloa (east of Kalaeloa Airport) in the ʻEwa District, on the island of Oʻahu.

The Project area encompasses approximately 163-acres primarily located within tax map keys (TMKs): 9-1-013:038 and :040, both owned by Department of Hawaiian Home Lands (DHHL). Project electrical transmission lines will also be located within rights-of-way owned by Hawaiʻi Department of Transportation (HDOT) (Coral Sea Road and Roosevelt Avenue) and Hawaiʻi Community Development Authority (HCDA) as well as within a portion of TMK 9-1-016:027 (owned by Kapolei Infrastructure, LLC).

As the Project would involve the use of State-owned land, compliance with Hawaiʻi Revised Statutes (HRS) Chapter 343 is required. Pursuant to the requirements of HRS Chapter 343 and Hawaiʻi Administrative Rules (HAR) §11-200.1, Barbers Point Solar, LLC is preparing an environmental assessment (EA) to evaluate the potential environmental effects of the project. DHHL has agreed to be the Accepting Authority for the EA. The Project does not require the use of federal lands.

As part of the environmental review process, pre-assessment consultation is being conducted to obtain input on the scope of issues to be considered in the Draft EA. An overview of the Project and a location map are attached. We are requesting input regarding the Project, including concerns related to particular environmental resources, as well as relevant information that should be considered in the evaluation.

Please provide comments regarding the scope of the EA in writing via U.S. postal mail to Leslie McClain at Tetra Tech (737 Bishop Street, Suite 2340, Honolulu, Hawai'i 96813) or email barberspointsolar@innergex.com. Comments must be postmarked by June 30, 2021 to be considered in the Draft EA.

Thank you for your participation in the environmental review process for the proposed project.

Sincerely

Barbers Point Solar, LLC

Julia Mancinelli
Director - Environment

<image001.jpg>

888 Dunsmuir Street, Suite 1100, Vancouver, BC V6C 3K4
Tel. 604 633-9990 x2231 | Cell. 604 345-4009 | www.innergex.com
Facebook | Twitter | LinkedIn

<2021-05-28 Preassessment Scoping Consultation Letter for Barbers Point Solar Project_FINAL_Map.pdf>

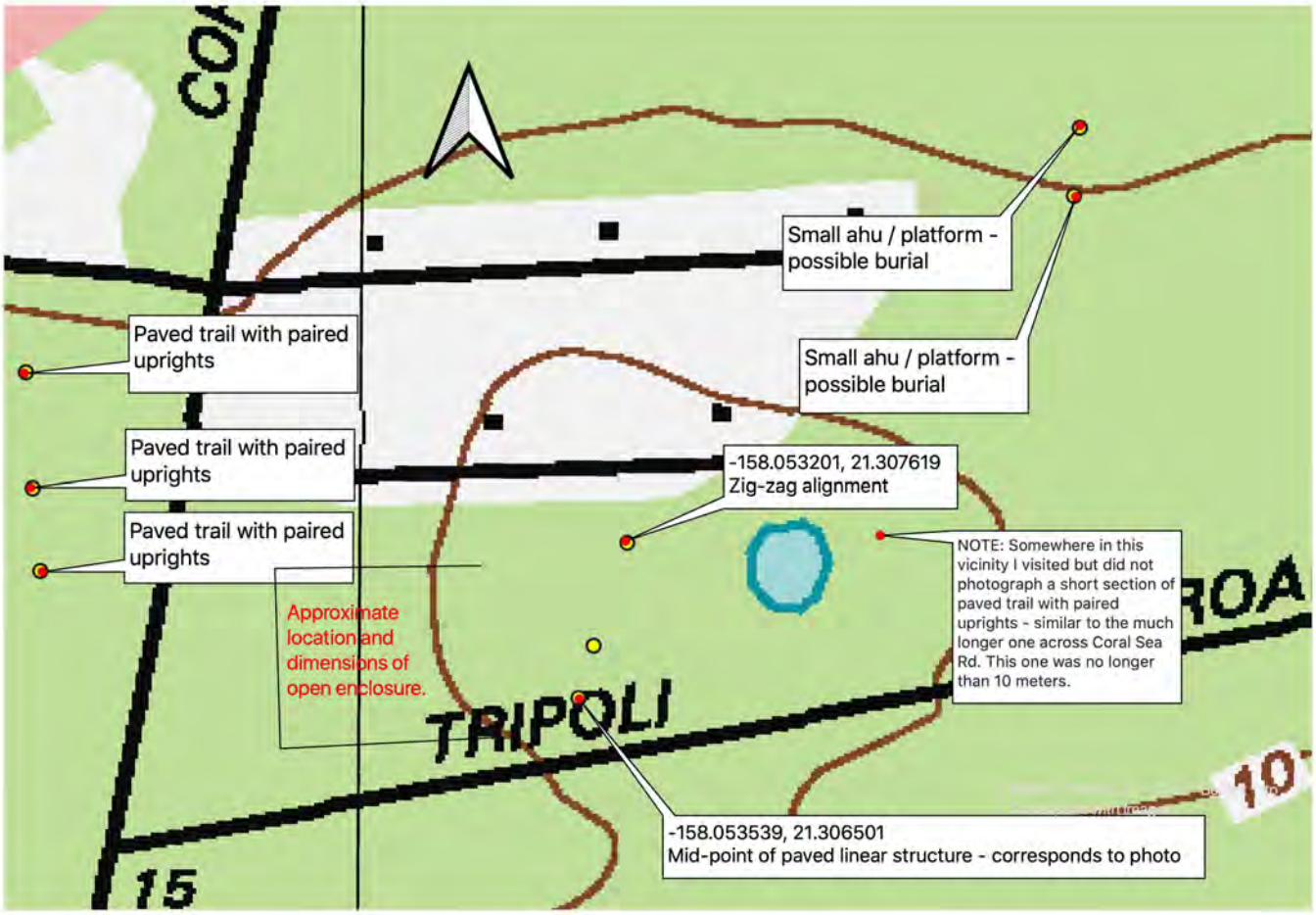
I visited the DHHL property at Ordy Pond several times in 2007 and 2008 and was able to obtain images of structures there before they were impacted and / or destroyed by the Raceway Park operators and by military ordnance cleanup.

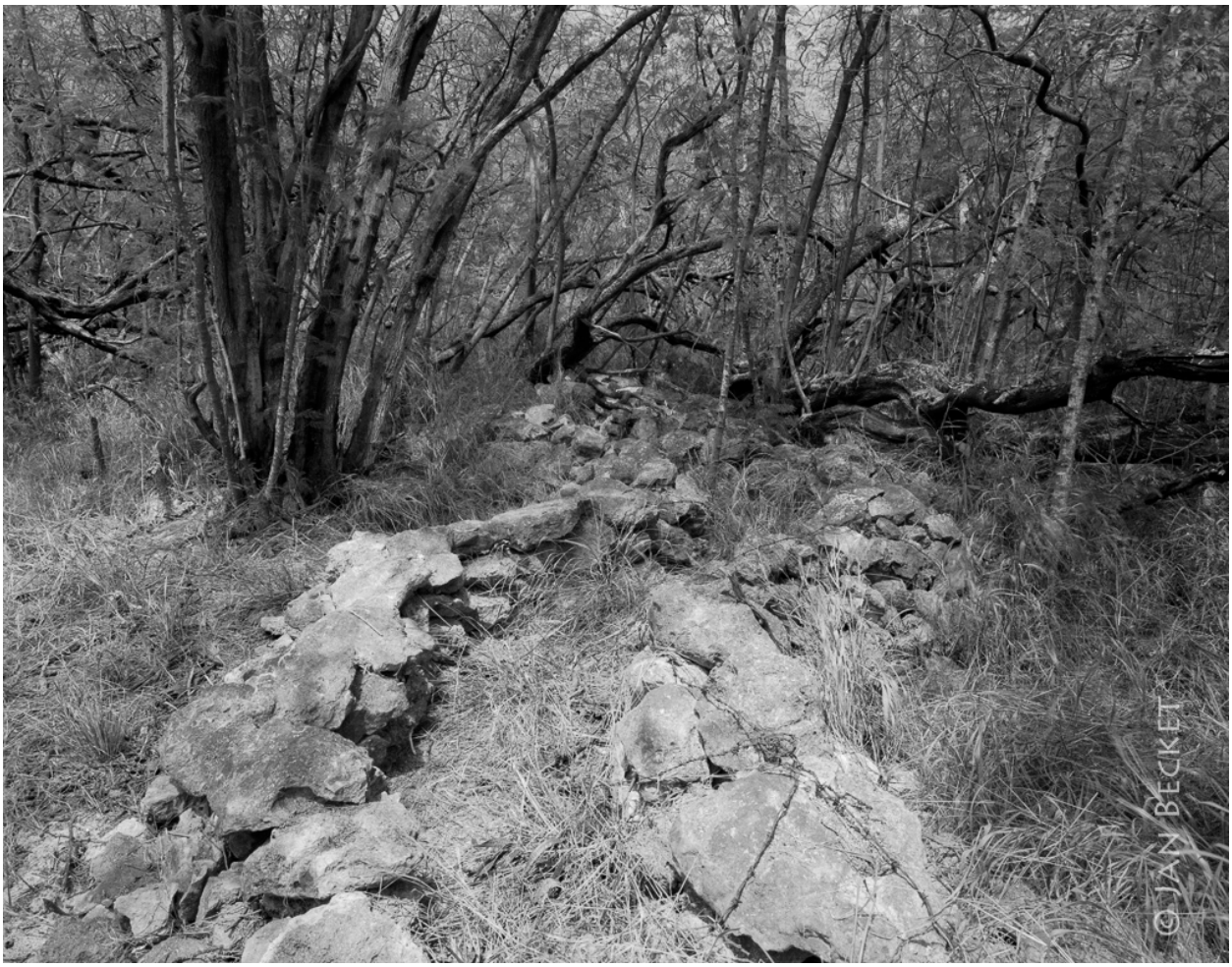
The principal feature of the area, bordered along one side by Coral Sea Road and on another by Tripoli Road, was a large enclosure walled on three sides and open on the side facing Ordy Pond. As far as I could tell, the structure enclosed an area of sand that did not exist outside its walls. I do not have points for the corners, unfortunately, and have drawn in a very approximate polygon to represent relative dimensions and location.

The function of these large pre-contact enclosures is not clear. One exists at Keawa‘ula (perhaps connected with ‘uala cultivation), one at Pālehua and another at the rear of Wailupe. Another large, low enclosure exists in the pasture at the old Meadow Gold Ranch on the North Shore. Recent archaeological research at Pālehua has identified one wall aligned on the rising point of the Makali‘i - a clear confirmation of pre-contact origin. The report suggests that the enclosure was a collection point for Makahiki taxes. Similar work needs to be undertaken for this enclosure.

The other two structures were a low, paved, linear structure close to Tripoli and two parallel walls on the NW side of the pond that formed a zig-zag alignment. Images are on the following pages. It is of course my hope and expectation that none of the pre-contact structures near Ordy Pond or in other parcels will be impacted by the solar project. I ask that best practices be observed in setting adequate buffer zones around all structures.

— Jan Becket, 4/8/21





Zig-Zag alignment. I have not seen other structures like this elsewhere at Kalaeloa - or anywhere else in Hawaiʻi. Not evident in the images is the use of the traditional upright construction style in the interior wall at several points - a confirmation of its pre-contact origin.

The west wall of the large enclosure - somewhat parallel to Coral Sea Rd.

The NE / mauka wall of the large enclosure.

The paved linear structure at Ordy Pond, close to Tripoli. For reference, the images below are of two similar low, paved structures nearby.

An image taken in 2006 of a similar paved, linear structure on the makai side of Tripoli, close to the plane crash site and to a platform structure.

An image taken in 2002 of another paved, linear structure. This one is in an undisturbed area on the SE side of site 1752, the complex identified as a heiau in the area curated by the Heritage Park.

None of these structures run for a great distance - perhaps 250 feet.

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

RICK BLANGIARDI
MAYOR

LIONEL CAMARA JR.
ACTING FIRE CHIEF

SHELDON K. HAO
ACTING DEPUTY FIRE CHIEF

June 14, 2021

Ms. Julia Mancinelli
Director - Environment
Innergex Renewable Energy Inc.
3636 Nobel Drive, Suite 260
San Diego, California 92122

Dear Ms. Mancinelli:

Subject: Revised Ordinances of Honolulu Chapter 25 Preassessment Consultation
Environmental Assessment
Barbers Point Solar Project
Ewa District, Oahu, Hawaii
Tax Map Keys: 9-1-013: 038, 040 and 9-1-016: 027

In response to your letter dated May 28, 2021, regarding the abovementioned subject, the Honolulu Fire Department (HFD) reviewed the submitted information and requires that the following be complied with:

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 meters) 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, 2012 Edition, Sections 18.2.3.2.2 and 18.2.3.2.2.1.)

   A fire department access road shall extend to within 50 feet (15 meters) 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, 2012 Edition, Section 18.2.3.2.1.)

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 (45,720 millimeters) 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, 2012 Edition, Section 18.3.1, as amended.)

3. The unobstructed width and unobstructed vertical clearance of a fire apparatus access road shall meet county requirements. (NFPA 1, 2012 Edition, Sections 18.2.3.4.1.1 and 18.2.3.4.1.2, as amended.)

4. New photovoltaic systems shall be installed in accordance with Section 11.10, Section 11.12 and NFPA 70. (NFPA 1, 2012 Edition, Section 11.12.1.)

5. Stationary storage battery systems having an electrolyte capacity of more than 100 gallons (378.5 liters) in sprinklered buildings or 50 gallons (189.3 liters) in unsprinklered buildings for flooded lead-acid, nickel-cadmium, and valve-regulated lead-acid batteries or 1,000 pounds (454 kilograms) for lithium-ion and lithium metal polymer batteries used for facility standby power, emergency power, or uninterrupted power supplies shall be in accordance with Chapter 52 and Table 52.1. (NFPA 1, 2012 Edition, Section 52.1.)

6. Submit civil drawings to the City and County of Honolulu's Department of Planning and Permitting for review and approval.

Should you have questions, please contact Battalion Chief Reid Yoshida of our Fire Prevention Bureau at 723-7151 or ryoshida@honolulu.gov.

Sincerely,

JASON SAMALA
Assistant Chief

JS/TC:gl

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

ROBERT K. MASUDA
FIRST DEPUTY

M. KALEO MANUEL
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
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET, ROOM 325
HONOLULU, HAWAII 96813

June 24, 2021

Julia Mancinelli
Innergex Renewables USA, LLC
4660 La Jolla Village Drive, Suite 680
San Diego, CA 92122

Log no. 3165/3199

Dear Ms. Mancinelli:

The Department of Land and Natural Resources, Division of Forestry and Wildlife (DOFAW) has received your inquiry regarding the pre-assessment consultation for the Barbers Point Solar Project in 'Ewa on O'ahu, Hawai'i, TMKs: (1) 9-1-013:038, 9-1-013-040, and 9-1-016:027. The proposed project consists of constructing a 15-megawatt (MW) solar photovoltaic system coupled with a 15 MW, 4-hour (60 MW-hour) photovoltaic coupled battery energy storage system (PV-Coupled ESS) as well as ancillary support infrastructure on 163-acres of undeveloped land.

We appreciate your proactive planning efforts with DOFAW to date on avoidance, minimization, and mitigation measures for these listed species to inform the development of the solar project. Based on the preliminary project information from the in-person meeting on November 13th, 2020 and the Draft Biological Resources Survey Report, DOFAW provides the following comments on the potential of the proposed work to affect listed species in the vicinity of the project area.

Survey records indicate endangered plant species, such as *Euphorbia skottsbergii* var. *skottsbergii* and *Achyranthes splendens* var. *rotundata*, are known to occur within or near the proposed project area. DOFAW recommends that a qualified botanist survey for these rare and endangered plants. Surveys of dry areas should be done after rains to be considered legitimate. If any of these species are found near the project site, we recommend no ground/soil disturbance with heavy machinery within 100 meters of the actual plants even if they are not on the project property. For more information on avoidance and minimization measures for plants please refer to the following link: https://www.fws.gov/pacificislands//articles.cfm?id=149489721

The State endangered Pueo has been observed in the project site vicinity. Pueo are a crepuscular species, most active during dawn and dusk twilights. DOFAW recommends twilight pre-construction surveys by a qualified biologist prior to clearing vegetation for construction. If Pueo nests are present, a buffer zone of 46 m (150 feet) should be established in which no clearing occurs until nesting ceases, and DOFAW staff should be notified. Work should not resume until directed by DOFAW.

Due to the arid climate and risks of wildfire to listed species, we recommend coordinating with the Hawai'i Wildfire Management Organization (808-850-900, admin@hawaiiwildfire.org) on how wildfire prevention can be addressed in the project area.

State listed waterbirds such as the Hawaiian Stilt (*Himantopus mexicanus knudseni*), Hawaiian Coot (*Fulica alai*), and Hawaiian Moorhen (*Gallinula galeata sandvicensis*) have the potential to occur in the vicinity of the proposed project site. It is against State law to harm or harass these species. If any of these species are present during construction activities, then all activities within 100 feet (30 meters) should cease, and the bird should not be approached. Work may continue after the bird leaves the area of its own accord. If a nest is discovered at any point, please contact the O'ahu DOFAW Office at (808) 973-9778.

The State listed Hawaiian Hoary Bat or 'Ōpe'ape'a (*Lasiurus cinereus semotus*) has the potential to occur in the vicinity of the project area and may roost in nearby trees. If any site clearing is required this should be timed to avoid disturbance during the bat birthing and pup rearing season (June 1 through September 15). If this cannot be avoided, woody plants greater than 15 feet (4.6 meters) tall should not be disturbed, removed, or trimmed without consulting DOFAW. It has been documented that hoary bats can become ensnared in barbed wire during flight and die. We therefore recommend the use of barbed wire be avoided, and are pleased to note that your plan states that barbed wire will not be installed at the project site.

We note that artificial lighting can adversely impact seabirds that may pass through the area at night by causing disorientation. This disorientation can result in collision with manmade artifacts or grounding of birds. For nighttime lighting that might be required, DOFAW recommends that all lights be fully shielded to minimize impacts. Nighttime work that requires outdoor lighting should be avoided during the seabird fledging season from September 15 through December 15. This is the period when young seabirds take their maiden voyage to the open sea. For illustrations and guidance related to seabird-friendly light styles that also protect the dark, starry skies of Hawai'i please visit: https://dlnr.hawaii.gov/wildlife/files/2016/03/DOC439.pdf.

DOFAW recommends minimizing the movement of plant or soil material between worksites, such as in fill. Soil and plant material may contain invasive fungal pathogens, vertebrate and invertebrate pests, or invasive plant parts that could harm Hawai'i's native species and ecosystems. We recommend consulting the O'ahu Invasive Species Committee at (808) 266-7994 during planning, design, and construction of the project to be informed of any high-risk invasive species in the area and ways to mitigate their spread. All equipment, materials, and personnel should be cleaned of excess soil and debris to minimize the risk of spreading invasive species.

We appreciate your efforts to work with our office for the conservation of Hawai'i's native species. Should the scope of the project change significantly, or should it become apparent that threatened or endangered species may be impacted, please contact our staff as soon as possible. If you have any questions, please contact Paul Radley, Protected Species Habitat Conservation Planning Coordinator at (808) 587-0010 or paul.m.radley@hawaii.gov.

Sincerely,

DAVID G. SMITH
Administrator

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843
www.boardofwatersupply.com

RICK BLANGIARDI, MAYOR

BRYAN P. ANDAYA, Chair
KAPUA SPROAT, Vice Chair
RAY C. SOON
MAX J. SWORD
NA'ALEHU ANTHONY

JADE T. BUTAY, Ex-Officio
ROGER BABCOCK, Jr., Ex-Officio

ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

ELLEN E. KITAMURA, P.E.
Deputy Manager and Chief Engineer

June 15, 2021

Ms. Leslie McClain
Tetra Tech
737 Bishop Street, Suite 2340
Honolulu, Hawaii 96813

Dear Ms. McClain:

Subject: Your Letter Dated May 28, 2021 Requesting Comments on Pre-Assessment Consultation for HRS Chapter 343 Environmental Assessment for the Proposed Barbers Point Solar Project
Tax Map Key: 9-1-013: 038, 040; 9-1-016: 027

Thank you for the opportunity to comment on the proposed solar project.

The Honolulu Board of Water Supply does not have water facilities in the proposed project area. Water service and fire protection should be provided by the private water system.

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

DEPARTMENT OF FACILITY MAINTENANCE

CITY AND COUNTY OF HONOLULU

1000 Ulu'ohia Street, Suite 215, Kapolei, Hawaii 96707
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RICK BLANGIARDI
MAYOR

ROGER BABCOCK, JR., Ph. D., P.E.
DIRECTOR AND CHIEF ENGINEER

DAWN B. SZEWCZYK, P.E.
DEPUTY DIRECTOR

IN REPLY REFER TO:
DRM 21-373

June 15, 2021

Tetra Tech
Ms. Leslie McClain
737 Bishop Street, Suite 2340
Honolulu, Hawaii 96813-3484

Dear Ms. McClain:

Subject: Barbers Point Solar Project
Pre-Assessment Consultation for HRS Chapter 343,
Environmental Assessment
TMK's: 9-1-013:038, 9-1-013:040, and 9-1-016:027

Thank you for the opportunity to review and comment on the subject project.

This is our comments as follows:

- During construction and upon completion of the project, any damages/deficiencies along the roadway on Tripoli Street shall be repaired to City standards and accepted by the City and at no cost to the City and County of Honolulu.

If you have any questions, please call Mr. Kyle Oyasato of the Division of Road Maintenance at 768-3697.

Sincerely,

Roger Babcock, Jr., Ph. D., P.E.
Director and Chief Engineer

HAWAII COMMUNITY DEVELOPMENT AUTHORITY

547 Queen Street, Honolulu, Hawaii 96813
Telephone: (808) 594-0300 Fax: (808) 587-0299
Web site: http://dbedt.hawaii.gov/hcda/

DAVID Y. IGE
GOVERNOR

JOHN WHALEN
CHAIR

DEEPAK NEUPANE, P.E., AIA
EXECUTIVE DIRECTOR

June 15, 2021

Ms. Leslie McClain
Tetra Tech
737 Bishop Street, Suite 2340
Honolulu, Hawaii 96813

Dear Ms. McClain:

Re: Barbers Point Solar Project, Oahu, Kapolei, Kalaeloa Tax Map Key No.: (1)-9-1-013: 038, (1)-9-013: 040 and (1)-9-1-016: 027 Pre-Assessment Consultation for HRS Chapter 343 Environmental Assessment.

Pursuant to Act 184 of the 2002 Hawaii State Legislature, effective July 1, 2002, the Hawaii Community Development Authority (HCDA) assumed the responsibility for implementation of the Community Redevelopment Plan - overseeing remaining conveyances, contract administration, promulgation of administrative rules, and other responsibilities relating to the former Barbers Point Naval Air Station (BPNAS). Act 184, expanded the designation of the Kalaeloa Community Development District (KCDD), to encompass the land within the former BPNAS, including land retained by the Navy and land conveyed to other Federal, State and City agencies. The Navy also utilized the BPNAS base closure to convey 500 acres to the Department of Hawaiian Home Lands (DHHL) through the federal Public Law 104-42, the Hawaiian Home Lands Recovery Act. Parcels Tax Map Key No.: (1)-9-013: 038 and 040 proposed for the Barbers Point Solar Project (Project) site is owned by the DHHL.

The HCDA provides the following comments:

- The Project will require a development permit and the contested case public hearing process pursuant to Hawaii Administrative Rules (HAR) 15-219, Practice and Procedures,
- The Project may require variances regarding fencing, landscaping, irrigation, frontages and setbacks; and
- HAR 15-215, Kalaeloa Rules require new electrical infrastructure to be underground unless it will be installed on the existing electrical poles.

Thank you for the opportunity to provide comments. If you have any questions, please contact Ms. Tesha Malama, Kalaeloa Director of Planning and Development at 808-372-3562 or email Tesha.malama@hawaii.gov.

Sincerely,

Deepak Neupane, P.E., AIA
Executive Director

DAVID Y. IGE
GOVERNOR

JADE T. BUTAY
DIRECTOR

Deputy Directors
LYNN A S ARAKI-REGAN
DEREK J CHOW
ROSS M HIGASHI
EDWIN H SNIFFEN

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO
DIR 0515
STP 8.3198

June 16, 2021

Ms. Leslie McClain
Tetra Tech
737 Bishop Street, Suite 2340
Honolulu, Hawaii 96813

Dear Ms. McClain:

Subject: Pre-Assessment Consultation for Environmental Assessment (EA)
Barbers Point Solar Project
Ewa, Oahu, Hawaii
Tax Map Keys (TMK): (1) 9-1-013: 038, 040; 9-1-016: 027

Thank you for your letter dated May 28, 2021 requesting comments on the proposed project. The State of Hawaii Department of Transportation (HDOT) has reviewed your letter and understands Barbers Point Solar, LLC is proposing to build and operate a 15-megawatt (MW) solar photovoltaic (PV) system coupled with a 15 MW, 4-hour PV coupled battery energy storage system as well as other supporting infrastructure. The project will utilize approximately 163-acres of land primarily on two non-contiguous parcels in the Kalaeloa area. Both parcels being owned by the Department of Hawaiian Home Lands.

HDOT also understands the project will include electrical collector lines between the two parcels and be located within the HDOT right-of-way (ROW) of Coral Sea Road (State Route 8955) and Roosevelt Avenue (State Route 8940).

Access to the two primary parcels will be via Coral Sea Road via a new driveway and access road within an existing Hawaii Community Development Authority (HCDA) easement to TMK (1) 9-1-013: 038. There is an existing access driveway to TMK (1) 9-1-013:040 on Coral Sea Road, however a new access is being proposed to accommodate construction access.

HDOT has the following comments:

Airports Division (HDOT-A)

1. The proposed solar project is within 0.5 miles from Kalaeloa Airport (JRF). All projects within 5 miles from Hawaii State airports are advised to read the Technical Assistance Memorandum (TAM) for guidance with development and activities that may require further review and permits. The TAM can be viewed at this link: http://files.hawaii.gov/dbedt/op/docs/TAM-FAA-DOT-Airports_08-01-2016.pdf.

2. The proposed solar project is approximately 2,107 feet from the end of Runway 22L at JRF. Federal Aviation Administration (FAA) regulation requires the submittal of FAA Form 7460-1 Notice of Proposed Construction or alteration pursuant to the Code of Federal Regulations, Title 14, Part 77.9, if the construction or alteration is within 20,000 feet of a public use or military airport which exceeds a 100:1 surface from any point on the runway of each airport with its

longest runway more than 3,200 feet. Construction equipment and staging area heights, including heights of temporary construction cranes, shall be included in the submittal. The form and criteria for submittal can be found at the following website: https://oeaaa.faa.gov/oeaaa/external/portal.jsp.

3. PV systems located in or near the approach path of aircrafts can create a hazardous condition for pilots due to possible glint and glare reflected from the PV array. If glint or glare from the PV array creates a hazardous condition for pilots, the owner of the PV system shall be prepared to immediately mitigate the hazard upon notification by the HDOT-A and/or FAA.

   A glint and glare analysis must be attached to the PV submittal of FAA Form 7460-1. The following website may assist you with preparation of a glint and glare analysis: www.sandia.gov/glare. When you have received the FAA determination from your submittal of FAA Form 7460-1, please provide a copy for our files.

4. PV systems have also been known to emit radio frequency interference (RFI) to aviation-dedicated radio signals, thereby disrupting the reliability of air-to-ground communications. Again, the owner of the PV system shall be prepared to immediately mitigate the RFI hazard upon notification by the HDOT-A and/or FAA.

5. Due to the proximity to the airport, the developer should be aware of potential noise from aircraft operations. There is also a potential for fumes, smoke, vibrations, odors, etc., resulting from occasional aircraft flight operations over or near the project location. These impacts may increase or decrease over time depending on airport operations.

6. Thick smoke from uncontrolled fires are potential obstruction hazards to flight operations. Therefore, the energy or battery storage facility for the solar project shall have sufficient firefighting/fire suppressant ability to prevent potential smoke obstruction in the protected air space.

<u>Highways Division (HDOT-HWY)</u>

HDOT-HWY has the following comments relevant to State highways which are to be addressed in the Draft EA:

1. Any work within the State ROW requires a Permit to Perform Work Upon State Highways and a Traffic Management Plan. Construction plans prepared by a Hawaii licensed engineer shall be submitted to the HDOT-HWY Oahu District for review and approval prior to applying for a permit to perform work.

2. The HDOT-HWY ROW Branch is reviewing proposed changes to the existing Innergix Use and Occupancy Permit for the proposed project. The permit review and consultation will be conducted outside of the EA consultation process, but the EA should list this permit requirement.

3. Include a discussion of potential construction-phase and decommission-phase impacts on regional traffic, including the number of trips, construction duration, work schedule, and anticipated routes.

4. Based on our review of similar projects, the operational impacts of the solar facility on State roads would not be significant; however, the EA should include a discussion of existing and future traffic, transit, pedestrian routes, and bikeways in the vicinity.

5. Describe other proposed Kalaeloa Master Plan development that would share the project's access driveways or require additional access driveways on Coral Sea Road.

6. The HDOT-HWY encourages joint-use, single-pole construction at locations where more than one utility or type of facility is involved to minimize the number of utility lines and poles within the State ROW, and visual impacts. Ideally, overhead lines are limited to one side of the roadway.

7. The United States Coast Guard (USCG) also proposed (2019) use of Coral Sea Road ROW for underground and overhead electrical lines. The underground segment was required by HDOT to avoid interference with flight operations at Kalaeloa Airport. The underground portion is in the vicinity of the proposed access to TMK (1) 9-1-013:038, and the same restriction would apply to the proposed project. Recommend consulting with the USCG on the status of their project, and opportunities for co-location of overhead facilities.

8. Describe the existing utility infrastructure in the vicinity of the project, any proposed removal/decommissioning of existing electrical infrastructure, HCDA's latest updates for the Kalaeloa Master Plan utility infrastructure and the project's consistency with those plans. Include project alternatives that provide opportunities for current and future co-location of electrical utilities along Coral Sea Road for future Kalaeloa development and land uses.

9. An HDOT-HWY permit is required to transport oversized and/or overweight vehicles and loads on HDOT roadways. The HDOT-HWY may require temporary or permanent roadway improvements to accommodate the safe turning movements of heavy and oversized vehicles on State roads.

10. No additional discharge of surface water run-off onto State ROW is permitted. This includes the use of the existing State drainage culverts and channels. All additional stormwater runoff from the project site shall be managed and mitigated onsite. Describe the project's stormwater management.

If there are any questions, please contact Mr. Blayne Nikaido of the HDOT Statewide Transportation Planning Office at (808) 831-7979 or via email at blayne.h.nikaido@hawaii.gov.

Sincerely,

JADE T. BUTAY
Director of Transportation

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

RICK BLANGIARDI
MAYOR

ALEX KOZLOV, P.E.
DIRECTOR

HAKU MILLES, P.E.
DEPUTY DIRECTOR

June 24, 2021

Leslie McClain
Tetra Tech
737 Bishop Street, Suite 2340
Honolulu, Hawaii 96813

Dear Leslie,

Subject: Barbers Point Solar Project
Ewa District, Oahu
TMKs: 9-1-013:038, 9-1-013:040, and 9-1-016:027
Pre-Assessment Consultation for HRS Chapter 343 Environmental Assessment

Thank you for the opportunity to review and comment. The Department of Design and Construction has no comments to offer at this time.

Should you have any further questions, please contact me at 768-8480.

Sincerely,

FOR Alex Kozlov, P.E.
Director

AK:krn (853169)

DAVID Y. IGE
GOVERNOR

DR. CHRISTINA M. KISHIMOTO
SUPERINTENDENT

STATE OF HAWAI'I
DEPARTMENT OF EDUCATION
P.O. BOX 2360
HONOLULU, HAWAI'I 96804

OFFICE OF FACILITIES AND OPERATIONS

June 28, 2021

Leslie McClain
Tetra Tech
737 Bishop Street, Suite 2340
Honolulu, Hawaii 96813

Re: Chapter 343, Hawaii Revised Statutes Pre-Assessment Consultation for the Barbers Point Solar Project, Barbers Point, Oahu, Hawaii
TMK (1) 9-1-013:038 & 040 and (1) 9-1-016:027

Dear Ms. McClain:

Thank you for your letter dated May 28, 2021. The Hawaii State Department of Education (HIDOE) has the following comments for the preparation of a Draft Environmental Assessment for the proposed Barbers Point Solar Project (Project) located at Barbers Point, Island of Oahu, TMK (1) 9-1-013:038 & 040 and (1) 9-1-016:027.

Based upon the information provided, the proposed Project will not impact HIDOE schools.

Thank you for the opportunity to comment. Should you have questions, please contact Robyn Loudermilk, School Lands and Facilities Specialist of the Facilities Development Branch, Planning Section at 784-5093 or by email at robyn.loudermilk@k12.hi.us.

Sincerely,

Roy Ikeda
Interim Public Works Manager
Planning Section

RI:rll

HISTORIC HAWAI'I FOUNDATION

680 Iwilei Road Suite 690, Honolulu HI 96817 • (808) 523-2900 • preservation@historichawaii.org • www.historichawaii.org

June 30, 2021

Leslie McClain
Tetra Tech
737 Bishop Street, Suite 2340
Honolulu, HI 96813
Via Email: barberspointsolar@innergex.com

Re: Barbers Point Solar Project
'Ewa District, O'ahu; TMKs 9-1-013:038, 9-1-013:040, and 9-1-016:027
Pre-Assessment Consultation for HRS Chapter 343 Environmental Assessment

Dear Ms. McClain,

Thank you for referring the above-mentioned project to Historic Hawai'i Foundation (HHF) under Chapter 343 of the Hawai'i Revised Statutes. HHF received the notice dated May 28, 2021 (received via email on June 7, 202) requesting pre-consultation on issues to consider when preparing the Environmental Assessment.

Historic Hawai'i Foundation is a statewide nonprofit organization established in 1974 to encourage the preservation of sites, buildings, structures, objects and districts that are significant to the history of Hawai'i. HHF is an organization with a demonstrated interest in the undertaking and a concern for the effects on historic properties.

Project Scope

Barbers Point Solar, LLC is proposing to develop, own and operate the Barbers Point Solar Project (Project) located in east Kalaeloa, 'Ewa District, on the island of O'ahu. The Project will consist of a 15-megawatt (MW) solar photovoltaic system coupled with a 15 MW, 4-hour (60 MW-hour) photovoltaic coupled battery energy storage system (PV-Coupled ESS) as well as ancillary support infrastructure.

The Project area encompasses approximately 163-acres primarily located within tax map keys (TMKs): 9-1-013:038 and :040, both owned by Department of Hawaiian Home Lands (DHHL).

The purpose of the Project is to construct and operate a renewable energy facility on the DHHL property that would generate and store electricity derived from solar resources, thereby providing clean, renewable energy for the island of O‘ahu.

Planning Area

The Project area includes three (3) parcels (Areas 1, 2 & 3) shown within the lands owned by DHHL (TMKs: 9-1-013:038 and :040); roadway rights-of-way along Coral Sea Road and Roosevelt Road owned by Hawai‘i Department of Transportation (HDOT) and Hawai‘i Community Development Authority (HCDA); as well as within a portion of TMK 9-1-016:027 (owned by Kapolei Infrastructure, LLC).

Need for Environmental Assessment

The Notice of Pre-Assessment Consultation stated that the environmental assessment is required by Hawai‘i Revised Statutes (HRS) Chapter 343 and Hawai‘i Administrative Rules (HAR) Section 11-200.1 for the proposed use of State-owned lands.

Please note that the environmental assessment is also required pursuant to HRS 343-5(4) for the proposed use within any historic site as designated in the National or Hawai‘i Registers of Historic Places, as provided for in the National Historical Preservation Act of 1966, Public Law 89-665 or HRS Chapter 6-E.

A portion of the project (TMK: 9-1-013:038, Area 1) is located within the boundary of the ‘Ewa Plain Battlefield historic district, which is listed on both the Hawai‘i and the National Registers of Historic Places (State Inventory of Historic Places No. 50-80-12-08025; listed on 8/10/2013).

Context

Portions of TMK: 9-1-013:038, Area 1 is contained within the ‘Ewa Plain Battlefield. The proposed Area 1 site is adjacent to an existing solar array, a portion of which is also located within the ‘Ewa Plain Battlefield historic district boundary. The areas covered by the adjacent Kalaeloa Renewable Energy Project (KREP) were determined to be a "non-contributing" and "temporary" within the historic district since the facility is expected to be removed within 20 years and the site cleared to its pre-installation condition. *See NR Nomination, ‘Ewa Plain Battlefiled, Section 7, page 15*.

Also within the DHHL parcel, between Areas 1 and 2, is an eligible historic district of World War II aircraft revetments (‘Ewa Field South Revetment Dispersal Area). Previous historic inventory surveys and assessments determined that the revetments meet the criteria for listing on both the Hawai‘i and National Registers of Historic Places. When these parcels were transferred from the Navy to DHHL, the conveyance our of federal ownership was made subject to a perpetual historic preservation covenant mandating the protection and preservation of archaeological sites and World War II-era historic structures, including the remaining revetments (Parcel: 91013038; Tax Map Key Nos. 1-9-1-013-038)". See *NR Nomination: Ewa Field South Revetment Historic District, Section 7, page 3*.

HHF Comments on Scope of Issues to be Considered in the Draft Environmental Assessment

Historic Hawai'i Foundation is generally supportive of Hawaii's Renewable Energy Mandate in cases where such improvements are located, designed and implemented to avoid, minimize or mitigate effects to historic properties and cultural resources. Project components should be developed in accordance with the Secretary of the Interior's Standards for the Treatment of Historic Properties (SOI Standards) and other relevant standards and guidelines for the treatment of historic properties.

HHF expects that the scope of the Draft Environmental Assessment will include discussion, evaluation and recommendations for project components located within and/or adjacent to both the 'Ewa Plain Battlefield District and the WWII Revetment District. Specifically:

- Assessment of how the project will affect the character-defining features of the historic properties;
- Discussion of contributing and non-contributing features of the districts that are present within the project area;
- The project's potential effect on viewsheds to and from the historic districts;
- Direct and indirect effects on the historic districts, both short-term (during construction) and long-term (post-construction);
- Permanent and temporary effects on the historic districts, both during the life of the project and when the infrastructure has completed its lifecycle. For example, like the adjacent KREP solar array, will this project be removed and the site restored to pre-installation conditions?

HHF also expects to see identification and evaluation of any other cultural resources that may be present, including properties to which Native Hawaiians attach religious and cultural significance.

Thank you for the opportunity to comment. Historic Hawai'i Foundation looks forward to participating in the environmental review and historic preservation processes.

Very truly yours,

Kiersten Faulkner

Kiersten Faulkner
Executive Director

Copy via email:

Julia Mancinelli, Innergex Renewable Energy Inc., JMancinelli@innergex.com
Susan Lebo and Julia Flauaus, Hawai'i State Historic Preservation Division

HAWAII STATE ENERGY OFFICE
STATE OF HAWAII

DAVID Y. IGE
GOVERNOR

SCOTT J. GLENN
CHIEF ENERGY OFFICER

235 South Beretania Street, 5th Floor, Honolulu, Hawaii 96813
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Telephone: (808) 587-3807
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Web: energy.hawaii.gov

June 30, 2021

Via Email: barberspointsolar@innergex.com
Ms. Leslie McClain
Tetra Tech
737 Bishop Street, Suite 2340
Honolulu, Hawai'i 96813

Dear Ms. McClain:

Subject: Barbers Point Solar Project
'Ewa District, O'ahu; TMKs 9-1-013:038, 9-1-013:040, and 9-1-016:027
Pre-Assessment Consultation for HRS Chapter 343 Environmental Assessment

The Hawai'i State Energy Office (HSEO) offers the following comments on the Barbers Point Solar Project (Project), which would be located on 163 acres across three (3) parcels owned by the Department of Hawaiian Home Lands (DHHL) east of the Kalaeloa Airport in the 'Ewa District of O'ahu. The Project also requires transmission lines located within rights-of-way owned by the Hawai'i Department of Transportation (HDOT) and the Hawai'i Community Development Authority (HCDA).

HSEO's comments are guided by its statutory purpose under Hawai'i Revised Statutes §196-71 and its mission to promote energy efficiency, renewable energy, and clean transportation to help achieve a resilient, clean energy, and ultimately carbon negative economy. As an island community currently dependent on imported fossil fuels for over 60% of its electrical power, Hawai'i is particularly vulnerable to fuel and energy supply disruptions, unpredictable fuel cost fluctuations, unintended fuel releases impacting both marine and terrestrial environments, and the many impacts associated with climate change. That is why Hawai'i's 100% renewable energy goal is critical to the health, safety, affordability, and well-being of Hawai'i's residents. However, it is important that reaching 100% renewable energy generation by 2045 be done in a manner that prioritizes the health, safety, and well-being of Hawai'i's residents, natural resources, culture, and environment.

Contribution to State Renewable Energy, Fossil Fuel Displacement, and Greenhouse Gas Goals

The proposed 15-megawatt (MW) solar photovoltaic system with a 4-hour 60 megawatt-hour (MWh) battery system has the capacity to generate 37,014 megawatt-hours annually and

increase O'ahu's renewable energy portfolio by nearly 0.6%.[1] The Project also includes batteries that are critical components necessary for controlled energy output and grid-stabilization.

The Project is one of nine (9) solar plus storage projects being developed or proposed on O'ahu to enable the retirement of O'ahu's 180 MW coal plant by September 1, 2022, and two units of the Hawaiian Electric Wai'au power plant totaling nearly 93 MW in early 2024. Notably, when these power plants are retired their energy production will need to come from alternative sources. If the energy cannot be produced by renewables and cannot be conserved through energy efficiency measures, the power will come from fossil fuel sources, further underscoring the importance of developing renewable energy and storage projects. The Project is expected to be commercially operational by December 29, 2023, which is an important period between the retirement of these fossil fuel power plants. HSEO recommends the DEA state how the Project would contribute to the State's and O'ahu's renewable energy portfolio and support the retirement of these fossil fuel units. The DEA should identify any other benefits such as grid stabilization, long-term resiliency, and energy self-reliance.

The Project Pre-assessment Scoping Consultation Letter states the Project would offset approximately 1,139,396 barrels of fossil fuel and approximately 455,598 metric tons of greenhouse gases (GHG) over the 25-year life of the Project. HSEO recommends the DEA incorporate the Hawai'i Greenhouse Gas Emissions Report for 2017 (April 2021) with analysis pursuant to HRS §225P-5[2] and lifecycle analysis pursuant to HRS §269-6(b) to inform decision-making by the Hawai'i Public Utilities Commission (PUC).

Impact to Ratepayers

The Project would sell power to Hawaiian Electric at $0.112/kilowatt-hour (kWh) for 25 years under the power purchase agreement (PPA) submitted to the PUC on September 15, 2020. On February 10, 2021, the Hawai'i Consumer Advocate recommended approval of the PPA subject to certain conditions. The PPA is awaiting PUC decision. If approved, Hawaiian Electric estimates the Project would save an average customer who uses 500 kWh per month about $0.25/kWh per month or $12 per year.[3] HSEO recommends the DEA provide the projected estimated value of the Project including the estimated savings to Hawaiian Electric customers over the Project lifetime.

Community Input and Benefits

Genuine collaboration with community members and stakeholders is necessary for any large renewable energy project to be considered a "win" for the surrounding communities. Past renewable energy projects have received invaluable input by participating and presenting at neighborhood board meetings, conducting one-on-one interviews with local cultural

[1] Hawai'i Division of Consumer Advocacy's Statement of Position (Feb. 10, 2021).
[2] https://health.hawaii.gov/cab/files/2021/04/2017-Inventory_Final-Report_April-2021.pdf

practitioners, conducting public meetings, and other outreach activities with key community stakeholders.

The Hawai'i Consumer Advocate notes Innergex conducted virtual public meetings on July 8, 2020, and November 10, 2020, and sent a flyer to 1,043 homesteads in Kapolei informing them of the later meeting.[3] According to the Consumer Advocate, concern was raised at the first meeting about impact to the pueo and the second meeting had only a few questions from community members, none expressing opposition or concerns. However, a concerned comment was submitted to the PUC docket for the Project about the historic value of the Project site and the need to comply with the necessary historic preservation reviews.[4] HSEO recommends the DEA identify the public outreach activities conducted by Innergex for the Project, summarize the public input received, and identify the responses to this input including appropriate Project modifications and/or mitigation measures.

HSEO notes there is a distinction between required public engagement activities – such as required under HRS Chapter 343, the utility procurement process, approval by the PUC, and other permitting requirements – and voluntary community outreach activities such as those conducted by Innergex as mentioned above. HSEO encourages Innergex to identify these distinct activities in the DEA and to continue its voluntary outreach activities in addition to fulfilling its regulatory requirements.

To date, Innergex has identified several potential community benefits associated with the Project:

1) Dedicated funding to Kapolei Community Heritage Center
2) Solar training program for Center for Native Hawaiian Advancement and the Mākaha Learning Center
3) Commitment to local employment and contracting
4) Sponsorships and donations for local festivities, events, conferences, and fundraisers
5) Memberships in organizations
6) Opportunities to support local schools

HSEO recommends the DEA identify all community benefit commitments associated with the Project.

Decommissioning, Site Restoration, and Materials Disposal and Handling

Project decommissioning and site restoration upon the end of the useful life of the Project will impact DHHL's long-term plans for these properties. HSEO recommends the DEA discuss the mechanisms in place to implement the required decommissioning of the Project and site restoration.

---

[3] Hawai'i Division of Consumer Advocacy's Statement of Position (Feb. 10, 2021).
[4] Public Comment from John Bond, President, Kanehili Cultural Hui and Save 'Ewa Field (Feb. 16, 2021).

Recognizing the potential environmental impacts caused by the mismanagement of spent photovoltaic (PV) panels throughout the world, on June 25, 2021, Governor David Ige signed Act 92, which requires the Hawai'i Natural Energy Institute (HNEI), in consultation with the Department of Health (DOH), to conduct a comprehensive study to determine best practices for disposal, recycling, and secondary use of clean energy products in the State of Hawai'i. These discarded clean energy products could also have market value potential for Hawai'i or other places.

Further, the DOH Solid and Hazardous Waste Branch has implemented changes to Hawai'i Administrative Rules (HAR) §11-273, effective on June 7, 2021, that categorize photovoltaic solar panels as a universal waste and streamline a process for their disposal under the universal waste standards. HSEO recommends the DEA discuss how the discarded PV panels, racking, wiring, battery units, and other Project components will be handled upon the end of the useful life of the Project. HSEO further recommends consultation with the DOH Solid and Hazardous Waste Branch regarding the appropriate disposal of the solar panels, as well as other electronic items and batteries, at their end of life.

Benefit to DHHL Beneficiaries

Given the Project's location, HSEO recommends the DEA identify how the Project will directly benefit DHHL beneficiaries.

Thank you for the opportunity to provide these comments in support of developing an informative DEA. HSEO looks forward to reviewing and providing additional comments on the DEA when it is completed and published. If there are any questions, please contact Maria Tome at maria.l.tome@hawaii.gov or at 754-5771.

Sincerely,

Scott J. Glenn

Scott J. Glenn
Chief Energy Officer

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 • web: www.honolulu.gov

RICK BLANGIARDI
MAYOR

J. ROGER MORTON
DIRECTOR

JON Y. NOUCHI
DEPUTY DIRECTOR

TP6/21-853514

June 30, 2021

Ms. Leslie McClain, Senior Environmental Planner
Tetra Tech, Inc.
737 Bishop Street, Suite 2340
Honolulu, Hawaii 96813

Dear Ms. McClain:

SUBJECT: Pre-Assessment Consultation for HRS Chapter 343 Environmental Assessment Barbers Point Solar Project, Ewa District, Oahu TMKs 9-1-013:038, 9-1-013:040, and 9-1-016:027

Thank you for the opportunity to provide written comments regarding the subject project. We have the following comments.

1. **Neighborhood Impacts**. The area representatives, neighborhood board, as well as the area residents, businesses, emergency personnel (fire, ambulance, and police), Oahu Transit Services, Inc. (TheBus and TheHandi-Van), etc., should be kept apprised of the details and status throughout the project and the impacts that the project may have on the adjoining local street area network.

2. **Street Usage Permit**. A street usage permit from the Department of Transportation Services should be obtained for any construction-related work that may require the temporary closure of any traffic lane or pedestrian mall on a City street.

3. **Construction Impacts.** Construction materials and equipment should be transported 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.

4. **Vehicle/Bicycle/Pedestrian Crossing.** Any existing pedestrian, bicycle and vehicle access/crossing shall be maintained with the highest safety measures during construction.

5. **Disability and Communication Access Board (DCAB).** Project plans (vehicular and pedestrian circulation, sidewalks, parking and pedestrian pathways, vehicular ingress/egress, etc.) should be reviewed and approved by DCAB to ensure full compliance with Americans with Disabilities Act requirements.

Should you have any questions, please contact Virginia Sosh, of my staff, at (808) 768-5461.

Very truly yours,

J. Roger Morton
Director

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

July 02, 2021

LD 0610

Leslie McClain
Tetra Tech
737 Bishop Street, Suite 2340
Honolulu, HI 96813

Via email: barberspointsolar@innergex.com

Dear Sirs:

SUBJECT: **Barbers Point Solar Project**
Pre-Assessment Consultation for Environmental Assessment
'Ewa District, Island of Oahu, Hawaii
TMK: (1) 9-1-013:038, 040, and 9-1-016:027

Thank you for the opportunity to review and comment on the subject project. The Land Division of the Department of Land and Natural Resources (DLNR) distributed copies of your request to various DLNR divisions, as indicated on the attached, for their review and comment.

Attached are comments received from our (a) Engineering Division and (b) Division of Forestry and Wildlife. Should you have any questions, please feel free to contact Barbara Lee via email at barbara.j.lee@hawaii.gov. Thank you.

Sincerely,

Russell Tsuji

Russell Y. Tsuji
Land Administrator

Attachments

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

June 15, 2021

LD 0610

FROM: **MEMORANDUM**

~~TO:~~ **DLNR Agencies:**
__Div. of Aquatic Resources *(via email: kendall.l.tucker@hawaii.gov)*
__Div. of Boating & Ocean Recreation
_X_Engineering Division *(via email: DLNR.Engr@hawaii.gov)*
_X_Div. of Forestry & Wildlife *(via email: Rubyrosa.T.Terrago@hawaii.gov)*
__Div. of State Parks
_X_Commission on Water Resource Management *(via email: DLNR.CWRM@hawaii.gov)*
__Office of Conservation & Coastal Lands
_X_Land Division – Oahu District *(via email: DLNR.Land@hawaii.gov)*

TO:

~~FROM:~~ Russell Y. Tsuji, Land Administrator *Russell Tsuji*
SUBJECT: **Barbers Point Solar Project**
Pre-Assessment Consultation for Environmental Assessment
LOCATION: ‘Ewa District, Island of Oahu, Hawaii; TMK: (1) 3-1-042:007
APPLICANT: **Innergex on behalf of Barbers Point Solar, LLC**

Transmitted for your review and comment is information on the above-referenced project. Please review the attached information and submit any comments by the internal deadline of **June 29, 2021** to the Land Division at DLNR.Land@hawaii.gov, and copied to barbara.j.lee@hawaii.gov.

If no response is received by the above due date, we will assume your agency has no comments at this time. If you have any questions, please contact Barbara Lee at barbara.j.lee@hawaii.gov. Thank you.

( ) We have no objections.
( ) We have no comments.
( ) We have no additional comments.
(✓) Comments are attached.

Signed: CSC
Print Name: Carty S. Chang, Chief Engineer
Division: Engineering Division
Date: Jun 25, 2021

Attachments
Cc: Central Files

DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

LD/Russell Y. Tsuji
Ref: Barbers Point Solar Project
Pre-Assessment Consultation for Environmental Assessment
Location: 'Ewa District, Island of Oahu
TMK(s): (1) 3-1-042:007
Applicant: Innergex on behalf of Barbers Point Solar, LLC

COMMENTS

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 Special Flood Hazard Area (high-risk areas). State projects are required to comply with 44CFR regulations as stipulated in Section 60.12. Be advised that 44CFR reflects the minimum standards as set forth by the NFIP. Local community flood ordinances may stipulate higher standards that can be more restrictive and would take precedence over the minimum NFIP standards.

The owner of the project property and/or their representative is responsible to research the Flood Hazard Zone designation for the project. Flood Hazard Zones are designated on FEMA's Flood Insurance Rate Maps (FIRM), which can be viewed on our Flood Hazard Assessment Tool (FHAT) (http://gis.hawaiinfip.org/FHAT).

If there are questions regarding the local flood ordinances, please contact the applicable County NFIP coordinating agency 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) 241-4896.

Signed: _____
CARTY S. CHANG, CHIEF ENGINEER

Date: Jun 25, 2021

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 15, 2021

LD 0610

MEMORANDUM

TO: **DLNR Agencies:**
___Div. of Aquatic Resources *(via email: kendall.l.tucker@hawaii.gov)*
___Div. of Boating & Ocean Recreation
_X_Engineering Division *(via email: DLNR.Engr@hawaii.gov)*
_X_Div. of Forestry & Wildlife *(via email: Rubyrosa.T.Terrago@hawaii.gov)*
___Div. of State Parks
_X_Commission on Water Resource Management *(via email: DLNR.CWRM@hawaii.gov)*
___Office of Conservation & Coastal Lands
_X_Land Division – Oahu District *(via email: DLNR.Land@hawaii.gov)*

FROM: Russell Y. Tsuji, Land Administrator *Russell Tsuji*
SUBJECT: **Barbers Point Solar Project**
Pre-Assessment Consultation for Environmental Assessment
LOCATION: 'Ewa District, Island of Oahu, Hawaii; TMK: (1) 3-1-042:007
APPLICANT: **Innergex on behalf of Barbers Point Solar, LLC**

Transmitted for your review and comment is information on the above-referenced project. Please review the attached information and submit any comments by the internal deadline of **June 29, 2021** to the Land Division at DLNR.Land@hawaii.gov, and copied to barbara.j.lee@hawaii.gov.

If no response is received by the above due date, we will assume your agency has no comments at this time. If you have any questions, please contact Barbara Lee at barbara.j.lee@hawaii.gov. Thank you.

( ) We have no objections.
( ) We have no comments.
( ) We have no additional comments.
(☑) Comments are attached.

Signed: [signature]
Print Name: DAVID G. SMITH, Administrator
Division: Division of Forestry and Wildlife
Date: Jun 24, 2021

Attachments
Cc: Central Files

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

ROBERT K. MASUDA
FIRST DEPUTY

M. KALEO MANUEL
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
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET, ROOM 325
HONOLULU, HAWAII 96813

June 24, 2021

Julia Mancinelli
Innergex Renewables USA, LLC
4660 La Jolla Village Drive, Suite 680
San Diego, CA 92122

Log no. 3165/3199

Dear Ms. Mancinelli:

The Department of Land and Natural Resources, Division of Forestry and Wildlife (DOFAW) has received your inquiry regarding the pre-assessment consultation for the Barbers Point Solar Project in ʻEwa on Oʻahu, Hawaiʻi, TMKs: (1) 9-1-013:038, 9-1-013-040, and 9-1-016:027. The proposed project consists of constructing a 15-megawatt (MW) solar photovoltaic system coupled with a 15 MW, 4-hour (60 MW-hour) photovoltaic coupled battery energy storage system (PV-Coupled ESS) as well as ancillary support infrastructure on 163-acres of undeveloped land.

We appreciate your proactive planning efforts with DOFAW to date on avoidance, minimization, and mitigation measures for these listed species to inform the development of the solar project. Based on the preliminary project information from the in-person meeting on November 13th, 2020 and the Draft Biological Resources Survey Report, DOFAW provides the following comments on the potential of the proposed work to affect listed species in the vicinity of the project area.

Survey records indicate endangered plant species, such as *Euphorbia skottsbergii* var. *skottsbergii* and *Achyranthes splendens* var. *rotundata*, are known to occur within or near the proposed project area. DOFAW recommends that a qualified botanist survey for these rare and endangered plants. Surveys of dry areas should be done after rains to be considered legitimate. If any of these species are found near the project site, we recommend no ground/soil disturbance with heavy machinery within 100 meters of the actual plants even if they are not on the project property. For more information on avoidance and minimization measures for plants please refer to the following link: https://www.fws.gov/pacificislands//articles.cfm?id=149489721

The State endangered Pueo has been observed in the project site vicinity. Pueo are a crepuscular species, most active during dawn and dusk twilights. DOFAW recommends twilight pre-construction surveys by a qualified biologist prior to clearing vegetation for construction. If Pueo nests are present, a buffer zone of 46 m (150 feet) should be established in which no clearing occurs until nesting ceases, and DOFAW staff should be notified. Work should not resume until directed by DOFAW.

Due to the arid climate and risks of wildfire to listed species, we recommend coordinating with the Hawaiʻi Wildfire Management Organization (808-850-900, admin@hawaiiwildfire.org) on how wildfire prevention can be addressed in the project area.

State listed waterbirds such as the Hawaiian Stilt (*Himantopus mexicanus knudseni*), Hawaiian Coot (*Fulica alai*), and Hawaiian Moorhen (*Gallinula galeata sandvicensis*) have the potential to occur in the vicinity of the proposed project site. It is against State law to harm or harass these species. If any of these species are present during construction activities, then all activities within 100 feet (30 meters) should cease, and the bird should not be approached. Work may continue after the bird leaves the area of its own accord. If a nest is discovered at any point, please contact the O‘ahu DOFAW Office at (808) 973-9778.

The State listed Hawaiian Hoary Bat or ‘Ōpe‘ape‘a (*Lasiurus cinereus semotus*) has the potential to occur in the vicinity of the project area and may roost in nearby trees. If any site clearing is required this should be timed to avoid disturbance during the bat birthing and pup rearing season (June 1 through September 15). If this cannot be avoided, woody plants greater than 15 feet (4.6 meters) tall should not be disturbed, removed, or trimmed without consulting DOFAW. It has been documented that hoary bats can become ensnared in barbed wire during flight and die. We therefore recommend the use of barbed wire be avoided, and are pleased to note that your plan states that barbed wire will not be installed at the project site.

We note that artificial lighting can adversely impact seabirds that may pass through the area at night by causing disorientation. This disorientation can result in collision with manmade artifacts or grounding of birds. For nighttime lighting that might be required, DOFAW recommends that all lights be fully shielded to minimize impacts. Nighttime work that requires outdoor lighting should be avoided during the seabird fledging season from September 15 through December 15. This is the period when young seabirds take their maiden voyage to the open sea. For illustrations and guidance related to seabird-friendly light styles that also protect the dark, starry skies of Hawai‘i please visit: https://dlnr.hawaii.gov/wildlife/files/2016/03/DOC439.pdf.

DOFAW recommends minimizing the movement of plant or soil material between worksites, such as in fill. Soil and plant material may contain invasive fungal pathogens, vertebrate and invertebrate pests, or invasive plant parts that could harm Hawai‘i’s native species and ecosystems. We recommend consulting the O‘ahu Invasive Species Committee at (808) 266-7994 during planning, design, and construction of the project to be informed of any high-risk invasive species in the area and ways to mitigate their spread. All equipment, materials, and personnel should be cleaned of excess soil and debris to minimize the risk of spreading invasive species.

We appreciate your efforts to work with our office for the conservation of Hawai‘i’s native species. Should the scope of the project change significantly, or should it become apparent that threatened or endangered species may be impacted, please contact our staff as soon as possible. If you have any questions, please contact Paul Radley, Protected Species Habitat Conservation Planning Coordinator at (808) 587-0010 or paul.m.radley@hawaii.gov.

Sincerely,

DAVID G. SMITH
Administrator

LD 0610

RECEIVED
LAND DIVISION

2021 JUN -2 AM 11:47

DEPT. OF LAND &
NATURAL RESOURCES
STATE OF HAWAII

INNERGEX

Renewable Energy.
Sustainable Development.

May 28, 2021

RE: Barbers Point Solar Project
'Ewa District, O'ahu; TMKs 9-1-013:038, 9-1-013:040, and 9-1-016:027
Pre-Assessment Consultation for HRS Chapter 343 Environmental Assessment

---

Dear Interested Party,

Barbers Point Solar, LLC is proposing to build and operate the Barbers Point Solar Project (Project) located in east Kalaeloa (east of Kalaeloa Airport) in the 'Ewa District, on the island of O'ahu.

The Project area encompasses approximately 163-acres primarily located within tax map keys (TMKs): 9-1-013:038 and :040, both owned by Department of Hawaiian Home Lands (DHHL). Project electrical transmission lines will also be located within rights-of-way owned by Hawai'i Department of Transportation (HDOT) (Coral Sea Road and Roosevelt Avenue) and Hawai'i Community Development Authority (HCDA) as well as within a portion of TMK 9-1-016:027 (owned by Kapolei Infrastructure, LLC).

As the Project would involve the use of State-owned land, compliance with Hawai'i Revised Statutes (HRS) Chapter 343 is required. Pursuant to the requirements of HRS Chapter 343 and Hawai'i Administrative Rules (HAR) §11-200.1, Barbers Point Solar, LLC is preparing an environmental assessment (EA) to evaluate the potential environmental effects of the project. DHHL has agreed to be the Accepting Authority for the EA. The Project does not require the use of federal lands.

As part of the environmental review process, pre-assessment consultation is being conducted to obtain input on the scope of issues to be considered in the Draft EA. An overview of the Project and a location map are attached. We are requesting input regarding the Project, including concerns related to particular environmental resources, as well as relevant information that should be considered in the evaluation.

Please provide comments regarding the scope of the EA in writing via U.S. postal mail to Leslie McClain at Tetra Tech (737 Bishop Street, Suite 2340, Honolulu, Hawai'i 96813) or email barberspointsolar@innergex.com. Comments must be postmarked by June 30, 2021 to be considered in the Draft EA.

Innergex Renewable Energy Inc
888 Dunsmuir Street, Suite 1100
Vancouver, British Columbia V6C 3K4
Canada
Tel. 604 633-9990 | Fax 604 633-9991
info@innergex.com | www.innergex.com

Head Office
1225 Saint-Charles Street West, 10th floor
Longueuil, Québec J4K 0B9
Canada
Tel. 450 928-2550 | Fax 450 928-2544
info@innergex.com | www.innergex.com

Innergex Renewables USA, LLC
3636 Nobel Drive, Suite 260
San Diego, CA 92122
United States
Tel. 858 346-4004 | Fax 604 633-9991
info@innergex.com | www.innergex.com

INNERGEX

Renewable Energy.
Sustainable Development.

Thank you for your participation in the environmental review process for the proposed project.

Sincerely,

Barbers Point Solar, LLC

Julia Mancinelli

Julia Mancinelli
Director – Environment
Innergex Renewable Energy Inc.
JMancinelli@innergex.com

Attachments: Project Overview
Location Map

INNERGEX

Renewable Energy.
Sustainable Development.

Barbers Point Solar Project Overview

Barbers Point Solar, LLC is proposing to develop, own and operate the Barbers Point Solar Project (Project) located in east Kalaeloa, 'Ewa District, on the island of O'ahu. The Project will consist of a 15-megawatt (MW) solar photovoltaic system coupled with a 15 MW, 4-hour (60 MW-hour) photovoltaic coupled battery energy storage system (PV-Coupled ESS) as well as ancillary support infrastructure. The Project area encompasses approximately 163-acres primarily located within tax map keys (TMKs): 9-1-013:038 and :040, both owned by Department of Hawaiian Home Lands (DHHL). Project electrical transmission lines will be located within rights-of-way (ROWs) owned by Hawai'i Department of Transportation (HDOT) (Coral Sea Road and Roosevelt Avenue) and Hawai'i Community Development Authority (HCDA) as well as within a portion of TMK 9-1-016:027 (owned by Kapolei Infrastructure, LLC). The Project area is shown in the attached figure.

The purpose of the Project is to construct and operate a renewable energy facility on the DHHL property that would generate and store electricity derived from solar resources, thereby providing clean, renewable energy for the island of O'ahu. The Project will assist DHHL in meeting Objective 2 of the Hawaiian Homes Commission (HHC) 2009 Ho'omaluō Energy Policy, which instructs DHHL to pursue the leasing of lands identified as suitable for renewable energy projects[1]. Also, in 2009, DHHL and Hawaiian Electric entered into an Energy Partnership Charter[2] where the two organizations agreed to collaborate on achieving critical energy objectives including the leasing of DHHL owned lands for renewable energy projects. In coordination with DHHL, Barbers Point Solar, LLC developed a preliminary layout for a solar plus storage facility and submitted a proposal to Hawaiian Electric Company (Hawaiian Electric) in response to their *Request for Proposals for Variable Renewable Dispatchable Generation for the Island of O'ahu*, issued in August 2019. This competitive procurement process for renewable energy projects specifically targeted projects that would satisfy the resource needs identified in Hawaiian Electric's 2016 Power Supply Improvement Plan, as part of the effort to meet Hawai'i's goal of generating 100 percent of its energy needs from renewable sources by 2045. The Project is one of five O'ahu based solar plus storage projects selected by Hawaiian Electric from the August 2019 request for proposals.

The major components of the Project would include:

- **Solar Panels:** The solar PV system would include a series of panels arranged into arrays consisting of evenly-spaced rows. The panels would be mounted on a racking system installed on posts. The Project's solar arrays will include three areas: Area 1 in the northern portion of TMK 9-1-013:038, Area 2 in the southern portion of TMK 9-1-013:038, and Area 3 located on TMK 9-1-013:040.

- **Battery Energy Storage System:** The photovoltaic coupled battery energy storage system (PV-Coupled ESS) would be distributed across the Project area and would include a self-contained standalone unit that combines a lithium-ion battery system, inverter, and controller. The PV-Coupled ESS units would incorporate several layers of protection to avoid failures, to contain potential hazardous substances, and to prevent fires.

[1] Department of Hawaiian Home Lands. Ho'omaluō Energy Policy. January 2009.
[2] DHHL-HECO-Energy-Partnership-Charter-082709.pdf (hawaii.gov)

- **Collector Lines:** The solar panels and battery units would connect with a Project substation primarily via underground electrical collector lines. The collector line connecting the solar arrays on TMK 9-1-013:040 to the collector substation on TMK 9-1-013:038 will run along Coral Sea Road. Portions of this line may need to be overhead depending on final site design and ROW constraints. Also, in cases where subsurface conditions make it difficult or too costly to trench, other portions of the collection system may go overhead similar to a transmission line.

- **Substation:** A project collector substation would be constructed on DHHL TMK 9-1-013:038 and will function to increase the voltage from the PV system to 46 kV in order to match the voltage of the Hawaiian Electric electrical grid. The Project collector substation and associated interconnection infrastructure will include equipment such as medium voltage bus structure, circuit breakers and switches, a main power transformer, and associated underground electrical lines.

- **Overhead Generation-Tie Line:** An approximately 1.5 mile generation-tie line (combination of overhead and underground) will extend underground from the Project's collector substation, north along Coral Sea Road and transition to overhead at the existing 12 kV Hawaii Electric overhead transmission line. The 46 kV will be overbuilt on top of the 12 kV transmission line and terminate to the existing Hawaiian Electric 46-kV overhead transmission line located on TMK 9-1-016:027 (owned by Kapolei Infrastructure, LLC) near the intersection of Coral Sea Road and Roosevelt Avenue.

- **Access and Site Work:** Access to solar array Areas 1 and 2 on TMK 9-1-013:038 will be provided by a new driveway off of Coral Sea Road. This driveway will be located within an existing HCDA ROW associated with Roadway Lot 13083. Access to DHHL's parcel 9-1-013:40 is currently via Coral Sea Road; however, the Project proposes to construct a new driveway on Coral Sea Road to accommodate construction access. Access within the Project's two solar array parcels will be provided through a network of existing and new on-site access roads. Improvements to existing roads may include drainage upgrades, smoothing, and graveling as needed to accommodate construction vehicles. New access roads may require excavation and fill to achieve acceptable grades.

The Project would be constructed and operated by Barbers Point Solar, LLC, and the power generated by the Project would be sold to Hawaiian Electric under a new 25-year power purchase agreement (PPA). It is anticipated that construction and commissioning would require approximately 12-15 months, with commercial operations commencing at the end of 2023. Once operational, the Project would provide the energy needed to power approximately 6,200 homes on O'ahu each year, offsetting approximately 1,139,396 barrels of fossil fuel consumption by Hawaiian Electric's generating units and approximately 455,598 metric tons of greenhouse gas emissions over the life of the Project[3].

For more information regarding the Project, please visit www.barberspointsolar.com.

[3] Hawaiian Electric Company PUC Filing Docket No. 2020-0143.

Barbers Point Solar

Figure 1
Project Vicinity

CITY AND COUNTY OF HONOLULU

- Project Study Area
- Project TMK
- TMK Boundary
- Interstate Highway
- State Highway
- County Road

TETRA TECH

Barbers Point Solar LLC

Reference Map

1:24,000 WGS 1984 UTM Zone 4N

0 0.5 1 Miles

NOT FOR CONSTRUCTION

P:\GIS_PROJECTS\Innergex\BarbersPoint_Solar\MXD\ConsultationLetter_20210519\Innergex_BarbersPoint_Figure1_ProjectVicinity_11x17_20210527.mxd

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

ROBERT K. MASUDA
FIRST DEPUTY

M. KALEO MANUEL
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
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BUREAU OF CONVEYANCES
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FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET, ROOM 325
HONOLULU, HAWAII 96813

July 15, 2021

Julia Mancinelli
Innergex Renewables USA, LLC
4660 La Jolla Village Drive, Suite 680
San Diego, CA 92122

Dear Ms. Mancinelli:

The Department of Land and Natural Resources, Division of Forestry and Wildlife (DOFAW) has received your revised request for a species list and impact avoidance measures for the Barbers Point Solar Project in ʻEwa on Oʻahu, Hawaiʻi, TMKs: (1) 9-1-013:038, 9-1-013-040, and 9-1-016:027. The proposed project consists of constructing a 15-megawatt (MW) solar photovoltaic system coupled with a 15 MW, 4-hour (60 MW-hour) photovoltaic coupled battery energy storage system (PV-Coupled ESS) as well as ancillary support infrastructure on 163-acres of undeveloped land.

We appreciate your proactive planning efforts with DOFAW on avoidance and minimization measures for listed species to inform the development of the proposed solar project. Based on the information from the updated June 2021 Draft Biological Resources Survey Report, DOFAW provides the following comments.

The wet season survey data from June 2021 report indicates that no *Euphorbia skottsbergii* var. *skottsbergii* were found within 100-meters of the proposed project area. If any *Euphorbia skottsbergii* var. *Skottsbergii* are observed during the construction and operation of the proposed solar project, DOFAW supports the U.S. Fish and Wildlife guidelines and does not support any digging within 100 meters of any endangered plants regardless of their location to the project boundaries.

Due to the arid climate and risks of wildfire to listed species, we recommend coordinating with the Hawaiʻi Wildfire Management Organization (808-850-900, admin@hawaiiwildfire.org) on how wildfire prevention can be addressed in the project area.

DOFAW recommends that any Wiliwili (*Erythrina sanwichensis*) trees present at the project site should not be damaged and avoided by project infrastructure when possible. While not State listed species, these Wiliwili have been species of concern in the past and are still a valuable resource for Hawaii's imperiled lowland dry forests. Additionally, we recommend reaching out to the Kalaeloa Heritage and Legacy Foundation near the project site about the best practices for caring for the Wiliwili trees in this area. Please visit: https://www.khlfoundation.org/ for more information.

The State endangered Pueo has been observed in the project site vicinity. Pueo are a crepuscular species, most active during dawn and dusk twilights. DOFAW recommends twilight pre-construction surveys by a qualified biologist prior to clearing vegetation for construction. If Pueo nests are present, a buffer zone of 46 m (150 feet) should be established in which no clearing occurs until nesting ceases, and DOFAW staff should be notified. Work should not resume until directed by DOFAW.

State listed waterbirds such as the Hawaiian Stilt (*Himantopus mexicanus knudseni*), Hawaiian Coot (*Fulica alai*), and Hawaiian Moorhen (*Gallinula galeata sandvicensis*) have the potential to occur in the vicinity of the proposed project site. It is against State law to harm or harass these species. If any of these species are present during construction activities, then all activities within 100 feet (30 meters) should cease, and the bird should not be approached. Work may continue after the bird leaves the area of its own accord. If a nest is discovered at any point, please contact the O'ahu DOFAW Office at (808) 973-9778.

We appreciate your efforts to work with our office for the conservation of Hawai'i's native species. Should the scope of the project change significantly, or should it become apparent that threatened or endangered species may be impacted, please contact our staff as soon as possible. If you have any questions, please contact Paul Radley, Protected Species Habitat Conservation Planning Coordinator at (808) 587-0010 or paul.m.radley@hawaii.gov.

Sincerely,

DAVID G. SMITH
Administrator

cc: Tiffany Agostini, Tetra Tech
Leslie McClain, Tetra Tech

Water Resources Research Center

UNIVERSITY of HAWAI'I®
MĀNOA

July 28, 2021

To Whom It May Concern,

This is to acknowledge receipt of your letter requesting a review of an environmental assessment (EA) or environmental impact statement (EIS), see attached. The Environmental Center at the University of Hawai‘i at Mānoa, which for a time was linked to the Water Resources Research Center (WRRC), has been discontinued. As a result of the closure of the Environmental Center, we regret that WRRC no longer has the capacity to review environmental documents.

Sincerely,

Thomas Giambelluca
Director

Attachment

2540 Dole Street, Holmes Hall 283
Honolulu, Hawai‘i 96822
Telephone: (808) 956-7847
Fax: (808) 956-5044
An Equal Opportunity/Affirmative Action Institution